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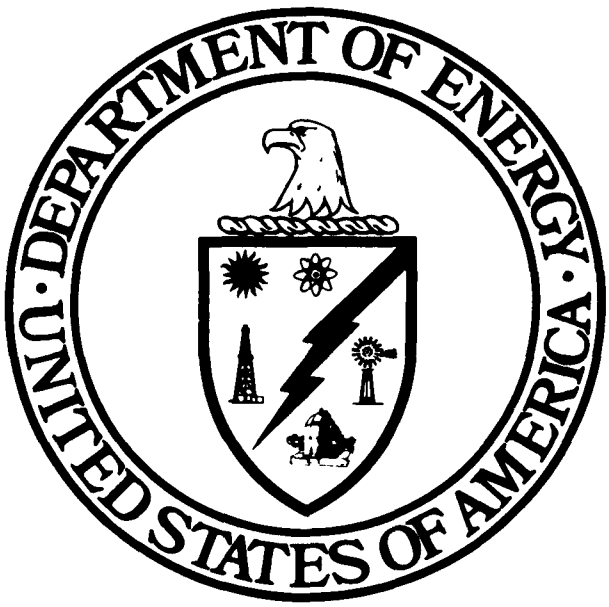

Tiger Team Assessment
of the
Los Alamos National Laboratory
Washington, DC 20585

November 1991

MASTER

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4.0

SAFETY AND HEALTH ASSESSMENT

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4.1 PURPOSE

The purpose of the safety and health assessment was to determine the effectiveness of representative safety and health programs at the Los Alamos National Laboratory (LANL). Four Technical Safety Appraisal (TSA) teams were assembled for this purpose by the Department of Energy (DOE), Deputy Assistant Secretary for Safety and Quality Assurance, Office of Performance Assessment. Safety and Health (S&H) Subteam 1 reviewed plutonium and enriched uranium facilities; S&H Subteam 2 reviewed nuclear reactors, critical facilities, and tritium operations; S&H Subteam 3 reviewed accelerators; and S&H Subteam 4 reviewed other selected facilities and activities. The safety and health assessment was performed concurrently with Management and Environmental Subteams.

4.2 SCOPE

Within the safety and health programs at LANL, performance was assessed in the following technical areas: Organization and Administration, Quality Verification, Operations, Maintenance, Training and Certification, Auxiliary Systems, Emergency Preparedness, Technical Support, Packaging and Transportation, Nuclear Criticality Safety, Security/Safety Interface, Experimental Activities, Site/Facility Safety Review, Radiological Protection, Personnel Protection, Worker Safety and Health (OSHA) Compliance, Fire Protection, Aviation Safety, Explosives Safety, Natural Phenomena, and Medical Services.

4.3 APPROACH

The S&H Subteam was assembled under the Deputy Assistant Secretary for Safety and Quality Assurance, Office of Performance Assessment. In addition, the Deputy Assistant Secretary for Health provided a technical advisor to the team for Radiation Protection, Industrial Hygiene, Emergency Preparedness, and health-related issues in the Personnel Protection and Worker Safety and Health (OHSA) Compliance technical areas.

The LANL site was reviewed by the S&H Subteam to identify safety concerns at nuclear facilities and high and moderate hazard nonnuclear facilities. Also, selected facilities and activities were assessed to provide a representative sample of the entire site. Based on these considerations, the S&H Subteam was divided into four TSA Team. The TSA Teams were led by four Team Leaders from the Office of Performance Assessment. The assessment was conducted from September 23, to November 8, 1991. Guidance and direction were provided by the EH Senior Manager and by the Deputy Assistant Secretary for Safety and Quality Assurance.

The TSA Teams were composed of personnel from DOE, DOE contractors and outside consultants. A list of Subteam members and their areas of responsibility is contained in Section 4.9; a biographical sketch of each member is provided in Appendix A-1.

A TSA is designed to be operationally focused and to use performance based appraisal techniques. Therefore, the evaluations by the TSA Teams focused on the safety aspects of operating facilities and activities in progress. Also,

the teams reviewed the condition of equipment and facilities. This approach is based on the assumption that a facility and its equipment have been appropriately designed and constructed. Each team assessment addressed whether the current operations are being conducted within the scope of DOE Orders, mandatory and recommended standards, and good industry practices.

The activities of the S&H Subteam were guided by DOE/EH-0135 "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites," June 1990, and supplemented by performance objectives and criteria developed for explosives safety and natural phenomena.

The findings and concerns identified by the S&H Subteam were developed using the performance objectives for each of the technical areas evaluated. Sections 4.5.1, 4.5.2, 4.5.3, and 4.5.4 identify the findings and concerns for each activity reviewed at LANL, as well as those related to appropriate DOE Headquarters Program Offices, the Albuquerque Field Office (AL) and the Los Alamos Area Office (LAAO). Although nearly all the performance objectives were addressed, this report cites only those performance objectives that have a concern identified. Therefore, the reader is cautioned to review the overview sections of the technical report before forming an opinion of the performance in any technical area. When a performance objective is not listed in the technical section, the omission implies that no findings or concerns were identified by the Subteam.

The findings and concerns identified by the Subteam were obtained in three ways: (1) observing operations, emergency exercises and drills, and observations of the physical condition of the site and facilities; (2) interviewing management, staff, operators, and crafts personnel; and (3) reviewing policy documents, manuals, plans, procedures, records, and other relevant documents.

As defined by the procedure guidelines, a concern addresses a situation that in the judgment of the S&H Subteam either: reflected less than full compliance with a DOE safety and health requirement or mandatory standard; threatened to compromise safe operations; or, if properly addressed, would substantially enhance excellence in safety, even though that part of a particular operation was judged to have a currently acceptable margin of safety. Because this last category addresses excellence in operations, more concerns are reported than would result from a strictly compliance-oriented appraisal.

The findings that support each concern immediately precede that concern. The category rating, potential hazard level, and compliance level for each concern were determined using the criteria presented in Section 4.7. Most of the concerns were judged to be Category III. A tabulation of concerns is contained in Section 4.8.

Self-assessments were reviewed by the Subteam. In some instances, the self-assessments were specific, stand alone documents, in other instances they were a compilation of findings or were contained in other documents such as memoranda, reviews, and studies. Only those documents dated September 23, 1991 or earlier were considered. The following self-assessments were reviewed: (1) "DOE AL Self-Assessment Report," September 1991; (2) "DOE Los Alamos Area Office Assessment of ES&H Practices at Los Alamos," September 1991; (3) "Los Alamos National Laboratory ES&H Self-Assessment Report," August

1991. With regard to the LANL self-assessment, lower-tier division and group level self-assessments were also reviewed, when available.

A comprehensive OSHA-type compliance inspection covering general industry and construction standards was performed. The scope of this inspection was focused on high hazard facilities that present the most risk to workers. All four TSA Teams included worker safety inspectors. The inspection included major facilities, buildings, process areas, service and support facilities, maintenance buildings, and construction sites.

The Subteam attempted to identify some of the causal factors and potential root causes for the concerns identified. They are intended to assist LANL in performing its own root cause analysis to determine the fundamental problems that exist. Correction of the root causes should ensure that improvements in the safety of operations will be sustained.

4.4 SUMMARY

This S&H Subteam assessment is the first sitewide TSA at LANL. In the past, TSAs have been conducted at the Plutonium Facility, the Omega West Reactor and the Tritium System Test Assembly. Although the same performance objectives and criteria have been used, the assessment is based on new requirements contained in the recently issued Orders. Conduct of Operations and Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities are but two of the recent DOE Orders that reflect the more stringent safety and health requirements being applied to DOE facilities.

The four TSA Teams reported that LANL senior management has started changes at the Laboratory that are directed toward enhancing performance in environment, safety, and health (ES&H). These changes are consistent with the Secretary of Energy initiative to provide at least equal importance to ES&H programs and activities as to other laboratories programs and activities. The change has only begun and much more work is needed to achieve full implementation and institutionalization of the many changes required. The S&H Subteam found that, although the awareness level of Laboratory personnel is noticeable, personnel are proceeding in accordance with their own perception of what is needed rather than being responsive to established Laboratory policy. The Laboratory has not yet provided its expectations to the organization by issuing policies, requirements, guidelines and management plans to effect change. Without this direction, there can be little assurance that an effective program will result.

The present organizational structure and functional performance of the Laboratory is in need of change to clearly establish the responsibility and authority of organizational units and to set accountability for performance in the ES&H functions. The system, as it is now implemented, has few ES&H policies and guidelines and allows wide latitude in approach and implementation of safety-related programs. In fact, these decisions are most often made at the group and section levels where the necessary safety expertise may not be available.

Safety review committees are established for the Laboratory. However, the Subteam found that they are not fully functioning to provide an independent safety review of the programs and experiments. Also, the Senior Management

Group is dependent on the Associate Director for Operations, a position that incudes line functions as well as the independent safety function for safety input. The recently established Laboratory Assessment Office could provide independent input to management, but at present, this office is not sufficiently staffed with technical expertise to assess ES&H programs and program requirements. In the lower levels of management where interface requirements between line and safety are not always clearly defined, this condition is even worse.

A change in the safety culture at LANL is beginning as indicated by the commitment to and support for this change demonstrated by senior laboratory management. However the change has been late in beginning and much remains to be done to make this commitment a part of the institutional process, and to bring the laboratory into minimum compliance with DOE requirements. The Laboratory has not yet developed a formal plan, based on workload and DOE requirements, to allocate resources and staff to bring about and sustain the change management is implementing.

The findings indicate that compliance with DOE Orders, national consensus standards, and regulations is breaking down. Approximately 74 percent of the concerns identified in the four reports indicate noncompliance with DOE mandatory requirements as a major issue. In the plutonium operations, a key concern was related to the inability of management of LANL and DOE to demonstrate that these facilities are being operated within an approved design basis and safety envelope.

The laboratory performed a self-assessment that is a satisfactory first attempt. The effort started late and was completed just as the team arrived on site. The self-assessment recognized many of the identified deficiencies as sitewide issues and, therefore, applicable to all organizational units. However, there are many areas where the assessment is shallow, consisting of a listing of previously identified deficiencies. For the most part, the deficiencies covered broad areas in general terms with little specificity of actual problems. There is no indication that an evaluation of these problems was made by the formal self-assessment effort, thereby detracting from the effort. However the Laboratory identified fully or partially 78 percent of the Category III concerns, 80 percent of the Category II concerns and 100 percent of the I concerns (only one concern).

Corrective action plans for the deficiencies identified in the self-assessment have not yet been completed but some development is under way. The self-assessment effort has not been made a part of the institutional process and, therefore, may not be a sustained effort directed toward improving performance.

Summary charts are included as Figure 4.4.1 for the LANL self-assessment and Figure 4.4.2 for the DOE self-assessment. A summary chart is not presented for the Ross Aviation self-assessment because there were only nine concerns, all Category III and none of them were identified in the self-assessment. The self-assessments indicate the areas with the lowest percentages for fully or partially identifying problems are Security/Safety Interface, Radiological Protection and Fire Protection. The highest percentages were in Aviation Safety, Worker Safety and Health (OSHA) Compliance, and Emergency Preparedness, all with 100 percent.

4.4.1 Plutonium and Enriched Uranium

The S&H Subteam (TSA Team 1) appraised TA-55 and other plutonium and enriched uranium operations managed by the Nuclear Materials Technology Division. Overall, the Nuclear Materials Technology Division has made some progress in meeting DOE health and safety requirements, but considerable additional effort is needed for full compliance with DOE requirements. A total of 135 concerns are presented in this section of the report, distributed throughout all 18 technical areas examined. Five of the concerns are addressed to the Department of Energy. Eleven Category II concerns were identified during the appraisal which relates to significant hazards or noncompliance with a DOE Order, Federal regulation, or industry standard. The first dealt with the inability of LANL and the Nuclear Materials Technology Division management to demonstrate that TA-55 is being operated within an approved safety envelope or design basis. In the Operations, a Category II concern was identified in the area of shift supervision. This concern related to the lack of an individual with the responsibility and authority to manage and control TA-55 operations. Emergency Preparedness received a Category II concern because of significant deficiencies in the emergency management and response organization. Two Category II concerns were identified in the Worker Safety and Health (OSHA) Compliance area with the LANL respiratory protection program and lockout/tagout practices. Five Category II concerns were identified in area of Fire Protection which related to significant noncompliance with the Life Safety Code for egress, safe haven and detention of personnel, and reliability of fire protection and suppression systems. DOE received two Category II concerns which relate to the lack of oversight and guidance to assure that TA-55 is being operated within an approved design basis and safety envelope and to deficiencies in the DOE system for closeout of TSA findings, concerns, and recommendations.

The Nuclear Materials Technology Division operates the TA-55 facility in a manner such that considerable responsibility and authority are delegated to the group level. This style of management is common to all organizations and facilities at LANL and has served the Laboratory well in achieving excellence in research and development activities. It was the consensus of the S&H Subteam, however, that the current style may not be compatible with compliance with health and safety requirements. In particular, line management responsibility for issuing uniform policy guidance, for exercising oversight, and for requiring accountability should be strengthened.

LANL and Nuclear Materials Technology Division management have not supported and enforced quality assurance (QA) programs that meet DOE requirements. Management has not communicated to line personnel the expectation and commitment to quality attainment, verification, and improvement that is required by DOE Orders and other national codes. Line personnel are not aware of their responsibilities in quality attainment and improvement and, therefore, cannot be expected to meet those responsibilities. The approval and issuance of a generic QA plan does not ensure effective implementation. Management must demonstrate commitment to quality objectives, including expectation, vigilant enforcement, resources, and training for the program to be effective.

Overall, the operations functions are judged to require significant improvement to achieve compliance with current DOE Orders and industry standards for nuclear facilities. Deficiencies were found related to

assignment of responsibility without authority; informality in conduct of operations; deficient technician proficiency, procedures, and document control; deficient facility status controls; and deficient human factors engineering. Many of the findings and concerns are a result of failure to implement facility upgrades as industry standards evolved, whereas others are a result of failure to implement requirements of the DOE Orders. Two hierarchies of operations exist at TA-55: facility operations (such as control of power and ventilation), and laboratory operations (processes such as electro-refining and chemical treatment of plutonium scrap metal) conducted within Building PF-4, usually in gloveboxes by discipline groups. At both levels, duties and responsibilities are programmatically defined but require improvements in programs and implementation. Many operational activities were found to be informal both at the facility and at the process level. Many activities are performed by verbal agreements, rather than by documented fulfillment of requirements.

LANL has a great deal of work to do to come into compliance with current DOE maintenance requirements. The Laboratory has taken the necessary first step toward dealing with the problem, which is acknowledgment that the problem exists. The infrastructure needed for establishment of a maintenance management program required by DOE 4330.4A is counter to the LANL culture which values diversity and heterogeneity. Two other important steps have been taken toward establishment of a LANL maintenance management program; one being the establishment of a Maintenance Management Office with responsibility for maintenance policy, planning, and coordination sitewide; the other is the promulgation of a draft policy on maintenance. Maintenance of plutonium facilities, as well as of other LANL facilities, has been divided into two categories: Class A property and equipment such as buildings and associated utilities including plumbing, electrical and mechanical systems; and Class B equipment used purely for programmatic purposes such as gloveboxes and equipment inside gloveboxes. Maintenance of Class A equipment is the responsibility of the Facilities Engineering Division, while user groups are responsible for maintaining Class B equipment. A LANL subcontractor, Johnson Controls World Services, Inc. (JCI), conducts maintenance of most Class A equipment and some Class B equipment. LANL has provided essentially no sitewide guidance or requirements for the conduct of maintenance on Class B equipment. Each organizational unit has been left to make its own determination as to the planning, control, conduct, and documentation of maintenance for which it is responsible. In most cases, these decisions have been pushed down to the lowest organizational level (the groups). The net result of these practices is that the quality of maintenance activities is based on the individual initiative of group leaders and their subordinates. In some cases, these standards are high and maintenance is controlled, conducted, and documented effectively while in other cases, standards are not high.

The facilities provided for the TA-55 Training Center are excellent. They include classrooms, study booths with audiovisual equipment, office space for the training staff, reference materials, a testing center, and a state-of-the-art glovebox training laboratory. A noteworthy practice was identified regarding training facilities and equipment, specifically the glovebox training laboratory. This training laboratory provides trainees with excellent hands-on training in an exceptionally realistic environment that accurately mimics actual laboratories in Building PF-4. A two-phase training system is used at TA-55. Phase I training consists of the more generic

training requirement for personnel working in various job capacities. Six training job codes are identified which are directly related to the various types of work different personnel might be performing. Phase II training is job specific and is accomplished after successful completion of Phase I. This training is to be implemented by the nine Nuclear Materials Technology Division group leaders and administered by on-the-job training instructors. Certification of job competence is to be made by designated on-the-job training certifiers. Group leaders then approve individual certifications. Retraining and Phase II recertification is to occur on an annual basis. There were many discrepancies found in the administration of Phase II training, including out-of-date certifications, inadequate recordkeeping practices, inappropriate application of on-the-job training, and inconsistent application of training across the nine Nuclear Materials Technology Division groups. Each of the nine groups has portions of the required training programs in place; some are better than others, but none is without flaw.

In auxiliary systems, situations exist where two or more separate groups have responsibility for the same safety function or safety-related system. For example, the Field Operations Group personnel operate the safety-related systems of a facility, whereas another group is responsible for the safety of the facility. This appears to be due to a desire to centralize all service organizations whether any need or advantage exists. Furthermore, lack of oversight by management allows such activities to continue to the extent that they seriously weaken safety responsibility and destroy the ownership attitude needed by operating organizations. The Chemistry and Metallurgical Research Building is an example of divided responsibility. The Building Manager supposedly is responsible for the building safety; however, he does not have charge of the personnel who operate his safety systems. Further, he may have a dozen different groups in the building, and each group may implement safety procedures differently. The Building Manager has little authority except in the common spaces; his authority does not permit him to prescribe a common procedure to respond to failure of the ventilation systems. Reporting and evaluation of incidents less serious than those reported under DOE 5000.3A is deficient in Building PF-4 and in the Chemistry and Metallurgical Research Building auxiliary systems areas, even though the Health and Safety Division reportedly has a very good incident reporting and evaluation program.

Packaging activities for plutonium and enriched uranium are performed satisfactorily by the Nuclear Materials Technology Division. The Nuclear Materials Technology Division is the major shipper and receiver of significant quantities of such materials. It should have, and has, actively pursued establishing many of the positive controls necessary for successful operations. Weaknesses in the Nuclear Materials Technology Division's present packaging activities result from a lack of a formal system of controls from the sitewide perspective. Uncertainties in the Nuclear Materials Technology Division with respect to applicable requirements are due to poor sitewide oversight which fails to provide easy traceability to DOE Orders and Federal regulations. Those requirements are not effectively included in Laboratory policy and in transportation safety and QA manuals that ensure consistent and correct sitewide performance of plutonium and enriched uranium shipment-related activities. Further, lack of LANL support prevents the Nuclear Materials Technology Division from implementing known oversight requirements (QA). Thus, deficiencies at the Nuclear Materials Technology Division are likely to occur at other LANL plutonium and enriched uranium facilities that make fewer shipments than the Nuclear Materials Technology Division.

LANL has an effective and highly professional criticality safety analysis group, the Criticality Safety Group of the Health and Safety Division. However, the validation calculations are not comprehensively documented and the review of the criticality safety analysis is not sufficiently formal and is not comprehensively documented. Deficiencies were found in the contractor independent review and appraisal system. Of concern is the lack of a uniform review and approval system for safe operating procedures and the possibility of putting a standard operating procedure into use before it has received a comprehensive review. Deficiencies were found relating to the criticality alarm system evacuation procedures, maintenance and calibration, and documentation of the criticality alarm system. The training organization at TA-55 was found to be well organized. A good practice noted here was that when a worker's training expires, that worker is dropped from the personnel access database and denied entrance to Building PF-4. Until about 1985, AL provided nuclear criticality safety appraisals of various LANL facilities, but this practice was cut back with the advent of the DOE TSAs. LANL workers feel this is a loss. AL developed a Criticality Safety Appraisal Outline and a Nuclear Facility Safety Appraisal Program. Both are useful guides to facilitate nuclear criticality safety appraisals.

Security/safeguards improvements and modifications are processed through the same review and approval system as are modifications for other purposes. This system includes modifications at plutonium and enriched uranium facilities as well as at all other LANL facilities. However, deficiencies were identified in the overall review process. The General Security Orders and Station Orders include provisions for emergency access and egress, but several deficiencies in emergency egress provisions were identified.

With regard to experimental activities, the safety-related aspects of all activities from table-top experiments, to process development and scale-up to production-related activities are managed at the group level using operating procedures, safe operating procedures, and special work permits. There are inconsistencies, omissions, and lack of thoroughness in documentation that indicate that the management expectations and requirements are not being implemented consistently within a group or from group-to-group within the division. It was found that the administrative controls to ensure that the TA-55 management has reviewed and concurred in the experimental safety evaluation of experiments conducted by other LANL organizations and performed at TA-55 do not cover all experiments. The converse is also true; that is, the Nuclear Materials Technology Division can conduct experiments at other facilities, and the other facility management has no formal means to ensure that they concur with the safety analysis and that it meets their criteria established for conducting experiments in their facility.

The independent safety review at TA-55 is provided by a complex set of committees and a Directorate ES&H committee and Laboratory Committees provide support and oversight. Although there are examples of when this system appears to be working well, improvements are needed if it is to provide the high-quality oversight required by DOE Orders. Most of these improvements are needed for the activities of the nine groups of the Nuclear Materials Technology Division to ensure a consistent, high-quality review and the clear documentation of the review so that it can be subjected to independent verification. The Laboratory Assessment Office conducts an annual safety review that meets the requirements of DOE 5480.5 for an annual, independent safety review of TA-55. LANL is examining its overall safety assessment

process, but has not made provisions for conducting the triennial appraisal of the nuclear, site/facility, and safety review system required by DOE Orders.

Health physics at TA-55 is a function of the Health Physics Operations Group, Health and Safety Division. A recent reorganization of the Health and Safety Division changed the radiation protection organization from a geographical basis to a functional basis with a Health Physics Measurements Group, and Health Physics Policy & Programs Group. The reorganization is an improvement, but the level of radiation protection performance appears to be an inverse function of the distance of the facilities being supported from the Health Physics Operations Group managers. The radiation protection program, although conducted by highly-dedicated and competent personnel, has just begun sitewide reorganization and implementation of DOE Order 5480.11. Formal, written delineation of authorities and responsibilities for radiation protection exist, but uniform implementation throughout the plutonium and uranium areas has not been achieved. There are no formal written programs describing LANL requirements for such major areas as ALARA. The radiation protection program and procedures have not been updated to reflect the recent reorganization and radiation protection policy.

Although Nuclear Materials Technology Division conducts a personnel protection program that generally protects the health and safety of personnel working at TA-55, there is substantial room for improvement. Many deficiencies must be corrected in order to bring the personnel protection program in compliance with DOE Orders, Federal regulations, and industry-accepted standards. The Nuclear Materials Technology Division relies on group leaders and process safety committees to administer and control the health and safety program for the facility. Key to this effort is the knowledge expected of line management to ensure that workplace hazards are identified, evaluated, and controlled. However, group leaders and their subordinates are not proactively aided by the Health and Safety Division. Nuclear Materials Technology Division personnel receive little guidance, training, and direction from the Health and Safety Division concerning health and safety program elements to emphasize in approaches to the daily conduct of their operations. Technical support from the Health and Safety Division is limited to reactive responses, part-time presence of industrial safety professional, and on-call response of Industrial Hygiene Group personnel. In the absence of effective support and guidance from LANL management and the Health and Safety Division, the Nuclear Materials Technology Division has taken the initiative to put new systems in place and to update other aspects of its health and safety programs to achieve excellence.

A comprehensive, OSHA-type safety and health appraisal covering general industry and construction standards was conducted at TA-55 to determine compliance with existing OSHA regulations as adopted by DOE. Evaluation criteria are based, in part, on OSHA general industry and construction standards, 29 CFR 1910 and 29 CFR 1926, respectively. No construction activity was taking place at TA-55 during this appraisal. The inspection covered maintenance shops, material storage areas, laboratories, and process test areas. A less comprehensive sample of office space and other low-hazard areas was also included. A total of 211 noncompliance issues are identified. Of these, 203 are considered serious, and 8 are classified as other than serious. The high percentage of serious noncompliance issues reflects the fact that the S&H Subteam focused its attention on identifying this type of issue.

The fire protection program is not being effectively implemented at TA-55. There is no distinct assignment of responsibilities for fire protection at TA-55. As a consequence, some valves in safety-class sprinkler systems and fire protection water supply valves are not properly inspected, fire doors are found inoperable, modifications are not properly reviewed for fire protection impact, and required fire barriers are not provided or maintained. The facilities at TA-55 are in substantial noncompliance with various requirements of the Life Safety Code.

The TA-55 PF-4 facilities have many design provisions in place for protection against natural phenomena hazards. In areas other than seismic concerns, natural phenomena hazards have been considered and found to have a significantly lower contribution to the overall total risk. There is a general lack of concern at the facility for earthquakes, and little attention is paid to design details and seismic performance considerations. TA-3 has almost no provisions for seismic hazards and gives minimal attention to the problem. This lack of concern for seismic hazards is evident on a sitewide basis. The large number of concerns developed from this appraisal is indicative of an underlying problem; namely, LANL has placed a low priority on seismic safety including design criteria, installation of new equipment, inspection, and planning for mitigation of accidents from earthquakes.

4.4.2 Reactor, Critical Assembly, and Tritium Facilities

The results of S&H Subteam (TSA Team 2) appraisal of the reactor, critical experiments, and tritium facilities reflect the effort that has been done in enhancing the ES&H program, but significant work is still needed to achieve safety excellence. A total of 131 concerns are presented in this section of the report, distributed throughout the 17 technical categories examined. Three of the concerns were addressed to the Department of Energy. No concerns are designated as Category I; five concerns are designated Category II and the remaining 126 are designated as Category III. Three Category II concerns in the Operations area cites failure to demonstrate technical specification compliance at the Critical Experiments Facility, operations at the High Pressure Tritium Laboratory without a formal approved plan, and failure to evaluate and approve operation of Godiva IV with a cracked fuel ring. Two Category II concerns in the Radiological Protection area cites failure of the contamination control program at the Ion Beam Facility to protect workers against internal tritium exposure and the Laboratory lack of capability to calibrate and test the Eberline RMS-II instrument.

LANL management style has delegated considerable authority and autonomy to lower levels of the organization at the tritium and reactors facilities. The management style provides the research staff with the maximum latitude of activity so as not to stymie the creativity and ingenuity of those performing research. This management system has led to an informality of operations which is not consistent with the new safety culture initiative of the Secretary of Energy. A long history of successful operation of LANL has also led to complacency in compliance with the evolving safety and health Orders, requirements, and standards with little emphasis for safety excellence. Recently, however, LANL management has recognized the need for cultural change, and considerable work is needed to effect this desired change. Upper Laboratory management must find a way to provide line management with accurate and timely guidance on ES&H requirements while providing mandated appraisals and independent review without destroying the culture of scientific and

intellectual freedom and creativity. Finding a satisfactory compromise and fostering a culture in which good researchers welcome review of their practices will be a major challenge.

The QA plans for the reactor, critical experiments, and tritium facilities are not being reviewed and modified so that they can be applied in a consistent manner. Management support has not provided resources for implementing QA plans. This is changing, but considerable work remains to be done before the QA program is fully implemented.

Omega West Reactor management is making progress in achieving formality in the conduct of operations, but improvements are needed at the Los Alamos Critical Experiments Facility. These improvements included an evaluation of the cracked fuel ring in Godiva IV and an increased formality in the verification of Technical Specifications, both subjects of Category II Concerns. Although tritium facilities are staffed by competent personnel, concerns arose regarding formality of operations, the lack of detail in many procedures, not identifying and correcting potential hazards, and poor records practices. A noteworthy practice was identified concerning the use of operating procedures in which warnings or other highlights to the operator are printed in colored ink. A Category II Concern was identified at the High Pressure Tritium Laboratory because it has been operated without an approved LANL or DOE plan since its shutdown in October 1990. That facility must continue to receive management attention commensurate with the hazards present.

Lack of a Laboratory policy on maintenance has resulted in significant differences in the maintenance programs for the two different classes of equipment. Because the establishment of maintenance policies and procedures for Class B (programmatic) equipment has been assumed by group management, the uniformity and formality of maintenance practices for this equipment vary widely between groups. In some groups, formal maintenance practices and procedures are nonexistent. But other groups, such as those operating the TSTA and OWR, have preventive maintenance programs which approach conformance and provide a basis upon which the Maintenance Management Office can build to develop uniform systems throughout LANL. An audit of actual maintenance work in progress was hampered by the lack of ongoing work during the appraisal. Only housekeeping operations and emergency work were in progress. The backlog of preventive maintenance conducted by the maintenance subcontractor, JCI, varied from up-to-date in some cases to as much as 2 years behind in others.

The training program is progressing toward a performance-based program as required by DOE Orders. Only recently has the Laboratory placed a priority on the need for training and additional management attention is required since the development of facility training plans ranges from no written plans to plans that almost meet the requirements. There is no schedule for full implementation of a training program.

The auxiliary systems in the tritium and reactors facilities span an entire spectrum with respect to reliability, their operational readiness, and material condition. Operational safety requirements and associated limiting conditions for operation and surveillance requirements are not structured in sufficient detail. Procedures for operation and maintenance of some systems were weak and lacked detail. Some instrumentation was uncalibrated, and most system equipment was not labeled to allow for status control. Personnel in charge of maintaining and operating these systems are generally knowledgeable

and aware of system problems and operating parameters. The good conditions that were observed appeared to be due more to individual efforts of experienced and dedicated personnel than to a rigorous system of comprehensive safety analysis reports (SARs), procedures, training, and data documentation and trending.

The TA-41 Emergency Response Plan is not supported by implementing procedures which would support the sitewide emergency plan and provide for integrated response in conjunction with the Emergency Management Office. For both the TA-2 and TA-41 sites, emergency plan implementing procedures did not address assignment of individual responsibilities, Design Engineering Division specific emergency action levels, notification and integration of response activities with the Emergency Management Office, provisions for the determination and initiation of protective action recommendations for both the Laboratory and offsite populations.

Technical support for experimental activities and for the reactor facilities are primarily provided by the persons who are best qualified from a technical point of view: the experimenters and operating personnel. For more extensive or complicated support, assistance must be obtained from specialists in other Laboratory organizations. The problem with such self-support is that independent review will not be provided, national standards may not be applied, and a false sense that everything has been addressed will persist.

Packaging and transportation activities are fragmented; no central organization provides direction, coordination, and control of the activities. The availability of approved containers is not regularly assessed to allow planning for present and future needs. Training requirements are not clearly defined, and training is not always consistent from facility-to-facility. There is no independent QA overview. Hazardous materials and waste stored at the Tritium Salt Facility, Tritium Systems Test Assembly, and the High Pressure Tritium Laboratory do not meet DOE storage and inspection requirements. Operating procedures and QA program requirements have not been established for the 89001 shipping container as required by its approval certificate. Compressed gas cylinders are improperly marked and stored at the High Pressure Tritium Laboratory. There is no reusable shipping container maintenance program. AL and LAAO are not providing adequate support or oversight of LANL packaging and transportation activities.

The review and approval of experimental activities at the reactors is well documented, understood and generally meets DOE requirements. For the tritium facilities, LANL does not have an independent safety committee which uses independent subject matter (tritium) experts to review experiments and all operating procedures. Annual appraisals of the reactors meet DOE requirements. However, the triennial appraisals of safety review systems have been directed to the reactors and nuclear criticality safety and have not addressed requirements for annual appraisals of the tritium facilities. Most personnel who work with tritium do not consider the full danger of handling tritium. They usually assume that tritium is in the gaseous form and do not consider the potential danger of tritiated water or oil.

While there is some isolated improvement in radiation protection at the tritium facilities and reactors, the overall quality of the program is lower than in the past. Radiation protection programs were not uniform in the past since there were three independent health and safety groups which operated

unilaterally. With the adoption of the concept of identifying safety and radiation protection officers in the operating programs, radiation protection is becoming more nonuniform. Only marginal progress has been made in implementing the more stringent DOE requirements. Many of the concerns identified relate directly to the inadequacy in allocation or reallocation of physical and human resources necessary to develop a quality radiation protection program. Calibration facilities for radiation detection instruments are obsolete. Two Category II Concerns were identified related to high-range calibration of area monitors and tritium contamination control at the Ion Beam Facility. Management must make a substantial commitment towards the upgrade of the radiation protection program to meet the quality of safety required in SEN 6D-91.

LANL has made an effort to improve the safety and health climate by identifying hazards and revising safety and health procedures. There is no system to ensure that the identified deficiencies are corrected, and many of the identified hazards have not been corrected or eliminated. Employees have not been trained to comply with the revised procedures. A revised lockout/tagout plan (although still not in compliance with OSHA and DOE Orders) was issued in August 1991, but a training program has not been developed. Many electrical deficiencies exist in the tritium and reactor facilities that must be corrected. There are numerous injury and illness recordkeeping irregularities in the 1989, 1990, and 1991 OSHA 200 logs. To bring the personnel protection program into compliance with DOE Orders and OSHA regulations, deficiencies must be corrected, and employees and supervisors must be trained to recognize, evaluate, correct, and report workplace hazards.

The worker safety group conducted a safety and health compliance appraisal (OSHA-type) covering general industry standards. Thirty buildings at the tritium and reactor facilities were inspected. A total of 179 noncompliance issues were identified. Of these 172 are considered serious and seven were classified as other than serious. The findings indicate significant deficiencies in the following areas: emergency eyewash stations, confined space entry, hazard communication, fixed industrial stairs, emergency egress, electrical, and lockout/tagout. The safety and health staff is dedicated; however, additional formal training is needed. Progress is noted toward regulatory compliance with DOE safety and health requirements, but significant effort is still needed to bring the facilities into full compliance.

Resources are insufficient to fully implement the LANL Fire Protection Program or to implement DOE fire protection requirements. Sprinkler systems are not installed in all locations where needed, and those that are installed are not routinely inspected. Egress paths are not provided in some buildings, and, in some cases, marked exit paths are blocked. Combustible material is not properly stored in some locations. Fire suppression systems are not provided in some buildings where fires could cause financial losses above that specified in DOE Orders.

Medical care and advice are provided by a qualified, trained, experienced, and motivated staff and meet the standards of medical care expected under professional ethical codes. Nevertheless, problems exist with a need to furnish the full measure of occupational medical services required, both with respect to timely delivery and compliance with all relevant Federal regulations. The site Medical Director has been relatively isolated from

policy levels, line management, and related safety and health organizations. These problems will be solved when the mission of the Occupational Medical Program is understood by LANL management, when formality of operations increase, and when the related disciplines of industrial hygiene, radiation protection, and safety exchange information freely.

4.4.3 Accelerators

The S&H Subteam (TSA Team 3) appraisal of the accelerators at LANL reflected the substantial effort that has been and is continuing to be exerted in enhancing the ES&H program throughout all components of the Laboratory. Substantive progress is apparent, but deficiencies remain and further significant improvements are required before the ES&H program sitewide can be judged to have achieved an acceptable level of performance. A total of 112 concerns are presented in this section of the report, distributed throughout the 16 technical categories examined. Four of the concerns are addressed to the Department of Energy. No concerns are designated Category I; six concerns are designated Category II; and the remaining 106 were designated Category III. Of the six Category II concerns, one concern in the training and certification area cites the lack of initial and continuing safety training for accelerator facility personnel. One concern in the radiological protection area deals with deficiencies in the accelerator interlock and warning systems. Two concerns are reported in the worker safety area, one pertaining to inadequate training for individuals required to clean up chemical spills and hazardous waste sites, and one citing deficiencies in floor guarding, handrails, and fall protection. Two concerns are reported in fire protection, one pertaining to review of the design and construction of new or modified facilities, and one citing that accelerator facilities do not comply with NFPA 101, the Life Safety Code.

LANL management has initiated a serious effort to establish an effective ES&H oversight program and has recently become much more proactive in promoting the understanding that all employees are responsible and accountable for ES&H. However, neither LANL management nor AL has provided the necessary guidance and oversight to the LANL accelerator organizations for many DOE-mandated activities. A system of administrative controls to ensure an acceptable ES&H program is not uniformly enforced by all accelerator organizational units. Incident reporting throughout the accelerator organizations is limited to events that clearly exceed guidelines stipulated in DOE 5000.3A; no formal system has been documented and implemented to deal with less serious, but still important, incidents that do not exceed this threshold. Also, LANL management has not provided the necessary guidance and oversight to ensure proper procedural controls of all accelerator operations. An employee performance appraisal system, which appears to be well understood and accepted, is in place; however, a formal career development program for technical employees is needed to ensure continuity of managerial and professional excellence. Document control in the accelerator organizations has not received the level of management attention needed to ensure that field documents for accelerator units are maintained current.

The QA program at LANL has recently been rewritten to satisfy the requirements of DOE 5700.6C. The new Quality Assurance Manual was issued for review and comment by all LANL divisions on September 9, 1991. This document will become effective on January 6, 1992; however, full implementation is not scheduled for 3 years. Based on interviews with accelerator personnel, the requirements

of this manual are not well understood and are, therefore, not readily accepted. Upper management support for implementation has not penetrated to the operations level, and QA staffing for most of the reviewed facilities is insufficient to accomplish QA requirements specified in DOE Orders. Quality Program Plans have not been written for most LANL accelerator facilities. There is no formal system in place for the QA evaluation of potential suppliers, and no calibration policy is in place. Identification and control of hardware, materials, and shelf-life items were not addressed in any of the Quality Program Plans reviewed. In addition, formal nonconformance reporting systems have not been implemented at all facilities. Independent inspection of in-process parts and assemblies is not being accomplished.

The concerns related to conduct of operations for accelerators include two (one on logbooks and one on procedures) that were generic to sitewide operational concerns. Remaining concerns include: (1) the need to complete implementation of DOE 5480.19, (2) the lack of interface agreements that affect the safe operation of the Clinton P. Anderson Meson Physics Facility complex (including the Manuel Lujan, Jr., Neutron Scattering Center and the Weapons Neutron Research Facility), and (3) operation of accelerators with insufficient shielding. Also, responsibility for operation of very high-intensity portable linear accelerators was improperly divided between the Health Physics Operations Group and the operating groups. Fixed area monitors at accelerators are determined to be unable to perform their intended safety function. For example, Geiger-Muller detectors are used inappropriately for high- or short-duration radiation fields. The final concern deals with the staff response to off-normal events at one accelerator facility. All concerns are aggravated by the lack of formal interface agreements between groups and lack of external review of the implementation of mandatory standards. LANL appears to be moving aggressively to a more formal conduct of operations. Implementation of a proposed site-wide plan with supporting procedures for implementation of the conduct of operation policy at all levels should do much to resolve the concerns related to conduct of operations.

Responsibility for maintenance at LANL is divided between the Facilities Engineering Division, which works through the maintenance contractor, JCI, and the various Laboratory groups that conduct programs at sites throughout the LANL complex. No sitewide maintenance policy has been issued by senior LANL management, although one is in preparation. JCI has developed a reasonably structured work control and scheduling system, but each program management group has unique systems for the administration and control of its programmatic maintenance responsibilities. The limited number of maintenance policies currently in place for LANL accelerator programs does not include the elements necessary to achieve compliance with DOE 4330.4A and with "Albuquerque Operations Office Guidance for Maintenance Management Program," issued December 12, 1990. There is no formal, consistent program in place to generate and retain maintenance records as required by DOE 1324.2A and by the AL guidance document. The Lockout/Tagout Program varies widely from group-to-group within the accelerator organizations.

Top management at LANL recognized the need for a formal training program only during the past year. As a result, the training system is currently being formulated at the policy and procedure level. Therefore, the LANL training program does not meet the requirements of the DOE Orders, Federal regulations, or industry practices in connection with formal training for personnel at accelerator facilities. Training required for worker safety in such key areas

as radiation protection, occupational safety, hazard communication, and hazardous waste is not always provided. The practice of exempting users, researchers, or affiliates at LANL from training requirements or supervision by a trained employee-escort is especially serious. Similarly, employees may have training or retraining requirements waived indefinitely at the discretion of their manager.

A draft DOE Order, "Safety of Accelerator Facilities," addresses the establishment of safety program requirements and guidance specific to accelerators. Currently, there is no specific definition provided for accelerator auxiliary systems, and the LANL self-assessment did not address auxiliary systems for accelerators. This appraisal indicated that accelerators have ventilation, coolants, holdup, and auxiliary power systems. Further, the accelerator auxiliary systems lack formality regarding SARs, engineering descriptions, procedures, training, interface communication with service groups, trending of data, instrumentation calibration, and configuration control.

The key emergency preparedness concerns address the failure of facility management to develop an emergency preparedness program in accordance with the DOE 5500 series of Orders, prepare emergency action levels, prepare emergency plan implementing procedures, and provide sufficient training of facility emergency response teams. LANL emergency training personnel failed to ensure that facility management was adequately trained on the requirements of the DOE 5500 series of Orders and that emergency response efforts protect the health and safety of Laboratory personnel, the general public, and the environment.

Several technical support weaknesses were identified for LANL accelerator organizations, including the absence of a DOE Order compliance and audit system. The absence of program controls was also identified in the areas of facility modification, documentation and configuration management, procedures, operational readiness reviews, operational safety reviews, development of safety assessments and SARs. Other deficiencies include programs to monitor and trend equipment performance, training programs for technical support staff, and noncompliance with effluent monitoring requirements at several accelerator facilities.

Some packaging and transportation waste coordination activities appear to be performed safely. However, the fragmented organizational structure and the absence of QA plans and safety oversight are serious concerns. Major efforts toward reorganization, QA verification, training, procedure development and the new onsite manual will provide a significant safety improvement for packaging and transportation.

A system has been established in the LANL accelerator organizations to ensure both security and safety review of design and construction of security facilities or modifications thereto. Measures to ensure emergency access to and egress from the one security zone in TA-53 are prescribed in the Mason & Hanger-Silas Mason Company, Inc. (M&H), General Security Orders and in the Station Orders for guard stations controlling access to and egress from the security zone. However, (1) Station Orders do not completely reflect current practices, (2) emergency egress from the security zone is not ensured under all conditions, and (3) alternative evacuation routes required for specified conditions have not been posted. Protective force personnel receive only General Employee Training on ES&H-related subjects. M&H management has

submitted a proposal to organize the protective force into four dedicated sectors for personnel assignments which, if adopted, will enable site-specific training as a practical measure and will enhance the value of ES&H training to protective force personnel assigned to a given area.

The LANL accelerator organizations have no overall policy or management system that prescribes safety requirements and procedural controls for experiments at their facilities. Independent review of the safety of accelerator experiments is not clearly required by policy and is not often conducted at any of the appraised facilities. The formality with which individual organizations evaluate, select, conduct, and oversee such experiments varies greatly. At most accelerator facilities, experiments are regarded as relatively benign, incurring only moderate hazards. As such, they are conducted under standard operating procedures or special work permits without invoking detailed procedures or close oversight. Thus, some experimental details escape review for safety. The respective responsibilities of experimenters and operations personnel for safety are not well defined. Experiments with accelerators per se (as opposed to user experiments at instrument stations) are not required to undergo more formal review or hazard analysis, even though the risk is likely to be higher. More stringent policies and procedures for experimental activities have been formulated but have not been fully implemented in some of the accelerator facilities. No experimental activities were in progress at the time of the appraisal; hence, observation and evaluation of improvements against past practice were not possible.

LANL management has assigned the Laboratory Assessment Office (LAO) the responsibility for conducting internal, independent safety reviews of all LANL facilities on a periodic basis. These reviews have been implemented for reactor and nuclear facilities, but no corresponding reviews have been conducted or scheduled for accelerator facilities as required by DOE 5480.1A. LAO attributed the absence of such reviews to inadequate funding. In addition to periodic LAO appraisals, the LANL internal appraisal system requires comprehensive, independent reviews at the organizational level (e.g., division level) of proposed facility modifications, proposed experiments, procedures, organization and staffing, operating limits, training programs, and operating experience. However, neither policy nor procedure documents clearly define this requirement, and no independent safety review systems have been implemented at the organizational level. There is confusion among LANL personnel about the requirements for such independent reviews, and there is no management system to ensure implementation as required by the DOE Order. All facilities appraised effectively use internal safety committees, and some have standing or ad hoc committees to review selected safety topics; however, these activities are not sufficiently comprehensive or independent to meet the requirements of the Order. In addition, triennial review of the LANL system for safety reviews has not been implemented, and no formal lessons-learned program is in place.

Radiological protection practices conducted at accelerator facilities, installations with x-ray generating devices and sealed gamma ray sources, and incidental x-ray radiation-producing devices at LANL were evaluated during this appraisal. Also, LANL operations were reviewed against the requirements of DOE Orders, prescribed DOE policies, and American National Standards Institute standards; 21 concerns resulted. Radiation protection at radiation-producing installations is not implemented in accordance with all ES&H requirements. Most installations do not implement at least some of the

requirements for interlocks, barriers, warning devices, personnel safety system testing, and posting. Among the principal causal factors for these deficiencies is that LANL lacks sitewide standards for these areas and does not provide effective management oversight for implementation of a radiological safety program. LANL has recognized some of the deficiencies and has initiated changes in the responsibility for implementation of radiation protection at accelerators, x-ray devices, and source installations.

Personnel protection programs at LANL show signs of ineffective oversight by Laboratory management as well as by DOE. The Laboratory is working toward change but has not established control over health and safety issues. Personnel protection programs do not incorporate many mandatory requirements, and efforts at oversight or enforcement of safety requirements at accelerator facilities have not been made. There are three key deficiencies in personnel protection at LANL: (1) health and safety is pushed up from the bottom and not down from the top, (2) enforcement of health and safety requirements does not exist, and (3) documented programs do not reflect mandated requirements.

The purpose of the worker safety team appraisal was to determine LANL compliance with existing OSHA regulations as adopted by DOE. LANL was evaluated against the 29 CFR 1910, General Industry Standards. A total of 148 noncompliances were identified, 135 of which were considered serious. Of the noncompliances, the largest percentage was categorized as electrical problems of a serious nature. Other concerns related to materials handling and storage, means of egress, walking, working surfaces, and machine guarding. Problems identified with toxic substances and hazardous materials made up the smallest percentage of the total noncompliances. The remainder are categorized as other problems, many of which were considered noncompliances of Section 5(a)(a) of the OSHA General Duty Clause.

The current LANL Fire Protection Program is described in a document entitled "Fire Protection Program," dated April 1991. Responsibility for direction and administration of the program rests with the Fire Protection and Utility Group. Responsibility for implementing various parts of the program rests with other groups, including the Health and Safety Division, JCI, the Los Alamos County Fire Department, and management at individual facilities. An established program has not been developed at accelerator facilities to ensure compliance with NFPA 101, Life Safety Code, nor is conformance verified by periodic field inspections. Consequently, most of the facilities that were observed during this appraisal do not fully comply with the Life Safety Code, and many have serious deficiencies. The current fire protection program for the accelerator facilities does not effectively implement DOE 5480.7, DOE 6430.1A, and other requirements as they relate to construction materials, limitation of dollar value, and programmatic concerns at risk. The program also does not provide effective fire protection engineering oversight for the planning, design, and construction, or modification of facilities.

4.4.4 Other Selected Facilities and Activities

The S&H Subteam (TSA Team 4) appraised selected facilities and activities sitewide as well as Ross Aviation. Laboratory management has made a commitment to a new safety culture, and the prevailing attitude across the Laboratory is positive toward making the required changes. Numerous deficiencies were identified that are significant management challenges. The 253 concerns identified were distributed throughout all 18 technical areas

examined. Thirty of the concerns were directed to the Department of Energy (HQ, AL, LAAO). One Category I concern was identified in the shoring of excavation operations. This operation was shutdown until proper shoring was installed.

Twenty-one Category II concerns were identified. One Category II concern in the area of Maintenance related to the installation, modification, and maintenance of cranes. One Category II concern in Auxiliary Systems related to a 12-inch high-pressure natural gasline that does not meet code requirements. Three Category II concerns were identified in the area of Emergency Preparedness; these concerns were in the development of a Laboratory emergency program, an unsatisfactory emergency exercise, and no public notification system. Four Category II concerns were identified in Packaging and Transportation. These concerns related to no oversight program, no checklists for packaging, loading of hazardous materials by untrained or unqualified personnel, and the transport and storage of unmarked gas cylinders.

One Category II concern in Radiation Protection related to two gamma irradiators that were not properly controlled by the Laboratory. Four Category II concerns in Personnel Protection dealt with the lockout/tagout program, asbestos control, laser operations, and the confined space program. Three Category II concerns in Worker Safety related to machine guarding, electrical hazards, and oversight of construction subcontractors. Four Category II concerns in Fire Protection related to Life Safety Code deficiencies; lack of review of designs, major building modifications, and changes in equipment; and the lack of an emergency voice notification system at the Laboratory. The fourth concern was addressed to LAAO and concerned the training program for the fire department personnel.

Laboratory management has made the commitment to the new safety culture. The prevailing attitude across the Laboratory is positive toward making the required changes. Numerous deficiencies cited during the course of this appraisal are significant management challenges. Many ES&H-related programs need further development and improvement and, then, integration into the Laboratory line organizations. Laboratory management needs to clearly communicate its direction and expectations to all levels of the organization. Organizational roles, responsibilities, and interfaces among the various ES&H groups and the line organizations need to be clarified and strengthened. Management of Laboratory ES&H resources must receive attention, including policy decisions on how these resources will be applied to support Laboratory ES&H programs. Attention to the career development and salary needs of the Laboratory ES&H personnel is needed to mitigate possible job transfers and resignations. Overall, management must remain diligent and committed if effective ES&H programs are to be institutionalized across the Laboratory.

In March 1989, LANL issued its first sitewide QA Program as the first step towards complying with DOE 5700.6B. The QA Program required each division, center, and facility to establish Quality Program Plans to implement its requirements. Some organizations prepared Quality Protection Plans, which were implemented with varying degrees of success. Some organizations did not prepare Quality Protection Plans. Still others prepared Quality Protection Plans in response to direction from external sponsoring organizations. As a result, the QA program has not been consistently nor comprehensively implemented throughout the Laboratory. The cause can be attributed to a lack

of management commitment and followup to ensure successful implementation, a general lack of understanding and knowledge of how to implement the QA program requirements, and lack of resources. Specific QA program elements generally found to be lacking include procurement and supplier controls, identification and control of materials, performance of independent inspections and verifications, and control of welding and nondestructive testing. Other concerns, which are related to LANL, include a nonfunctioning QA audit program; lack of a sitewide records management and document control programs; lack of a sitewide program for the identification, disposition, and prevention of suspect/counterfeit parts; lack of a sitewide calibration program; and failure of management to enforce compliance.

Operational activities were conducted with evident personal pride and knowledge of the operations. Personnel recognize that safe operation is crucial to their own safety and operate the facilities in accordance with existing approved procedures. Supervisors and operators had an excellent attitude and were receptive to the new "culture" requirements of the DOE, which requires more formalization of operations. They recognize the benefits of establishing more formal documentation records such as SARs, consistent lockout/tagout controls, narrative logbooks, and formal documentation control.

A preventive maintenance program is well established for Class A equipment but does not totally comply with DOE 4330.4A. Programmatic equipment (Class B) is the responsibility of the various program groups in the field; however, the Laboratory does not have a maintenance policy on Class B equipment. With no maintenance policy, a number of LANL organizations, that are essentially autonomous operations, are left to determine the level of maintenance performed. In most cases, there is no maintenance program for Class B equipment. LANL has initiated action to correct the deficiencies in its sitewide maintenance programs by establishing a Maintenance Management Office with responsibility for implementing a maintenance policy, which will provide for compliance with DOE 4330.4A, for all equipment at LANL. However, the Maintenance Management Office will be a staff function within the Facilities Engineering Division with no direct authority for implementation. This policy will require direction from the Director to enforce compliance sitewide.

For all auxiliary systems reviewed, inconsistencies exist for the certification and maintenance of auxiliary equipment defined as Class A and Class B. The Class A auxiliary equipment is inventoried and maintained by the Maintenance Group and JCI using a rather formal system. In contrast, the Class B auxiliary equipment maintenance program is very informal; inventory of the equipment is frequently not available at the site; and schedules for preventive maintenance, operating instructions, and historical records are informal and frequently not available. LANL has not implemented a sitewide program to assure that Class B equipment, associated with auxiliary systems, is properly maintained.

LANL is just beginning to implement a formalized health and safety training program. Personnel at LANL recognize the need to improve training both sitewide and within the divisions. However, the trend is to equate training with continuing education rather than mastery of assigned job tasks, measurement of job competencies, and auditability of training records. The lack of approved operating procedures, health and safety procedures, and instructional materials and evaluation measures made appraising division training records difficult. Both the LANL self-assessments and the S&H

Subteam found numerous deficiencies related to life safety issues, safety and operating procedures, and knowledge of regulator codes. The findings demonstrate the importance of divisions, and the facilities they operate, developing site-specific training necessary to provide LANL workers with required safety and health knowledge and skills.

The LANL Emergency Preparedness Program is in the early stages of development and documentation with limited capability to respond and to report credible data on which assessments can be made for providing protection to onsite employees and offsite population. LANL has an existing 2-year-old, out-of-date emergency management plan and has recently drafted and distributed a revised edition for coordination and comments. This revised emergency management plan had not been developed using the criteria established in the new DOE 5500 series of Orders and lacks considerable vital information. When the new DOE 5500 series of Orders was distributed, the LANL Emergency Management Office did not formally distribute these new Orders to divisions and groups so they could revise their facility emergency plans and procedures. These landlords and facility managers have not been given the appropriate training or directives to ensure they develop suitable emergency plans or procedures. Recently, the LANL Emergency Management Office was repositioned, and now reports directly to the Associate Director for Operations, providing them with increased management support and visibility. At present, this organization has suitable resources to perform both its normal and emergency response duties. The Emergency Management Office leader should review and use this workforce in a more detailed alignment to accomplish their assigned emergency preparedness mission.

Technical support for Laboratory programs is provided primarily by several divisions within the Operations Directorate. The Directorate responsible for this portion of the TSA include Health and Safety, Environmental Management, Facilities Engineering, and Mechanical and Electronics Support. Support is also provided by design and engineering groups within various divisions in other directorates and by subcontractors, primarily JCI. Reallocation of resources has reduced the capability of some technical support groups to provide quality services.

The Health and Safety Division and the Environmental Management Division have not developed formal guidance documents or procedures to aid them in conducting technical support activities. These two divisions play key roles in the safety-related reviews in providing ES&H advice and support to line organizations. The lack of formal guidance and procedures has led to inconsistency in the conduct of ES&H protection activities. A concerted effort has resulted in identifying the specific safety analysis documents required for each facility, and an excellent system is in place to track their preparation, review, and approval. Much of the required documentation has not been approved. In addition, some safety analysis documentation was found to be incomplete with respect to design criteria, conduct of operations, and definition of the overall safety envelope. It was also concluded that safety documentation is not adequately reviewed by independent experts.

The present packaging and transportation program at LANL is decentralized and uncoordinated, although LANL has a major restructuring under way to establish a sitewide, single point of transportation management in the Materials Management Division. At present, five organizations at LANL have independent and overlapping responsibilities in packaging and transportation. The major

deficiencies identified include (1) lack of formal, approved procedures; (2) lack of training standards/requirements and qualification/certification programs; and (3) lack of safety reviews and effective safety oversight/audit programs.

The security forces are generally competent in performing their assigned duties. The M&H General Security Orders and Station Orders have good scope and detail. LANL facility and Operational Security and Safeguards Division management are responsive in addressing security-related concerns brought to their attention. However, deficiencies were identified in the areas of emergency egress, emergency planning, protective force training, analysis of the safety impacts of security activities, and protective force injury experience. Security and safeguards improvements and modifications are processed through the same review and approval system as are modifications for other purposes. However, deficiencies were identified in the overall review process.

The review of Experimental Activities addressed operations associated with approximately 30 small-scale laser laboratories and 3 larger laser facilities. The main concerns related to failure to implement DOE policies and procedures, specifically, lack of compliance with ANSI Z136.1, the laser safety procedures as mandated by DOE 5480.4. A lack of required "Independent Safety Review" for new and proposed experiments was also observed. These deficiencies arise principally due to insufficient direction and implementation of DOE Orders by the Laboratory. There is no sitewide guidance and administration of laser safety. A related finding is the reluctance at all levels to provide a diligent search for root causes to ES&H deficiencies.

The LANL safety review system is complex, with a top-level ES&H Council, 12 upper-level safety committees, and other committees reporting at division, group, and even section levels. In addition, LANL has a line safety support organization, the Health and Safety Division. This combination provides substantial safety support to the operating and research divisions. However, it does not meet the independent internal safety review requirements of DOE 5480.5 and 5482.1B. Additional deficiencies were identified in quality of documentation, annual facility safety appraisals, triennial review of the safety review system, and occurrence report review and distribution. The safety committees, below the 12 top levels that report to either the Laboratory Director or the Health and Safety Division Leader, all serve the line operating/research divisions and groups, to assist the leaders of these organizations in meeting their safety responsibilities. This is a valuable function. However, LANL has not developed a policy or guidance to direct the line organizations in establishing fully effective committees.

Radiological protection programs vary considerably from group-to-group and division-to-division within the Laboratory, even though the requirements and conditions are similar. There are many reasons for these inconsistencies, including (1) lack of adequate review by Health and Safety Division professionals, (2) the lack of rigor and formality in the administrative requirements, (3) the reassignment of safety staff and technicians away from the Health and Safety Division into the research and development divisions, and (4) the lack of oversight by Laboratory managers from all divisions. The quality of the radiation protection programs at LANL also varies. Many of the elements of the good programs could easily be transferred to weaker programs. Examples include training and re-training programs (especially for

radiological protection technicians), procedures, record keeping systems, routine survey programs, and others. There is evidence of need to better manage resources within the Health and Safety Division. The distribution of work appears to be skewed, with the Health Physics Operation Groups having the larger share, particularly in day-to-day operations. The interactions required to maintain an excellent program will increase as the Laboratory program mix changes from a few large programs to many smaller R&D programs.

In the area of Personnel Protection, the Health and Safety Division, comprised of the Safety and Risk Assessment Group and the Industrial Hygiene Group, operate in a service and support role relative to line management. The effectiveness of these groups has been diminished by (a) extensive personnel exodus to line management and other organizations which has occurred without strategic planning by LANL; (b) lack of definition of roles, responsibilities, and authorities; (c) lack of guidance criteria to direct functions; and (d) lack of effective management of resources. As a result, these groups are not effectively providing support, are not functional in an oversight or programmatic review role, and have not identified and evaluated many credible hazards. Information transfer between line management, the Health and Safety Division, and Medical Services is not apparent. Groups within differing line organizations which share common facilities do not always coordinate their efforts. Many deficiencies exist in the application of a health and safety program including program aspects of lockout/tagout, confined space entry, hazard analysis, exposure monitoring, asbestos abatement, carcinogen control, chemical handling and storage, hazard communication, ES&H training, and laser safety, among others.

The worker safety group conducted a safety and health compliance appraisal (OSHA-type) covering general industry and construction standards. Priority facilities or sites included maintenance shops, hazardous materials storage areas, materials storage areas, hazardous waste disposal and decontamination areas, laboratories, and process facilities. A less comprehensive sample of office facilities and low hazard areas were inspected. A total of 574 noncompliance issues were identified. Of these, 573 were considered serious and one was considered other than serious. The findings indicate significant deficiencies in emergency eyewash stations, confined space entry, hazard communication, machine guarding. Electrical safety problems were noted across the site in both permanent installations and portable power tools.

The fire protection program at LANL is inefficient and ineffective in identifying problems or having known problems resolved in a timely manner. Major emphasis is placed on having outside organizations come in to identify problems instead of relying on in house personnel. Existing personnel do not spend sufficient time in the individual building at LANL to fully evaluate the facilities. Thus, this appraisal identified numerous serious deficiencies in all the areas reviewed. The functions of the fire protection program are spread out among several organizations of which there is no clear oversight or guidance. Life safety issues get little to no attention in existing facilities and minimal attention in new facilities under design. Fire protection equipment maintenance is not reviewed by the fire protection engineering department in a degree that will assure that it is being properly maintained. The fire department is not in compliance with DOE or NFPA requirements.

The aviation safety appraisal included Ross Aviation, Inc. (Ross), and the Los

Alamos Airport. Ross is well-organized, professional and has a safety record comparable to any major airline. Deficiencies involve marking and documentation of emergency egress procedures and equipment, training, refueling equipment and post-flight procedures. The day-to-day management of the Los Alamos airport is carried out by JCI. The majority of the concerns regarding the airport stem from a lack of management action and direction on the part of LAAO and LANL and the lack of a comprehensive plan to address deficiencies documented in this and previous appraisals.

The overall Explosives Safety Program at LANL is satisfactory; however, several areas need management attention. Explosive storage, assembly, testing, and handling operations are being accomplished by a workforce with years of experience in the specific types of activities being performed; however, there was no documented initial or continuing training program for explosive operations. Frequent independent oversights of explosive storage and operating facilities are not performed by qualified explosive safety personnel. Transient personnel are not alerted to exclusion areas adjacent to explosive operations to prevent their inadvertent entry and exposure to high overpressures and hazardous fragments.

TABLE 4.4.1
COMPARISON OF SELF-ASSESSMENT PROBLEM IDENTIFICATION WITH TSA CONCERNS
NUMBER OF SELF-ASSESSMENT CONCERNS/PERCENTAGE OF TSA CONCERNS/
TSA DISCIPLINE BY SERIOUSNESS CATEGORY
Los Alamos National Laboratory – All 4 TSAs

	Category I			Category II			Category III		
TSA DISCIPLINE	Self	TSA	TSA%	Self	TSA	TSA%	Self	TSA	TSA%
Organization and Administration	0	0	0	1	1	100%	35	35	100%
Quality Verification	0	0	0	0	0	0	32	35	91%
Operations	0	0	0	1	4	25%	23	33	70%
Maintenance	0	0	0	1	1	100%	25	27	83%
Training and Certification	0	0	0	1	1	100%	30	34	88%
Auxiliary Systems	0	0	0	0	0	0	35	48	73%
Emergency Preparedness	0	0	0	4	4	100%	23	23	100%
Technical Support	0	0	0	0	0	0	16	21	76%
Packaging and Transportation	0	0	0	3	4	75%	41	43	95%
Nuclear Criticality Safety	0	0	0	0	0	0	11	13	85%
Security/Safety Interface	0	0	0	0	0	0	8	11	73%
Experimental Activities	0	0	0	0	0	0	12	13	92%
Site/Facility Review	0	0	0	0	0	0	16	20	80%
Radiological Protection	0	0	0	2	4	50%	48	70	69%
Personnel Protection	0	0	0	4	4	100%	30	30	100%
Worker Safety & Health (OSHA)	1	1	100%	7	7	100%	8	8	100%
Fire Protection	0	0	0	8	10	80%	24	33	73%
Medical Services	0	0	0	0	0	0	12	15	80%
Aviation Safety	0	0	0	0	0	0	2	2	100%
Explosives Safety	0	0	0	0	0	0	8	11	73%
Natural Phenomenon	0	0	0	0	0	0	14	14	100%
Totals	1	1	100%	32	40	80%	453	539	84%

Note: "% TSA" column indicates the percentage of TSA concerns identified (in whole or in part) in the various LANL self-assessment reports.

TABLE 4.4.2
COMPARISON OF SELF-ASSESSMENT PROBLEM IDENTIFICATION WITH TSA CONCERNS
NUMBER OF SELF-ASSESSMENT CONCERNS/PERCENTAGE OF TSA CONCERNS/
TSA DISCIPLINE BY SERIOUSNESS CATEGORY
DOE/AL/LAAO – All 4 TSAs

	Category I			Category II			Category III		
TSA DISCIPLINE	Self	TSA	TSA%	Self	TSA	TSA%	Self	TSA	TSA%
Organization and Administration	0	0	0	1	1	100%	4	4	100%
Quality Verification	0	0	0	0	0	0	2	3	67%
Operations	0	0	0	0	0	0	0	3	0%
Maintenance	0	0	0	0	0	0	0	0	0%
Training and Certification	0	0	0	0	0	0	1	1	100%
Auxiliary Systems	0	0	0	1	1	100%	0	0	0%
Emergency Preparedness	0	0	0	0	0	0	2	2	100%
Technical Support	0	0	0	0	0	0	1	1	100%
Packaging and Transportation	0	0	0	0	0	0	1	3	33%
Nuclear Criticality Safety	0	0	0	0	0	0	0	1	0%
Security/Safety Interface	0	0	0	0	0	0	0	0	0%
Experimental Activities	0	0	0	0	0	0	0	0	0%
Site/Facility Review	0	0	0	0	0	0	0	0	0%
Radiological Protection	0	0	0	0	0	0	0	0	0%
Personnel Protection	0	0	0	0	0	0	0	2	0%
Worker Safety & Health (OSHA)	0	0	0	0	0	0	0	0	0%
Fire Protection	0	0	0	0	1	0	7	12	58%
Medical Services	0	0	0	0	0	0	1	1	100%
Aviation Safety	0	0	0	0	0	0	1	5	20%
Explosives Safety	0	0	0	0	0	0	1	1	100%
Totals	0	0	0	2	3	67%	21	39	54%

Note: "% TSA" column indicates the percentage of TSA concerns identified (in whole or in part) in the various LANL self-assessment reports.

4.5 SAFETY AND HEALTH FINDINGS AND CONCERNS

4.5.1 Plutonium and Enriched Uranium

4.5.1.1 Organization and Administration

4.5.1.1.1 Overview

The Organization and Administration appraisal of TA-55 addressed all eight performance objectives. Appraisal findings and concerns are based on review of a substantial number of Laboratory and Nuclear Materials Technology Division documents, including environment, safety, and health (ES&H) plans, manuals, the Safety Analysis Report (SAR), Operational Safety Requirements (OSRs), policy statements, self-assessment documents, performance indicators, and incident reports. In addition, interviews were held with Los Alamos National Laboratory (LANL) top-level and middle management personnel, including the Laboratory Director, the Deputy Director, the Associate Director for Chemistry and Materials, the Nuclear Material Technology Division Leader and Deputy Division Leader, and several group leaders and technicians. TA-55 operating areas and several LANL document storage facilities were observed.

Overall, the Nuclear Materials Technology Division has made some progress in meeting Department of Energy (DOE) health and safety requirements, but considerable additional progress is needed for full compliance with DOE requirements. The Nuclear Materials Technology Division operates the TA-55 facility in a manner such that much responsibility and authority are delegated to the group level. This style of management is common to all organizations and facilities at LANL, and has served the Laboratory well in achieving excellence in research and development activities. It was the consensus of the Safety and Health (S&H) Subteam, however, that the current style may not be compatible with compliance with health and safety requirements. In particular, line management responsibility for issuing uniform policy guidance, for exercising oversight, and for requiring accountability should be strengthened.

The current structure of the Nuclear Materials Technology Division is well defined and understood. Safety committees in each of the nine Nuclear Materials Technology Division groups, a Facility Safety Committee, and numerous staff experts provide support to line management. A Directorate ES&H committee and Laboratory committees provide additional support, oversight, and communications. Position descriptions for most positions are in place and include ES&H responsibilities, but not all descriptions are current.

An incident reporting system is in place to meet the requirements of DOE 5000.3A. A system is in place for tracking corrective actions that respond to findings of internal and external audits and incident investigations; but the system does not ensure that corrective actions are timely and proper. Employee participation in the TA-55 safety program is encouraged by an employee safety suggestion program, by a safety award program, and by participation in safety committees and safety reviews. Safety reviews of processes and equipment are conducted by safety committees, but reviews by groups that are independent from the line organization are not normally conducted.

The commitment of management of the Nuclear Materials Technology Division to safe work practices is expressed in the mission statement of the Division, the safety manual of the Division, policy statements, and other documents. The Division effectively uses some quantitative safety goals to challenge the organization; more quantitative goals will be used in the future. Progress toward achieving safety goals is tracked.

Direct support from the University of California at the level of the TA-55 safety and health programs is not evident. Support and guidance from the University occur primarily at higher levels in the LANL organization. One exception is the Nuclear Materials Technology Division External Advisory Committee, which meets every 18 months to advise the Nuclear Materials Technology Division on management, technical, ES&H, and other matters. One member of the Committee is from the University of California. The performance objective describing support to LANL by the University of California is addressed in the S&H Subteam 4 assessment.

Career development of supervisory and management personnel is not strong. Laboratory management has not developed guidelines for career development of supervisors and managers. The personnel performance appraisal program now requires that ES&H factors be evaluated for all personnel. This policy has not been completely implemented.

The present document control system at TA-55 and in the entire Laboratory is not well formalized. At TA-55, some groups exercise careful control over important ES&H and quality documents; others are less formal. The SAR and OSRs for TA-55 are not current, and no mechanism is in place to promptly update and approve revisions. DOE approval is slow.

Fitness for Duty and Employee Assistance Programs are partially implemented. Drug testing for cause is implemented, but pre-employment drug testing and random drug testing have not been implemented. Training for the Personnel Security Assurance Program will begin late in 1991.

The LANL self-assessment is appropriately critical of the Laboratory performance in organization and administration areas. The Nuclear Materials Technology Division self-assessment identified a number of substantive issues in the organization and administration area, some of which are consistent with concerns in this report. Some sections of the Nuclear Materials Technology Division self-assessment are lacking in breadth and detail.

4.5.1.1.2 Findings and Concerns

OA.1 SITE/FACILITY ORGANIZATION

PERFORMANCE OBJECTIVE: Management should organize and manage the site/facility's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

FINDINGS:

- Although the team identified deficiencies, none appear to present an imminent risk or hazard to personnel, the public, or the environment; however, a number of significant noncompliances were identified. The findings presented here are examples taken from this report that illustrate the safety-related deficiencies in the current TA-55 operating basis.

- LANL and the Nuclear Materials Technology Division management have not enforced implementation of Quality Assurance (QA) Programs for each program or project as required by DOE 5700.6C. (See Concern TSA-1, QV.1-3.)

- The Nuclear Materials Technology Division and the TA-55 Facilities Management Group management have not established policy, guidelines, criteria, or standards for control of facility operation in accordance with DOE 5480.5 and DOE 5480.19. (See Concern TSA-1, OP.1-1.)

- The currently approved Final SAR is not up-to-date; the more recent OSRs are incomplete and inconsistent with the approved Final Safety Analysis Report; OSRs lack specificity required by DOE 5480.5 and DOE 5481.1B. (See Concerns TSA-1, OP.3-1, and TSA-1, AX.1-1.)

- The TA-55 Final SAR contains omissions in the analysis of criticality accidents. (See Concern TSA-1, CS.1-6.)

- The configuration of the TA-55 facility with respect to fire protection features and fire hazards are not controlled to remain within the parameters of the Final SAR to ensure that the facility does not present an added threat to the public. (See Concern TSA-1, FP.3-1.)

- Operations personnel at TA-55 do not always know the current operating status of systems and equipment or design configuration of the facility as required by DOE 5480.5. (See Concerns TSA-1, OP.4-1, and TSA-1, OP.4-2.)

- Maintenance is not managed in plutonium facilities in a manner that ensures protection of facility personnel, safe facility operation, or compliance with the standards of DOE 4330.4A. (See Concern TSA-1, MA.2-1.)

- There is no effective Nuclear Materials Technology Division oversight or control of training activities that

occur within the various Nuclear Materials Technology Division groups; job-specific training does not ensure that assigned workers have received adequate training as required by DOE 5480.5. (Concerns TSA-1, TC.1-1, and TSA-1, TC.3-1.)

- Packaging and transportation activities for plutonium and enriched uranium are fragmented among many groups without the oversight required to ensure compliance with requirements. (See Concern TSA-1, PT.1-1.)

- Buildings in TA-55 are in substantial noncompliance with the requirements of National Fire Protection Association (NFPA) 101, Life Safety Code. (See Concern TSA-1, FP.2-1.)

- Plans, procedures, and training are not in place to enable occupants of TA-55 buildings to respond to a design base earthquake; steps are not in place to ensure seismic adequacy for modifications or the existing facilities. The Bldg. PF-4 Operations Center, the ventilation compressed air system, and fire protection system may be rendered inoperable during a safe shutdown earthquake. (See Concerns TSA-1, NP.1-1; TSA-1, NP.2-1; TSA-1, NP.6-1; TSA-1, NP.6-2; TSA-1, NP.6-3; TSA-1, NP.6-4; and TSA-1, NP.6-5.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.1-1) (H1/C1) CAT. II

The management of the Los Alamos National Laboratory and the Nuclear Materials Technology Division cannot demonstrate that TA-55 is operated and maintained within an evaluated and approved safety envelope as required by DOE 5480.5 and DOE 5480.19.

FINDINGS:

- The DOE Technical Safety Appraisal (TSA) system as implemented does not ensure effective completion of corrective action prior to close-out of significant (Category II) concerns. (See Concern TSA-1, FP.2-3.)

- DOE has not provided timely approval of LANL safety analysis documents as required by DOE 5480.5. (See Concern TSA-1, QA.7-2.)

- See Concern TSA-1, QA.1-1.

- The following concern was partially identified in the DOE self-assessment.

CONCERN: (TSA-1) (OA.1-2) (H1/C1) CAT. II

Department of Energy has not provided oversight and direction to Los Alamos National Laboratory and the Nuclear Materials Technology Division to ensure that TA-55 is operated and maintained within an evaluated and approved safety envelope as required by DOE 5480.5 and DOE 5480.19

FINDINGS:

- The Nuclear Materials Technology Division has conducted a self-assessment. Action has been taken to address some of the deficiencies, but no integrated action plan containing priorities and resource allocations has yet been prepared.

- LANL has developed an ES&H action plan project, which provides a methodology for producing action plans for all external and internal assessment findings. However, an integrated action or implementation plan that addresses all concerns from the LANL self-assessment has not yet been produced.

- See Concern TSA-4, OA.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.1-3) (H2/C2)

The management of the Los Alamos National Laboratory and Nuclear Materials Technology Division have not yet prepared an integrated action plan to evaluate and correct all environment, safety, and health deficiencies identified in the Los Alamos National Laboratory self-assessment.

FINDINGS:

- Position descriptions that define the responsibilities, authorities, and the extent of freedom-to-act are not in place, or are not up-to-date, for all positions in the Nuclear Materials Technology Division.

  Examples are the following:

  - The roles and responsibilities for the Nuclear Materials Technology Division safety officer have not been defined by the Division Leader (See Concern TSA-1, PP.1-1.)

  - Not all position descriptions in the Facilities Management Group are up-to-date.

CONCERN:

See Concern TSA-4, OA.6-1.

OA.2 ADMINISTRATION

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning health and safety are administered throughout the facility.

FINDINGS:

- Several examples were noted by the S&H Subteam of Nuclear Materials Technology Division procedures that do not receive adequate independent safety review.
  - Minor process changes can be made to safe operating procedures without review by a Process Safety Committee. (See Concern TSA-1, QV.1-2.)
  - Some safe operating procedures contain only generic information about the process. Certain critical process parameters are described in detailed instructions, which do not receive independent safety review. (See Concern TSA-1, QV.1-2.)
- The TA-55 Facility Safety Review Committee does not independently review and approve all safe operating procedures, only those that are common to all operating groups in TA-55.
- When requested, the Health and Safety Division provides independent review of Nuclear Materials Technology Division safe operating procedures, but review is not always timely, and some safe operating procedures are placed in use before Health and Safety Division review is obtained.
- See Concerns TSA-1, CS.4-1; TSA-1, QV.1-2; TSA-1, OP.3-2; and TSA-1, FR.1-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.2-1) (H2/C1) **At the Los Alamos National Laboratory, no system exists in the Nuclear Materials Technology Division to ensure that nongeneric safe operating procedures involving operations with significant risk receive independent safety reviews as required for compliance with DOE 5480.5.**

OA.3 MANAGEMENT OBJECTIVES

PERFORMANCE OBJECTIVE: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

FINDINGS:

- Some quantitative safety goals are being used by TA-55 management, including as low as reasonably achievable (ALARA) goals. However, other performance areas, such as personnel contamination and Occupational Safety and Health Act (OSHA) violations, are being emphasized, but no quantitative annual goals have been set.
- See Concern TSA-1, MA.2-1.

CONCERN: **See Concern TSA-4, OA.3-1.**

FINDINGS:

- During this assessment, the S&H Subteam identified numerous examples of activities that were performed in violation of approved procedures and policy. Examples include Nuclear Materials Technology Division processes, fire protection inspections, and worker safety violations.
- See Concerns TSA-1, OP.3-2; TSA-1, OP.6-2; TSA-1, QV.1-3; TSA-1, MA.2-1; TSA-1, RP.1-1; TSA-1, RP.4-1; and TSA-1, FP.7-4.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.3-1) (H2/C1) **The management of Los Alamos National Laboratory, the Nuclear Materials Technology Division, and Johnson Controls World Services, Inc. do not enforce and require that all work be accomplished in accordance with established and approved procedures or policy as required by DOE 5480.19.**

OA.5 MANAGEMENT ASSESSMENT

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

FINDINGS:

- Safety performance improvement is not included in the Nuclear Materials Technology Division QA Program. (See Section 4.5.1.2.2, QV.1.)
- TA-55 management and supervisors spend a large amount of time in process observation; however, they do not always critically evaluate safety and health aspects of procedures and technician performance. (See Concern TSA-1, OP.6-2.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.5-1) (H2/C2) **At the Los Alamos National Laboratory, the Nuclear Materials Technology Division managers and supervisors do not always critically assess facility safety-related activities to improve performance.**

OA.6 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

FINDINGS:

- ES&H training is not a formal part of the career development program for supervisors and managers in the Nuclear Materials Technology Division.
- Candidates for advancement in management are rarely given career development assignments, for example, in other Nuclear Materials Technology Division groups or in other divisions.
- Laboratory management has not developed broad guidelines for career development for managers.

CONCERN: See Concern TSA-3, OA.6-1.

FINDINGS:

- According to a memorandum from the Director of Human Resources (DHR:91-029F, "Performance Appraisal," March 29, 1991, beginning in 1991), Laboratory policy requires that all employee performance appraisals address ES&H factors. Based upon interviews with Nuclear Materials Technology Division managers, implementation of this policy has begun in the Nuclear Materials Technology Division, but is incomplete. The Laboratory Director confirmed in an interview that the policy has not yet been uniformly applied throughout LANL
- No audit or followup has been conducted to determine the effectiveness and completeness of application of this policy by supervisors. The policy memorandum DHR:91-029F, does not require a followup audit to measure compliance.

CONCERN: See Concern TSA-4, OA.6-1.

FINDINGS:

- The S&H Subteam noted that qualification requirements have not been established for all position or assignments in TA-55. Examples include personnel performing inspections, QA representatives, and operations center specialists.
- There is no formal program at LANL or at TA-55 to qualify inspectors who perform inspection activities, other than dimensional and nondestructive examination (examples - electrical, civil, piping, mechanical). (See Concern TSA-1, QV.6-1.)
- In TA-55 there are no qualification requirements for assignment as a QA representative. (See Concern TSA-1, QV.1-4.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.6-1) (H3/C2) **At the Los Alamos National Laboratory, job qualification requirements are not established for some positions in TA-55.**

OA.7 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support site/facility operations.

FINDINGS:

- TA-55 is operating under the original Final SAR, approved by DOE in April 1978. A revised SAR, issued in 1988, was disapproved by DOE.
- The SAR was rewritten in the format required by AL 5481.1B and submitted to DOE for approval in July 1991. This revised SAR has not yet been approved.
- TA-55 is operating under OSRs approved by DOE in 1988. Two revisions to the OSRs were submitted to DOE in 1989. Approval has not yet been received.
- Changing guidance from DOE, and a lengthy review process by DOE have contributed to the difficulty of having a current, approved SAR and OSRs.
- No SAR exists for the Chemistry and Metallurgical Research Building, and the OSRs are out of date. A new SAR is being prepared. (See Concern TSA-1, AX.1.)
- See Concern TSA-1, OP.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.7-1) (H2/C1) **At the Los Alamos National Laboratory, TA-55 and the Chemistry and Metallurgical Research Building are operating under safety analysis reports and operational safety requirements that are not current as required by DOE 5481.1B.**

FINDINGS:

- The following concern is partially identified in the DOE self-assessment.

CONCERN: (TSA-1) (OA.7-2) (H2/C1) **The Department of Energy has not provided timely approval of safety analysis documents as required by DOE 5480.5.**

FINDINGS:

- LANL does not have a centralized system to ensure that important ES&H documents such as The Laboratory Manual, Chapter 1, "Environment, Safety, and Health" (ES&H Manual), are kept current or that superseded or voided documents are removed from use.
- ES&H documents are issued by several organizations within the Laboratory. There is no standardized or centralized control of preparation, review, approval, or distribution-for-use.

- Few ES&H documents are issued under receipt to maintain control. No audits of document control are conducted.

- See Concern TSA-1, RP.12-1.

CONCERN: **See Concern TSA-4, OA.7-1.**

FINDINGS:

- Baseline configuration control drawings and documents for TA-55 are stored in a document center in the basement of Bldg. PF-3. The storage room is not fire-proof, but it is protected by a sprinkler system. Protection of documents from accidental sprinkler actuation is not provided.

- Storage of documents is provided at several locations by several Laboratory organizations. There is no formal guidance for Laboratory personnel to determine the appropriate storage location for documents. The main storage locations are:

  - TA-3 Bldg. SM-410. Engineering drawings for all Laboratory buildings and facilities.

  - TA-0 Bldg. 130. Inactive Laboratory records of historical value.

  - TA-3 Bldg. SM-40. Vital records storage vault. Microfilmed copies of vital records.

  - Otowi Building. Personnel records.

- No formal Laboratory guidance exists to define which records should be duplicated and stored as vital records, to define retention requirements, and to define proper protection of important records.

- Similarly, no formal Nuclear Materials Technology Division policy exists for the identification and storage of vital records.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **(TSA-1)** **(OA.7-3)** **(H2/C1)** **No Los Alamos National Laboratory or TA-55 policy or procedure exists to identify and store vital records as required by DOE 1324.2A.**

FINDINGS:

- Personnel employment records are stored in the Otowi Building. The storage area is alarmed and protected by a sprinkler system. No duplicate records exist. A program is under way to prepare backup copies on optical disc.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (OA.7-4) (H3/C2) **At the Los Alamos National Laboratory, important personnel employment records are not protected against damage or loss.**

OA.8 FITNESS FOR DUTY

PERFORMANCE OBJECTIVE: The Fitness for Duty Program should be capable of identifying persons who are unfit for their assigned duties as a result of drug or alcohol use or other physical or psychological conditions and should provide procedures to remove them from such duty and from access to vital areas of the site or facility pending rehabilitation or remedial actions.

FINDINGS:

- The Personnel Security Assurance Program to ensure fitness for duty of identified employees is not in place at the Laboratory.
- Members of the Laboratory protective force have been subject to drug testing for the past 5 years. About 45 Laboratory employees who work with nuclear devices were placed on a random drug test program in September 1991.
- Beginning in 1992, in an expansion of The Personnel Security Assurance Program, about 700 additional employees, including Laboratory and Johnson Controls World Services, Inc., (JCI) personnel who work at TA-55 and the Chemistry and Metallurgical Research Building will be placed on random drug tests.
- All affected employees will receive Personnel Security Assurance Program training beginning in December 1991. Substance abuse training for Laboratory supervisors is incomplete at this time. About 75 percent of TA-55 supervisors have received training.
- LANL, DOE, and the University of California have not reached agreement on all of the critical positions that will be included in the Personnel Security Assurance Program. Training can not be completed until this is accomplished.

CONCERN: **See Concern TSA-2, OA.8-2.**

4.5.1.2 Quality Verification

4.5.1.2.1 Overview

The Nuclear Material Technology Division was evaluated using the performance objectives and criteria for TSAs. All seven performance objectives were evaluated. Minimal emphasis was placed on QV.2 Procurement and Supplier Control because in-depth coverage was provided by S&H Subteam 4.

The status of DOE 5700.6 during this assessment made for a unique condition regarding the compliance ratings. Since DOE 5700.6B has been revoked, and DOE 5700.6C is not required to be implemented until February, 1992, C1 compliance ratings are only assigned for deficiencies that do not meet both DOE 5700.6 revisions. For noncompliance to only DOE 5700.6C, a C2 compliance rating is assigned.

The results of this assessment show major differences in the level of quality attainment and verification between groups in the Nuclear Materials Technology Division. A quest for quality within is driven by customer demand rather than top management commitment to quality attainment and improvement. The Nuclear Fuels Technology Group and Heat Source Technology Group lead the Division in quality program implementation, but this is largely due to National Aeronautic and Space Administration (NASA) imposed quality requirements. However, the Craf/Cassini project milestones for the Heat Source Technology Group will be adversely affected by the lack of a shipping container to deliver completed assemblies to Mound Applied Technologies. The potential exists for the resulting major schedule change to have an adverse impact on quality. Most other groups in the Nuclear Materials Technology Division have developed QA plans, but these plans and the concept of QA are not understood by the people who must implement them. Some groups have not implemented any QA plan. The Heat Source Technology Group and Nuclear Fuels Technology Group programs have been adversely affected by a lack of effective QA in Division and Laboratory support groups.

Throughout the Nuclear Materials Technology Division, several consistently deficient areas in quality attainment were noted. The first deficient area is identification and control of items and material. The second is a lack of independent verification of critical activities. A third area of major deficiency is nonconformance control. A fourth area that has resulted in an ineffective quality program is a lack of understanding by all levels of division personnel of basic quality principles. Each of these four areas will be briefly discussed below.

Items and material, including completed, in-process, and awaiting use items, are not identified, labeled, or controlled to ensure correct use. Many examples were noted during this assessment of items where status could only be determined by contacting some specific individual. Material traceability is often lost during the work process. Certified material is not consistently controlled to ensure batches, lots, or heats are verifiable.

Acceptance of critical or special process activities are not consistently and independently verified by qualified personnel. Maintenance of Class A systems is not consistently and independently verified by Nuclear Materials Technology Division personnel to assure operability after work is completed. Inspections are not always performed by qualified personnel using established and approved

acceptance criteria. The dimensional inspection program may be self-defeating, due to the charge-back program that charges the requester $95 per hour for inspection. Project managers may decide to reduce or eliminate inspections to reduce the "cost" of their project.

A primary aspect of any quality program is to identify, determine cause, and correct deficiencies or trends that are adverse to quality. Although the Heat source Technology Group is applying a nonconformance program, most other Nuclear Materials Technology Division groups do not use or understand the nonconformance system. Many examples were noted during this appraisal of items or processes that did not meet specifications, yet were not identified as nonconforming. The causes of these deficiencies have not been identified and corrected; recurrence can, therefore, be expected. An almost universal attitude within the Nuclear Materials Technology Division toward items or processes that do not meet expectations is simply to "run it again, and it will work next time." This attitude is contrary to the concepts of deficiency identification, cause determination, and action to prevent recurrence.

Personnel throughout the Nuclear Materials Technology Division demonstrate a lack of understanding of QA concepts and principles. Even the QA representatives assigned to some groups do not understand quality attainment and verification. The QA representatives throughout LANL do not have to meet any minimum qualification requirement, and there is no professional development program that ensures they will have the knowledge needed to develop or coordinate QA activities within their group. Most division personnel think of QA as either calibration, documentation, or inspection. Line personnel up through top management do not understand their responsibility to attain and verify quality.

The LANL self-assessment addressed most of the concerns developed during this appraisal. The causes identified are appropriately critical and demonstrate a good effort to determine basic causes. The self-assessment does not, however, include a corrective action plan to fix the identified problems. Identifying problems does not assure that any will be corrected. The self-assessment recognizes some causes that will be difficult, expensive, and time consuming to correct. The lack of a corrective action plan is a serious deficiency in the LANL self-assessment.

In summary, LANL and the Nuclear Materials Technology Division management have not supported and enforced QA programs that meet DOE requirements. Management has not communicated to line personnel the expectation and commitment to quality attainment, verification, and improvement that is required by DOE Orders and mandatory standards. Line personnel are not aware of their responsibilities in quality attainment and improvement and, therefore, cannot be expected to meet those responsibilities. The approval and issuance of a generic QA plan does not ensure effective implementation. Management must demonstrate commitment to quality objectives, including expectation, vigilant enforcement, resources, and training for the program to be effective.

4.5.1.2.2 Findings and Concerns

QV.1 QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning quality are administered for each facility throughout the site.

FINDINGS:

- Many critical activities within the Nuclear Materials Technology Division and LANL site are operated by computer controlled automatic process systems. Examples include calibrations in the standards laboratory, the operation of the AA gage machine, testing of high-efficiency particulate air (HEPA) filters, welding of capsules for the SP-100 program, and others. No software QA program has been developed to verify and insure the integrity and configuration of the computer codes. Corrupted computer codes can cause improper machine operation, resulting in product failure or personnel injury.
- See Concern TSA-1, CS.2-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.1-1) (H2/C1) **At the Los Alamos National Laboratory, no quality assurance program has been developed and implemented within the Nuclear Materials Technology Division for control and verification of computer codes as required by ASME NQA-1 1989, DOE 5700.6C, and DOE 5700.6B.**

FINDINGS:

- Minor process changes can be made within some Nuclear Materials Technology Division operations using a temporary change to the safe operating procedure without review by the Process Safety Committee. It is the responsibility of the group leader to determine whether a change is minor.
- The Nuclear Fuels Technology Group procedure for fabrication of nuclear fuel pellets specifies that a nonconformance report be initiated for fuel batches that do not meet specification, but not for completed fuel pellets that fail final visual inspection.
- Some Nuclear Materials Technology Division, safe operating procedures (Example: 563-NMT 4-Rev 01) only contain generic information about the respective process. Critical process parameters are described in a detailed instruction document that is not reviewed, approved, or controlled.
- There is no Nuclear Materials Technology Division policy for review and approval of detailed instructions.

- The Nuclear Materials Technology Division safe operating procedure for electro-refining does not include criteria most likely to produce product rejection due to impurities. The existing approved procedure was not followed during an observed electro-refining run.

- Some procedures do not specify allowable limits and actions to be taken if allowable limits are exceeded. For example, some maintenance procedures require personnel to take readings on fluid level but do not specify action to be taken if level is low or high.

- See Concerns TSA-1, OP.3-2; TSA-4, MA.8-1; TSA-1, OA.2-1; TSA-1, PT.1-2; TSA-1, EA.2-1; TSA-1, CS.4-1; and TSA-1, AX.1-5.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.1-2) (H2/C1) **At the Los Alamos National Laboratory, procedures for some work processes in the Nuclear Materials Technology Division are not prepared, reviewed, approved, and controlled as required by DOE 5700.6C, and DOE 5480.19.**

FINDINGS:

- Section 2.3 of the Nuclear Materials Technology Division QA Plan, Rev. 00, states that QA criteria "apply to some of the many and diverse activities performed within the division's four programmatic areas of responsibility." This is contrary to DOE 5700.6C.

- Section 7.1 of the Nuclear Materials Technology Division QA Plan, Rev. 00 states: "The division office realizes that not all group functions require extensive Quality Assurance Plans. An appropriate Quality Assurance Plan will be written and implemented in each group by its line management in order to meet its groups unique needs."

- The modifications to the AA gauge machine were not covered by a QA plan or project plan. Most examples of this type measuring machine are in use at DOE facilities other than LANL. A QA plan would ensure that lessons-learned can be transferred to other DOE sites.

- A pressure safety committee and a die committee have been implemented at LANL. The 30,000 psi working pressure vessels used at TA-41 were not reviewed by the pressure vessel committee. A variable diameter die for a Fabrication and Assembly Group project being fabricated by the Mechanical and Electronics Support Division had not been reviewed by the die committee.

- The position of QA independent representative (from the Quality Operations Office) for the Nuclear Fuels Technology Group has been deleted due to budget constraints.

- The Heat Source Technology Group and the Nuclear Fuels Technology Group have implemented QA programs for several years that basically meet DOE and customer (NASA) requirements. However, other groups vary widely in their level of QA implementation. The Nuclear Materials Measurement and Accountability Group does not have an approved QA plan. The Plutonium Metallurgy Group has issued a QA plan, but it has not been implemented. The Fabrication Development Group has not developed a QA plan.

- Examples of poor housekeeping and electrical code violations were noted in Bldg. PF-4. When brought to the attention of facility supervision, it could not be determined if Class A or Class B maintenance personnel were responsible. (See Section 4.5.1.16.2, WS.4.)

- The currently approved Nuclear Materials Technology Division QA plan does not address quality improvement.

- See Sections 4.5.1.9.2, PT.3, and 4.5.1.2.2, QV.1.

CONCERN: **See Concern TSA-4, QV.1.**

FINDINGS:

- One Nuclear Materials Technology Division group QA representative stated that "quality does not apply to many of our processes." Another Nuclear Materials Technology Division group QA representative could not define the term quality assurance when asked. A third Nuclear Materials Technology Division group QA representative could not locate a copy of the QA plan for his group.

- There are no qualification requirements for assignment as a QA representative and no professional development plan to ensure QA representatives become knowledgeable in basic QA concepts.

- See Concern TSA-1, PT.2-1.

- The following concern was identified in the LANL self-assessment.

CONCERN:
(TSA-1)
(QV.1-3)
(H2/C2)

At the Los Alamos National Laboratory, Nuclear Materials Technology Division personnel responsible for coordination and development of quality assurance plans are not trained and qualified to ensure their performance capability as required by DOE 5700.6C.

FINDINGS:

- A large number of original and unique documents are stored in cardboard boxes piled about 6 feet high in the Nuclear Materials Technology Division warehouse. No protection is provided against accidental sprinkler actuation.

- Calibration records and other important documents for several groups are stored in three ring binders without any control or protection from effects of activation of overhead sprinklers.

CONCERN: **See Concern TSA-1, OA.7-3.**

FINDINGS:

- Only one QA audit of a group in the Nuclear Materials Technology Division was conducted in 1989 and only one in 1990. Some groups in the Nuclear Materials Technology Division have not been subjected to audit in several years. DOE 5700.6C requires regular planned and periodic independent assessments to measure effectiveness and improve quality.

- See Concerns TSA-1, PT.1-1, and TSA-1, PT.3-1.

CONCERN: **See Concern TSA-4, QV.1-2.**

QV.2 PROCUREMENT AND SUPPLIER CONTROL

PERFORMANCE OBJECTIVE: Provisions should be established for the control of purchased material, equipment, and services; for selection and control of suppliers; and for assessing the adequacy of procurement activities.

FINDINGS:

- Reliance Metals supplies most of the exotic and certified metals to LANL. No verification has been conducted to determine the validity of certifications received from Reliance Metals.
- There is no approved supplier's list for selection and control of suppliers at LANL.
- Several pressure vessels were purchased in 1985 for use with tritium research. These vessels are used with working pressures of 30,000 psi. Since they are filled with radioactive materials, the expected design code would be the ASME Boiler and Pressure Vessel Code, Section III, Nuclear Pressure Vessels. However, these vessels were not designed, fabricated, or tested in accordance with the requirements of Section III.
- A regulator and pressure gauge installed in Bldg. PF-4 has a maximum rating of 100 psi, but is installed on a system that normally operates at 98 to 115 psi. A review of procurement initiation by technically qualified personnel would have prevented an inappropriate item from being procured.
- See Section 4.5.4.2.2, QV.2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.2-1) (H2/C1) **Los Alamos National Laboratory has not implemented a program to qualify and review procurement activities and suppliers as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.**

QV.3 RECEIVING AND PRE-INSTALLATION INSPECTIONS

PERFORMANCE OBJECTIVE: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

FINDINGS:

- Critical parameters of material received for fabrication at the Mechanical and Electronics Support Division are not inspected and verified prior to use. The metals support personnel verify no shipping damage, material count, and some documentation. The user group is responsible for determining if material is suitable for use. Most users interviewed stated that they assume the material received is suitable for use.

- The Nuclear Fuels Technology Group has inspected the iridium cup halves furnished from the Y-12 Plant. Twenty-three of 91 did not pass visual and dimensional inspection. A nonconformance report has been issued. Nonconforming items were segregated but not tagged as required by the Nuclear Fuels Technology Group procedures.

- Some graphite dies stored as acceptable material in the Nuclear Fuels Technology Group storage area did not meet specified acceptance criteria, yet were not identified as nonconforming. The inspection data sheets indicated that each of these dies had at least one measurement outside allowable tolerances.

- Since no shelf-life program has been implemented, items cannot be inspected for exceeding allowable shelf life or known life span prior to installation.

- A new tritium monitor was found defective upon initial calibration by the Health Physics Measurements Group. Procurement has not been notified of the item failure; no nonconformance report has been initiated.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.3-1) (H2/C1) **At the Los Alamos National laboratory, a program to inspect, identify, and disposition items prior to use has not been implemented throughout the Nuclear Materials Technology Division in accordance with ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.**

QV.4 CALIBRATION PROGRAM

PERFORMANCE OBJECTIVE: Provisions should be made to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- Some groups in the Nuclear Materials Technology Division have not developed a calibration plan for all measuring devices used in their processes.
- Some calibration procedures used in the Standards and Calibration Group are not subjected to a formal review and approval program.
- A ratio of precision for standards is not prescribed for calibration performed in the Standards and Calibration Group. The ratio used is left to technician discretion.
- There is no implemented and documented certification and qualification program for all personnel performing calibration activities in the Standards and Calibration Group.
- Most surface plates used for precision measurement noted during this assessment were overdue for calibration. Examples of this deficiency were noted sitewide, including TA-55, the Mechanical and Electronics Support Division, and others. Some of the surface plates were overdue for calibration by lengths of time approaching 20 years.
- Many measuring and test equipment items used to measure critical process parameters in the Nuclear Materials Technology Division are not included in a periodic calibration or recall system. Examples include devices for critical temperature, voltage, speed, amperage, and mass measurement.
- See Concerns TSA-1, MA.3-1; TSA-1, RP.8-1; and TSA-1, RP.9-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.4-1) (H2/C1) **Equipment used for process monitoring, data collection, inspections, and tests at the Los Alamos National Laboratory is not always properly calibrated and maintained at specified frequencies by qualified personnel using controlled and approved procedures as required by DOE 5700.6C, ASME NQA-1-1989, and DOE 5700.6B.**

FINDINGS:

- A set of certified gauge blocks used by machinists in the Mechanical and Electronic Support Division for calibrating their micrometers, indicators, etc. are out-of-tolerance. The certification that is with the set

identifies that many are out-of-tolerance, some by over 10 times the allowable tolerance.

- The specific gravity for the liquid used by the Plutonium Metallurgy Group for density measurements has never been verified. This liquid is not subjected to periodic verification or testing to ensure density measurements are consistent and accurate.

- A voltage standard is past due for recalibration in the Mechanical and Electronic Support Division standards laboratory yet had not been identified as such and was available for use.

- A set of personally-owned, uncalibrated gauge blocks were noted in a machinist's tool box at the Mechanical and Electronics Support Division shop. The blocks are not identified for limited, conditional, or do not use as required by DOE 4330.4A.

- Records of use are not maintained for standards or measuring and test equipment at LANL. Devices found out-of-tolerance cannot therefore be traced to where the device has been used, and no impact evaluation can be made of the suitability or validity of previous measurements.

- Some neutron counter standards used by Nuclear Materials Measurement and Accountability Group are not traceable to any national standards or standards of the National Institute of Standards and Technology (NIST).

- The balances used as mass transfer standards in the Standards and Calibration Group for calibration are not subjected to a full routine calibration program. (They are performance checked prior to use, but linearity is not verified.)

CONCERN: **See Concern TSA-4, QV.4-1.**

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

PERFORMANCE OBJECTIVE: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

FINDINGS:

- A Fluke digital multimeter was found out-of-tolerance (many readings over 500% of allowable tolerance) upon calibration. No nonconformance was generated, no performance data was entered to identify trends adverse to quality, and no investigation was conducted to determine where the device had been used.
- If the final product in chloride processing fails to meet specification, it is simply recycled to repurify. No nonconformance is issued and the cause of the failure is not determined or corrected.
- Completed fuel pellets that are rejected during final acceptance inspection are segregated from the others and used as milling abrasive. No nonconformance is issued, no causes analyzed, and no corrective action taken.
- Material received by the Plutonium Metallurgy Group is analyzed for chemical composition upon receipt. If the material does not meet specification requirements, it is returned for recycle in the electro-refining process. The material is not identified as nonconforming; no cause determination is made.
- An area supervisor stated that products for some Nuclear Materials Technology Division processes occasionally do not meet specifications. When this happens the product is reprocessed. No basic cause has been determined, and corrective actions have not been taken.
- See Concerns TSA-1, PP.4-1, and TSA-1, EA.2-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.5-1) (H2/C1) **At the Los Alamos National Laboratory, items and processes that fail to meet established requirements are not identified, controlled, dispositioned, nor are causes of failure corrected as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.**

FINDINGS:

- Several examples were noted of hazardous chemicals that were not labeled or identified as required by procedures. Chemicals included ethylene glycol, bromobenzene, and calcium fluoride.
- Several examples of threaded fasteners identified as suspect were found installed in seismic Class 1 equipment in Bldg. PF-4. No program has been implemented in the Nuclear Materials Technology Division to find and

disposition suspect fasteners. Several thousand pounds of suspect bolts have been identified elsewhere at LANL.

- The ring gauge being fabricated in the Mechanical and Electronic Support Division, Shop 4, for use with the TA-55 AA-gauge was specified to be made of A-2 material. No certification was with the work sheet to indicate the material used. This is only one example of the problem of material ordered with Certified Material Test Reports, then the test reports being discarded when received. Material traceability is, therefore, lost.

- Certified material is stored in the Mechanical and Electronic Support Division warehouse with mixed heats and lots. No lot or heat identification is ensured for individual items. Material certification and traceability may, therefore, be invalid.

- Waste drums stored by the Nuclear Materials Management Group in the Bldg. PF-4 may be awaiting documentation completion, reopening for item removal, or resurvey. The drums are not labeled or segregated to indicate status.

- See Concerns TSA-1, OP.4-1; TSA-1, OP.5-1; TSA-1, CS.4-3; TSA-4, MA.7-1; TSA-4, RP.3-1; TSA-1, WS.3-1; and Sections 4.5.1.4.2, MA.3, and 4.5.1.9.2, PT.7.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.5-2) (H2/C1) **Items at Los Alamos National Laboratory are not identified and controlled to indicate status, maintain quality attributes, and prevent inappropriate use as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.**

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- Inspections within the Nuclear Materials Technology Division are performed only when requested and paid for by the customer group. Dimensional inspections are conducted by Inspection Group personnel and welding inspections are performed by JCI and the Fabrication and Assembly Group. The Inspection Group inspections are charged back to the customer at $95.00 per hour. Several personnel stated that inspections are minimized for many activities to decrease project "cost" and inspection charges.

- Not all dimensional inspections performed by the Inspection Group are done by certified inspectors. Inspectors are formally certified only for the advanced level of inspection in the Inspection Group, Dimensional Measurement.

- Personnel certified for waste characterization in the Nuclear Materials Management Group could not always identify some inspection attributes when presented with specific inspection scenarios and parameters. Qualification of these personnel may not ensure the expertise to conduct effectively all aspects of the inspections.

- There is no formal program to qualify inspectors that conduct inspection activities other than dimensional and nondestructive examination (examples-electrical, civil, piping, mechanical, etc.) at LANL.

- Helium leak testing is performed by several groups in the Nuclear Materials Technology Division, including the Plutonium Metallurgy Group, the Nuclear Fuels Technology Group, and the Heat Source Technology Group. None of these groups have implemented qualification programs for leak testing that meet ASNT-TC-1A.

- Many of the activities conducted in the Nuclear Materials Technology Division meet the definition of special process. The results of special processes should be verified to ensure that required acceptance standards are met. Very few Nuclear Materials Technology Division activities are subjected to independent verification.

- Independent verification of maintenance is not consistently conducted on critical equipment by the Nuclear Materials Technology Division to ensure equipment operability and correct maintenance.

- Inspections of construction and modification that impact facility safety work or reliability for Nuclear Materials Technology facilities is typically performed by engineering personnel. These inspectors are also responsible for cost and schedule for construction work and, therefore, cannot be considered independent.

- See Concern TSA-1, TC.8-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.6-1) (H2/C1)

A program for inspection and testing of items and processes at Los Alamos National Laboratory using established acceptance criteria has not been effectively implemented as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.

QV.7 CONTROL OF SPECIAL PROCESSES

PERFORMANCE OBJECTIVE: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

FINDINGS:

- There is no formal process work control or traveler system in use within the Central Fabrication Group area to direct work sequencing, material control, document special process parameters, or specify inspections. The work sheets that are used are not subjected to formal review. Examples of work sheets were noted that had steps omitted or in an incorrect order. The actual work is left to the discretion of the shop machinist.

- Almost all work conducted by the Fabrication Development Group meets the ASME NQA-1-1989 definition of a special process. There is no formal special process control system in use in the Fabrication Development Group that includes personnel qualification, review and approval of procedures, or advance review and approval of equipment.

- A variable diameter die (Dwg # 13Y85858, Rev. C) was being fabricated and had been heat treated. There was no documentation of the procedure or critical parameters for the heat treating. There was no verification of the heat treat process.

- See Concerns TSA-4, MA.2-1, and TSA-1, PT.3-1, and Section 4.5.1.4.2, MA.2.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (QV.7-1) (H2/C1) **Not all special process procedures, equipment, and personnel at Los Alamos National Laboratory are qualified in accordance with applicable codes, standards, quality requirements, and specifications as required by ASME NQA-1-1989, DOE 5700.6C and DOE 5700.6B.**

4.5.1.3 Operations

4.5.1.3.1 Overview

All of the eight performance objectives in the Operations functional area are addressed in this appraisal. The appraisal was conducted by means of direct observation and interviews with management; technical support and operating personnel; and a review of procedures, records, and manuals. Facilities visited and inspected included those in TA-3, TA-21, and TA-55. The primary facility inspected was TA-55, the plutonium processing facility; lesser time was devoted to the other lower-hazard facilities. However, the weaknesses noted were similar to those noted at TA-55.

Overall, the operations functions are judged to require significant improvement to achieve compliance with current DOE Orders and industry standards for nuclear facilities. Deficiencies were found related to assignment of responsibility without authority; informality in conduct of operations; deficient technician proficiency, procedures, and document control; deficient facility status controls; and deficient human factors engineering. Many of the findings and concerns are a result of failure to implement facility upgrades as industry standards evolved, whereas others are a result of failure to implement requirements of the specific Orders, particularly DOE 5480.5 and DOE 5480.19. Thirteen concerns are identified.

Two hierarchies of operations exist at TA-55; facility operations (such as control of power and ventilation), and laboratory operations (processes such as electro-refining and chemical treatment of plutonium scrap metal) conducted within Bldg. PF-4, usually in gloveboxes by discipline groups. At both levels, duties and responsibilities are programmatically defined but require improvements in programs and implementation. A generic concern of the S&H Subteam is the assignment of responsibility to management staff without commensurate authority to discharge the responsibility.

An organizational concern is noted in that the nine groups in the Nuclear Materials Technology Division function independently and inconsistently, even though many of the group responsibilities such as QA document control, training, and procedures are common to all the Nuclear Materials Technology Division groups. The lack of uniform, division-level requirements, oversight, or guidance contributes to deficient programs and deficient implementation at the subordinate group level.

Many operational activities were found to be informal, both at the facility and at the process level. Many activities are performed by verbal agreements, rather than by documented fulfillment of requirements. This resulted in a S&H Subteam concern that documentation was not available to demonstrate that all activities were performed in a safe, reliable manner. None of the facility managers interviewed exercise control over all critical activities and status changes. The TA-55 facility utilizes an Operations Center solely as a monitoring focal-point; little if any facility status control is exercised in the Center.

Shift turnovers by the Operations Center watch are conducted in accordance with a checklist but were noted to be rather informal and not comprehensive. Operations are primarily conducted on a single shift per day basis, but some processes run on a 24-hour per day basis. These processes are not explicitly

made known to operations personnel to permit their increased awareness during back-shift periods.

Most activities at TA-55 have procedures to govern operations, but the S&H Subteam is concerned that procedures are not uniformly used by all persons, are not always accurate, do not contain items of guidance commonly found in industry, and that control of procedures does not uniformly ensure that the latest approved version is available and in use. Some facility safety systems do not have procedures for startup, normal operation, shutdown, and abnormal or off-normal operation.

Facility equipment and system design changes and modifications are not always managed effectively or known to supervisory operations personnel. Multiple organizations outside TA-55 operations can effect changes to TA-55 without the authority of TA-55 management. There is concern that the facility status is not always controlled to ensure its safe and reliable operation and compliance with design basis requirements.

In general, operations stations and facility equipment supports normal facility operation. Equipment condition, including minimal off-normal equipment, and general area housekeeping are satisfactory. However, an area of concern was noted by the S&H Subteam in that management sensitivity to potential off-normal operation was poor. Unsafe conditions, such as poorly anchored, critical safety panels which contain loose, electrically conducting materials and improperly secured hazardous gas bottles, are present. These conditions may place the facility outside of its design safety envelope. These concerns are addressed in detail in the Natural Phenomena technical area, Section 4.5.1.18.2; NP.1.

Operator knowledge was assessed by direct observation of performance of tasks and by interview. Weaknesses were noted in operator knowledge and performance of routine and off-normal duties which are a result of deficient procedures, training, and supervision.

The S&H Subteam is concerned that several areas throughout the TA-55 complex, including facilities housing critical safety systems and components, have entire systems, (including valves and other components), that are not labeled in order to facilitate operator control, information processing, and recognition and proper response to alarms and instruments. Out-of-service equipment is not identified. Support equipment such as vacuum pumps and associated pipes and valves, to processes in TA-55, is not labeled with meaningful information. There are few color ranges on instruments. In general, human factors engineering considerations are not applied to facility modifications or repairs.

In summary, the S&H Subteam is concerned about the ability of TA-55 (the buildings and its systems, the facility personnel, and the Laboratory) to correctly and promptly respond to an off-normal event to protect the health and safety of the public. Inspections of fire protection systems and other critical safety systems, and inspections showing low resistance to the adverse effects of seismic events, clearly indicate the facility may be operated outside its design basis. Initiating events, such as a seismic disturbance, could cause an accident that would not be mitigated by the facility design. A 24-hour per day facility manager (shift supervisor), with the authority and responsibility to immediately initiate mitigative strategies and to

immediately initiate offsite notifications and formulate protective action recommendations, is not available but must be called in. Lastly, an emergency action level and classification scheme to permit effective offsite notifications is not included in the facility emergency plan. When combined, this series of program and implementation deficiencies represents a threat to the safe operation of the TA-55 facility.

The LANL self-assessment was appropriately critical of operations activities at LANL; however, corrective action plans have not been developed which identify programs to address the identified deficiencies.

4.5.1.3.2 Findings and Concerns

OP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Operations organization and administration should ensure effective implementation and control of operations activities.

FINDINGS:

- The Nuclear Materials Technology Division Leader, has the responsibility for safe operation of the facility in accordance with the Final SAR and OSRs, but groups outside the line organization of the Nuclear Materials Technology Division have responsibility for operation and maintenance of the facility equipment and not infrequently perform those activities independently of the Division. The Division Leader can exercise authority over some but not all personnel and activities affecting operations at TA-55 (this condition is repeated at other facilities).

- Administrative controls for activities that affect safe and reliable facility operation and required by DOE 5480.5 and DOE 5480.19 are not implemented.

- Nine groups function within the Nuclear Materials Technology Division that are individually responsible for establishing their own programs in areas such as QA, document control, job-specific training, and procedures. The programs, implementation, and adequacy at the group level is not uniform.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OP.1-1) (H2/C1) **At the Los Alamos National Laboratory, the Nuclear Materials Technology Division and the TA-55 Facilities Management Group organization and administration have not established policy guidelines, criteria, or standards for control of facility operations in compliance with DOE 5480.5 and DOE 5480.19.**

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

FINDINGS:

- Some TA-55 process operations continue 24-hours per day. However, the person assigned the facility watch 24-hours per day does not have the duties, responsibilities, or authorities of DOE 5480.19 to control the process activities.
- Many TA-55 maintenance activities affecting facility status are performed during back-shift periods to prevent interference with daytime process activities. However, the person assigned the facility watch 24-hours per day does not have the duties, responsibilities, or authorities of DOE 5480.19 to control the facility status changes.
- A continuous watch is maintained in the TA-55 Operations Center to monitor computer presentations and instruments, but the watch only initiates callout of cognizant personnel and makes public address system announcements in event of an off-normal condition. No individual is continuously available to ensure the facility status is maintained in accordance with the OSRs, nor to immediately initiate mitigative response strategies or required notifications in the event of an off-normal event.
- The management of TA-55 was unaware of shift supervisor responsibilities for off-normal event identification, classification, and notification in accordance with the DOE 5500 series of Orders.
- See Concern TSA-1, EP.1-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OP.2-1) (H1/C1) CAT. II

At the Los Alamos National Laboratory, a program to provide a qualified shift supervisor who exercises facility command and control in compliance with DOE 5480.19 during all TA-55 operations has not been implemented.

FINDINGS:

- TA-55 Operations Center activities are conducted in an informal manner. Newspapers are read, and large numbers of persons congregate in the center and in the horseshoe area of the computer console. Operations Center access is not restricted.
- The Operations Center Manual (e.g., operating and off-normal procedures) is not a controlled document, and contains unapproved sections. A controlled TA-55 Safety

Manual is not available in the Operations Center, although required to be by the Operations Center Manual.

- The TA-55 facility logbook is not maintained in accordance with instructions for its use, e.g., meaningless entries, open-ended entries (log entry when an action is started but no entry for its termination), informal entries such as first names of watchstanders, blot-outs, etc. Although a shift turnover sheet is in use, at least one does not comprehensively reflect equipment status at shift turnover.

- Logs of operating equipment parameters are not maintained, nor is trending of equipment parameters performed. This prevents equipment failure prediction based upon evaluation of operating parameters.

- This concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OP.2-2) (H2/C1) **At the Los Alamos National Laboratory, TA-55 Operations Center activities are conducted in an informal manner, which is not in compliance with DOE 5480.19.**

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

FINDINGS:

- The TA-55 draft Final SAR, dated April 1991, requires Bldg. PF-4 Zone 2 Recirculation Filtration to be operating for Zone 2 recirculation to be considered "operable." TA-55 OSRs, dated September 1988 (Revised January 1989), lists several Limiting Conditions for Operation of ventilation in the Bldg. PF-4, but omits the Final SAR requirements regarding Zone 2 Recirculation Filtration.

- Paragraph 3.5.1 "Specifications. Fire alarms . . . ." of the OSR for Bldg. PF-4, dated September 1988 (Revised January 1989), lists the limiting conditions for operation for fire alarms. The Specification states, "Fire alarms . . . must be operable to warn personnel . . . .", but does not specify the required action if one or more fire alarms are found inoperable.

- The TA-55 Final SAR, April 1991, lists the maximum expected hazardous and toxic materials, and their location, e.g., "Phosgene 2 cylinders 30 lbs ea. PF-3." These values are used in the Final SAR computations of design accident calculations, but the amounts are not specifically limited by the OSRs as specifications. TA-55 OSRs simply state, "Hazardous or toxic materials in PF-4 are limited to the greatest extent possible. . ."; Bldg. PF-3 amounts are omitted. The practice of not specifying permissible amounts of hazards outside of Bldg. PF-4, but within the TA-55 facility is inconsistent with the requirements of DOE 5481.1B, Chapter II, paragraph 2., Extent of Applicability.

- See Concerns TSA-1, OA.7-1, and TSA-1, OA.7-2.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OP.3-1) (H2/C1) **At the Los Alamos National Laboratory, the currently approved TA-55 Operational Safety Requirements are not complete and not consistent with the Final Safety Analysis Report as required by DOE 5480.5 and DOE 5481.1B.**

FINDINGS:

- Most groups at TA-55 do not have detailed procedures that specify steps for preparation, verification, validation, review (including independent review), and distribution of group procedures, nor do the groups have a writer's guide for preparation of procedures.

- The TA-55 Facilities Management Group has a recently prepared writer's guide, but the guide is inconsistent

with industry standards, and the guide was not published to some persons responsible for preparation of procedures within the Group.

- A procedure document control system that includes the following elements is not implemented for all TA-55 groups:

  - signature for issue and receipt of revised procedures in controlled manuals,

  - periodic audit of group manuals to ensure manual contents are the latest revisions,

  - specific requirements for users to verify that the procedure about to be used is the latest revision, and

  - updating of the procedure index when significant change occurs or at some periodic interval that prevents the index from becoming grossly out-of-date.

- Procedures have not been prepared for startup, operation, shutdown, and abnormal operation of several of the safety systems, such as the air system for TA-55. The same condition exists for TA-3 and TA-22.

- Not all off-normal and emergency procedures have been considered and prepared for TA-55 (e.g., emergency response to natural phenomena), nor do the current off-normal procedures reference the laboratory emergency plan.

- Procedures do not include applicable source documentation. For example, OSRs are not referenced by applicable procedures; surveillance procedures do not state the OSRs criteria to which they are related, the acceptance criteria, nor the required action to be taken if outside acceptance criteria.

- Data sheets supporting process procedures lack attributes of a quality record, e.g., data sheets are filled out in pencil, contain erasures, contain data blocks without required data, and are not marked with retention periods or location.

- An Operations Center watchstander did not refer to procedures for off-normal conditions when presented hypothetical scenarios; rather, he relied on his memory.

- The S&H Subteam noted that TA-55 laboratory technicians did not refer to the appropriate procedure prior to nor during a technically challenging process manipulation requiring multiple technician coordination. The

procedure was not immediately available as it is required to be. The team noted that the procedure for the process lacked specific detail and was different from the process observed.

- Although a daily check of TA-55 systems and equipment in the Bldg. PF-4 basement is informally conducted, the checks are not formalized, records of the checks are not retained, criteria for acceptable equipment performance are not established or published, and the checks may not be performed if personnel are not present.

- Operator aids are posted in the TA-55 facility (on switchgear, Computer Processing Units), but are uncontrolled, not verified as correct, not dated, and not approved for posting.

- See Concerns TSA-4, MA.8-1; TSA-1, CS.4-1; and TSA-1, QV.1-2.

- Many operating procedures at the tritium facilities are not sufficiently detailed, are not properly authorized, or are not under configuration control program as required in DOE 5480.19. (See Section 4.5.2.3.2, OP.3.)

- Operating procedures (experimental plans) at the Los Alamos Critical Experiments Facility are not prepared according to the conduct of operations Order, DOE 5480.19. (See Section 4.5.2.3.2, OP.3.)

- Development, control, and conduct of procedures at the accelerator facilities do not meet the requirements of DOE 5480.19. (See Section 4.5.3.3.2, OP.3.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OP.3-2) (H1/C1) **At the Los Alamos National Laboratory, procedures are not consistently prepared, reviewed, controlled, or implemented in compliance with DOE 5480.5 and DOE 5480.19.**

OP.4 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should know the effect of non-operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- Permission of the TA-55 Facilities Manager is not required to alter facility status, that is, to commence maintenance or to commence surveillance testing. Facility management does not perform centralized processing of work authorizations or setting of equipment tagouts.

- Neither a facility plan-of-the-day of management-approved activities nor any other notification is used to notify operations and other facility persons of authorized, planned activities that affect facility status. As a consequence, several occasions of critical safety equipment status changes have occurred without the knowledge of responsible TA-55 Facilities Management Group operations personnel.

- Equipment and system operations, troubleshooting, and repair (other than heating, ventilation, and air conditioning and uninterruptible power supply) are performed by the Field Operations Group of the Facilities Engineering Division and the maintenance contractor. These organizations are not in the line of authority of the Division Leader for TA-55 (similar situations exist for TA-3 and TA-21), thus their respective activities that can affect facility status are not directly controlled by the division/group that is responsible for the facility.

- A deficiency identification system for equipment out-of-service or in degraded operating condition is not in use. Operators can not readily identify the current status of indicators and instruments.

- See Concerns TSA-1, QV.5-2, and TSA-1, MA.1-1, and Section 4.5.1.6.2, AX.1.

- TA-55 does not have a program for performance of special tests or evolutions (temporary modifications), nor is the subject addressed in the OSRs. The S&H Subteam noted an instance of an unapproved and unreviewed temporary modification to safety-related equipment (controllers for Bldg. PF-4 basement ventilation blowers).

- TA-55 drawings were not updated to as-built configuration from design configuration upon completion of the construction project in 1978.

- Numerous sketches of design changes made during construction, and numerous modifications (that may or may not have drawings) made during the operational period for the facility, have resulted in a large difference between original design drawings and current as-built condition.

- Facility management has initiated a program to re-establish (re-constitute) the facility configuration by system walkdowns of about 2000 important safety and safety-related drawings, but limited resources place the completion of the project years into the future.

- A walkdown of affected systems to verify as-built conditions is not required prior to initiating a facility modification or setting a system tagout.

- Modifications affecting TA-55 have been initiated by organizations outside the Nuclear Materials Technology Division without the review and approval of the Division.

- Recent modifications have not always resulted in the Facilities Engineering Division forwarding correct as-built drawings to TA-55.

- See Concerns TSA-1, FP.3-1, and TSA-1, AX.5-1.

CONCERN: **See Concern TSA-2, OP.4-1.**

FINDINGS:

- Procedure 503-GEN-R00, "Tagouts and Lockouts," does not clearly define duties, responsibilities, and authorities for initiating, reviewing, approving, setting, auditing, and clearing tagouts.

- Specific details, that is, setting boundary points, vent/drain paths, pressures and type of energy source vs. numbers of tags required, tagging sequence, and requirements for independent verification, are not included in the facility tagout procedure.

- Records of previous tagouts are not retained.

- See Concerns TSA-1, WS.4-2, and TSA-4, PP.2-2, and Section 4.5.1.15.2, PP.2.

- Lockout and tagout practices in tritium areas at LANL do not meet requirements of DOE 5480.19. (See Section 4.5.2.3.2, OP.4.)

- The Omega West Reactor facility and the Los Alamos Critical Experiments Facility do not employ a lockout and tagout system which is consistent with DOE 5480.19. (See Section 4.5.2.3.2, OP.4.)

- See Section 4.5.4.3.2, OP.1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (OP.4-1) (H1/C1) **At the Los Alamos National Laboratory, an effective program for control of equipment tagouts and lockouts that provides for personnel and equipment protection and configuration control has not been established or implemented in compliance with DOE 5480.19.**

FINDINGS:

- The DOE facility representative is not included in the review process of work items. As a consequence, the facility representative is unable to fulfill DOE 5480.19 responsibilities related to oversight of day-to-day operations.

- The following concern was not identified in the Los Alamos Area Office (LAAO) self-assessments.

CONCERN: (TSA-1) (OP.4-2) (H2/C1) **The Los Alamos Area Office facility representative to TA-55 at the Los Alamos National Laboratory, does not fulfill all responsibilities related to oversight of day-to-day operations in compliance with DOE 5480.19, such as review of facility modifications that may involve unreviewed safety questions.**

OP.5 OPERATION STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operation stations and facility equipment should effectively support facility operation.

FINDINGS:

- Material conditions internal to equipment or immediately adjacent to equipment are unsatisfactory as the following examples indicate:

  - The Bldg. PF-6 west switchgear room contains a large, open telephone termination panel, with significant amounts of salt (probably $CaSO_4$) leaching from the supporting concrete blocks onto the terminal panel. The extent of impact on the communication system due to the potential for shorting or grounding of the telephone system is unknown.

  - Combustible and conducting material is found on numerous battery cells or battery racks. The batteries supply power for the auxiliary generator (nonsafety-related) and control power for the auxiliary generator switchgear.

  - Four file cabinets of uncontrolled spare parts for the safety-related air compressors are adjacent to the auxiliary diesel generator and may be subjected to extreme environmental conditions. Discarded and used parts are among the spares.

  - Two full 5-gallon pails of paint stripper were found unattended alongside the auxiliary diesel engine (Bldg. PF-8). Two boxes of glass reagent jars (about 10 lbs in each jar, four jars per box) of calcium metal are stacked unsupported on a pallet in the proximate location of a wash sink in Bldg. PF-7.

  - The Bldg. PF-4 heating ventilation and air conditioning control panel CP824 contains much electrically conducting material on elevated shelves, including discarded relays, tubing fittings, and instrument tubing (about 10" long) and three mercury containing thermometers. Several other control panels contained equivalent debris.

  - A piping modification to the nonsafety regenerative gas manifold P-10 (outside, adjacent to Bldg. PF-4) was made several years ago to remove remotely actuated, ASCO solenoid trip valves. The work item is incomplete as evidenced by the solenoid valves still hanging from their electrical conduits at the manifold. Piping and instrumentation drawings do not reflect any details concerning the installation.

- See Concern TSA-1, QV.5-2.

- The following concern was partially addressed in the LANL self-assessment.

CONCERN: (TSA-1) (OP.5-1) (H2/C1) **At the Los Alamos National Laboratory, not all TA-55 material conditions effectively support facility operation as required by DOE 5480.19.**

OP.6 OPERATOR KNOWLEDGE AND PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which they are responsible.

FINDINGS:

- The DOE facility representative has not been provided with detailed, facility-specific training in systems and equipment that would provide the knowledge to perform the responsibilities defined in DOE 5480.19.
- See Concern TSA-1, OP.4-2.
- The following concern was not identified in the LAAO self-assessments.

CONCERN: (TSA-1) (OP.6-1) (H3/C1) **The Los Alamos Area Office facility representative has not been provided facility-specific training to promote effective oversight of the Los Alamos National Laboratory TA-55 operations in compliance with DOE 5480.19.**

FINDINGS:

- Not all TA-55 Operations Center specialists understand the relationship of OSRs "Specifications" and the impact of success or failure of surveillances performed to demonstrate safety system operability.
- See Concern TSA-1, TC.3-1.
- A Nuclear Materials Processing: Chloride Systems Group process of recovering product following an electro-refining process was conducted by technicians who did not refer to the appropriate procedure before, during, or after the operation.
  - Several weaknesses in technique were observed, e.g., the furnace was opened widely on initial exposure of the product to the atmosphere, creating metal fire and sparks. At least one spark jumped onto the rubber-gloved hands of one of the technicians but was seen by the opposite side technician and promptly brushed off. Smoke generation was so significant that visibility of the sparks was reduced. The procedure cautioned the technicians to exercise caution when opening the furnace.
  - Technicians used tools improperly, e.g., beating with a file on the handle of a crescent wrench laid on a packing gland to reduce the stacked height of the packing.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **(TSA-1)** **(OP.6-2)** **(H2/C1)**	**At the Los Alamos National Laboratory, TA-55 facility operations and technician personnel do not always demonstrate technical proficiency nor receive management supervision to ensure the safe and effective performance of their duties and responsibilities as required by DOE 5480.19 and DOE 5480.20.**

OP.8 HUMAN FACTORS

PERFORMANCE OBJECTIVE: Human factors considerations should be incorporated in the design, layout, and operation of all facilities on the site in order to facilitate operator control, information processing, and the recognition and proper response to alarms, instruments, and other equipment.

FINDINGS:

- Not all indicators, instruments, controls, panels, valves, and piping for safety and nonsafety systems are labeled in TA-3, TA-21, and TA-55.
- Inoperative instruments or indicators are not identified in TA-3, TA-21, and TA-55.
- Some instruments have ambiguous labeling, e.g., the wind direction indicator on the meteorological panel in the Operations Center. Operations personnel do not understand indications - in the example, it was unknown whether the wind was "to" or "from" the direction indicated.
- TA-55 Operations Center computer monitors do not always display information in an unambiguous manner. As an example, the heating, ventilation, and air conditioning system air flow directions are graphically depicted as ">----------<", when in fact the flow is ">---------->"; differential pressures are not annotated with the reference points of measurement. Stack release rates of radioactivity to the environment are in units of disintegrations per minute versus microCuries per second thus, conversion is required by the monitor user to obtain meaningful information.
- Light fixtures in the Operations Center over the Supervisory Control and Data Acquisition computer terminal flicker at a rate that induces flicker vertigo when seated at the terminal.
- Computer cabinets are not maintained with proper closure status; e.g., cabinet doors are left ajar in the Operations Center, and grommets are improperly positioned in wireways to the cabinets.
- Facility modification packages are not subjected to human factors review when applicable.
- Facility procedures do not incorporate attributes of human factors engineering from DOE 5480.19 and NUREG-0899 so as to ensure that each procedural step contains only one action item or to place caution and warning notes before the step to which they are applicable.
- Numerous modifications have been made to the TA-55 ventilation system that result in electro-controllers

becoming inoperative. These controller faces are taped over with no annotation to indicate the controller status.

CONCERN: **See Concern TSA-2, OP.8-1.**

4.5.1.4 Maintenance

4.5.1.4.1 Overview

All eight of the performance objectives in the Maintenance technical area were addressed in this appraisal. The appraisal was conducted by observation of the conduct of maintenance activities; interviews and discussions with managers, supervisors, and technicians; and a review of procedures, records, and other documents. Facilities reviewed were in TA-3, TA-21, TA-41, and TA-55. The principal focus of this appraisal was on plutonium processing in TA-55 because it is the highest hazard nuclear facility at LANL and has received the greatest attention by LANL senior management. Thus, issues identified with respect to TA-55 maintenance are also expected to apply to other plutonium-related facilities.

LANL has a great deal of work to do to come into compliance with current DOE requirements for the management of maintenance. The Laboratory has taken the necessary first step toward dealing with the problem, which is acknowledgement that the problem exists. However, it is not yet clear that LANL knows how to implement programs to achieve compliance with these maintenance requirements. The infrastructure needed for establishment of a maintenance management program required by DOE 4330.4A is counter to the LANL culture which values diversity and heterogeneity. Two other important steps have been taken toward establishment of a LANL maintenance management program; one being the establishment of a Maintenance Management Office with responsibility for maintenance policy, planning, and coordination sitewide; the other being the promulgation of a draft policy on maintenance. However, discussions with cognizant personnel indicated that there is no clear implementation strategy identified that will provide a maintenance management program which meets the requirements of DOE 4330.3A while addressing the Laboratory values of diversity and heterogeneity.

Historically, maintenance of plutonium facilities, as well as of other LANL facilities, has been divided into two categories; Class A property and equipment such as buildings and associated utilities including plumbing, electrical and mechanical systems, and Class B equipment used purely for programmatic purposes such as gloveboxes and equipment inside gloveboxes. Maintenance of Class A equipment is the responsibility of the Facilities Engineering Division, while user groups are responsible for maintaining Class B equipment. A LANL subcontractor, JCI conducts maintenance of most Class A equipment and some Class B equipment. LANL has provided essentially no sitewide guidance or requirements for the conduct of maintenance on Class B equipment. Each organizational unit has been left to make its own determination as to the planning, control, conduct, and documentation of maintenance for which it is responsible. In most cases, these decisions have been pushed down to the lowest organizational level (the groups). There has also been little oversight of maintenance activities by LANL upper management.

The net result of these practices is that the quality of maintenance activities is based on the individual initiative of group leaders and their subordinates. In some cases, these standards are high and maintenance is controlled, conducted, and documented effectively. In other cases, however, materials are not received, stored, or controlled in a way ensuring that (1) appropriate materials are used for maintenance; (2) measurement and test equipment used for maintenance is not out of, or past due for, calibration;

(3) procedures are used to conduct maintenance; (4) post-maintenance testing is performed to ensure that equipment is functioning as intended; and (5) maintenance is documented in a way that demonstrates that plutonium facilities are operating within their approved safety envelopes.

Another area of concern relates to the maintenance and surveillance of inactive LANL facilities. LANL has implemented a program to decontaminate and decommission (D&D) inactive and excess facilities. However, there is no program to ensure that Class B equipment in inactive facilities, that are not in the D&D program, is provided maintenance and surveillance in a way that it does not become a hazard to Laboratory personnel or a threat to public health and safety.

The LANL self-assessment was appropriately critical of maintenance activities at LANL. In addition to concerns with respect to each of the maintenance performance objectives, one of the 17 key findings (concerns) in the LANL self-assessment was that "the Laboratory management has not mandated a maintenance program consistent with DOE 4330.4A." However, corrective action plans have not been developed that identify programs to address the identified deficiencies.

4.5.1.4.2 Findings and Concerns

MA.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

FINDINGS:

- LANL has not established sitewide standards or other requirements for the conduct of maintenance on equipment used for programmatic purposes (Class B equipment), including that in nuclear facilities. Each division is responsible for determining its own maintenance standards for programmatic equipment. Divisions and groups can choose to conduct their own maintenance or use the services of the LANL support services contractor (JCI).

- The Facilities Engineering Division is responsible for conducting maintenance on Class A equipment sitewide. Class A equipment includes buildings and utilities such as plumbing, electrical, and ventilation systems. Several examples were identified during this appraisal where maintenance and modification of Class A equipment was conducted by the Facility Engineering Division without the knowledge or consent of the landlord or building manager for the subject facility.

- In June 1991, LANL established the Maintenance Management Office within the Facilities Engineering Division. This office is intended to provide sitewide policy and plans for maintenance and criteria for critical systems including those in nuclear facilities; however, none of these plans have been finalized.

CONCERN: **See Concern TSA-4, MA.1-1.**

FINDINGS:

- LANL has not imposed sitewide maintenance goals, objectives, or performance indicators. DOE 4330.4A, Chapter II, Section 2.3.4, indicates that maintenance goals are to be used as a management tool for involving cognizant facility groups in improving maintenance performance and for measuring maintenance effectiveness.

- LANL has established June 1993 as the target date for developing goals, objectives, and performance indicators for maintenance. This was judged by the S&H Subteam to be an unnecessarily long delay.

- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-1) (MA.1-1) (H2/C1)** **The Los Alamos National Laboratory, has not established goals and objectives or performance indicators for maintenance as required by DOE 4330.4A.**

FINDINGS:

- DOE 4330.4A, Section 9.k, requires that the maintenance of DOE nuclear facilities meet guidelines, as appropriate, equivalent to those required for the conduct of maintenance at commercial nuclear power stations. LANL has established a draft maintenance policy, but it does not specifically address nuclear facilities. The current LANL schedule does not call for facility-specific maintenance plans until June 1993.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (MA.1-2) (H2/C1)

The Los Alamos National Laboratory draft maintenance policy does not provide a commitment to maintenance of nuclear facilities that meets the requirements of DOE 4330.4A.

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

FINDINGS:

- Maintenance of safety-related equipment in plutonium facilities is not always controlled or conducted in such a way that the building manager is aware of activities which compromise the intended function of such equipment. For example:

  - In TA-55 Bldg. PF-4, the S&H Subteam found that both ventilation systems in the basement had been modified so that they are controlled by the same controller. This modification to the system, done to prevent hunting by the two separate controllers was not formally reviewed or approved. The system drawings had not been modified to reflect this change.

  - Welding was conducted on the backup air compressor receivers for the Chemistry and Metallurgical Research Building. The air system in the Chemistry and Metallurgical Research Building provides control for the ventilation system, which is a safety-related system. Nonstructural welding on a pressure vessel is not allowed by the American Society of Mechanical Engineers (ASME) Code; as a result, the Authorized Inspection Agency responsible for conducting inspection and testing of LANL pressure vessels (Hartford Steam Boiler Company) did not certify the Chemistry and Metallurgical Research Building backup air compressor receivers. The Facilities Engineering Division (not an Authorized Inspection Agency) subsequently provided its own certification of these receivers. The Chemistry and Metallurgical Research Building Manager was not involved in any of these decisions which potentially involve a question of compliance with OSRs.

- Maintenance activities related to OSRs are not authorized, controlled, conducted, or documented in a way that ensures the plutonium facilities (e.g., TA-55 and the Chemistry and Metallurgical Research Building) are maintained within the safety envelope defined in the SARs. Examples of deficiencies in this area include:

  - Maintenance activities related to OSRs are not identified so that personnel performing such maintenance are aware of authorization and documentation requirements.

  - There are no requirements for the use of procedures to conduct such maintenance, or for the

documentation of such maintenance in a way that demonstrates compliance with OSR requirements.

- Re-test requirements are not established to ensure that maintenance was properly conducted and that the equipment will function as intended upon completion of maintenance.

- Several instances were observed of improper electrical wiring in plutonium facilities, including terminations and wiring not in compliance with the National Electrical Code. These deficiencies indicate that either electrical work is being done by individuals who are not properly qualified, or that qualified individuals are knowingly performing substandard work.

- Several instances were observed in plutonium facilities where the lockout/tagout requirements of OSHA Standard 29CFR1910.147 and DOE 5480.19 were not being followed for maintenance and servicing work. These deficiencies include the assignment of responsibility for the operation and maintenance of laboratories to individuals who were not aware of lockout/tagout requirements, and use of locks and tags other than those specified by the LANL AR.8-6, "Lockout/Tagout Plan and Procedure," dated August 20, 1991, and the OSHA standard.

- Several areas in the plutonium facilities that personnel must enter to perform maintenance are confined spaces per ANSI Z117.1-1989 but were not so identified.

CONCERN: **See Concern TSA-4, MA.2-1.**

MA.3 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- Gauge blocks used by mechanics to set up micrometers in the Mechanical and Electronics Support Division are out of tolerance. These gauge blocks are not segregated or marked to indicate that they are not to be used.
- Several measuring and test items available for use in fabrication in the Mechanical and Electronics Support Division were noted to be overdue for calibration.
- Several glovebox radiation monitors in Bldg. PF-4 were past due for calibration. Discussions indicated that a backlog at the calibration facility had resulted in their not being calibrated within the established period. Personnel questioned were uncertain about what actions should be taken as a result of these monitors being past their calibration due dates.
- DOE 4330.4A, Chapter II, Section 12, states that measurement and test equipment with suspected or actual deficiencies should be segregated and marked to prohibit its use. Neither the LANL Calibration Handbook nor the Nuclear Materials Technology Division calibration procedures address this issue.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (MA.3-1) (H2/C1) **At the Los Alamos National Laboratory, not all measurement and test equipment related to plutonium facilities with suspected or actual deficiencies has been segregated or marked as required by DOE 4330.4A, Chapter II, Section 12.**

FINDINGS:

- During a review of maintenance activities at TA-55, five of seven lifting devices checked had not been inspected as required by LANL AR 13-2. AR.13-2 is based on American National Standards Institute (ANSI) and OSHA standards related to cranes, hoists, lifting devices, and rigging.
- AR 13-2 provides forms for preoperational inspections and monthly inspections for overhead cranes and hoists. For some cranes and hoists these forms are prominently displayed for use by operators; for others, they are not provided.

CONCERN: **See Concern TSA-4, MA.3-3.**

FINDINGS:

- LANL has not implemented policies and procedures for receiving, inspecting, handling, storing, retrieving, and

issuing equipment, parts, and materials for maintenance as required by DOE 4330.4A, Chapter II, Section 11.

- During walkthroughs of material storage areas in TA-55 and TA-21, numerous deficiencies were identified. Examples include: materials such as metal pipe were not marked and segregated to ensure that improper materials were not used; shelf-life control programs were not in place for items important to safe operation; and stainless steel components were stored outside in direct contact with carbon steel components, resulting in accelerated corrosion.

CONCERN: **See Concern TSA-1, QV.5-2.**

MA.4 PLANNING, SCHEDULING, AND WORK CONTROL

PERFORMANCE OBJECTIVE: The planning, scheduling, and control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and effective manner.

FINDINGS:

- The Facilities Engineering Division has established a sitewide system for planning, scheduling, and controlling maintenance for Class A property and equipment, which includes buildings, utility systems, and equipment that is essential to the normal functions of a building such as plumbing, mechanical and electrical systems. However, this system does not ensure that landlords and building managers who are responsible for this equipment are involved in decisions related to maintenance actions.

- For Class B equipment, which is equipment used for programmatic purposes, such as reactors, accelerators, chemical processing lines, and lasers, there are no sitewide standards or requirements for the conduct of maintenance.

- For LANL plutonium facilities, the lowest organizational unit (the group) is provided little, if any, guidance or requirements on how it is to conduct maintenance of its Class B equipment. As a result there is considerable variability in the quality, frequency, documentation, and formality of maintenance by different organizational units.

- There is little evidence that lessons learned by individual organizational units are shared with other LANL organizations who maintain the same or similar equipment. An example is the replacement of glovebox exhaust filters. Some organizations have established fixed intervals for these changeouts (e.g., 12- or 24-month intervals), others have established changeouts based on differential pressure (e.g., "HEPA filters are usually changed when the Magnehelic gauges drop below approximately .25 inches of water"), whereas still other organizations have not enforced any specific standards for changeout.

- In response to the issuance of DOE 4330.4A, LANL, in June 1991, established a Maintenance Management Office within the Facilities Engineering Division and requested that divisions appoint representatives to a LANL Maintenance Management Committee. The Maintenance Management Office has developed a draft policy for the sitewide Maintenance Management Program, however, the implementation of this program is not yet defined.

CONCERN: **See Concern TSA-4, MA.4-1.**

MA.5 CORRECTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

FINDINGS:

- TA-21 Bldgs. 3 and 4 South were used for uranium processing until 1984. These buildings were left with significant uranium contamination and other hazardous and radioactive materials still in process equipment, hoods, and gloveboxes. In 1986, about $200,000 of program funds were provided to perform decommissioning and decontamination (D&D) work in these areas. This work proceeded for about 8 months, until the funds were exhausted. There continues to be hazardous and radioactive materials in these buildings (e.g., liquids in glass columns, bottles in hoods/gloveboxes, lead bricks). In addition, there are leaks in the building envelopes that permit rainwater to run into gloveboxes and through contamination control areas, possibly spreading contamination and making future D&D efforts more difficult. These buildings were formally accepted into the DOE D&D program as of October 1, 1991, with D&D remediation work scheduled to begin within the next few months.

- The establishment of a continuing D&D organization within the Environmental Management Division, along with the Office of the Assistant Secretary for Environmental Restoration and Waste Management (EM), is intended to prevent abandonment of future LANL facilities in the way TA-21 Bldgs. 3 and 4 were. The D&D Program involves formal acceptance of facilities for D&D only after the Headquarters, DOE, Program Office has certified that the facilities are surplus and inactive and also requires that the facility be placed in a stable condition with radioactive and hazardous materials removed to an extent mutually agreed to by the responsible line organization and the Environmental Management Division. Once EM accepts a facility there will be funds identified for maintenance and surveillance to keep the facility from deteriorating.

- There is no LANL program to ensure that Class B facilities, equipment, and structures, which are inactive but are not in the D&D Program, are maintained in a condition that protects the DOE investment and that ensures they do not become a greater hazard to LANL personnel or to public health and safety. With LANL beginning a program in FY 92 to impose a fee for each square foot of space, it is likely that there will be more inactive facilities, increasing the importance of establishing such a maintenance and surveillance program.

- TA-33 Bldg. 86, has recently become inactive. Significant quantities of tritium still remain in the facility. However, housekeeping has been neglected and there is no program for maintenance of Class B equipment which contains this tritium.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (MA.5-1) (H2/C2) **There is no program to ensure that Class B equipment, structures, and systems that are inactive, but are not in the decontamination and decommissioning program, are maintained in such a way that they will not pose a hazard to Los Alamos National Laboratory personnel or a threat to public health and safety.**

MA.6 PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

FINDINGS:

- LANL has not established standards or guidance for preventive maintenance of Class B facilities and equipment that are important to safe operation to ensure that they meet or exceed their design requirements throughout their use. Individual divisions and groups are responsible for establishing their own standards in this area. There has been little LANL oversight of divisions or groups to ensure that appropriate preventive maintenance is conducted.

- Some groups responsible for plutonium facilities have developed regular preventive maintenance schedules and procedures for conducting maintenance for their Class B equipment, whereas others have not. In some cases, such as changeout of glovebox filters, there is considerable variability in the frequency of filter changes, the criteria for changes, and how the changes are conducted by different organizations, with little or no information exchange among organizations on lessons learned.

- In August 1991, LANL published a draft Laboratory Maintenance Policy which includes a commitment to establishment of preventive maintenance programs for facilities and equipment important to safe operation. A schedule has been developed calling for preventive maintenance criteria to be developed by December 1992.

- Some measurement devices important to product quality in the Nuclear Materials Processing: Nitrate Systems Group (e.g., flow indicators, temperature controllers) are not included in a calibration program.

CONCERN: **See Concern TSA-4, MA.6-1.**

MA.7 PREDICTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- LANL has not established standards or criteria for maintenance history records or root cause analysis of maintenance problems at plutonium facilities.
- There is no integrated age-related degradation program for plutonium facilities, even though facilities in the Chemistry and Metallurgical Research Building and TA-21 used for plutonium-related work have been in use for nearly 40 years.
- The lack of documentation of as-built facility configuration and maintenance history continues to result in inefficient and ineffective maintenance because maintenance time is used to determine the as-built condition before maintenance can be initiated. Also in some cases, documentation identifying the as-built condition is not retained for future use.
- The draft Laboratory Maintenance Policy of August 1991, does address responsibilities of Laboratory managers for evaluating the effectiveness of their maintenance efforts, however, methods for implementing these responsibilities have not been identified.

CONCERN: **See Concerns TSA-4, MA.7-1, and TSA-4, MA.7-2.**

MA.8 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Maintenance procedures and related documents should provide appropriate directions and guidance for work and should be used to ensure that maintenance is performed safely and effectively.

FINDINGS:

- Sitewide standards for development, validation, review, and approval of maintenance activities, including maintenance procedures and work packages are not implemented.

- Review of preventive maintenance procedures for TA-55 vacuum systems found several deficiencies including: differences between the procedure steps and the way the preventive maintenance was actually performed, steps in the procedure that could not be performed as written, lack of configuration control of procedure revisions, and units of measure that were inconsistent with installed indications. Several of these deficiencies are indicative of inadequate validation of procedures.

- Electro-refining work in TA-55 involving plutonium addressed by SOP 432-MPP-R03 was observed by the S&H Subteam. Several steps were not performed as required by the standard operating procedure, including setting the temperature controller setpoint. Maintenance actions conducted were not addressed in the procedure including replacement of chevron packing.

- Inspections and tests of fire system devices in TA-55 are conducted without procedures defining which devices are to be tested and inspected or how they are to be inspected or tested. As a result, some fire detection and suppression equipment in Bldg. PF-4 has not been inspected and tested as required. (See Concern TSA-1, FP.7-2.)

CONCERN: **See Concern TSA-4, MA.8-1.**

4.5.1.5 Training and Certification

4.5.1.5.1 Overview

Ten of the 11 Training and Certification performance objectives were addressed during this appraisal. Performance objective TC.2 Reactor Operations does not apply to TA-55 because there are no reactors at TA-55. No concerns are noted in the following performance objectives: TC.6 Criticality Safety, TC.7 Training Facilities and Equipment, TC.9 Radiological Protection Personnel, and TC.10 Training for Supervisors, Managers, and Technical Staff. Therefore, these performance objectives are not specifically addressed within this appraisal report. The appraisal was conducted by interviewing personnel with training responsibilities; including the Nuclear Materials Technology Division training manager; various Nuclear Materials Technology Division group leaders; various JCI managers, supervisors, and foremen; and others outside of the Nuclear Materials Technology Division who have training responsibilities affecting Nuclear Materials Technology Division personnel. The appraisal also consisted of reviews of training documents, such as plans, policies, procedures, examinations, and individual training and certification records. The Nuclear Materials Technology Division has not yet implemented DOE 5480.20, "Personnel Selection, Qualification, Training, And Staffing Requirements At DOE Reactor And Non-Reactor Nuclear Facilities." The Training Implementation Matrix required by the Order is scheduled to be submitted to the Albuquerque Field Office (AL) by November 8, 1991. Therefore, DOE 5480.5, "Safety Of Nuclear Facilities," paragraph 10, "Personnel Selection And Training," was used, with other Orders and requirements, to ascertain compliance level.

The Nuclear Materials Technology Division Training Center consists of 10 people, including a training manager, five training specialists, and support staff. Three of the five training specialists are new, their positions having been established within the last 6 months. The Nuclear Materials Technology Division training manager reports directly to the Nuclear Materials Technology Division leader in a staff capacity.

The facilities provided for the TA-55 Training Center are excellent. They include classrooms, study booths with audio-visual equipment, office space for the training staff, reference materials, a testing center, and a state-of-the-art glovebox training laboratory.

The two-phase training system for use at TA-55 is fully described in the TA-55 Training Plan. Phase I training consists of the more generic training required for personnel working in various job positions. Six training job codes are identified, which are directly related to the various types of work different personnel might be performing. The training job codes differentiate between radiation workers, nonradiation workers, special nuclear material handlers, etc., and also include differentiation between authorized work locations. Topics in Phase I training include radiation safety, criticality safety, fire extinguisher use, glovebox glove replacement, control of contamination, and others. Each training job code has its own required training topics, and personnel assigned to a specific training job code are required to successfully complete the training prior to being assigned work activities. Access to Bldg. PF4 is denied until required Phase I training has been completed. This is accomplished by configuration of the Entry Control System, or badge reader. Retraining and Phase I recertification occurs on an annual basis.

Criticality safety training is included as part of Phase I training and is administered initially, when a person is newly-assigned to TA-55, and on an annual basis, thereafter. It is also included in Phase II training and is tailored as appropriate to specific operations. This also is repeated on an annual basis. Criticality evacuation drills are conducted annually.

Phase II training is job-specific and is accomplished after successful completion of Phase I. This training is to be implemented by the nine Nuclear Materials Technology Division group leaders. It is designed to be administered by on-the-job-training instructors. Certification of job competence is to be made by designated on-the-job training certifiers. Group leaders then approve individual certifications. Retraining and Phase II recertification is to occur on an annual basis. There were many discrepancies found in the administration of Phase II training, including out-of-date certifications, inadequate record-keeping practices, inappropriate application of on-the-job training, and inconsistent application of training across the nine Nuclear Materials Technology Division groups. Each of the nine groups has portions of the required training programs in place; some are better than others, but none is without flaw.

Nondestructive examination technicians, who perform liquid penetrant and radiograph tests, are provided to the Nuclear Materials Technology Division from JCI, and from the Fabrication and Assembly Group of the Design Engineering Division when their services are required. These nondestructive examination technicians are certified in accordance with the American Society of Nondestructive Testing Recommended Practice No. SNT-TC-1A. Level I, II, and III interpreters are available. However, at least one Nuclear Materials Technology Division leak check procedure is performed by people who should be, but are not, certified, in accordance with Recommended Practice No. SNT-TC-1A. Many quality control inspection services within the Nuclear Materials Technology Division are performed by Division personnel because there is not an effective QA program at LANL to provide quality acceptance inspections. The technicians who perform the quality control inspections, the instructions for which are contained within applicable procedures, are not qualified and certified inspectors.

Radiation protection technicians at TA-55 receive classroom training and on-the-job training in subjects appropriate to enable them to complete assigned tasks safely and properly. Written, oral, and practical examinations are included in their training program. Training and qualification records are maintained by the Health Physics Policy and Programs Group representative assigned to implement radiation protection technician training at TA-55. These records were inspected and found to be complete and current.

An appropriately higher level of training is provided for supervisors in the Nuclear Materials Technology Division than for technicians. Supervisors are defined as the group leaders, staff members, and lead technicians. The supervisors receive initial and recertification training in technical topics such as hazards communication for supervisors, procedures and changes, occurrence reporting, etc. Some have also had opportunity to attend courses to enhance managerial and human relationships skills.

A noteworthy practice was identified by the S&H Subteam regarding training facilities and equipment, specifically the glovebox training laboratory located at TA-55. This training laboratory provides trainees with excellent

hands-on training in an exceptionally realistic environment that accurately mimics actual laboratories in Bldg. PF-4.

The LANL self-assessment was partially effective in identifying the concerns noted during this appraisal.

4.5.1.5.2 Findings and Concerns

TC.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administration should ensure effective implementation and control of training activities.

FINDINGS:

- The nine groups within the Nuclear Materials Technology Division do not uniformly adhere to the requirements of the Training Plan regarding Phase II training, the on-the-job training portion of the Nuclear Materials Technology Division training and certification process.
- The performance of on-the-job training personnel is not routinely evaluated.
- There is no consistency among the nine Nuclear Materials Technology Division groups relative to maintaining group training records. Types of information appearing within the records of one group may not appear in the records of another group.
- Some Nuclear Materials Technology Division group training records could not be audited without continuous assistance and clarification by the group leader or an administrative assistant.
- Several Nuclear Materials Technology Division group training records were inaccurate, incomplete, or contained unexplained discrepancies.
- None of the group training records reviewed indicate the degree of performance adequacy for the person receiving the training or certification.
- In some cases, verification of training for fissionable material handlers within the Nuclear Materials Technology Division has been performed by their immediate supervisors, which is prohibited by DOE 5480.5.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (TC.1-1) (H2/C1) **At the Los Alamos National Laboratory, oversight and control functions of training activities in the Nuclear Materials Technology Division fail to meet the requirements of DOE 5480.5, such as recordkeeping, auditability, verification of training, and so forth.**

TC.3 NUCLEAR FACILITY OPERATIONS OTHER THAN REACTORS

PERFORMANCE OBJECTIVE: The nuclear facility operator and supervisor training and certification programs should be based on DOE 5480.5, as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions. (Nuclear Facilities Only)

FINDINGS:

- Phase II training is designed to be provided primarily by on-the-job training. However, on-the-job training is not formally structured within most of the nine Nuclear Materials Technology Division groups, and consists primarily of a less-experienced worker performing tasks as directed by, and at the discretion of, a more experienced worker.

- There is little use of on-the-job training checklists. Those that are used are not written in sufficient detail to ensure uniform and consistent training.

- For Phase II certification, there are generally no documented performance measures with required standards to identify successful completion of tasks.

- There is no documentation of oral questions asked and answers received during the Phase II certification process.

- Use of written examinations to assess knowledge proficiency of trainees varies among the nine Nuclear Materials Technology Division groups. Where written examinations are used, they are generally deficient, consisting of only a very few questions, which are used repeatedly.

- Only a few Nuclear Materials Technology Division personnel have been trained in performance-based training techniques, although 123 people are designated as qualified to perform on-the-job training certifications. Additionally, virtually every lead technician and staff member has on-the-job training responsibilities for at least some operations procedures.

- There are no specific requirements for on-the-job training course content, or for measurement standards for mastery, leading to certification. Certification policy is at the discretion of individual group leaders.

- There is no evidence that any individual has ever failed to obtain Phase II recertification on the first attempt.

- Most of the nine Nuclear Materials Technology Division groups have no written requirement precluding an on-the-job training trainer from also signing off as the on-the-job training certifier for any given operation.

- See Concerns TSA-1, OP.6-2, and TSA-1, TC.1-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (TC.3-1) (H2/C1)

At the Los Alamos National Laboratory, job-specific training within the Nuclear Materials Technology Division does not ensure that all assigned workers have received training as required by DOE 5480.5; for example, there is insufficient documentation of job-specific examinations, insufficient implementation of a formally documented training program, and so forth.

TC.4 GENERAL EMPLOYEE/PERSONNEL PROTECTION TRAINING

PERFORMANCE OBJECTIVE: General employee and personnel protection training programs should ensure that site/facility personnel, subcontractors, and visitors have an understanding of their responsibilities and expected safe work practices and have the knowledge and practical abilities necessary to effectively implement personnel protection practices associated with their work.

FINDINGS:

- Training records of fire department personnel, specific to TA-55 Phase I training, could not be produced by the TA-55 Training Center.
- There is no requirement for fire department personnel to participate in TA-55 Phase I training.
- There is no mechanism for the TA-55 training center staff to set standards for training that fire department personnel might receive relevant to personnel protection practices at TA-55.
- As part of the training course for new security inspectors that had been presented prior to May 1991, the only general employee training included was a 2-hour presentation on radiation safety, and a 1-hour presentation on TA-55 safety (broad overview). Training outlines for these courses had not been approved or had not been developed, and it could not be ascertained whether or not examinations were administered.
- Only supervisors (lieutenants) on the security inspection force receive training specifically relevant to personnel protection practices at TA-55. This training is for Job Code E. Job Code E personnel are radiation workers who may only observe contaminated equipment. (They may not touch equipment, and are therefore not likely to become contaminated under normal situations.) It is then assumed that less knowledgeable security inspectors (subordinates) will always be accompanied by a trained supervisor during any situation requiring their access to Bldg. PF-4. No documentation could be located which specifically states this requirement.

CONCERN: **See Concern TSA-4, TC.4-1.**

FINDINGS:

- Although the Nuclear Materials Technology Division has primary responsibility for compliance with DOE Orders and requirements related to TA-55 training, a sitewide training and testing system is being put in place at LANL which does not yet incorporate formal and documented training plans, policies, and procedures as required by DOE 5480.5 and DOE 5480.18.
- The hazard communication course presented as part of LANL sitewide general employee training has no test associated

with it. Instead, there is a student self-evaluation, which students are requested to complete. The TA-55 training staff has identified this as a deficiency. Therefore, the site-specific hazards communication course at TA-55 does require successful completion of a written examination to pass the course. However, the course content is deficient. (See Section 4.5.1.16.2, WS.3.)

- The sitewide radiation worker course has a test associated with it, but the passing score on this test is only 72 percent. The TA-55 training staff has identified this as a deficiency. The TA-55 site-specific radiation worker course written examination requires a score of 90 percent to pass.

- On September 25, 1991, a letter was distributed from the Nuclear Materials Technology Division training manager to involved parties identifying, in detail, the problems currently associated with centralizing training functions. Because the Nuclear Materials Technology Division training program must become accredited, it cannot yet subscribe to the requirements of the sitewide program, which is currently undeveloped. No resolution of these identified problems has been forthcoming.

- The Nuclear Materials Technology Division training program is significantly more fully developed than the site-wide program.

- The following concern was partially identified the LANL self-assessment.

CONCERN: (TSA-1) (TC.4-1) (H2/C2) **At the Los Alamos National Laboratory, the Nuclear Material Technology Division training program accreditation status is in jeopardy if it must conform with the undeveloped sitewide training program.**

FINDINGS:

- For TA-55 Phase I training, there are a limited number of written examination questions for each of the course topics. The examinations that are constructed from these questions are used repeatedly.

- Some of the TA-55 Phase I examination questions have discrepancies. Examples of identified discrepancies include implausible distractors, giveaway answers, and unclear or imprecise phrasing.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (TC.4-2) (H2/C2) **At the Los Alamos National Laboratory, written examinations used during TA-55 training do not ensure that training material has been mastered.**

TC.5 MAINTENANCE PERSONNEL

PERFORMANCE OBJECTIVE: The maintenance personnel training qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- The maintenance subcontractor, JCI, subscribes to the individual bargaining units' apprenticeship and continuing training programs. Journeyman grade maintenance personnel come to LANL certified by the bargaining units to possess specific skills and expertise. However, there is no formal, documented program or mechanism to evaluate skills and expertise, either by JCI or LANL.

- Neither LANL nor JCI has evaluated the bargaining units' apprenticeship programs or continuing training programs.

- Neither LANL nor JCI has a program to provide comprehensive training specific to facilities, such as TA-55, where JCI personnel are assigned.

- JCI has many training courses available onsite, however, there is no documented requirement for attendance at most of these courses.

- No one in the JCI Construction Area 3, which provides maintenance personnel to TA-55, has received first aid training, although it is one of the offered courses.

- On October 2 and 3, 1991, interviews were conducted with six JCI personnel who were said to have various training responsibilities. In all of these interviews, queries were made relative to the existence of documented training programs, plans, or procedures, and documentation of individual training responsibilities. None were produced at that time.

- During the course of these interviews, it became clear to the appraiser that training responsibilities for JCI, if they in fact existed, were widely distributed among many people, and not well defined. A common statement communicated in all the interviews was that someone else had responsibility for whatever topic was under discussion. Often, that other person could not be identified by the interviewee. The conclusion drawn by the appraiser was that there was no documented training program, and no clearly defined responsibilities related to training.

- On October 23, 1991, during the factual accuracy verification period of the report preparation, new information was forthcoming:

- A Standard Practice Instruction was produced, dated September 4, 1990, and entitled "Training Program." This document includes a policy, general information, and broadly applied responsibilities. The document is not written in sufficient detail to encompass all the requirements of a comprehensive training program.

- A Standard Practice Instruction was produced, dated January 1, 1991, and entitled "Training Documentation and Reporting." This document includes a policy statement, general information, and broadly defined responsibilities for training coordinators and the general JCI employee population.

- Examples of memoranda were produced, such as Memorandum No. JMGR 91.350, entitle "JCI Operations - Replacement of Fluorescent Lights Ballasts," which established that personnel repairing or replacing fluorescent light ballasts must receive training according to the PCB01 Training Code, one of the JCI offered courses. Another memorandum, in a similar vein, required cardiopulmonary rescusitation training for electricians. It was stated that training requirements are most often imposed by this method of distributing a memorandum, after it has been identified by the manager that some specific type of training is required.

- The above documents had not been produced, described, or alluded to during the earlier interviews of October 2 and 3, 1991, even though the line of questioning would have led interviewees to do so had they been aware of their existence at the time.

- On October 3, 1991, the training attendance records of four randomly-chosen electricians were reviewed. None of the four had received first aid training. Two of the four had received no hazard communications training. Two of the four had received no cardio-pulmonary rescusitation training. None of the four had current electrical lockout/tagout training, one of the few courses which JCI requires for electricians.

- On October 23, 1991, at the encouragement of the JCI employee who had been present during the first attendance record review, the same electricians' training attendance records were reviewed. From this review, it appeared that all four had, in fact, received hazard communications training, cardiopulmonary rescusitation training, and electrical lockout/tagout training, indicating that either the appraiser was mistaken during

the initial review, the records are overly complex for auditing purposes, or the records had been changed.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (TC.5-1) (H2/C1) **At the Los Alamos National Laboratory, oversight and control of training for maintenance personnel at TA-55 does not ensure that they possess adequate knowledge and skills to safely and correctly complete assigned tasks as required by DOE 4330.4A and DOE 5480.5.**

TC.8 QUALITY CONTROL INSPECTOR AND NONDESTRUCTIVE EXAMINATION TECHNICIAN

PERFORMANCE OBJECTIVE: The quality control inspector and nondestructive examination technician training and qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Most quality control inspection services at TA-55 are performed by technicians actually performing the applicable procedures. They are not trained in accordance with ASME NQA-1-1989, "Quality Assurance Program Requirements for Nuclear Facilities."
- Standard Operating Procedure 357-WEL-R03, "Leak Checking," is a nondestructive examination procedure that should be performed by personnel who have attained certification in accordance with the ASME Recommended Practice No. SNT-TC-1A. However, these personnel have not been certified, as required.

CONCERN: **See Concern TSA-4, TC.8-1.**

TC.11 SIMULATOR TRAINING/FACILITY EXERCISES

PERFORMANCE OBJECTIVE: Simulator training and/or facility exercises should be conducted utilizing methods and techniques that are effective in developing and maintaining team and individual knowledge and skills in responding to abnormal and emergency events and in integrated operations. (Reactors and Nuclear Facilities Only)

FINDINGS:

- There is no program established for conducting periodic exercises or drills to develop and maintain the skills necessary to respond to abnormal and emergency events relating to specific procedures or processes within TA-55 work areas.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (TC.11-1) (H2/C2)

At the Los Alamos National Laboratory, exercises to develop and maintain skills in responding to process and procedure abnormal and emergency events are not conducted at TA-55.

4.5.1.6 Auxiliary Systems

4.5.1.6.1 Overview

Appraisal of the auxiliary systems in Bldg. PF-4, and in the Chemistry and Metallurgical Research Building was conducted by inspection of systems and operations, by review of incident and safety reports, and by discussion with individuals associated with the systems. Emphasis was placed on the safety activities of management and supervisory personnel in providing organization and procedures designed to shield the system against hazards which might endanger personnel or the facility.

Seven out of nine performance objectives in the Auxiliary Systems area were addressed in the appraisal. Two other performance objectives, AX.8 Engineered Safety Systems and AX.9 Coolant Cleanup Systems, do not pertain to TA-55 or the Chemistry and Metallurgical Building.

Problems were found where responsibility is divided and in areas where LANL does not apply the DOE safety regulations such as DOE 5480.19, Conduct of Operations Requirements for DOE facilities, and DOE 5480.5, Safety of Nuclear Facilities.

Situations exist where two or more separate groups have responsibility for the same safety function or safety-related system. For example, personnel of the Field Operations Group of the Facilities Engineering Division operate the safety-related systems of a facility whereas another group is ostensibly responsible for the safety of the facility. This is a violation of the principle of clear definition of responsibility. This violation appears to be due to a desire to centralize all service organizations whether any need or advantage exists. Furthermore, there is a lack of oversight by management that allows such activities to continue to the extent that they seriously weaken safety responsibility and destroy the ownership attitude needed by operating organizations.

The Chemistry and Metallurgical Research Building has been described in safety evaluations as having many safety problems; however, it has some desirable features, and its problems can be solved. The once-through ventilation system is a simpler and safer system than a recirculated one. HEPA filtration is provided on building wings handling plutonium or other transuranics. However, the Chemistry and Metallurgical Research Building is also an example of divided responsibility. Whereas the building manager supposedly is responsible for building safety, he is not in charge of the personnel who operate the safety systems. Further, he may have a dozen different groups in the building, and each group may implement safety procedures differently. The building manager has little authority except in the common spaces; his authority does not permit him to prescribe a common procedure to respond to failure of the ventilation.

Reporting and evaluation of incidents less serious than those reported under DOE 5000.3A is deficient in Bldg. PF-4 and in the Chemistry and Metallurgical Research Building auxiliary systems areas, even though the Health and Safety Division reportedly has a very good incident reporting and evaluation program. In late 1990, LANL began reporting incidents according to the requirements of DOE 5000.3A. Prior to that only a few incidents were reported according to the requirements of DOE 5000.3.

Although more incidents are now being reported, there is no indication that auxiliary system incidents less serious than DOE 5000.3A requirements are recorded in a visible form so that they may be evaluated as possible precursors of serious incidents. An example of the information that might have been learned from a good incident reporting system is found in an incident that occurred at Bldg. PF-4 on February 27, 1990. In this incident water from a wet vacuum system overflowed into two gloveboxes causing a severe spread of contamination. The accident would have been much more severe if it had occurred in other gloveboxes. Similar but less serious incidents had occurred for some years but have not been recognized as precursors of a serious accident.

Bldg. PF-4 has a very deficient design for detecting and controlling the dumping of excessively radioactive liquid waste. Deficiencies of this nature are gradually being overcome by installing monitors and administratively controlling additions of waste. However, lack of space and difficulties of changing an existing system will probably leave the liquid waste system difficult to operate in the future.

At present, a team of three or four people must don respiratory protection to manually reclose a breaker on switchgear in Bldg. PF-4 following an air outage. A request to provide as-built drawings which are required to convert the switchgear to automatic reclosure has languished in the Design Group of Facilities Engineering Division for 17 months. The Design Group does not even communicate with the TA-55 Facilities Management Group personnel who placed the order, but rather with another Facility Engineering Group. It is difficult to understand how such a situation could exist.

Overall there is a demonstrated general lack of understanding of DOE safety regulations, and a lack of oversight by management in enforcing them.

The LANL self-assessment addresses many of the deficiencies which are known to exist in hardware and procedures and which had been identified in previous appraisals. While there were occasional references to deficiencies in compliance with DOE Orders, there was no indication that a thorough analysis of deficiencies was made. Deficiencies were not recognized in even the basic requirements of DOE Orders pertaining to organization, where the Orders require a clear delineation of responsibility. The LANL organization in the facilities appraised had many violations of this principle.

The TA-55 self-assessment was rather specific on a number of equipment deficiencies. However, no assessment covered compliance with DOE Orders and there was indication of a general lack of understanding or even knowledge of the Orders.

4.5.1.6.2 Findings and Concerns

AX.1 SYSTEMS REQUIREMENTS

PERFORMANCE OBJECTIVES: Auxiliary systems should be considered under the same functional criteria for design, engineering, operations, maintenance, and modifications as the structural, confinement, and primary process system of the facility.

FINDINGS:

- The drawings for Bldg. PF-4 do not represent as-built configuration, and although a program to update them is underway, several years will be required to complete this.
- The latest final SAR for Bldg. PF-4 has been awaiting approval by AL for 5 months.
- A revision of the OSRs for Bldg. PF-4 has also been awaiting approval by AL since November 1989. The OSRs now in effect were issued in January 1989; they do not include changes made since November 1989.
- The drawings, final SAR and OSRs for the Chemistry and Metallurgical Research Building are missing or out of date. A new final SAR is being prepared.

CONCERN: **See Concerns TSA-1, TS.2-1; TSA-1, OA.7-1; and TSA-1, OP.3-1.**

FINDINGS:

- The ventilation, chilled water, compressed air, power distribution, and other auxiliary systems, are operated by personnel of the Field Operation Group of Facilities Engineering Division, but the TA-55 Facilities Management Group of the Nuclear Material Technology Division operates those sections of the auxiliary systems inside Bldg. PF-4 and is responsible for the auxiliary systems as they pertain to safety.
- Although the people involved are diligent and dedicated, the divided organizational structure causes confusion and errors.
- Personnel of the Field Operations Group, who operate auxiliary systems in Bldg. PF-4, have no operating procedures, although they have operated for 13 years. Their parent organization has ignored this deficiency.
- At the Chemistry and Metallurgical Research Building, there is no standard for alarms when the ventilation fails.
- The different groups at the Chemistry and Metallurgical Research Building may have different procedures pertaining to ventilation failure.

- Some groups prefer to use the change in sound in the CMR building as an alarm when ventilation stops, others may use a manual alarm button.

- The manager of the Chemistry and Metallurgical Research Building does not have authority to establish a single procedure for ventilation failure.

- Responsibility for safety at the Chemistry and Metallurgical Research Building is divided.

- See Concern TSA-1, OP.4-1.

- The following concern was not identified in the LANL self-assessment.

CONCERN: **(TSA-1) (AX.1-1) (H2/C1)**

At the Los Alamos National Laboratory, responsibility for safety function and/or safety related systems is divided between organizations in violation of DOE 5480.5.

FINDINGS:

- Building managers ostensibly have the safety responsibility for the buildings to which they are assigned, but there may be as many as 12 to 15 groups within the Chemistry and Metallurgical Research Building. Further, each group may implement safety procedures differently when responding, for example, to a ventilation failure.

- The authority of the Chemistry and Metallurgical Research Building manager is extremely limited except in the common areas.

- The degree of authority of the building manager observed in the appraisal, is in contrast to that stated in a memorandum dated May 6, 1991, SUBJECT: 5000.3A Facility Manager Qualification Criteria; namely, that the facility manager must have direct line responsibility.

CONCERN:

See Concern TSA-1, AX.1-1.

FINDINGS:

- Auxiliary systems important to safety at TA-55 are in operation whenever the Bldg. PF-4 is in operation; when a failure occurs that would affect safety, the building is shutdown and evacuated. Only the Operations Center computer, phones, alarms, and the stack monitoring are supplied by an uninterruptable power system and continue to operate.

- Bldg. PF-4 has operated in this manner since 1978. Although no significant problems have developed, it would be desirable to keep some additional monitoring systems in operation continuously.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.1-2) (H2/C2) **At the Los Alamos National Laboratory, the need for significantly larger uninterruptable power system at TA-55 Building PF-4 has not been evaluated.**

FINDINGS:

- There is no implemented system for reporting incidents less severe than those covered by DOE 5000.3A even though such a system is an important device for alerting management and the DOE to problems or potential problems.
- Other DOE contractors have such systems and use them extensively.
- Without a system of reporting lesser incidents, it is impossible to determine whether occurrence reports are being made properly or whether more serious incidents might have been anticipated.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.1-3) (H2/C2) **At the Los Alamos National Laboratory, there is no implemented program at the TA-55 to document and evaluate incidents below the level of DOE 5000.3A.**

FINDINGS:

- There is some system surveillance of TA-55 auxiliary systems but no long-term program is in effect to detect age-related degradation of systems such as piping and ductwork.
- The TA-55 fire loop is corroding badly; a number of leaks have developed.
- See Concern TSA-1, FR.1-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.1-4) (H2/C2) **At the Los Alamos National Laboratory, no long-term surveillance program is in effect to detect degradation of systems.**

FINDINGS:

- Some auxiliary systems at TA-55 and in the Chemistry and Metallurgical Research Building do not have operating procedures.
- Where procedures are available, they often lack operating or safety limits, and hazard and caution statements.

- Documentation on how temporary procedures are used, approved, and controlled is deficient.
- See Concerns TSA-1, OP.3-2; TSA-1, OP.3-2; and TSA-1, QV.1-2.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.1-5) (H2/C1) **At the Los Alamos National Laboratory, safe operating procedures for TA-55 and the Chemistry and Metallurgical Research Building do not meet requirements of DOE 5480.5 and DOE 5480.19.**

AX.2 EFFLUENT HOLDUP AND TREATMENT

PERFORMANCE OBJECTIVE: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or as effluent gaseous or liquid releases are less than Department of Energy and Environmental Protection Agency standards and are as low as reasonably achievable.

FINDINGS:

- Stack monitors for Bldg. PF-4 include a continuous air monitor and an isokinetic sampling array monitor for each stack. However, neither monitor takes an isokinetic sample.
- Monitoring of liquid effluents from acid, caustic, and process waste lines at Bldg. PF-4 is difficult because the original design made practically no provision for holdup, diversion, or monitoring tanks. This situation is being improved by the Nuclear Materials Management Group by adding radiation monitors and flow meters. However, it will never be possible to completely eliminate the problems.
- Locking valves at the gloveboxes have helped to reduce some inadvertent or unauthorized dumping of radioactive waste but has not solved the problem completely.
- Although a radiation monitor will be placed on the sanitary waste line, it is presently unmonitored.
- At the Chemistry and Metallurgical Research (CMR) Building the procedure is to send waste containing significant amounts of plutonium to the TA-55 laboratory for recovery. The amounts of plutonium sent to TA-50 as waste are believed to be small but are not monitored.
- The Chemistry and Metallurgical Research Building has no radiation monitor on the sanitary waste line.
- Only one of the eight stacks at the Chemistry and Metallurgical Research Building handling plutonium has an isokinetic sampling head although it is planned to add these in the other seven.
- The stack samplers at the Chemistry and Metallurgical Research Building are not supplied with uninterruptable power.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.2-1) (H2/C1) **At the Los Alamos National Laboratory, liquid waste monitoring at TA-55 Building PF-4 and the Chemistry and Metallurgical Research Building is deficient and gaseous waste discharges are not monitored in compliance with the National Emissions Standards for Hazardous Air Pollutants and ANSI N13.1-1969.**

AX.3 SOLID WASTES

PERFORMANCE OBJECTIVE: Solid hazardous wastes (including radioactive wastes) should be controlled to minimize the volume generated and handled in a manner that provides safe storage and transportation.

FINDINGS:

- Recent cleanup programs at TA-55 have generated large volumes of boxed and drummed waste that has not been shipped.
- Cemented waste drums have developed free water which leaked from the cement after setting for some time. Disposal of the drums must await a solution to this problem.
- An excessive number of wooden waste boxes are stored outside the northeast side of Bldg. PF-4. Some of these boxes were moved during the appraisal.
- The waste minimization program was observed to be deficient in the control of materials brought into Bldg. PF-4. Craft personnel often bring in more than the amount needed for a job; the excess is usually treated as solid waste during the next cleanup.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.3-1) (H2/C2)

At the Los Alamos National Laboratory, much low-level radioactive waste in wooden boxes and cemented barrels has accumulated at TA-55 and restriction on the material brought into the controlled area is deficient.

AX.4 STORAGE AND HANDLING OF FISSILE MATERIAL

PERFORMANCE OBJECTIVE: Fissile material should be stored and handled in a manner which minimizes the chances of loss, contamination, release, or inadvertent criticality.

FINDINGS:

- The possibility that large amounts of plutonium had accumulated in Zone 1 exhaust ducts was investigated.
- TA-55 had just made such an investigation by monitoring the ducts, although the results were not complete. The amounts detected were not large enough to constitute a criticality problem, but they indicate that significant amounts of plutonium leak past the filters on the gloveboxes, or that the filters have not been effective at some time.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.4-1) (H2/C2) **At the Los Alamos National Laboratory, the reason that the plutonium, which has been found on the interior walls of the TA-55 Zone 1 exhaust ducts, was not stopped by the glovebox filters has not been determined.**

AX.5 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is as low as reasonably achievable.

FINDINGS:

- An incident occurred at TA-55 on February 27, 1990, when a valve was left open on a wet vacuum system. The water overflowed through Zone 1 ductwork into two gloveboxes. Contamination escaped and extensive decontamination was required.
- Instrumentation designed to prevent such an incident had been found to be unreliable and was disconnected.
- Drawings needed in the incident were deficient or missing. The current program to update drawings is years away from completion.
- The current configuration control is still deficient.
- See Concern TSA-1, OP.4-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.5-1) (H2/C1) **At the Los Alamos National Laboratory, configuration control rules required by DOE 5480.5 are not fully implemented.**

FINDING:

- It was stated by TA-55 personnel that a safety evaluation of the wet vacuum system had been performed, but no minutes were recorded.
- No other evidence of safety reviews on similar systems could be produced by Bldg. PF-4 personnel.
- See Concerns TSA-1, FR.1-1, and TSA-1, FR.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.5-2) (H2/C2) **At the Los Alamos National Laboratory, the safety reviews at TA-55 have been informal and cannot be audited as required by DOE 5480.5.**

FINDINGS:

- Several organizations were involved in operating the wet vacuum system. The TA-55 Facilities Management Group was supposedly responsible, but JCI personnel did some operating work and technicians from four other Nuclear

Materials Technology Groups performed operations on occasion. Responsibility was divided.

CONCERN: **See Concern TSA-1, AX.1-1.**

FINDINGS:

- The investigation brought out the fact that similar but less serious incidents had occurred over many years. Lack of an incident reporting system prevented these from being recognized as precursors.

CONCERN: **See Concern TSA-1, AX.1-3.**

FINDINGS:

- In Bldg. PF-4, the only audible automatic alarm outside the Operations Center from ventilation failure is on Zone 1 (glovebox) ventilation.
- If Zone 2 ventilation (outside gloveboxes) fails, an announcement is made from the Operations Center.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.5-3) (H2/C2) **At the Los Alamos National Laboratory, no automatic audible alarm is given if Zone 2 ventilation fails in TA-55 Building PF-4.**

AX.6 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

FINDINGS:

- The fire water loop that serves TA-55 is corroding badly and has developed numerous leaks. The original design did not provide electrical protection for this line; replacement is anticipated.
- The electrical switchgear does not have automatic reclosure following a power outage, although it is planned to install this feature to increase safety.
- The as-built drawings needed to upgrade the switchgear system cannot be done by LANL because the JCI contract requires that these be done by JCI. However, JCI does not have the necessary people, and clearances may take as long as 18 months.
- The present 37.5 KVA, uninterruptable power system, cannot handle some of the monitoring equipment that should be kept in operation during a power outage; a new system of 150 KVA capacity is being planned.
- See Concerns TSA-1, AX.1-6, and TSA-1, MA.2-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.6-1) (H2/C2) **At the Los Alamos National Laboratory, identified deficiencies in vital supply systems are not being remedied in a timely manner.**

FINDINGS:

- The Chemistry and Metallurgical Research Building does not have uninterruptable power for the stack monitors; a system is being planned.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.6-2) (H2/C2) **At the Los Alamos National Laboratory, no uninterruptable power is provided for stack monitors at the Chemistry and Metallurgical Research Building.**

FINDINGS:

- Facilities Engineering Division groups have taken responsibility for operating safety systems and providing engineering and other services at TA-55, at the Chemistry and Metallurgical Research Building and at other facilities; however, these organizations receive little oversight by upper management.

- Observations during the appraisal confirmed that the quality of service from these organizations may range from acceptable to unacceptable.

- When the service provided is unsatisfactory, users may complain, but if the service organization is unresponsive, there is no authority to which the user can turn for help.

- In some areas, service groups may have special expertise or equipment that make it necessary for operating groups to use their service. However, in such cases, LANL does not make it clear that the operating groups retain the responsibility and only delegate it to the service group.

- An example of unresponsive engineering service was encountered while investigating a 1987 TSA concern.

- The concern, identified deficiencies in the TA-55 electrical system. (The following findings are in response to each finding of the 1987 concern.)

- An improvement in the electrical system allows the system to ride through a disturbance of six cycles or one tenth of a second duration.

- Only a major disturbance now causes a problem. If an alternate feeder has power, an automatic transfer occurs without a loss of power to TA-55.

- The diesel generator for TA-55 is not used during outages. However, TA-55 personnel believe that it could be used if needed.

- The diesel generator is considered to be an auxiliary unit rather than an emergency unit. Personnel believe that it could be put under load following air outage and the system transferred back to normal power without a second shutdown.

- The change in original design criteria referred to in the 1987 TSA was apparently the removal of automatic switchgear reclosure. TA-55 has been trying to have this feature added which would save much downtime. At present a team of three or four people have to don face masks and enter Bldg. PF-4 to reclose the breakers manually.

- A request to the Design Group of the Facilities Engineering Division to have as-built drawings prepared, so that automatic switchgear could be added, has languished for 17 months.

- No drawings have been obtained.

- Over $20,000 of costs have accumulated.

- TA-55 Facilities Management Group personnel at Bldg. PF-4 who ordered the drawings have only limited influence over such orders.

- The Design Group does not report progress directly to the Facilities Management Group, but to other engineering groups such as the Project Management or the Field Operations Group who operate some of the equipment.

- A complicated Facility Engineering Division organization typically involves as many as six Facilities Engineering Division groups, two or three Health and Safety Division groups, JCI, and two Nuclear Materials Technology Division groups in a job.

- Engineering service at TA-55 is not responsive to these deficiencies.

- See Concern TSA-1, AX.1-1.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (AX.6-3) (H2/C1)

At the Los Alamos National Laboratory, important modifications related to safety and reliability at TA-55 are not being addressed promptly as required by DOE 5480.5.

AX.7 HEAT REMOVAL SYSTEMS

PERFORMANCE OBJECTIVE: The heat removal systems should reliably remove heat as required from the reactor or process equipment important to safety.

FINDINGS:

- Heat removal for processes in gloveboxes and other areas is provided by a central circulating chilled water system, positive pressure circulating chilled water systems, negative pressure circulating chilled water loops, and limited volume positive pressure circulating chilled water loops.
- The first two systems are operated by the Field Operations Group of the Facilities Engineering Division, a group separate from the TA-55 Facility Management Group.
- No operating procedures are provided for the first two systems.
- The responsibilities for the first two systems are divided between the Field Operations Group and the Facilities Management Group.

CONCERN: **See Concern TSA-1, AX.1-2.**

4.5.1.7 Emergency Preparedness

4.5.1.7.1 Overview

This appraisal addressed the first three performance objectives in the Emergency Preparedness technical area. The performance objectives assessed are: EP.1 Organization and Administration, EP.2 Emergency Plan and Implementing Procedures, and EP.3 Emergency Response Training. The remaining four performance objectives are addressed on a sitewide basis in the S&H Subteam 4 assessment. Findings and concerns related to these performance objectives are contained in Section 4.5.4.7.2 and should be reviewed in conjunction with the material presented in this section.

The appraisal was accomplished through interviews with TA-55 managerial staff members, who have been tasked with Emergency Preparedness responsibilities. These interviews were conducted to determine how the TA-55 emergency response activities and the site emergency preparedness program are conducted, managed, controlled, and maintained. Included was a review of the TA-55 Safety Manual, including but not limited to the various sections pertaining to emergency preparedness at the site, hazard and safety analysis reports, past exercise critiques, appraisals, training program documentation, and supporting documentation against the requirements of the DOE 5500 series of Orders, the DOE 5480 series of Orders, DOE 5500.3A (and its predecessor DOE 5500.3), and applicable ANSI standards and good industry practices.

The LANL Emergency Management Office has developed a sitewide emergency plan that when fully implemented should provide oversight and augmented emergency response capabilities to assist TA-55 in the event of an actual emergency or during exercise related activities. The TA-55 Emergency Controls Plan in its current state is not supported by emergency plan implementing procedures to support the sitewide emergency plan and to provide for an integrated response in conjunction with the Emergency Management Office in the event of an emergency. These TA-55 emergency plan implementing procedures should address such items as the assignment of individual responsibilities, site-specific emergency action levels, notification and integration of response activities with the Emergency Management Office, and provisions for the determination and initiation of onsite protective action recommendations, for both the Laboratory and offsite populations.

The TA-55 emergency management organization and emergency response teams appear to possess the capabilities to respond to emergency conditions at TA-55. However, the emergency preparedness organization at TA-55 lacks the necessary procedural guidance and necessary emergency response team training to ensure a coordinated emergency response with the Emergency Management Office.

The existing emergency plan training program at TA-55 should be upgraded to address the requirements of the DOE 5500 series of Orders. The current training requirements for the TA-55 emergency response team members are based on classical emergency based responses, that is, medical, hazardous materials, and rescue/re-entry. However training is not provided that ensures the initial identification and categorization of events, prompt initial notification, and the initiation of mitigative and corrective actions to minimize consequences to workers, public health and safety, and the environment. Additionally, the current training program has no formal

mechanism in place to ensure that emergency response team members are current with respect to annual training or respiratory protection qualification requirements.

Of the five concerns developed, all were partially identified in the LANL self-assessment. The group level self-assessments, which addresses TA-55, appears not to recognize the nature of the emergency preparedness performance objectives and the requirements of the DOE 5500 series of Orders; therefore, the group level self-assessment does not correctly identify these concerns.

4.5.1.7.2 Findings and Concerns

EP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, site/facility emergency response.

FINDINGS:

- Primary and alternate emergency management, support staff, and emergency response team members are not identified by normal duty position title.
- Emergency responsibilities for both primary and alternate emergency positions are not described in the TA-55 Safety Manual.
- The TA-55 emergency plan had not been reviewed or approved by the Emergency Management Office prior to issuance.
- The TA-55 emergency controls plan alludes to a 24-hour capability but does not assign the after hours responsibility to any single individual within the Nuclear Materials Technology Division.
- The TA-55 emergency controls plan does not address functions and operations as outlined in the Emergency Management Plan.
- The individuals at TA-55 who have been tasked with facility specific emergency management responsibilities have not been provided the necessary guidance (in the form of DOE Orders or implementation directives), by the Laboratory or the Emergency Management Office, to ensure fulfilling their emergency management mission.
- See Concerns TSA-1, OP.2-1; TSA-1, EP.2-1; and TSA-1, EP.3-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (EP.1-1) (H1/C1) CAT. II

At the Los Alamos National Laboratory, the management of TA-55 have not developed an effective management and response organization that can detect, react to, coordinate, and mitigate emergency situations as required by DOE 5500.3A (and its predecessor DOE 5500.3) and DOE 5500.1B.

EP.2 EMERGENCY PLAN AND IMPLEMENTING PROCEDURES

PERFORMANCE OBJECTIVE: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

FINDINGS:

- The TA-55 emergency controls plan does not consider a spectrum of accidents from minor to beyond-the-design basis as required by DOE 5500.3A (and its predecessor DOE 5500.3).
- The TA-55 emergency controls plan does not reflect the guidance depicted in DOE 5500.3A (and its predecessor DOE 5500.3) for description of all credible emergencies, protective actions for LANL personnel, and a description of the TA-55 emergency planning zone.
- The existing emergency controls plan has not been developed using facility safety analysis of potential abnormal conditions and does not cover the wide range of credible emergencies in sufficient details.
- The format used to develop the TA-55 emergency controls plan has not been approved by the Emergency Management Office.
- Emergency response personnel responsibilities are not fully addressed in the emergency controls plan for all emergency response team members.
- The TA-55 emergency plan is not a stand alone document but is embedded in the TA-55 Safety Manual.
- This emergency controls plan does not include a reporting and notifications system as stated in DOE 5500.3A (and its predecessor DOE 5500.3) and DOE 5500.2B.
- See Concern TSA-1, PP.2-3.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (EP.2-1) (H2/C1) **The TA-55 emergency controls plan does not address notifications and reporting and protective action recommendations for Los Alamos National Laboratory personnel as required by DOE 5500.1B, DOE 5500.3A (and its predecessor DOE 5500.3), and DOE 5480.10.**

FINDINGS:

- The TA-55 emergency plan implementing procedures have not been developed to support all the provisions of the emergency controls plan. These include:
  - assignment of individual responsibilities;
  - notifications and reporting;

- emergency classification;
- search and rescue operations;
- sitewide evacuations;
- assembly and accountability;
- protective action recommendations; and,
- integration of response activities.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (EP.2-2) (H2/C1) **At the Los Alamos National Laboratory, the TA-55 emergency plan implementing procedures have not been developed as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).**

FINDINGS:

- In accordance with DOE 5500.3A (and its predecessor DOE 5500.3), emergency action levels provide the basis for emergency classification and the required prompt initial notification of emergency response personnel and response organizations. TA-55 does not incorporate this requirement in their emergency controls plan.

- The TA-55 emergency planning conducted to date has not identified the development of site-specific emergency action levels to be used as the specific criteria to be used to recognize and categorize events.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (EP.2-3) (H1/C1) **At the Los Alamos National Laboratory, the TA-55 emergency plan does not consider site-specific emergency action levels as required by DOE 5500.3A (and its predecessor DOE 5500.3).**

EP.3 EMERGENCY RESPONSE TRAINING

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- The current training program for emergency response team members at TA-55 has no formal mechanism in place to ensure that the emergency response team members are current with respect to annual training or respiratory protection qualification requirements.
- TA-55 emergency preparedness training does not address emergency management training for those key facility managers or their designees tasked with an emergency response role in the initial identification and categorization of events, prompt initial notification, and the initiation of mitigative and corrective actions to minimize consequences to workers, public health and safety, and the environment.
- TA-55 emergency response team training and lesson plans designed to ensure a coordinated emergency response have not been reviewed by the Emergency Management Office.
- See Concerns TSA-1, WS.3-3; TSA-1, CS.5-2; TSA-1, PP.6-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (EP.3-1) (H2/C1) **At the Los Alamos National Laboratory, the TA-55 training program and implementation of training activities do not meet the requirements of DOE 5500.3A (and its predecessor DOE 5500.3); furthermore, the management and support personnel have not been trained in emergency management requirements and responsibilities outlined in DOE 5500 series of Orders.**

4.5.1.8 Technical Support

4.5.1.8.1 Overview

This appraisal of the Technical Support functional area focussed on the TA-55 complex. Five performance objectives were reviewed, TS.1 Organization and Administration, TS.2 Procedures and Documents, TS.3 Facility Modifications, TS.4 Equipment Performance Testing and Monitoring, and TS.5 Environmental Impact. Performance objectives TS.6 Packaging and Transportation of Hazardous Materials, and TS.8 Criticality Safety, were not included; these were covered by separate S&H Subteams. Performance objective TS.7 Reactor Engineering was not applicable to TA-55. The appraisal was conducted by means of interviews with managers, supervisors, engineers, scientists, and technicians and tours of TA-55 operations.

Many reports, procedures, design files and drawings, records, administrative requirements, and personnel performance appraisals were reviewed. The following groups in the Nuclear Materials Technology Division and operational process systems were reviewed: Nuclear Materials Processing: Nitrate Systems; Nuclear Materials Processing: Chloride Systems; Plutonium Metallurgy; Actinide Materials Chemistry; Facilities Management; and Heat Source Technology. Technical support personnel are provided from several different organizations. LANL engineers and technicians and contract technicians from JCI are assigned to the different groups. They were generally found to be capable of independently supporting the TA-55 operations and programmatic activities. Lines of communication between Facilities Management technical personnel and other Nuclear Materials Technology Division groups, with respect to technical effort requirements, are not clearly defined. Some deficiencies exist in the Facilities Engineering Division and Nuclear Materials Technology Division management interface. Facilities Engineering Division personnel do not always inform facility management that they are performing maintenance or testing and installation of new process equipment. There is no established communication procedure to solve this problem.

The S&H Subteam found that technical support personnel for both the facility and programmatic operations are competent, experienced, and capable of handling their assignments. However, not all technical support personnel have well-defined lines of responsibility. Technical personnel in Bldg. PF-4 have taken the prescribed safety and health training and are certified in their area of work assignments. However, interaction and communication between Nuclear Materials Technology Division management and Facilities Engineering Division are weak.

At present, the TA-55 complex is operating under previously approved documents that are outdated. The existing OSR was approved in January 1989 and the Final Safety Analysis Report in 1978. But modifications and changes to the facility that could affect safety are not included in the approved OSRs and the Final Safety Analysis Report. A revision of the Final Safety Analysis Report and the OSR was recently sent to DOE for approval. There has been no response from DOE.

The file and records package of a Work Order Request was randomly selected to review its documentation. The work was to relocate three "hot" boxes at TA-

55. The records on file did not include the Special Work Permit and the Radiation Work Permit required before start of work.

Good engineering practices such as applying the correct codes and standards are used for facility and programmatic modification projects. Drawings and specifications generally contain the correct technical information but lack independent review and approval. Documentation of engineering and safety information are inconsistent; some are auditable with complete records, others have incomplete files. TA-55 does not have an operational readiness review system prior to final closeout of modification projects as required by DOE 5480.5. There are written procedures for design reviews; however, some members of the design review committee have only limited knowledge of the TA-55 operations and have never even been within the TA-55 complex. There is a functional system to report incidents which complies with DOE 5000.3A.

The NMT-8 technicians who perform the testing of equipment are knowledgeable and competent. The testing of equipment is conducted for the programmatic group only when such a request is made to the NMT-8 technical support person. There are no written test procedures for much of the TA-55 equipment. Neither Class A nor Class B equipment test records are complete. Although monitors are in gloveboxes and are operational when the process is on line, there is no monitoring of highly toxic effluents such as phosgene from process gloveboxes before release to the environment.

The self-assessment was not comprehensive and their findings did not provide details and specifics. Statements of their findings were mostly generic. The depth of the technical discussions was limited. The open admittance by LANL that they are deficient in complying with the safety and health requirement of DOE is an indication that the LANL directorate is cognizant of the safety and health issues and problems that need to be addressed.

4.5.1.8.2 Findings and Concerns

TS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The technical support organization and administration should ensure effective implementation and control of technical support activities.

FINDINGS:

- There are no sitewide engineering design procedures/guidelines to provide direction or oversight for the safe design, installation, inspection and testing of high pressure gas systems.
- There are no documented criteria to define high and low pressure gas systems.
- There is no training program in place to certify LANL and Johnson Controls World Services, Inc. technical support personnel who perform work on high pressure gas systems operating at 6,000 to 45,000 psig.
- Technical support responsibilities and authorities at LANL are not concentrated in one central organization. The technical support system is fragmented in the distribution and performance of technical assignments.
- The technical support teams that respond to programmatic needs are sometimes pressed to complete tasks without the benefit of a safety review, the following are examples:
  - Room 401-A was constructed in TA-55, Bldg. PF-4 without a documented fire protection review of the automatic sprinkler system.
  - A modification that included rerouting the fire protection water supply for the Bldg. PF-5 warehouse was completed with no documented fire protection engineering review.
- A glove box within Bldg. PF-4 was moved, re-installed and all utilities installed with no safety review. Documentation was incomplete.
- During the appraisal the water pump for the TA-55 fire protection system was being tested by a maintenance technician assigned from the Maintenance Group, (ENG-6), Facilities Engineering Division. The Deputy Group Leader of TA-55 Facilities Management (NMT-8) did not know that the test was being conducted.
- Glass tapes and plastic films are wrapped around flange connections in the aqueous nitrate system to indicate and control leakage of radioactive liquid. There was at least one instance of a personnel contamination

occurrence while wrapping a flange connection with the plastic film.

- Periodic torquing of the flange bolts in the aqueous nitrate system is conducted because the gasket material would "cold flow".

- A potential for leaks exist in the aqueous nitrate process system indicative of use of improper gasket/valve packing material.

- The following concern was fully identified in the LANL self-assessment.

CONCERN: (TSA-1) (TS.1-1) (H2/C2) **TA-55 technical support activities with safety significance are not always controlled or reviewed in a way that ensures protection of facility personnel or public health and safety.**

TS.2 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and be properly and effectively used to support safe operation of all facilities on the site.

FINDINGS:

- The Management Configuration Control Program being implemented at TA-55 as required by DOE 5480.5 has significant deficiencies in updating its records of drawings to conform to ongoing changes and new designs. When TA-55 was completed in 1978, an as-built drawing configuration was not established. There are drawings that need to be updated to comply with the 1987 TSA findings and concerns.
- The existing TA-55 Operational Safety Requirements and Final Safety Analysis Report are documents approved by DOE but are now outdated. The Operational Safety Requirements were approved in January 1989; the Final Safety Analysis Report in 1978.
- The revised Final Safety Analysis Report and the Operational Safety Requirements for TA-55 have been submitted to DOE, but not yet approved.
- See Concerns TSA-1, AX.1-1; TSA-1, OA.7-2; and TSA-1, OA.7-1.

CONCERN: **See Concern TSA-1, OP.4-1.**

TS.3 FACILITY MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that should assure proper design, review, control, implementation, and documentation in a timely manner.

FINDINGS:

- A design review process using qualified and appropriate engineering personnel to review modifications is not consistently applied for TA-55. For example the large evaporator/steam jet ejector/condenser process in TA-55 had some documentation of the design review but no record of independent review.
- Ventilation modification in Bldg. PF-42, TA-55 were reviewed by individuals with limited knowledge of facility operations.
- There is no existing operational review process.
- See Concern TSA-1, FR.1-1.

CONCERN: **See Concern TSA-4, TS.3-2.**

TS.5 ENVIRONMENTAL IMPACT

PERFORMANCE OBJECTIVE: The impact on the environs from the operation of each facility on the site should be minimized.

FINDINGS:

- At TA-55 no surveillance or monitor is provided outside gloveboxes to detect releases of highly toxic/hazardous effluents (i.e. phosgene) to the environment.

CONCERN: **See Concern TSA-1, AX.2-1.**

4.5.1.9 Packaging and Transportation

4.5.1.9.1 Overview

All 12 performance objectives in the Packaging and Transportation technical area were addressed in this appraisal. Six of the objectives (PT.5 Accidents and Incidents, PT.7 Intra-building Movements, PT.8 Onsite Transfers, PT.9 Offsite Shipments, PT.10 Records, PT.11 Appraisals and Internal Audits, and PT.12 Packaging and Storage Procedures) had findings that also support other broader objectives (PT.1 Administration and Organization, PT.3 Quality Assurance, and PT.6 Operations) and are reported under those three objectives only. Interviews were held with managers, staff, and technicians in the groups in the Nuclear Materials Technology Division having responsibilities for the preparation and receipt of hazardous material shipments. Interviews were also held with the Fabrication and Assembly Group, Design Engineering Division. Preparation of packages by the Nuclear Materials Management Group for an onsite shipment of a Type B quantity of plutonium was observed. Receipt and unloading operations following onsite shipment of packages by the Analytical Chemistry Group, Chemical and Laser Sciences Division were observed. Information was gathered from tours of the TA-55 laboratories, basement, and outside storage areas. Policies, manuals, procedures, shipping records, shipping package Certificates of Compliance, audit reports, and correspondence were reviewed during the appraisal.

Overall, packaging activities for plutonium and enriched uranium are performed satisfactorily by the Nuclear Materials Technology Division. The Nuclear Materials Technology Division is the major shipper and receiver of significant quantities of such materials. It should have, and has, actively pursued establishing many of the positive controls necessary for successful operations. Weaknesses in the present packaging activities of the Nuclear Materials Technology Division result from a lack of a formal system of controls from the sitewide perspective. Uncertainties in Nuclear Materials Technology Division with respect to applicable requirements is due to poor sitewide oversight which fails to provide easy traceability to DOE Orders and Federal regulations. Those requirements are not effectively included in Laboratory policy and in transportation safety and QA manuals to ensure consistent and correct sitewide performance of plutonium and enriched uranium shipment-related activities. Further, lack of LANL support prevents the Nuclear Materials Technology Division from implementing known oversight requirements (QA). Thus, deficiencies in the Nuclear Materials Technology Division are likely to occur at other LANL plutonium and enriched uranium facilities that make fewer shipments.

Oversight has principally been provided by the Safety and Risk Assessment Group, Health and Safety Division, in the form of guidance information and has not included the independent oversight of packaging operations. Guidance information is provided at the request of an organization preparing a package for shipment. Shipments have been successful due to the cooperation of experienced personnel knowing when to seek assistance, more than through a system of positive controls on those performing the operations. A plan is in progress toward achieving a sitewide system of more positive controls.

Changes in packaging and transportation regulations, DOE Orders and directives, and policy guidance from LANL are not being provided under a formal system of controls to those at the Nuclear Materials Technology

Division using the procedures for packaging operations. Receipt of new information by users and incorporation of new information into procedures, is not being accomplished in a timely manner. At present, procedures are not always used for packaging and transportation operations as required by DOE Orders, and are not always safe operating procedures as required by LANL policy. Also, safe operating procedures are not always reviewed by an oversight organization to ensure that regulatory requirements are properly reflected in the operating methods and that the operating methods are consistent across the site. Neither a transportation safety committee nor a packaging users group committee exists at the site to coordinate activities between organizations. QA oversight is not uniformally applied across the site. In Nuclear Materials Technology Division, the QA program is not written to apply to all packaging operations and is not implemented for all activities that it does address.

Both the Nuclear Materials Technology Division and LANL self-assessments identified four of five concerns and partially addressed one concern identified by the S&H Subteam.

4.5.1.9.2 Findings and Concerns

PT.1 ADMINISTRATION AND ORGANIZATION

PERFORMANCE OBJECTIVE: Management should develop and implement a system of policies and directives that will provide for effective implementation of Department of Energy Orders, particularly DOE 5480.3, DOE 1540.2, Federal and State regulations, and good industrial practices, in operations involving packaging and transportation of hazardous materials.

FINDINGS:

- AL, LAAO, LANL, the Safety and Risk Assessment Group, and the Quality Operations Office do not provide oversight of preparation of packages of plutonium and enriched uranium for shipment. (See Concerns TSA-4, PT.3-3, and TSA-1, PT.3-1.)
- The Nuclear Materials Technology Division and its facility safety committee do not provide oversight of preparation of packages of plutonium and enriched uranium for shipment from TA-55. (See Concern TSA-1, OA.2-1.)
- The Nuclear Materials Management Group is the centralized shipping and receiving organization for radioactive materials at the TA-55 and receives radioactive materials already in sealed packages from the Plutonium Metallurgy Group and the Heat Source Technology Group. The Nuclear Materials Management Group process safety committee does not receive safe operating procedures from the other two groups for review to confirm the safety of their packaging activities.
- There is no transportation safety committee at LANL to assist in the review of changes to packaging and transportation directives, Orders, and regulations and their coordination during implementation by all affected organizations.
- Groups of the Nuclear Materials Technology Division do not have a formal system to determine future needs for specialized packagings and to initiate actions to locate or design such packagings.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (PT.1-1) (H2/C1) **Oversight of packaging and transportation activities for plutonium and enriched uranium is not provided by Los Alamos National Laboratory or the Nuclear Materials Technology Division in compliance with DOE 5480.3.**

FINDINGS:

- Safe operating procedures are not always used, do not reflect current operations, or do not provide clear instructions for the various groups performing packaging activities for plutonium and enriched uranium.

- The Fabrication and Assembly Group receives and prepares packages of plutonium and enriched uranium at TA-8 without using a safe operating procedure for these packaging activities.

- The TA-55 Facilities Management Group receives and prepares hazardous materials for shipment without using a safe operating procedure for these packaging activities.

- The Heat Source Technology Group prepares some packages of plutonium for shipment without using a safe operating procedure for these packaging activities.

- The Nuclear Materials Processing: Chloride Systems Group uses an operating procedure rather than a safe operating procedure for plutonium packaging activities.

- All procedures for packaging and transportation of plutonium and enriched uranium are not yet revised to require use of the new Hazardous Materials Transfer Form that was initiated in August 1991.

- The new Hazardous Material Transfer Form provides less information than the previously used Radioactive Materials Transfer Tag. This change results in a less formal method (for adding up the amount of fissile materials per shipping package by technicians) for ensure that limits are not exceeded.

- The Onsite Transportation Manual, dated October 17, 1988, is not accurate or current. The manual does not reflect how operations are presently being performed, for example, road closures and use of a Hazardous Materials Transfer Form rather than a Radioactive Materials Transfer Tag.

- The Hazardous Materials Packaging and Transportation Quality Assurance Program (HAZPACT QA Manual), dated May 19, 1989, is not comprehensive or current. The manual addresses only radioactive materials and does not specify use of a Hazardous Materials Transfer Form rather than a Radioactive Materials Transfer Tag.

- See Concerns TSA-1, OA.3-1, and TSA-4, PT.1-2, and Section 4.5.1.2.2, QV.1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (PT.1-2) (H2/C1)	Packaging activities for plutonium, enriched uranium, and hazardous chemicals are not always performed using safe operating procedures, as required by DOE 5480.3 and Los Alamos National Laboratory AR 1-3, that are based on current transportation safety and quality assurance manuals.

PT.2 TRAINING

PERFORMANCE OBJECTIVE: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE 5480.3 and 49 CFR.

FINDINGS:

- Training for preparation of packages of plutonium and enriched uranium products for shipment by the Nuclear Materials Management Group does not include training relative to QA requirements for the use of packagings.
- On-the-job training for preparation of packages of plutonium and enriched uranium products for shipment by the Nuclear Materials Management Group does not include certification requirements and criteria that are formally documented as specific oral and written questions.
- See Concerns TSA-1, QV.1-4, and TSA-4, PT.2-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (PT.2-1) (H2/C1) **At the Los Alamos National Laboratory, the training program for preparation of packages of plutonium and enriched uranium products by the Nuclear Materials Management Group does not meet the requirements for quality assurance in the use of packagings per DOE 5480.3.**

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures the quality assurance requirements of the applicable Department of Energy Orders, especially DOE 5700.6C, and ASME NQA-1-1989 are met.

FINDINGS:

- Implementation of the QA program for packaging and transportation activities does not include oversight of the preparation of packages of plutonium and enriched uranium products for shipment by the Plutonium Metallurgy Group and the Nuclear Materials Management Group.
- The Quality Program Plan for the Nuclear Materials Management Group does not include QA requirements for preparation of plutonium and enriched uranium packages for onsite shipments.
- See Concerns TSA-1, QV.1-3, and TSA-4, PT.3-2.
- The following concern was identified in the LANL self-assessment.

CONCERN:
(TSA-1)
(PT.3-1)
(H2/C1)

At the Los Alamos National Laboratory, packaging and transportation activities for preparation of packages of plutonium and enriched uranium product for shipment by the Plutonium, Metallurgy Group and Nuclear Materials Management Group are not verified by a comprehensive quality assurance program as required by DOE 5480.3 and DOE 5700.6C.

PT.4 REGULATORY COMPLIANCE

PERFORMANCE OBJECTIVE: All packaging and transportation operations involving hazardous materials should be conducted in compliance with the applicable Federal and State regulations, including those of the Department of Transportation, the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and the Environmental Protection Agency.

FINDINGS:

- Previously certified packagings that have recently lost their certification have not been replaced with new design packagings which meet current requirements.
- Future packaging needs for onsite shipments are known to be an immediate concern because without adequate packagings, road closures must be used for onsite shipments.
- The applicability of DOE Orders and Department of Transportation regulations regarding road closure for onsite shipments has not been specified to the Nuclear Materials Technology Division. (See Concern TSA-4, PT.8-2.)

CONCERN: **See Concern TSA-1, PT.1-1.**

PT.6 OPERATIONS

PERFORMANCE OBJECTIVE: Sitewide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and accepted practices.

FINDINGS:

- The Nuclear Materials Management Group does not always provide all information required on a Hazardous Material Transfer Form for onsite shipments of plutonium and enriched uranium which is part of the required shipping documentation.
- See Concern TSA-4, PT.8-4.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (PT.6-1) (H2/C1) **At the Los Alamos National Laboratory, use of the Hazardous Materials Transfer Form does not comply with the shipping documentation requirements of DOE 5480.3 and 49 CFR 172.**

PT.7 INTRA-BUILDING MOVEMENTS

PERFORMANCE OBJECTIVE: *Intra-building movements and en route storage* operations should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted practices.

FINDINGS:

- Several model 5332 packagings stored in the basement of Bldg. PF-4 had neither a LANL empty tag nor a radioactive material tag to indicate the status of the contents. A tamper indicating device provided the only traceability to the personnel responsible for last handling the container.

- See Concerns TSA-1, RP.3-4, and TSA-4, PT.4-3.

CONCERN: **See Concern TSA-1, QV.5-2.**

4.5.1.10 Nuclear Criticality Safety

4.5.1.10.1 Overview

All five performance objectives of Nuclear Criticality Safety were appraised. The appraisal was primarily directed at the TA-55 area of LANL with emphasis on operations of the Nuclear Materials Processing: Chloride Systems Group. The appraisal was conducted by means of interviews with personnel with responsibilities affected by nuclear criticality safety concerns, by review of documents relating to nuclear criticality safety, and by inspections of various laboratories and facilities. Areas inspected were Bldg. PF-4 in TA-55 including the vault; the isostatic press in Room 38 West; advanced fuel fabrication operations in Rooms 125 and 126; the foundry and casting operations in Room 327; Shop 13 in TA-3 Bldg. SM 102; the Hillside Vault at TA-18; the vault in the Chemistry and Metallurgical Building; and TA-41.

In the area of organization and administration deficiencies were noted in the contractor independent review and appraisal system. The training organization at TA-55 was found to be well-organized. A good practice noted here was that when a worker's training expires, that worker is dropped from the personnel access database and denied entrance to Bldg PF-4. Until about 1985, AL provided nuclear criticality safety appraisals of various LANL facilities, but this practice was cut back with the advent of the DOE TSAs. This is felt by LANL workers to be a loss. AL developed a Criticality Safety Appraisal Outline and a Nuclear Facility Safety Appraisal Program, both of which are useful guides to facilitate nuclear criticality safety appraisals. Six concerns are expressed in this area.

In the area of Use of Nuclear Criticality Safety Control Parameters, the appraisal revealed that LANL has an effective and highly professional nuclear criticality safety analysis group, namely, the Criticality Safety Group of the Health and Safety Division. The group is aware of, and applies the criteria of this performance objective. The validation calculations are not comprehensively documented. One concern is expressed in this area.

In the area of Nuclear Criticality Safety Evaluations it was noted that review of the nuclear criticality safety analyses is not sufficiently formal. Without rigorous peer review, there is always the danger that criticality guidance might be based on erroneous information. Also, the nuclear criticality safety analyses are not comprehensively documented. One concern is expressed here.

In the area of Operating Procedures and Criticality Safety Limits a lack of rigorous review was again noted. Of particular concern is the lack of a uniform safe operating procedure review and approval process, and the possibility of putting a standard operating procedure into practice before it has received a comprehensive review. Four concerns are expressed here.

Deficiencies were seen relating to the criticality alarm system evacuation procedures, criticality alarm system maintenance and calibration, and criticality alarm system documentation. Several shortcomings were noted in emergency planning at TA-55. Three concerns are expressed in this area.

The LANL self-assessment was effective in that most of the concerns identified in this appraisal were also identified in the self-assessment. Note that most of the concerns are identified in the self-assessment in sections other than that for nuclear criticality safety. The LAAO self-assessment does not identify the one concern directed at DOE.

4.5.1.10.2 Findings and Concerns

CS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: All operations with fissionable material should be conducted to provide effective nuclear criticality control during all activities.

FINDINGS:

- The September 30, 1991, charter of the Nuclear Criticality Safety Committee (NCSC) (ES&H Manual) omits the following elements: quorum, authority, reviews of accidents and incidents, evaluation of effects of facility aging, and others specified in DOE 5482.1B. Section 9.d. (2)(g).

- The NCSC is the prime safety review committee for nuclear criticality safety for all of LANL including TA-55. The chairman and one other member belong to the Nuclear Materials Technology Division, which makes questionable the independence of the review by the Nuclear Criticality Safety Committee of Nuclear Materials Technology Division programs.

- The NCSC charter does not specify the composition of the annual audit teams. The intention is that they be comprised of one member of the NCSC and one representative from the Safety and Risk Assessment Group. In practice, the audit teams usually consist of one member of the NCSC. This fails to satisfy DOE 5482.1B Section 9.d.(2).(f).

- The annual NCSC facility audits follow a review outline that does not include all requirements of DOE 5482.1B, Section 9.d.(2).(g).

- There is no written requirement for a formal closeout of the annual NCSC audits.

- There is no formal tracking system for action items that result from the annual NCSC audits or other NCSC activities. Action items are entered into the audit reports but are not tracked or checked until the next annual audit.

- There is no required response time on action items from the annual NCSC audits. If they have not been closed out by the time of the next audit, that deficiency is noted, but there is no policy requirement to do so.

- Suggestions have been made, but not implemented, to enhance the formality of operation of the NCSC. Examples include preclusion of an NCSC member from reviewing his/her own operations in the annual NCSC audit, defining a quorum for the committee, etc.

- The following concern was fully identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.1-1) (H3/C1)

The Los Alamos National Laboratory Nuclear Criticality Safety Committee fails to satisfy some requirements of DOE 5482.1B, such as having a charter that provides complete committee specifications, in fulfilling its role in the contractor independent review and appraisal system.

FINDINGS:

- During the course of the meetings held over the last 18 months by the TA-55 Facility Safety Committee, only one nuclear criticality safety issue was considered.
- The Facility Safety Committee conducted the semi-annual inspection tour (as required by its charter) in December 1990, but covered only OSHA-type issues.
- The Facility Safety Committee, the TA-55 Criticality Safety Committee, and the LANL NCSC all have responsibilities intended to satisfy the requirements for the contractor independent review and appraisal system as specified in DOE 5480.5, Section 9 and DOE 5482.1B, Section 9. The responsibilities are not clearly delineated, however, and overlaps and omissions are possible.
- The charter of the TA-55 Criticality Safety Committee does not specify a quorum.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.1-2) (H3/C1)

At the Los Alamos National Laboratory, the TA-55 Facility Safety Committee and the TA-55 Criticality Safety Committee fail to satisfy some requirements of DOE 5480.5 and DOE 5482.1B, such as suitable consideration of nuclear criticality safety issues, in their role in the contractor independent review and appraisal system.

FINDINGS:

- The September 30, 1991, charter of the NCSC (ES&H Manual) states that information input to the ES&H Council by the NCSC "provides the triennial management review required by DOE Order 5480.5." The input is in the form of an annual briefing and the ES&H Council does not undertake any appraisal activities first hand.
- AR 1-5 sets forth policy for ES&H audits and appraisals, but no requirement for a triennial appraisal is included.
- Although it is intended that the recently formed Laboratory Assessment Office will assume responsibility for the triennial appraisal of the site or facility safety review system that is required by DOE 5480.5, Section 9.i and DOE 5482.1B, Section 9.d.(2)(d), there is, as yet, no LANL policy governing this function.

- The charter of the ES&H Council includes the requirement to "periodically visit sites..." Review of the minutes of the monthly meetings from September 9, 1988, to September 13, 1991, reveals only one such inspection.

- Neither the charter nor the activities of the ES&H Council address fully the requirements of DOE 5480.5, Section 9 or DOE 5482.1B, Section 9.a.

- Functional appraisals of nuclear criticality safety, as required by DOE 5482.1B, Section 9.c. are not performed.

- See Concerns TSA-1, FR.1-1, and TSA-1, FR.1-5.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.1-3) (H3/C1) **Los Alamos National Laboratory policy does not fully address requirements of DOE 5480.5, Section 9 and DOE 5482.1B, Section 9 concerning the contractor independent review and appraisal system, such as providing for an effective triennial appraisal of the Nuclear Criticality Safety Program.**

FINDINGS:

- Nuclear Material Processing: Chloride Systems Group operators are sometimes certified by their immediate supervisors, which fails to satisfy DOE 5480.5, Section 10.a.(6).

- The "Environmental, Safety and Health Course Catalog," May 1991, describes four nuclear criticality safety courses (Numbers 5269-5272); however, these are suggested but not required of personnel with nuclear criticality safety responsibilities.

- The "Environment, Safety and Health Course Catalog," May 1991, specifies required and suggested courses for plutonium and americium workers (Appendix B), but not for uranium workers.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.1-4) (H3/C1) **The Los Alamos National Laboratory training program for personnel concerned with nuclear criticality safety does not satisfy all requirements of DOE 5480.5, Section 10.**

FINDINGS:

- AL stopped doing periodic appraisals of nuclear criticality safety in 1985. There is, however, an agreement between LANL and AL that specifies the frequency of such appraisals. The maximum interval between appraisals as specified in the agreement is 2 years. This agreement has never been rescinded.

- AL 5480.5 does not specify the appraisals required by DOE 5480.5, Section 7.e.(9). Further, AL 5480.5, Section 4.c.(7) states that AL is to conduct appraisals in accordance with DOE 5482.1B. DOE 5482.1B, Section 8.3.(2) requires functional appraisals "with sufficient scope and frequency."

- The AL Operational Surety Program specifies daily, weekly, and monthly duties of facility representatives. Some of these duties relating to nuclear criticality safety are not being discharged.

- The AL OSR Assistance Review document states that the November 1989 OSRs for TA-55 were to receive priority for approval. Further, AL 5480.5, Section 4.f.(2).(b) states that OSR are to be approved by the Director, Safety Programs Division. "Operational Safety Requirements for the Plutonium Facility (TA-55-4)," November 1989, does not indicate that such approval was obtained.

- Distribution of unusual occurrence notices by AL has not been formalized and is inconsistently performed.

- See Concern TSA-1, OA.7-2.

- The following concern was not identified in the AL self-assessment.

CONCERN: (TSA-1) (CS.1-5) (H3/C1) **The Albuquerque Field Office is failing to discharge some duties, such as administration of periodic appraisals, related to nuclear criticality safety required by DOE 5480.5, Section 7 and AL 5480.5.**

FINDINGS:

- The criticality accident scenario, reported in "TA-55 Final Safety Analysis Report," April 11, 1991, Section 7.3.4.1.1 and Section 7.3.4.1.2, postulates that fissile material solution is enabled to flow into one of the deep, compact wells suspended from the floor of a glovebox. It is further postulated that there is but a single fission spike because the initial energy release would eject the solution from the well and it would not return. It is not clear what is to prevent the solution from running back into the well just as it did initially.

- Table 7.1-1 of the Final SAR for TA-55 lists some identifiable criticality accident scenarios. The accident analyzed in Section 7.3.4.1 is asserted to be the most likely one, and the other conceivable accidents are omitted from further consideration. Apparently the other accidents are believed not to contribute significantly to the overall probability of a criticality accident, but that assumption is not validated.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.1-6) (H3/C2)	At the Los Alamos National Laboratory, the TA-55 Final Safety Analysis Report contains omissions in the analysis of criticality accidents.

CS.2 USE OF NUCLEAR CRITICALITY SAFETY CONTROL PARAMETERS

PERFORMANCE OBJECTIVE: Nuclear criticality safety should be achieved by controlling one or more specified parameters of the system within subcritical limits.

FINDINGS:

- Computer code validation calculations have been performed by Criticality Safety Group personnel, but documentation of these is incomplete, inconsistent, and fails to satisfy requirements of ANSI/ANS-8.1-1983, Section 4.3.6.
- See Concern TSA-1, QV.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.2-1) (H3/C2)

At the Los Alamos National Laboratory, validation of computer code calculations to support nuclear criticality safety analyses is not fully in compliance with ANSI/ANS-8.1-1983, Section 4.3.6.

CS.3 NUCLEAR CRITICALITY SAFETY EVALUATIONS

PERFORMANCE OBJECTIVE: Nuclear criticality safety evaluations of the design and operation of process equipment should ensure that subcriticality is maintained under normal and credible abnormal operating conditions.

FINDINGS:

- There was no formal review requirement for nuclear criticality safety analyses done by the Criticality Safety Group. Also, there is no formal requirement for checking computational input. Policy intended to correct this has now been formulated.
- There was no formal documentation requirement for nuclear criticality safety analyses done by the Criticality Safety Group. Policy intended to correct this has now been formulated.
- The documentation of nuclear criticality safety analyses done by the Criticality Safety Group does not always stand alone, and even with the reference documents, some aspects of the analyses are not addressed. For example, concise descriptions of the process and modeling approximations are sometimes omitted.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.3-1) (H3/C1) **At the Los Alamos National Laboratory, Health and Safety Division requirements for documentation and review of nuclear criticality safety analyses as required by ANSI/ANS-8.1-1983, Section 4.3.4, have not been completely implemented.**

CS.4 OPERATING PROCEDURES AND CRITICALITY SAFETY LIMITS

PERFORMANCE OBJECTIVE: The approved written operating procedures should address criticality safety limits in providing effective guidance for all aspects of facility activities.

FINDINGS:

- The Nuclear Materials Technology Division has policies (Nuclear Materials Technology Division QA Manual, Sections 8.5 and 8.6) that govern review and approval of safe operating procedures. These policies are not consistently applied among the nine Nuclear Materials Technology Division groups.
- There is no Nuclear Materials Technology Division policy governing distribution of TA-55 safe operating procedures.
- AR 1-3 states that "HSE-Division approval is required for hazardous operations involving procedures that deviate from the requirements specified in the Health and Safety Manual." However, the procedure for review and approval of safe operating procedures within the Nuclear Materials Processing: Chloride Systems Group makes them effective after review by the group leader and division leader. They are then routed to the Criticality Safety Group for review but are permitted to be used before that review is completed.
- All safe operating procedures governing TA-55 foundry and casting operations have gone more than a year since their last review and approval, which is at variance with ANSI/ANS-8.1-1983, Section 4.1.6.
- Many of the safe operating procedures governing TA-55 advanced fuel fabrication operations have gone more than a year since their last review and approval, which is at variance with ANSI/ANS-8.1-1983, Section 4.1.6.
- The Mechanical and Electronics Support Division has no policy governing review and approval of safe operating procedures. The Division relies on AR 1-3 for guidance in this regard. However, AR 1-3 states: "Divisions must ... set up an appropriate SOP review and approval system."
- See Concerns TSA-1, OA.2-1, and TSA-1, QV.1-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.4-1) (H3/C1) **Policies to govern review and approval of safe operating procedures are not consistently enforced at Los Alamos National Laboratory as required by ANSI/ANS-8.1-1983, Section 4.1.6.**

FINDINGS:

- Criticality Safety Limit Approvals require provision of diagrams of the workstations covered. Some diagrams are unclear.
- A criticality limit was violated at TA-55 on February 28, 1991. The violation was found to result from lack of clarity of the drawing of the workstation.
- A Criticality Safety Limit Approval dated January 22, 1990, displays the following deficiencies.
  - It contains the wording "What is changed is the wording under restrictions." It is not clear that what follows is intended to be the old or the new wording.
  - The "Diagrams of workstations" is uninformative.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.4-2) (H2/C1) **At the Los Alamos National Laboratory, Criticality Safety Limit Approvals are unclear and fail to satisfy DOE 5480.5, Section 11.c.**

FINDINGS:

- The mass limit forms for the TA-55 vault carts include the final entry: "Pu in Alpha Metal Shapes." This should be a reference to "Pu in Approved Shapes." This indicates that not all mass limit forms receive sufficient review. Also, as a result, the cart mass loading could have exceeded the correct mass limit by a factor of one-third.
- Box G139 of the TA-55 Advanced Fuel Fabrication area has a limit of 425 kg of uranium-235 in compound form. (This has been lowered administratively to 350 kg.) The material must be contained in small cans in a planar array, but these restrictions are not included on the mass limit posting.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.4-3) (H1/C1) **At the Los Alamos National Laboratory, some limit postings for materials in storage at TA-55 are incorrect or incomplete and do not fully satisfy the requirements of DOE 5480.5, Section 13.b.**

FINDINGS:

- Criticality limit violations are not documented in a timely fashion. Several violations dating from November 1989 to February 1991, are all reported in memoranda dated March 14, 1991.

- Memorandum NMT-2-BSB-91-033, March 14, 1991, an account of a criticality limit violation, calls for an action by the TA-55 Criticality Safety Committee. Inspection of the Committee minutes subsequent to March 14, 1991, does not reveal consideration of the incident by the Criticality Safety Committee.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.4-4) (H3/C1) **At the Los Alamos National Laboratory, notification, investigation, and reporting of criticality limit violations at TA-55 do not satisfy the requirements of DOE 5480.5, Section 8.g.**

CS.5 CRITICALITY ALARM SYSTEM AND EMERGENCY PROCEDURES

PERFORMANCE OBJECTIVE: All reasonable steps should be taken to mitigate the consequences of a nuclear criticality accident.

FINDINGS:

- During the course of this appraisal some maintenance work was conducted on the TA-55 criticality alarm system. A public address announcement advised personnel to ignore the alarm if it were to sound. TA-55 policy is that no work be in progress during maintenance of the criticality alarm system.
- Similar announcements were made during the course of criticality alarm system maintenance on January 4, 1979, and again on April 19, 1990. False alarms occurred both times and, according to the instruction given, some personnel did not evacuate. Issuing such an instruction in the course of criticality alarm system maintenance is considered to be bad practice, as the alarm is always to be regarded as real.
- The TA-55 Final SAR states that the criticality alarm system detectors are calibrated locally and remotely on a quarterly schedule. In fact, the criticality alarm system detectors are only locally response tested quarterly at three different source distances.
- The source that is used for the criticality alarm system response tests has not been laboratory calibrated.
- Criticality alarm system maintenance procedures are provided in the "HSE-10 Chemistry Health Protection Procedures," August, 1991. The Electronic Maintenance Group, however, uses checklists that have been in draft form since at least 1988.
- Studies have been conducted to show that criticality alarm systems are not needed at TA-18, the Chemistry and Metallurgical Research Building, or TA-41. Such studies have not been performed for the remaining special nuclear material storage area (Bldg. SM-164) not provided with criticality alarm systems.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.5-1) (H2/C1) **The criticality alarm system support operations including calibration, maintenance, and analysis at Los Alamos National Laboratory do not satisfy DOE 5480.5, Section 11.c.(3).(g) and Section 11.c.(3).(h).**

FINDINGS:

- Parts of the basement and the first floor of Bldg. PF-4 lack evacuation route markings.

- The TA-55 Safety Manual fails to specify emergency training requirements for TA-55 employees.

- Calculations to confirm the safety of the TA-55 evacuation assembly area are lacking.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (CS.5-2) (H2/C1) **At the Los Alamos National Laboratory, emergency preparations for criticality evacuations at TA-55 fail to satisfy DOE 5480.5, Section 8.k.**

4.5.1.11 Security/Safety Interface

4.5.1.11.1 Overview

The appraisal addressed all four of the performance objectives in the Security/Safety Interface technical area. The appraisal included visits to TA-41, TA-55, Bldg. AW-23 (Betatron), and Bldg. SM-164. Interviews were conducted with representatives of these facilities, the Operational Security and Safeguards Division, the Safety and Risk Assessment Group, and Mason & Hanger-Silas Mason Co., Inc. (M&H), management and security inspectors. Documents reviewed included safety analyses, General Security Orders and Station Orders, and emergency procedures.

Overall, a number of positive and negative aspects were identified. The organization and staff exhibited a willingness to aggressively correct deficiencies identified by the S&H Subteam, and a number of programs are in various stages of development to correct previously identified problems. However, five concerns specific to plutonium and enriched uranium facilities were identified in the areas of emergency access/egress, emergency response, security force training, and analysis of security related safety interactions.

Security and safeguards improvements and modifications are processed through the same review and approval system as are modifications for other purposes. This includes modifications at plutonium and enriched uranium facilities as well as at all other LANL facilities. However, the S&H Subteam identified deficiencies in the overall review process.

The General Security Orders and Station Orders include provisions for emergency access and egress. However, several deficiencies in emergency egress provisions were identified during the appraisal. Although LANL personnel took prompt actions to correct the individual deficiencies, the number identified by the team indicates that LANL does not have an effective program for identifying and correcting such deficiencies. No cases were identified in which loss of power to electrically operated barriers would preclude emergency egress. There are provisions for fire department emergency access, with or without security force presence (however, firefighters may not be trained (see Section 4.5.1.5.2, TC.4)).

Although the Security Orders address emergencies of various types, and the TA-55 emergency plan briefly addresses security emergencies, interfacing responsibilities of facility and security personnel are not explicitly described. Analyses of the potential safety consequences of using weapons and other protective force equipment in plutonium and enriched uranium facilities have not been performed. Consequently, training of security personnel in this area has not been possible.

A program, called the sectors program, has been initiated for the purpose of identifying facility-specific hazards training needs for protective force, fire department, and other emergency response personnel. This program is in the early developmental stage and the training is not being provided at this time. Protective force personnel do receive the general employee safety training, including radiation and hazardous materials training (although brief and undocumented). (See Section 4.5.1.5.2, TC.4.) Protective force personnel are not provided with or trained in the use of special equipment for

protection against radioactive or hazardous materials to which they might be exposed when responding to facility emergencies.

The findings from the S&H Subteam 1 appraisal supported five sitewide security/safety interface concerns stated in the S&H Subteam 4 report. The LANL self-assessment fully addressed four of these concerns and partially addressed the other one. The self-assessment demonstrates a familiarity with, and understanding of, the TSA performance objectives and criteria for the Security/Safety Interface area, which were used by LANL. The self-assessment is judged to have been reasonably thorough and effective in identifying security/safety interface deficiencies.

4.5.1.11.2 Findings and Concerns

SS.1 SAFETY OF IMPROVEMENTS

PERFORMANCE OBJECTIVE: Security/safeguards improvements and modifications should not create or increase hazards that would impede the safe, reliable operation or shutdown of any facility on the site in normal, abnormal, or emergency situations.

FINDINGS:

- Security and safeguards improvements and modifications at plutonium and enriched uranium facilities are processed through the same review and approval process as are modifications for other purposes. However, deficiencies in the general LANL review process were identified by the S&H Subteam.
  - LANL does not have a requirement or procedure for controlling modifications to facilities or equipment. (See Concern TSA-4, TS.3-2.)
  - Operational readiness reviews are not conducted consistently for startup of new facilities and experiments or following significant modifications. (See Concern TSA-4, TSA.3-3.)
  - The TA-55 protected area fence was moved to accommodate construction of Bldg. PF-41 without the potential for restriction of emergency evacuation paths being evaluated.

CONCERN: **See Concern TSA-4, TS.3-2.**

SS.2 EMERGENCY ACCESS AND EGRESS

PERFORMANCE OBJECTIVE: Authorized facility and safety support personnel should not be denied access in an emergency. Egress during emergencies should be conducted according to approved preplanning.

FINDINGS:

- The emergency exit doors at the rear of Bldg. PF-4, TA-55, are vault doors that require two separate actions to open rather than the single action specified by NFPA-101, Life Safety Code, Section 5-2.1.5.

- At TA-3 Bldg. SM-164 a security inspector unlocked the outer security grill covering the east door in accordance with instructions to do so when the facility is occupied. The door is equipped with a crash bar to provide rapid emergency egress when the grill is unlocked and open. However, the security inspector did not latch the grill into an open position. Thus, escape by this path would have required pushing against the weights of the door, the grill, and the friction between the grill and its frame. It was not clear that the escape path could be readily opened. When this was pointed out to the Operational Security and Safeguards Division Acting Deputy Director, who was accompanying the tour, he promptly issued instructions that the Station Order be revised to specify the grill be latched in the open position when the facility is occupied. The Order (Station Order #334) was revised that day.

- The entrance to the Ice House Tunnel has double steel doors (side by side). The door with conventional crash hardware is overlapped by a magnetically latched door with an unconventional quick release mechanism requiring special knowledge to actuate.

- See Concern TSA-1, FP.2-1, and Section 4.5.1.16.2, WS.4.

CONCERN: **See Concern TSA-1, FP.2-1.**

FINDINGS:

- Safety and Risk Assessment Group personnel interviewed were not aware of any analysis of the safety of TA-55 evacuation paths, or comprehensive analyses of the safety of the assembly area following various types of accidents.

- Persons exiting from the southwest rear exit of Bldg. PF-4 during an emergency must pass between the protected area fence and the portion of the building having greatest nuclear criticality potential to reach the designated evacuation assembly area.

- The evacuation assembly area for Bldg. PF-4 is inside the protected area fence. Bldg. PF-4 and Safety and Risk Assessment Group personnel expressed the opinion that the location was based upon protection from direct radiation

from a nuclear criticality, and that other hazards such as radioactive or toxic emissions from the facility were not addressed.

- See Concerns TSA-1, FP.2-4, and TSA-1, CS.5-2, and Section 4.5.1.16.2, WS.4.

CONCERN: **See Concern TSA-1, FP.2-1.**

SS.3 FACILITY PLANNING FOR SECURITY/SAFEGUARDS EMERGENCIES

PERFORMANCE OBJECTIVE: Safety authorities and responsibilities for all types of security/safeguards emergencies should be well defined and understood by all involved parties.

FINDINGS:

- LANL does not have documented analyses of the hazards of using weapons and other protective force equipment in and around LANL plutonium and enriched uranium facilities. Facility operations personnel and Safety and Risk Assessment Group staff members stated there have been no systematic analyses of such hazards.

- DOE 5480.16, Chapter I paragraph 1.i, requires a risk analysis or SAR prior to implementation of any new training or evaluation method involving firearms and nonroutine tactical operations. Armed responses to threats in a nuclear facility may be considered nonroutine.

CONCERN: **See Concern TSA-4, SS.3-1.**

FINDINGS:

- Section 6, "Emergency Controls - Responses," of the TA-55 Safety Manual addresses facility occupant responses to a variety of security emergencies. However, neither that section nor Section 5, "Emergency Controls - Plan," addresses the role of security forces in managing security or operational emergencies.

- Sections 5 and 6 of the TA-55 Safety Manual do not address notifying security inspectors at the perimeter fence security stations of operational emergencies.

- See Concerns TSA-1, EP.1-1, and TSA-1, EP-2-1.

CONCERN: **See Concern TSA-4, SS.3-2.**

SS.4 SAFETY OF SECURITY ACTIVITIES

PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous processes and materials should be identified and understood by all involved parties.

FINDINGS:

- The potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components, and hazardous materials and processes at LANL plutonium and enriched uranium facilities have not been factored into security inspector training.
- Such training is not possible at this time because analyses of the hazards have not been performed. (See Section 4.5.1.11.2, SS.3.)

CONCERN: **See Concern TSA-4, SS.4-1.**

FINDINGS:

- Chemical, radiological, and other hazards to which security inspectors might be exposed in TA-55 facilities have not been identified so as to provide a basis for facility-specific safety training.
- Identification of such hazards at TA-41 is in process, but facility-specific training of security inspectors has not been conducted.
- See Sections 4.5.1.16.2, WS.3, and 4.5.1.5.2, TC.4.

CONCERN: **See Concern TSA-4, SS.4-2.**

FINDINGS:

- M&H personnel, including the Chief Training and Operations Officer, stated that protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to facility emergencies. This deficiency relates to protective equipment relevant to response to plutonium and enriched uranium facilities as well as to other types of facilities at LANL.
- See Section 4.5.1.16.2, WS.3.

CONCERN: **See Concern TSA-4, SS.4-3.**

4.5.1.12 Experimental Activities

4.5.1.12.1 Overview

All four performance objectives in the Experimental Activities technical area were addressed in this appraisal. The appraisal was conducted by interviews with leaders, senior staff, and technicians of the Nuclear Materials Technology Division and five of its nine subordinate groups (Nuclear Materials Processing: Nitrate Systems; Nuclear Materials Processing: Chloride Systems; Actinide Materials Chemistry; Facilities Management; and Heat Source Technology). The Deputy Division Leader and senior staff of the Analytical Chemistry Group were also interviewed. Individual TA-55 laboratory experiments and operations were observed and monitored. Documents related to the description, control, and review of experimental activities were examined.

Overall, the safety aspects of experimental activities at TA-55 appear to be managed appropriately, with the exception of SAR and OSR control issues which are discussed elsewhere in this report. However, additional guidance on management requirements, expectations, and documentation of safety-related activities would further strengthen the safety of the activities performed. In addition, attention to details to avoid inconsistencies and omissions would further enhance the ability of the facility to demonstrate its commitment to and actual performance of safety.

The experimenters are generally senior, highly-qualified staff members. The technical staff conduct both experiments and operational activities. In addition, established and well understood administrative controls exist to assure that the experimenters have interacted appropriately with the staff assigned the landlord functions of TA-55. There are internal and external safety reviews of most planned experimental activities. Much of the safety-related emphasis is directed towards radiation and criticality safety. Because of these facts, no concerns were identified for performance objective EA.1 Interface With Experimenters.

The Nuclear Materials Technology Division has recognized the need for preparing and reviewing safety documentation in a more formal manner, and recent changes in the preparation and review of the procedures that govern such activities are under way. The Nuclear Materials Technology Division conducts a continuum of activities ranging from table top experiments, to investigation of plutonium processing improvements, to development and scale up of process improvements, to the conduct of recurring, production-related operations. The Nuclear Materials Technology Division has developed the use of safe operating procedures and special work permits to control the safety aspects of all of the types of activities performed at TA-55. These safe operating procedures and special work permits are prepared and approved by the groups that use them. This has the benefit of fully integrating the experimental and operating staff so that each individual understands the needs and requirements of both types of work efforts. However, it has also led to significant inconsistencies in the level of quality of the specific safety-related aspects of the safe operating procedures and special work permits prepared by the different groups of the Nuclear Materials Technology Division. Examples of some of the problems follows.

More guidance and followup are needed to define the level of detail and information that must be provided to the safety review committee for reviewing

experimental activities. Otherwise, the failure of some safe operating procedures and special work permits to be complete and to receive effective review for their safety implications will not be eliminated from all Nuclear Materials Technology Division experimental activities. Of special note is that the TA-55 administrative controls to ensure that safety is properly considered do not cover all situations when experiments sponsored and conducted by a LANL organization outside of TA-55 are conducted at TA-55. The converse, when Nuclear Materials Technology Division activities are performed at LANL facilities other than TA-55, is also true; that is, the organization responsible for the other facility may not have a method to ensure that its safety criteria and requirements are being met by the experiment.

Of the two concerns developed in this section of the report, one was identified and one was partially identified in the LANL self-assessment. However, the self-assessment only discussed the general nature of the concerns without identifying specific details of the issue being identified.

4.5.1.12.2 Findings and Concerns

EA.2 EXPERIMENT CATEGORIES

PERFORMANCE OBJECTIVE: All proposed experiments should be approved by an independent Safety Review Committee before they are performed.

FINDINGS:

- Safe operating procedures and special work permits are used as experimental plans to define the experiments and their safety-related issues. There has been a great variability in the quality and thoroughness of safe operating procedures.

- A draft Safe Operating Procedure Writer's Guide that is already being used by the Nuclear Materials Technology Division staff does not require all of the documentation required by LANL AR 1-3; Standard Operating Procedures and Special Work Permits," dated October 30, 1987, (for example, there are deficiencies such as identifying the location of the work, the assignment of responsibility for assuring compliance with the procedure, and the responsible personnel).

- Guidance on minimum requirements for special work permits is not available. Examples of special work permits that ranged from complete experimental plans to single, undated sheets that provide essentially no guidance for the experimenter are used.

- DOE 5480.19 requires a formality of operations. Director's Policy (DP No. 102, "Formality of Operations" dated September 1991) requires that deviations and deficiencies shall be documented. There is no TA-55 administrative control or requirement that implements these policy requirements for experimental activities (See Concerns TSA-1, QV.5-1, and TSA-1, AX.1-3).

- Requirements are not documented for the information and control of experimental notebooks or logs. A random sample of logs identified that some were lost, some personnel did not keep logs, some logs contained superficial information, and some logs were thorough.

- Most of the Nuclear Materials Technology Division groups do not conduct formal assessments at the conclusion of an experiment that is covered by a special work permit to assess what happened and lessons learned.

- The independent safety review committee is discussed in the Site/Facility Safety Review technical area. (See Concerns TSA-1, OP.3-2; TSA-1, FR.1-1; TSA-1, CS.1-1; and TSA-1, CS.1-3.)

- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-1) (EA.2-1) (H2/C1)**

At the Los Alamos National Laboratory guidance for preparing experimental plans for review by the appropriate TA-55 safety review committee does not ensure that all appropriate safety-related items will be identified and addressed.

FINDINGS:

- There is no formal mechanism for any group in the Nuclear Materials Technology Division to participate in the safety review of experiments conducted by other divisions and performed at TA-55, except when the experiment requires a modification to an existing glovebox or when it requires a new glovebox. However, the Nuclear Materials Technology Division is the landlord responsible for the overall safety of TA-55.

- Several experiments conducted by other organizations were under way at TA-55. They had not received review by the TA-55 independent safety review committee system.

- A similar condition exists when the Nuclear Materials Technology Division conducts experiments at facilities other than TA-55; the other facility may not participate in the Nuclear Materials Technology Division safety review activities.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **(TSA-1) (EA.2-2) (H2/C2)**

At TA-55, Los Alamos National Laboratory, there is no formalized method to ensure that the safety aspects of all experiments sponsored by outside organizations are appropriate and meet the criteria established for TA-55 activities; a similar concern exists when the Nuclear Materials Technology Division performs experiments at facilities other than TA-55.

EA.3 EXPERIMENT PROPOSALS

PERFORMANCE OBJECTIVE: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

FINDINGS:

- Experimental plans are documented as operating procedures, safe operating procedures, and special work permits. Many of these documents do not contain sufficient detail to allow an analysis of the safety implementations of the proposed activities.
- Approval of a safe operating procedure or special work permit may not include its review by the Group Process Safety Committee, even though the safe operating procedure or special work permit has been signed by the chairperson of the committee. (See Concern TSA-1, CS.4-1.)
- Some safe operating procedures only contain generic information. (See Concern TSA-1, QV.1-2.)

CONCERN: **See Concerns TSA-1, EA.2-1; TSA-1, FR.1-1; and, TSA-1, FR.3-1.**

EA.4 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments performed in any facility on the site should not present undue risk or significantly increase the risk previously evaluated for the facility or the site.

FINDINGS:

- There is no formal mechanism for any group in the Nuclear Materials Technology Division to participate in the safety review of experiments conducted at TA-55 by other divisions, except when the experiment requires modification to an existing glovebox or when it requires a new glovebox.
- Similarly, other divisions have no formal mechanism for reviewing the safety aspects of those experiments that the Nuclear Materials Technology Division conducts at their facility.

CONCERN: **See Concern TSA-1, EA.2-2.**

4.5.1.13 Site/Facility Safety Review

4.5.1.13.1 Overview

All six performance objectives in the Site/Facility Safety Review technical area were addressed in this appraisal. The appraisal was conducted by means of interviews with the leaders and senior staff of the Nuclear Materials Technology Division and its component groups, members of the Laboratory Assessment Office, and the secretary of the ES&H Council. Documents related to LANL and the Nuclear Materials Technology Division policies and facility and site safety analyses and assessments were examined.

The independent safety review at TA-55 is provided by a complex set of 12 committees and one line management organization. Although there are examples of when this system appears to be working well, improvements are needed if it is to provide the high-quality oversight required by DOE Orders. Most of these improvements are needed for the activities of the nine groups of the Nuclear Materials Technology Division to ensure a consistent, high-quality review, and the clear documentation of the review, so that it can be subjected to independent verification.

The Laboratory Assessment Office conducts an annual facility safety review that meets the DOE 5480.5, "Safety of Nuclear Facilities," requirements for an annual independent safety review of TA-55. Thus, no concerns were found for performance objective FR.4 Annual Facility Safety Review.

It is apparent that the Nuclear Materials Technology Division has made recent significant improvements in the TA-55 facility safety review process. Key management and senior professional staff are personally involved in performing a number of the independent safety reviews. However, the large number of discrepancies, errors, and omissions observed during this appraisal clearly indicates that greater formality of operations and documentation are required if compliance with requirements and overall excellence is to be achieved, and if that achievement is to be subjected to independent audit and validation. LANL recognizes the importance of independent, professional, ES&H appraisals, and it gives its sitewide appraisal office the stature and authority to perform effective reviews. A triennial review of the nuclear safety review process to ensure that it is meeting all requirements and expectations is not being performed.

The Nuclear Materials Technology Division uses a system of 12 separate committees and a line management organization to provide the ES&H oversight of its operations and activities. The bulk of this management effort is focused at the group level where the work of the Division is actually managed, and it is poorly documented. The committee charters do not include all DOE and LANL requirements, the committee work often is not detailed and thorough, the emphasis appears to be on the paper work as part of safety oversight at the expense of examining actual experiments and operations, and in a number of cases, the oversight is based upon individual diligence and excellence rather than on documented criteria and organizational structure. In addition, the ability of some of the individual committees to provide independent advice to the group and division leaders has been compromised by the actual assignment of group leaders to a committee and the lack of outside or independent expertise being provided for in the committee assignments.

Of the four concerns developed in this section of the report, one was identified in the LANL self-assessment and three were partially identified.

Understandably, the top-level LANL self-assessment presents a sitewide perspective. Thus, the discussions deal with questions such as is there a sitewide policy covering the issues examined. Although this is important, and resolution of such items can provide guidance on the importance that LANL is placing on the safety review committee processes, such policy guidance will of necessity be of a general nature and can not be expected to provide definitive direction to the many individual facility safety review committees. It is interesting to note that this LANL self-assessment does not recognize that the appraisals performed by its Laboratory Assessment Office usually meet the DOE Order requirements for annual, independent safety reviews of facilities and operations. It is disturbing that this self-assessment specifically denies that LANL has a requirement to conduct triennial appraisals of the safety review systems, even though DOE Orders and all previous TSAs conducted at LANL have explicitly documented that LANL is required to perform such reviews. However, recent changes in LANL policy and organizational realignments gives evidence that LANL is performing some assessments of its ability to manage and provide oversight of its safety review systems.

The TA-55 self-assessment, as expected, is focused on the facility and goes into much more detail than does the top-level LANL self-assessment. This appraisal identifies specific weaknesses that frequently provide details to the general statements provided in the top-level LANL self-assessment, and it addresses most of the concerns developed during the current appraisal. The self-assessment has focused on the meaning of independent as used in the requirement for an independent safety review committee and for independent safety reviews. The discussions indicate that there is some confusion as to what is intended by DOE, and attention on this item appears to have diverted resources from examining the more important questions of the quality and effectiveness of the TA-55 safety systems and reviews. With respect to the triennial appraisal of the safety review system, the TA-55 self-assessment recognized that this is not being performed at the facility level.

4.5.1.13.2 Findings and Concerns

FR.1 SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: A Safety Review Committee should be available to review safety questions and the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, DOE 5480.6, and/or DOE 5482.1B., Section 9.d.

FINDINGS:

- The Nuclear Materials Technology Division has developed a safety review committee system intended to fulfill the requirements of DOE 5480.5, "Safety of Nuclear Facilities," and DOE 5482.1B, "Environment, Safety, and Health Appraisal Program". This includes:
  - A Facility Safety Committee and its subordinate Criticality Safety Committee and ALARA Committee (the institution of a Chemical Safety Committee is under active consideration).
  - Nine Group Process Safety Committees.
  - A Training Steering Committee.
  - A line management organization, the TA-55 Facilities Management Group.
- It is possible that this structure could meet the requirements of DOE Orders. As it functions, it does not meet the requirements of DOE 5480.5 and DOE 5482.1B. Examples follow:
  - There is a general lack of formality of operations within the committee process. Often, some committees meet a DOE Order requirement while others do not.
  - Committee charters do not identify quorum requirements needed in order for the committee to act.
  - Committee chairpersons can individually conduct a review or assign a single committee member do a review, and then the committee chairperson can sign the review with the full authority of the committee.
  - A requirement for group discussions between reviewers on all but the more routine matters has not been identified.
  - The charters do not address analyzing age-related degradation issues. (See Concern TSA-1, AX.1-4.)
  - Not all of the committees are required to and some do not keep records of sufficient quality to allow

an independent determination of their actions and decisions.

- Some committees are chartered to review and evaluate incidents and accidents, others are not.

- Not all of the Group Process Safety Committees are directed to review all safe operating procedures prepared by the group. Not all Group Process Safety Committees are required to review special work permits. (See Concern TSA-1, OP.3-2.)

- Most charters do not require evaluation of potential unreviewed safety questions.

- Plutonium packaging and shipping is being performed without the use of safe operating procedures. (See Concern TSA-1, PT.1-2)

- Some safety operating procedures only contain generic information. The critical details are contained in detailed instructions whose review and approval is not required to be consistent with the safety operating procedure review and approval. (See Concern TSA-1, QV.1-2.)

- The group leaders are members of some of the Group Process Safety Committees, thus limiting their ability to obtain independent advice from the committee.

- The Group Process Safety Committee charters do not provide for any membership outside of the group.

- See Concerns TSA-1, OA.2-1, and TSA-1, AX.1-5, and Section 4.5.1.10.2, CS.1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FR.1-1) (H2/C1)

At the Los Alamos National Laboratory, the Nuclear Materials Technology Division safety committee system is not in compliance with the full requirements of the DOE 5480.5, DOE 5482.1B, and DOE 5481.1B, which govern the operation of a contractor independent review and appraisal system.

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

FINDINGS:

- LANL AR 1-10 requires new facilities to prepare an ES&H Questionnaire for independent review before the facility can be started.
- One of the process scaleup experiments at TA-55 was recently required to complete the ES&H Questionnaire, but not all scaleup experiments are preparing the ES&H Questionnaire.
- There are no documented criteria that describe which experiments must prepare the ES&H Questionnaire at TA-55.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (FR.2-1) (H2/C1) **The lack of facility-specific criteria may mean that the Environment, Safety and Health Questionnaire independent safety review required by Los Alamos National Laboratory policy is not being applied to all appropriate experimental activities at TA-55.**

FINDINGS:

- Revisions to safe operating procedures or special work permits can be used to change a glovebox configuration, to change the amount of special nuclear material processed in a glovebox, or to add new gloveboxes. Such changes may require a restart authorization or an operational safety readiness review, which is not being performed at TA-55. (See Section 4.5.1.8.2, TS.3.)
- The Nuclear Materials Technology Division Facility Safety Committee and its Group Process Safety Committees conduct periodic, planned inspections. The inspections are not criteria-based, although some committees use limited checklists. Except on rare occasions, the inspections do not examine the actual conduct of experiments or operations.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FR.2-2) (H2/C1) **At the Los Alamos National Laboratory, guidance and direction to the TA-55 safety review committee system for conducting inspections of operations or operational readiness reviews is not in compliance with DOE 5480.5.**

FR.3 OPERATION OF SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: Review of site/facility activities by the Safety Review Committee should ensure achievement of a high degree of safety.

FINDINGS:

- The LANL and the Nuclear Materials Technology Division do not have policies covering what should be included in the safety review committee agendas, other than a few items included in the various committee charters.

- The TA-55 safety review committee system is not thorough. Examples are:

  - An operating procedure to prepare a shipping package of kilogram quantities of special nuclear material should have been a safe operating procedure that required Health and Safety Division review and concurrence.

  - A special work permit did not include the required issue date nor the required expiration date.

  - Safety reviews are not documented. (See Concern TSA-1, AX.5-2.)

  - Safety reviews do not consider the safety implications of the human factors related to personnel and equipment crowding at TA-55. (See Section 4.5.1.3.2, OP.8.)

  - Draft Nuclear Materials Technology Division policy restricts the authority of the groups to implement a safe operating procedure while it is receiving independent Health and Safety Division review. Existing policy allows a safe operating procedure to be implemented while Health and Safety Division review is being obtained. A number of the staff were unaware of or confused about the policy and were operating under the basis of the existing policy. (See Concern TSA-1, CS.4-1, and TSA-1, RP.3-1.)

  - Typically, the hazards identification section in a safe operating procedure is general so that the training requirements and potential mitigation activities are not discussed. There is evidence that recent safe operating procedures have been more explicit in their discussion of the potential hazards. (See Section 4.5.1.15.2, PP.2.)

- See Concerns TSA-1, CS.1-1; TSA-1, PP.1-2; TSA-1, RP.3-1; TSA-1, PT.1-1; and TSA-1, PT.1-2.

CONCERN: **See Concern TSA-1, FR.1-1.**

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

FINDINGS:

- An assessment plan was submitted to DOE on September 20, 1991, by the Laboratory Assessment Office for review and approval. It also proposes a triennial review of the LANL nonnuclear facilities. The plan does not address a triennial appraisal of the nuclear safety review system.
- The Laboratory Assessment Office and the LANL Nuclear Criticality Safety Committee provide briefings to the Laboratory ES&H Council. Council oversight is reactive to these briefings; it does not conduct proactive, criteria-based evaluations of the effectiveness of these oversight organizations. This oversight process does not meet the requirements of DOE 5482.1B, and DOE 5480.5 for the conduct of triennial safety system reviews.
- Examples from the S&H Subteam nuclear criticality safety appraisal show that ES&H Council oversight of that aspect of the Facility Safety Review System does not go into enough depth to be effective. (See Concern TSA-1, CS.1-1 and Section 4.5.1.10.2, CS.5.)
- The LANL self-assessment had recognized that the Laboratory does not review its safety activities and committees in a formal documented manner. It further stated that there is no requirement that such triennial appraisals be done.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FR.5-1) (H3/C1) **A triennial appraisal of the entire Los Alamos National Laboratory nuclear site/facility safety review system in compliance with DOE 5480.5 and DOE 5482.1B, has not been implemented or proposed.**

FR.6 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experiences should be evaluated, and appropriate actions should be undertaken to improve safety and reliability .

FINDINGS:

- Nonconformance or rejected products are not analyzed to determine and correct the cause. (See Concern TSA-1, QV.5-1.)
- The Group Process Safety Committees and the Nuclear Materials Technology Division Facility Safety committee do not routinely examine operations during their scheduled work space inspections.
- Not all of the Group Process Safety Committees are charted to review incidents and accidents.
- Operation of the auxiliary systems is based on individual diligence and dedication, it is not supported by the organizational structure. (See Concern TSA-1, AX.1-1.)
- Not all Nuclear Materials Technology Division groups review the work experiences, after a special work permit has been completed, to assess what happened and lessons learned. (See Concern TSA-1, EA.2-1.)

CONCERN: **See Concern TSA-1, FR.1-1.**

4.5.1.14 Radiological Protection

4.5.1.14.1 Overview

All 12 performance objectives in the Radiological Protection technical area were addressed in this appraisal. There were no concerns in RP.1 Organization and Administration or RP.2 Internal Audits and Investigations. The areas of RP.3 Radiation Protection Procedures and Posting and RP.11 ALARA Program are addressed at the LANL level. The remaining 10 performance objectives were evaluated only in the plutonium and depleted uranium areas. These areas included the plutonium facility at TA-55 (Bldg. PF-4), the Sigma Complex at TA-3, the waste treatment and disposal facilities at TA-50 and TA-54, and the firing sites at TA-15, TA-36, and TA-39. The majority of plutonium handling at LANL occurs at TA-55, and the operational health physics management is located there. The appraisal included review of documentation, including records of audits and assessments and radiation measurements at the above facilities. The appraisal also included tours of facilities, discussions with operational as well as radiation protection personnel, and observations of operational tasks in radiation areas.

Health physics at TA-55 is a function of the Health Physics Operations Group, Health and Safety Division. There has been a recent reorganization of the Health and Safety Division to change the radiation protection organization from a geographical basis to a functional basis with a Health Physics Measurements Group, and Health Physics Policy and Programs Group. The reorganization is an improvement, but the level of radiation protection performance appears to be an inverse function of the distance of the facilities being supported from the Health Physics Operations Group managers. The radiation protection program, although conducted by highly-dedicated and competent personnel, has just begun sitewide reorganization and implementation of DOE 5480.11, "Radiation Protection for Occupational Workers." Formal, written delineation of authorities and responsibilities for radiation protection exists, but uniform implementation throughout the plutonium and depleted uranium areas has not been achieved. There are no formal written programs describing LANL requirements for such major areas as ALARA. The radiation protection program and procedures have not been updated to reflect the recent reorganization and radiation protection policy.

The format used for reporting internal audits at TA-55 is not consistent. Posting and the requirements for posting throughout the depleted uranium and plutonium areas are either not uniformly established, or procedures are not consistently implemented. Radiation surveys throughout the plutonium and depleted uranium areas do not conform to LANL policy and documented schedules. Positive control is not exercised in controlling doses to minors.

The use of whole body and extremity dosimeters throughout the plutonium and depleted uranium areas does not ensure that personnel doses are measured accurately. Commingling is allowed. Eating, drinking, and using tobacco products while wearing protective clothing is permitted in some break rooms. The method by which workers are chosen for inclusion in the bioassay program is inconsistently applied.

Calibration and response checking of fixed instruments and tritium monitors does not reflect the same level of attention and commitment given to portable instrumentation. Placement of air monitoring instruments at the depleted

uranium sites is not based on studies of flow patterns, and similar studies are incomplete at TA-55. The contamination control programs at the sites do not ensure complete control of the spread of contamination.

LANL has not established an ALARA program at the Laboratory level. ALARA is not addressed at the depleted uranium sites. Records related to radiation exposure are not readily available, especially at the depleted uranium firing sites.

The LANL self-assessment for the plutonium and depleted uranium areas was a thorough effort. Of the 15 concerns identified in this appraisal, 10 were at least partially identified in the LANL self-assessment.

4.5.1.14.2 Findings and Concerns

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

FINDINGS:

- Director's Policy (DP No. 107, "Radiological Protection," dated September 1991) and the ES&H Manual do not require the review and approval of procedures involving radiological work. Safe operating procedures are prepared, reviewed, and approved by the operating divisions. When the division deems it appropriate, the procedures are sent to the Health Physics Operational Group for review. All procedures are sent to the Health Physics Policy and Programs Group for review/retention. Those that involve radiological work are returned to the Health Physics Operations Group for review/comments.

- A new process for the fabrication of sources is being developed and implemented in the Robotic Isotope Detector Fabrication glovebox. The operator reported that the glovebox had previously been operated under a safe operating procedure and a "cold" special work permit. He stated that he had submitted a special work permit for signature for operating while he is revising the safe operating procedure. Radioactive material had been introduced into the glovebox even though the special work permit had not been approved.

- The Bldg. PF-4 vault procedure has a short paragraph devoted to radiation protection, no Health and Safety Division review is indicated on the cover page. Revision of this portion of the procedure has been initiated.

- No safe operating procedure or special work permit is in place for changing the HEPA filter on a portable vacuum cleaner at the Sigma Complex in TA-3 even though this procedure has been performed.

- See Sections 4.5.1.15.2, PP.2, and 4.5.4.13.2, RP.3.

- The review of radiation protection standards and practices by line management is informal and inconsistent and is not in compliance with Chapter XVI of DOE 5480.19. (See Section 4.5.4.13.2, RP.1.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **(TSA-1) (RP.3-1) (H2/C1)** **At the Los Alamos National Laboratory, the implementation of procedures involving radiological work without line management approval is not in compliance with DOE 5480.19 and without the review and approval of the Health Physics Operations Group does not provide the control and worker safety required for compliance with DOE 5480.11.**

FINDINGS:

- There are several "Late" annotations on the monthly dosimetry reports for TA-55 and TA-21. An employee replaces the dosimeters in the rack at the end of each dosimetry period. If a dosimeter is not in the rack, the new dosimeter is placed in the slot. The employee continues to check the rack until the old dosimeter appears. If the dosimeter does not appear by a prescribed date, the Health Physics Operations Group writes a memorandum to the worker. Similar procedures are used in TA-21 and TA-55 but do not include line management in the exchange process.

- See Concern TSA-1, OA.3-2.

CONCERN: **See Concern TSA-4, RP.5-2.**

FINDINGS:

- Until recently the different facilities at LANL have functioned independently with regard to radiation protection support. This results in different procedures being used for the same radiation protection function. An example of this is the three different forms for special work permits for radiological work used at LANL, TA-53, and TA-55.

- LANL AR 3, "Ionizing Radiation/Radioactive Materials" (numerous dates), has not been updated to reflect the LANL "Director's Policy on Radiation Protection" dated September 1991 or the recent reorganization of the Health and Safety Division.

- The procedures and processes used to implement radiation protection programs at accelerator facilities are not adequate to ensure that the requirements of DOE 5480.11, mandatory ANSI standards, and the LANL ES&H Manual are met. (See Section 4.5.3.13.2, RP.3.)

- LANL is not in compliance with its approved, Rev. 2, DOE 5480.11 implementation plan or with its latest revision, Rev. 4, scheduled completion dates. Examples include: line organization ALARA coordinators were scheduled to have been identified by May, 1991, but a Laboratory-level coordinator has not been identified, and completion of posting and labeling for existing facilities and operations was scheduled for September 1991 and has not been completed.

- Consistent procedures have not been prepared by LANL divisions to implement the currently approved DOE 5480.11 implementation plan. (See Section 4.5.4.13.2, RP.1.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.3-2) (H2/C1) **At the Los Alamos National Laboratory, procedures approved by site/facility management to implement the radiological protection program are not updated as necessary for compliance with DOE 5480.11.**

FINDINGS:

- Signs and labels throughout the plutonium and uranium facilities are not uniform and some either do not indicate the radiological conditions, are not accurate, or have other problems that could lead to unsafe practices. Examples include:

  - Two waste storage areas in the basement of Bldg. PF-4 have radiological conditions posted as "NA" mrem/hr;

  - Most of the waste storage areas in the basement of Bldg. PF-4 are not roped off and some do not have radiation posting at their perimeter;

  - There are drums in a storage area posted as "Empty Drums" without empty labels and with radiation signs indicating material quantities as high as 66 microcuries of plutonium; and

  - A storage area is posted as "Chemical Waste Only" with some of the containers having radiation labels requiring alpha monitoring.

- The radiation area signs posted on the individual doors in the Bldg. PF-4 vault do not have radiological conditions posted on them. The chief technician and the vault manager did not know the radiation levels in the rooms and stated that they would have to go to the survey map at the entrance of the vault to determine the radiation levels. Personnel working in the vault receive the highest radiation exposures in TA-55. (See Concern TSA-1, RP.11-2.)

- See Concern TSA-1, QV.5-2.

- Localized contaminated areas, or radiological hot spots, are not labeled with radiation-type markings (i.e., yellow and magenta coloring.) The area is usually marked with indelible ink. However, the count rate at contact with the hot spot is included on the marked area. Radiation tape is generally not used because the hot spots frequently occur in high-traffic areas and the tape markings would not last.

- DOE 5480.11 and ANSI N2.1 require that a radiation symbol with a yellow background be used to identify contamination levels greater than 10 times the levels listed in DOE 5480.11.

- LANL AR 3.7 requires posting at the levels in DOE 5480.11.

CONCERN: **See Concern TSA-4, RP.3-1.**

FINDINGS:

- Radiation sources in the Calibration Section of the Nuclear Materials Measurements and Accountability Group and Health Physics Measurements Group are not being periodically leak tested and no schedule for leak testing exists.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.3-3) (H2/C1) **All groups are not implementing the radiation source leak test program as required by Los Alamos National Laboratory AR 3-4.**

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

FINDINGS:

- At the orientation briefing for TA-21, it was pointed out by the TA-21 Manager that many of the personnel there are students. When asked if any of the students were less than 18 year of age, he responded that he did not know, but some probably were.
- DOE 5480.11 limits exposure of individual under age 18 to 0.1 rem in a year.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.4-1) (H2/C1)

At Los Alamos National Laboratory, positive control is not exercised by TA-21 line management as necessary to ensure compliance with radiation dose limitations of DOE 5480.11 concerning minors.

RP.5 EXTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The routine and accident personnel radiation dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- Whole body dosimeters are issued to all LANL personnel who enter areas where they might be exposed to ionizing radiation. DOE 5480.11 requires issuing of a dosimeter to anyone with the potential to receive greater than 100 mrem annual effective dose to the whole body, five rem to either the skin or any extremity, or 1.5 rem to the lens of the eye.
- Because the minimum detectable limit for the LANL whole-body dosimeter is 10 mrem, an annual missed dose as large as 108 mrem is possible with monthly dosimeter exchanges.
- Whole body dosimeters are worn either directly attached to the outer clothing or on a necklace. When the dosimeter is on a necklace, the actual position of the dosimeter can be 1 to 10 cm from the outer clothing. No studies have been made to show that the dose measured at the surface of the body is the same as the dose at a distance of 10 cm.
- See Concern TSA-4, RP.5-3.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.5-1) (H2/C1) **The issuance of dosimeters to all Los Alamos National Laboratory personnel is not technically based on the radiation dose criteria specified in DOE 5480.11.**

FINDINGS:

- The most likely type of radiation dose to extremities in nonaccident situations at TA-55 is from neutron and gamma radiation. Extremity neutron doses are determined from ratios of gamma-to-neutron doses for whole body dosimeters. This ratio includes shielding and albedo effects that may not be applicable to extremities, especially for neutron doses.
- Extremity dosimetry is not worn when handling cast depleted uranium.
- Extremity doses from handling newly cast depleted uranium and its oxide can be significant.
- Extremity doses are not measured accurately as required by DOE 5480.11.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **See Concern TSA-4, RP.5-5.**

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

- Commingling areas are areas where personnel in protective clothing (both laboratory coats and coveralls) are allowed to share the same facilities with personnel wearing street clothing. Commingling areas exist in Bldg. PF-4, including two break rooms (one smoking, one nonsmoking).
- Eating, drinking, and using tobacco products are allowed in the break areas.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.6-1) (H3/C1) **At the Los Alamos National Laboratory, internal radiation exposure controls do not preclude eating, drinking, and using tobacco products in commingling areas and do not minimize internal exposures as required to comply with DOE 5480.11.**

FINDINGS:

- The frequency of surveying mandated by procedures is not consistently followed. In particular, floor surveys are performed as needed but LANL policy requires semi-annual surveys.
- Documentation of floor surveys indicted that some laboratory floors had not been surveyed during 1991.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.6-2) (H2/C1) **At the Los Alamos National Laboratory, radiation surveys are not performed so as to comply with Health and Safety Division procedures.**

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- In TA-55, personnel are evaluated for inclusion in the bioassay program based on the expected type of work to be performed.
- A conservative approach to bioassay in TA-50 is taken so that all radiation workers participate in the program.
- At the firing sites, including TA-36 and TA-15, LANL personnel are not evaluated for inclusion in the bioassay program.
- Health and Safety Procedure HSE-10-06-02 and LANL AR 3-7 requires that all personnel be evaluated for inclusion in the bioassay program.
- DOE 5480.11 requires bioassay for any worker with the potential to receive 100 mrem annual effective dose equivalent from internal exposures.
- Not all personnel at the plutonium and depleted uranium facilities are evaluated for participation in the bioassay program to comply with DOE 5480.11.

CONCERN: **See Concern TSA-4, RP.7-1.**

RP.8 FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE OBJECTIVE: Personnel dosimetry and radiological protection instrumentation used to obtain measurements of radioactivity should be calibrated, used, and maintained so that results are accurately determined.

FINDINGS:

- The detectors on the Ludlum 214 fixed instruments (hand and foot monitors) are interchanged without recalibration or response testing.
- The detectors on the Ludlum 139 portable instruments are interchanged and response tested at each scale, but full calibrations are not performed.
- The check sources used to response check fixed instrumentation are disks of depleted uranium attached to each detector. The sources have not been characterized, are not documented, and emit at an unmeasured rate.
- The backlog in calibrating Ludlum 214 hand and foot monitors resulted in a large number of instruments that were out-of-calibration. In order to relieve this backlog, a technician was trained and certified to perform a calibration that did not include the electronics check required by ANSI N323-1978. Following the calibration procedure, a calibration sticker was affixed to the instrument.
- Documented studies of the field minimum detectable activity for fixed and survey instrumentation have not been performed.
- Several glovebox hand and foot monitors are out-of-calibration (calibration date has passed). The calibration cycle has recently been changed from 2 years to 1 year. As a consequence the calibration facility is unable to keep up with the increased number of instruments that require calibration.
- Hand and foot monitors that are past the calibration date are not placed out-of-service as required by LANL AR 3-1 because sufficient numbers of replacement instruments are not available.
- Annual calibration of instruments is required by ANSI N323-1978.
- Printouts describing instruments that require calibration show calibration frequencies of both 12 and 24 months for the same type of instrument (Ludlum 214 hand and foot monitors).
- See Concern TSA-1, QV.4-1.

- Radiation protection instruments are not being returned for calibration and maintenance as required by ANSI N323 and the Health Physics Measurements Group procedures. (See Section 4.5.2.13.2, RP.8.)

- There are no procedures to ensure that failed radiation protection equipment at accelerators are promptly removed from operation and evaluated to determine the impact of the failure. (See Section 4.5.3.13.2, RP.8.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.8-1) (H2/C1) **Fixed and portable radiation survey instruments are not calibrated annually or source checked in compliance with Los Alamos National Laboratory procedures and ANSI N323-1978, and instruments past calibration are not removed from service in compliance with Los Alamos National Laboratory AR 3-1.**

FINDINGS:

- Tritium detectors in laboratories and on stack monitors are not source checked.

- Tritium process monitors that have an effluent control function were found out of calibration but were not taken out of service.

- The tritium process monitors are the property of one of the operating groups.

- The Health and Safety Division has no control over the tritium process monitors.

CONCERN: **See Concern TSA-2, RP.8-5.**

FINDINGS:

- The following concern was fully identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.8-2) (H2/C1) **At the Los Alamos National Laboratory, process control monitors, for which calibration is required by DOE 5700.6C, are not under the oversight of Health and Safety Division even though they have the potential to be effective health and safety instruments.**

RP.9 AIR MONITORING

PERFORMANCE OBJECTIVE: Air monitoring systems through selection, location, calibration, and maintenance should ensure reliable estimates of air activity for radiological control purposes.

FINDINGS:

- Air flow studies have been performed and updated at Bldg. PF-4 to ensure that the positioning of the continuous air monitors is adequate to monitor for airborne activity. However, formally documented studies do not exist for the depleted uranium facilities at TA-50 and TA-3 (Sigma Complex).
- Particle size studies of airborne radioactive contaminants at Bldg. PF-4 have commenced but are not complete. Solubility studies have been completed and documented.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.9-1) (H2/C2) **At the Los Alamos National Laboratory, airflow, particle size, and solubility studies have not been documented at all plutonium and depleted uranium facilities, such as TA-50, TA-3 (Sigma Complex), and the firing sites, to verify the proper positioning of the continuous air monitors for monitoring airborne activity.**

FINDINGS:

- The tritium stack monitors are not calibrated due to the large quantities of tritium released during calibration. Electronic calibrations are performed at a specified frequency.
- The Kanne chamber used as a stack monitor can measure concentrations up to 20 mCi/m^3.
- Short-term releases in excess of 20 mCi/m^3 have occurred at TA-55.
- See Concern TSA-1, QV.4-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.9-2) (H2/C1) **At the Los Alamos National Laboratory, the tritium stack monitor at Building PF-4 are not calibrated as required by ANSI N13.10-1974, and the range of response of the instrument does not ensure accurate determination of released quantities of tritium during accident situations.**

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

FINDINGS:

- Floor surveys in TA-55 are performed with go/no go instruments. The minimum detectable activity of these instruments is greater than the levels specified in ANSI N323-1978.
- Floor surveys are not performed in TA-50 as required by LANL procedures.
- Surface contamination in TA-55 is determined through surveys of booties. Booty surveys are performed with portable instrumentation with a much higher minimum detectable activity than smear surveys can achieve.

CONCERN: **See Concern TSA-4, RP.10-1.**

FINDINGS:

- Smear surveys of objects carried into Bldg. PF-4 are performed prior to their release. However, unless specifically reminded by management, no documentation is consistently generated regarding the release of these materials.
- The basement area of Bldg. PF-4 is used as a staging area for radioactive waste, including equipment. Documented smears are not performed on the high (greater than 50,000 counts per minute) count areas. Smears are performed when equipment is moved, but the results are not documented.
- At TA-3 (Sigma Complex), procedures for removal of protective clothing are not posted at step-off pads, and surveying procedures are not being followed. The operational group realizes that training is needed, but they are delaying this training until sufficient numbers of monitoring equipment are available.
- At Bldg. PF-4, procedures for removal of protective clothing are posted at exits from the controlled areas. Radiation protection technicians are posted at these areas to ensure that procedures are followed.
- In the TA-21 Chemistry Laboratory, an air filter had fallen off the fixed vacuum head, no means is provided for real-time checking of the airflow from the room into the hoods, and no check source is provided at the hand and foot monitor at the exit from the laboratory.
- See Concern TSA-1, QV.1-2.

CONCERN: **See Concern TSA-4, RP.10-4.**

RP.11 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, auditable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

FINDINGS:

- Director's Policy (DP No. 107. "Radiological Protection," dated September 1991) does not address resources or priorities. It does not designate a laboratory ALARA coordinator or an ALARA committee.
- LANL AR 3.8 "ALARA Program," does not reference PNL-6577, the primary ALARA reference given in DOE 5480.11 and required by the LANL DOE 5480.11 implementation plan. It designates the Health and Safety Division and line management ALARA coordinators and ALARA committees, but it does not address a sitewide ALARA coordinator or ALARA committee, and none exists.
- Laboratory-level ALARA goals are not established. Cost benefit analyses in support of ALARA are not required by LANL policy or formally performed and documented.
- An ALARA assessment has not been performed for the proposed Godiva IV restart and future cracked ring replacement. (See Section 4.5.2.12.2, FR.6.)
- There are no sitewide trend analyses to measure the effectiveness of radiation protection programs required by the LANL DOE 5480.11 implementation plan. (See Section 4.5.4.13.2, RP.11.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.11-1) (H3/C1) **Los Alamos National Laboratory does not comply with DOE 5480.11 requirements for an As-low-As-Reasonably-Achievable Program as detailed in PNL-6577.**

FINDINGS:

- The Bldg. PF-4 vault door was not closed when there was no one in the vault. It was explained that security requires line-of-sight observation of the vault. There are plans to relocate the video camera that provides this observation into the vault.
- The use of distance and shielding in the vault area do not keep radiation exposures ALARA. An unshielded hand and foot monitor is located at the door of the vault, and a telephone is located on a post just outside the door. Activities are conducted outside the open door to the vault that could be conducted further away. It was explained that there are long term plans to move the material from that vault to another facility. No cost

benefit analyses have been performed on interim improvements to the present vault.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.11-2) (H2/C1) **At the Los Alamos National Laboratory, the Nuclear Materials Technology Division does not comply with DOE 5480.11 requirements to maintain radiation doses as low as reasonably achievable in the vault area.**

FINDINGS:

- LANL AR 3-1, states that "once a woman declares her pregnancy to her supervisor in writing, she may be referred to the Occupational Medicine Group for consultation" leaving referral for consultation optional.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.11-3) (H2/C2) **The lack of a firm counseling requirement for pregnant women in the Los Alamos National Laboratory AR 3-1 does not ensure that fetal exposures are as low as reasonably achievable.**

RP.12 RECORDS

PERFORMANCE OBJECTIVE: Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

FINDINGS:

- Historical radiation dose data, radiation dose data while working other than at LANL, and life-time radiation dose data on radiation workers is not available at the Health Physics Operations Group.
- A record of fixed air counts for the buildings planned for decontamination and decommissioning in TA-21 is maintained, but these counts are not being trended.
- Records of pocket dosimeter readings used on special work permits for radiological work are maintained in the area logbook where the work is performed but are not recorded on the special work permits for radiological work or with any other centrally located record.
- See Section 4.5.2.13.2, RP.12.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (RP.12-1) (H3/C1) **At the Los Alamos National Laboratory, comprehensive records related to occupational radiation exposure are not readily available as required by ANSI 13.6 and DOE 5480.11.**

4.5.1.15 Personnel Protection

4.5.1.15.1 Overview

The appraisal of the personnel protection program at TA-55 included the five performance objectives in the Personnel Protection technical area. The Industrial Hygiene performance objective, IH.5 Compliance with Occupational Health Standards, is also included in this report. Findings and concerns were developed through reviews of LANL, the Nuclear Materials Technology Division, and JCI policies and procedures, through discussions with industrial hygiene personnel, LANL line management, research and craft personnel, DOE site and field office personnel, and through inspections of LANL facilities. The results of these efforts were appraised against DOE performance objectives and criteria, Orders, applicable Federal regulations, and industry accepted standards. Worker safety is discussed in Section 4.5.1.16.1 of this report.

Although the Nuclear Materials Technology Division conducts a personnel protection program that generally protects the health and safety of personnel working at TA-55, there is substantial room for improvement. Many deficiencies must be corrected in order to bring the personnel protection program in compliance with DOE Orders, Federal regulations, and industry accepted standards. The Nuclear Materials Technology Division relies on group leaders and process safety committees to administer and control the health and safety program for the facility. Key to this effort is the knowledge expected of line management to be able to ensure that workplace hazards are identified, evaluated, and controlled. However, group leaders and their subordinates are not proactively aided by the Health and Safety Division at LANL. Nuclear Materials Technology Division personnel receive little guidance, training, and direction from the Health and Safety Division concerning health and safety program elements to emphasize in approaches to the daily conduct of their operations. Technical support from the Health and Safety Division is limited to reactive responses, part-time presence of industrial safety professional, and on-call response of Industrial Hygiene Group personnel. There are resident radiation protection personnel at TA-55. The ES&H Manual has many elements that are out-of-date. This deficiency has contributed to the presence of a number of occupational safety and industrial hygiene hazards in the workplace. In the absence of effective support and guidance from LANL management and the Health and Safety Division, the Nuclear Materials Technology Division has taken the initiative to put new systems in place and update other aspects of its health and safety programs to achieve excellence.

Sections of the LANL and the Nuclear Materials Technology Division self-assessments were reviewed to evaluate the depth of LANL and the Nuclear Materials Technology Division understanding of the requirements to implement an effective personnel protection program. Many of the deficiencies noted in these self-assessments are consistent with the findings and concerns identified. LANL management has recently developed a conceptual understanding of the deficiencies facing its health and safety programs. The LANL self-assessment and sections of the Nuclear Materials Technology Division self-assessment are lacking in breadth and detail. Specific action plans to bring the Nuclear Materials Technology Division program up to current standards have not been developed. The LAAO and AL self-assessments addressed the concerns identified in this appraisal in a very general manner.

The Nuclear Materials Technology Division personnel protection program is managed by personnel committed to providing an effective and rigorous program. The program lacks organizational and functional integration. Division-wide goals, performance criteria, and safety functions are not uniformly developed and applied throughout the Division. Nuclear Materials Technology Division line management is not consistently effective in implementing and enforcing the health and safety programs. Thus, degree of compliance varies by group. Numerous facility-wide deficiencies and non-compliances were found in areas such as electrical safety, lockout/tagout procedures, handling and storage of chemicals, review of incidents and occurrences, respiratory protection, procedure review, hazards identification and assessment. Many credible hazards throughout the facility have not been monitored.

The TA-55 Safety Manual revision has been accomplished yet the manual remains out-of-compliance with a number of DOE Orders, occupational health standards, and industry accepted standards. This deficiency is exacerbated by the fact that the sitewide ES&H Manual is out-of-date in many areas. Both TA-55 and non-TA-55 personnel exposures to hazards are not always being documented. Current methods to identify and evaluate health and safety concerns of TA-55 personnel are deficient.

Although the Facilities Engineering Division is responsible for construction and contract safety oversight, implementation and enforcement of health and safety requirements for construction and contract work remains deficient. DOE reportable incidents/accidents for JCI personnel at TA-55 have consistently and disturbingly climbed in the past 2 years whereas the workload and type has remained essentially the same. Of particular concern is the fact that the Nuclear Materials Technology Division, LANL, and JCI management have not systematically investigated the increase in these cases or implemented specific changes to improve JCI performance.

The respiratory protection program is overly relied upon for personnel protection at TA-55. It is fragmented, undocumented, and lacks control and discipline and is identified as a Category II concern in the Worker Safety and Health (OSHA) Compliance section of this S&H Subteam report. Many of these deficiencies reside with the Health and Safety Division and its reactive approach to supporting Laboratory needs. Effective hazards assessment and a structured approach to the conduct of the respiratory protection program are required to ensure personnel are properly protected.

Hazard communication training is improving but the Nuclear Materials Technology Division has not developed an overall program for hazards communication, as evidenced by the number and severity of hazards identified in the workplace.

In summary, LANL and the Nuclear Materials Technology Division have not implemented and integrated a unified safety and health program. Policy, procedures, roles and responsibilities, authority, interfacing and implementing mechanisms, and verification/assurance mechanisms exhibited deficiencies, lack definition, and uniformity in application.

4.5.1.15.2 Findings and Concerns

PP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

FINDINGS:

- The TA-55 Safety Manual, revised 1988, provides information concerning safety policy, emergency actions, and facility and personnel safety. This document does not establish a relationship of the safety policy of TA-55 to the ES&H policies and requirements presented in the LANL ES&H Manual.

- The replacement TA-55 Safety Manual, which has been completed but not issued, does contain reference to the LANL Safety Policy and the administrative requirements presented in the ES&H Manual.

- TA-55 has an industrial safety professional who is resident in the facility about 50 percent of the time. This individual is a member of some of the Nuclear Materials Technology Division safety committees, but participates on others only when requested. Although there are positive impacts of the presence of this individual in the facility, the reactive nature of this individual's participation has resulted in the continued presence of industrial safety deficiencies in the workplace.

- TA-55 has not had frequent industrial hygiene representation. Therefore, a number of required industrial hygiene programs are deficient such as respiratory protection, carcinogen monitoring, and hazard communications. (See Sections 4.5.1.15.2, PP.6, and 4.5.4.14.2, PP.6.)

- The Nuclear Materials Technology Division has obtained a qualified safety professional to assume the position of division safety officer. This individual is actively updating a number of the Nuclear Materials Technology Division ES&H programs. However, his roles and responsibilities in the Division organization have not been fully defined by the Division Leader. The lack of this definition has resulted in this position not being fully integrated into the ES&H structure of the Division. This is evidenced by the wide variation in meeting participation and information transfer to this safety officer.

- The Associate Director for Chemistry and Materials issued a plan which outlines the basic parameters for its ES&H program. The plan specifically places the responsibility for assuring the health and safety of employees on line management. However, these directors, managers, group

leaders, and section leaders have received limited training to identify occupational safety and industrial hygiene hazards in the workplace. In addition, not all Nuclear Materials Technology Division safety committee personnel, used by group leaders to conduct the ES&H programs, have received comprehensive training to identify, evaluate, or manage health and safety concerns in the work place.

- Several Nuclear Materials Technology Division personnel do not have formalized position descriptions. The Nuclear Materials Technology Division management expectations and tasks for an individual are contained in yearly appraisals of each individuals performance and many of these appraisals do not include specific appraisal of ES&H performance. (See Concern TSA-4, OA.6-1.)

- Several Nuclear Materials Technology Division groups have not proactively sought the assistance of Health and Safety Division personnel to assist in the identification, evaluation, and removal of occupational safety and industrial hygiene hazards.

- The Nuclear Materials Technology Division self-assessment perceived their deficiencies primarily as a lack of Health and Safety Division personnel to do all the jobs required. However, the above findings indicate deficiencies in the overall Nuclear Materials Technology Division program to uniformly apply management controls and resources for ES&H matters to all aspects of the Nuclear Materials Technology Division operations.

CONCERN: **See Concern TSA-4, PP.1-1**

PP.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the personnel protection program.

FINDINGS:

- The ES&H Manual is out-of-date and many LANL safety standards do not reflect current requirements. Some of these standards have been out of date since the early 1980s.

- The Nuclear Materials Technology Division operations use a wide range of toxic chemicals including benzene, chlorinated hydrocarbons, nitric acid, hydrogen fluoride, and phosgene gas. Although the Nuclear Materials Technology Division recognizes the potential hazards of using these materials, it does not have a program in place to identify occupational exposures to hazardous chemicals in the laboratory as required by 29 CFR 1910.1450.

- Nuclear Materials Technology Division groups safety committees perform walkthroughs of the TA-55 facility to identify and correct hazards in the workplace. Some group safety committee chairman have encountered resistance by group personnel to correct safety deficiencies. Further, the Nuclear Materials Technology Division does not have a program in place to track the resolution of these hazards.

- The Nuclear Materials Technology Division process or group safety committees review the safe operating procedures and other work instructions for each specific group. Most of these procedure reviews do not include procedure walkdowns to ensure that all hazards are identified and evaluated. In addition, these procedures are reviewed by various Health and Safety Division groups identified by the Safety and Risk Assessment Group. However, procedures do not always contain information that allow all hazards associated with the use of the procedures to be quantified.

- The Nuclear Materials Technology Division procedure review process allows procedures to be used prior to the completion of the Health and Safety Division review. Although many of the safe operating procedures and other work instructions do not significantly change with time, the Nuclear Materials Technology Division does not have specific controls in place to prevent the premature use of a procedure. (See Concern TSA-1, RP.3-1.)

- TA-55 has several areas where hearing protection is required. However, workers were observed in these areas who were not wearing hearing protection devices. In

addition, the TA-55 Safety Manual in use does not include discussion of hearing conservation or protection.

- The lockout/tagout procedure for TA-55 and LANL does not achieve compliance with 29 CFR 1910.147. Further, Nuclear Materials Technology Division management has not defined which lockout/tagout procedure should be used at TA-55. Therefore, many workers are confused as to what actions to take on lockout/tagout of TA-55 equipment. (See Concern TSA-1, WS.4-1, and TSA-4, PP.2-2, and Section 4.5.1.16.2, WS.4.)

- The Industrial Hygiene Group performed a limited egress/confined space survey of TA-55 in November 1990. However, these spaces are not specifically identified as to type and entry requirements and thus are not in compliance with ANSI C95.1-1982.

- The Health Physics Operations Group has a safe operating procedure for self-contained breathing apparatus (SCBA) operations at TA-55. The Industrial Hygiene Group now is requiring that this procedure must be a Nuclear Materials Technology Division procedure. Therefore, the Nuclear Materials Technology Division does not have a procedure in place which is applicable to the Nuclear Materials Technology Division organization and operations. Furthermore, a number of TA-55 emergency response team personnel are currently unqualified to use SCBA equipment to perform their task. The Industrial Hygiene Group does not have a Respiratory Protection Program in place. (See Concern TSA-1, WS.3-1.)

- TA-55 utilizes both special work procedures and safe operating procedures to conduct its operations. The safe operating procedures review process is structured within Nuclear Materials Technology Division but has deficiencies described previously in this section of the report. The special work permit review process control mechanisms and guidance are not in place to ensure that all special work permits receive review by safety personnel prior to use.

CONCERN: **See Concerns TSA-4, PP.2-1, and TSA-4, PP.2-2.**

FINDINGS:

- Chain of custody for workplace samples (e.g., personal, area and bulk) is established on an ad hoc basis by various groups.

- Personnel exposure records for workplace hazards are maintained in various locations within LANL. (See Concerns TSA-1, OA.7-3, and TSA-1, OA.7-4.)

- Industrial hygiene sample protocols, laboratory, and field safe operating procedures are not developed for the

evaluation of most occupational safety and industrial hygiene hazards.

- Eye examinations are not administered to all laser personnel and incidental personnel as required by ANSI Z136.1-1986.

- The following concern is not identified in LANL self-assessment.

CONCERN: (TSA-1) (PP.2-1) (H2/C1) **At the Los Alamos National Laboratory, workplace exposure monitoring and personnel medical records are not controlled, structured, or coordinated to ensure compliance with the exposure assessment requirements of 29 CFR 1910, Subpart C.**

PP.3 MANAGEMENT OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Chemical, physical, and other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

FINDINGS:

- During discussions, Nuclear Materials Technology Division safety personnel and managers indicated that health and safety reviews of all activities (e.g., experiments, new construction) were not performed. Non-Nuclear Materials Technology Division facility user activities are not reviewed, and Nuclear Materials Technology Division does not have formalized guidelines or requirements for such reviews.

- Reviews of standard operating procedures, experiments, work orders do not always include independent qualified personnel of the organization performing or proposing the work. In addition, these activities do not always provide sufficiently detailed information to enable the reviewers to assess the safety of the proposed operations.

- Hazard control methodologies incorporated into the activities do not always follow the requirements of DOE Orders or OSHA standards for use of engineered controls rather than administrative controls when such is possible.

CONCERN: **See Concern TSA-4, PP.3-1.**

FINDINGS:

- In the absence of a formalized LANL construction safety program the Facilities Engineering Division has developed its own construction safety program. However, this program not been fully implemented.

- Construction safety was the responsibility of the Safety and Risk Assessment Group. Documentation of construction safety inspections is incomplete and fragmented.

- Preconstruction meetings to review safety issues are not always conducted or documented.

- Safety performance by JCI is not a major criteria in the award fee performance assessment of the company. (See Concern TSA-4, OA.1-5.)

- Independent of the change in reporting criteria, the number of DOE reportable incidents/accidents for JCI personnel at TA-55 has climbed steadily in the past 3 years.

- A number of work activities (maintenance and construction) occur without LANL reviews or work site inspections, because LANL does not have a formal program to control construction activities.

- Formal reviews of non-LANL health and safety programs are not documented and tracked. Further, JCI is not required to review or provide to LANL subcontractor health and safety programs.

- This concern was partially addressed in the LANL, Nuclear Materials Technology self-assessment.

CONCERN: **See Concerns TSA-4, WS.5-1, and TSA-4, WS.5-2.**

PP.4 SURVEILLANCE OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

FINDINGS:

- An occurrence in a laboratory was experienced at TA-55 in which a reduction process allowed volatilized metal to escape from a reaction vessel. This resulted in the perforation of gloves attached to the glovebox and the release of hazardous and radioactive materials to the room. A formal investigation was performed by personnel independent of the Nuclear Materials Technology Division group involved in the incident. The investigation was thorough and addressed aspects that were not directly associated with the incident. The Nuclear Materials Technology Division has not established criteria for investigations of occurrences or potential incidents outside of the DOE 5000.3A requirements. (See Concern TSA-1, AX.1-3.)

- The Nuclear Materials Technology Division does not have a formalized system to track corrections of problems identified in its investigations.

- The Nuclear Materials Technology Division does not have a system requiring evaluation of processes for hazards that may be of the type that occurred in the above described incident.

- The investigation report identified the lack of an adequate hazards analysis. The Nuclear Materials Technology Division response did not include a commitment to perform a hazards analysis of this operation. Rather they addressed only specific hardware and procedural changes required to correct the immediate safety issues.

- See Section 4.5.2.14.2, PP.4.

- The following concerns were identified in the Nuclear Materials Technology Division self-assessment.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (PP.4-1) (H2/C1) **Los Alamos National Laboratory and Nuclear Materials Technology Division do not have in place a program to effectively identify, investigate, and abate hazards and their root causes and to systematically apply lessons learned as required by DOE 5480.19 and DOE 5480.4.**

PP.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Written programs, of sufficient quality to comply with all Department of Energy prescribed occupational safety and health standards, should be available.

FINDINGS:

- A new hazard communication training program has been developed at TA-55. The program does not contain all industrial safety hazards information.
- Not all laboratories at TA-55 have material safety data sheets for chemicals contained and used therein.
- Not all chemical containers are provided with hazard identification labels.
- Information, communication, chemical hygiene procedures, and training required by 29 CFR 1910.1450 are not in place.
- Not all personnel questioned knew the requirements for the use of respiratory protection.

CONCERN: **See Concern TSA-4, WS.3-1.**

FINDINGS:

- An industrial safety engineer is present at TA-55 about 50 percent of the time.
- Occupational safety and health issues as well as workplace identification training for LANL employees, and visitors, is formalized.
- See Section 4.5.1.16.2, WS.3.
- The number and severity of workplace hazards identified in the course of this appraisal indicate that the basic concept of workplace safety hazard identifications is not fully implemented.
- Health and safety concerns are not routinely trended.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (PP.5-1) (H1/C1) **The basic concepts of the Los Alamos National Laboratory industrial safety and industrial hygiene program are not fully implemented and trended as required by DOE 5480.10 and DOE 5482.1B.**

PP.6 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS

PERFORMANCE OBJECTIVE: Site/facility operations comply with Department of Energy-prescribed standards for the evaluation and control of occupational health standards.

FINDINGS:

- The Industrial Hygiene Group personnel responsible for the respiratory program stated that LANL do not have a documented respiratory protection program.
- Procedures for the maintenance of the various respiratory equipment are incomplete or are not developed.
- Safety hazards are associated with the self-contained breathing apparatus (SCBA) filling operation exist (e.g., the SCBA bottles are not properly restrained during filling operations).
- Safety hazards exist with the full face respirator and respirator cartridge test equipment (e.g., the equipment is not properly guarded).
- Respiratory protection fitting of personnel has been performed without proper medical clearance.
- LANL AR 12-1 requires that the operating entity requiring the use of SCBA respiratory protection equipment prepare a safe operating procedure for Industrial Hygiene Group approval. The Nuclear Materials Technology Division has operated under the Health Physics Operations Group safe operating procedure and has not developed a safe operating procedure for use by Nuclear Materials Technology Division personnel.
- The documented technical basis for the line supplied respirator system in TA-55 could not be provided. This includes items such as design documents, supporting calculations, operational restrictions, and number and type of respirator on the system at a given time.
- LANL has not developed a policy for the distribution and use of SCBA equipment.

CONCERN: **See Concern TSA-1, WS.3-1.**

FINDINGS:

- Although Nuclear Materials Technology Division personnel recognize the need to protect personnel from magnetic fields generated by certain analytical equipment and induction furnaces, a program to survey the laboratories containing such equipment has not been conducted by the Industrial Hygiene Group.
- A nuclear magnetic resonance system is located in Bldg. PF-4.

- The TA-55 Safety Manual, revised in 1988 does not address identification, control, or monitoring of potential radio frequency hazards in TA-55.

- The newly revised, but not yet issued, TA-55 Safety Manual does mention radio frequency as a hazard at TA-55 and refers the reader to AR 5-1. However, specific information is not provided as to the mechanisms to formally request evaluation of radio frequency hazards in the workplace.

- This concern was not identified in the LANL self-assessment.

CONCERN: **See Concern TSA-3, PP.6-6.**

FINDINGS:

- Documentation of laser interlock verification testing of TA-55 lasers is not available. Further, a requirement for testing of laser safety interlocks is not evident in TA-55 safe operating procedures.

- The Nuclear Materials Technology Division procedures for use of lasers are not always approved by the Industrial Hygiene Group prior to use.

- This concern was not identified in the LANL self-assessment.

CONCERN: **See Concern TSA-4, PP.6-3.**

4.5.1.16 Worker Safety and Health (OSHA) Compliance

4.5.1.16.1 Overview

A comprehensive OSHA-type safety and health appraisal covering general industry and construction standards was conducted at TA-55 to determine compliance with existing OSHA regulations as adopted by DOE. Evaluation criteria are based, in part, on OSHA general industry and construction standards, 29 CFR 1910, and 29 CFR 1926, respectively. Noncompliances and hazards were documented and discussed with management at the end of each day. Multiple noncompliances of the same standard in an area are noted only once on the inspection report form. (See Appendix F.) All performance objectives for the Worker Safety technical area were evaluated, except for WS.1 Management of Health and Safety Concerns and WS.2 Surveillance of Safety and Health Concerns. These objectives were reviewed by other S&H Subteams. Construction activity was not taking place at TA-55 during this appraisal. Objectives related to hazard communication are covered in WS.4 Compliance with Occupational Health Standards for General Industry. The appraisal covered maintenance shops, material storage areas, laboratories, and process test areas. A less comprehensive sample of office space and other low-hazard areas was also included.

A total of 211 noncompliance issues are identified. Of these, 203 are considered serious and 8 are classified as other than serious. The high percentage of serious noncompliance issues is a reflection of the fact that the S&H Subteam focused its attention on identifying this type of issue. Table WS-1 provides a summary of the buildings that were inspected, the number of noncompliance issues noted, and the OSHA noncompliance classification of each. Appendix F is a tabulation, by building, of all noncompliances with OSHA standards and the classification of each.

Three Category II concerns were documented related to respiratory protection and control of hazardous energy sources (lockout/tagout). TA-55 does not have a comprehensive respiratory protection program in place. As a consequence, tube trucks that provide a variety of industrial gases to the facility have standard gas delivery line connectors. These do not preclude the accidental connection of non-breathable gases into the supplied air respirator system.

Deficiencies in machine guarding have exposed workers to improperly guarded belts, pulleys, shafts, and power transmission apparatus which have the potential to cause amputation and crushing injuries.

Workers are not protected from unexpected energizing, startup, or release of stored energy from equipment or processes with which they are required to work. An effective energy control program (lockout/tagout) for servicing and maintenance of equipment does not exist at TA-55. Deficiencies related to standardization of lockout devices, attachment of lockout devices, singularity regarding the use of lockout/tagout devices, employee training, and means to enforce compliance with energy control procedures and programs were documented.

Table WS-1

Technical Area Inspections and Noncompliance Information

	Number of Noncompliances			
Location	Serious	Other-Than-Serious	Willful	Imminent Danger
Team 1 TA-55	203	8	0	0
Total	203	8	0	0
Percentage	96.21	3.79	0	0

Total Noncompliance 211

Both the TA-55 and LANL self-assessments were reviewed for corresponding findings and concerns. The TA-55 self-assessment partially addressed concerns related to hazard communication and chemical hygiene plans, electrical hazards, machine guarding, control of hazardous energy (lockout/tagout), safe means of egress, emergency response, and respiratory protection. Concerns related to machine guarding were fully addressed. Overall, this self-assessment does not have sufficient depth or detail to be of significant help in formulating a workable and effective action plan.

The LANL self-assessment partially addresses concerns related to respiratory protection, hazard communication, occupational exposure to hazardous chemicals in laboratories, and machine guarding. Electrical hazards, means of egress, control of hazardous energy (lockout/tagout), and emergency response were fully addressed. The quality of this self-assessment is considerably better than the TA-55 self-assessment and will be useful in the development of an action plan.

Hazard recognition training related to workplace safety and health issues, such as hazard communication, chemical hygiene, electrical safety, lockout/tagout, and machine guarding has not been provided to all managers and personnel responsible for complying with these mandated regulations. Where training has been provided, it has not been of sufficient depth or quality to assure minimum compliance with accepted standards or with the Secretary's initiative for safety excellence.

4.5.1.16.2 Findings and Concerns

WS.3 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Site/facility operations should comply with Department of Energy prescribed standards for the evaluation and control of occupational health hazards.

Note: Noncompliance with this performance objective is documented utilizing the OSHA Form 1B format and compiled in Appendix F to the Tiger Team Assessment.

FINDINGS:

- There is no formal hazard communication program specific for each worksite at TA-55.
- The generic TA-55 Chemical Hazard Communication Program does not address the following major program elements:
  - Labels and Other Forms of Warning. For example, the following information items are omitted: designation of persons responsible for ensuring labeling of in-plant containers, description of labeling systems in use at TA-55, description of written alternatives to labeling of in-plant containers, and procedures to review and update label information when necessary.
  - Material Safety Data Sheets. Omissions include designation of persons responsible for obtaining or maintaining the material safety data sheets, criteria for maintenance, and procedures to follow when a material safety data sheet is not received at the time of a shipment.
  - Training. Omissions include designation of persons responsible for conducting training, format of the program to be used, elements of the training program, procedures to train new employees when a new hazard is introduced into the workplace, and procedures to train employees about new exposure hazards when working on or near another employer's worksite.
- Container labeling of chemicals used by TA-55 is deficient. For example, the bulk storage diesel fuel tank located outside Bldg. PF-10 is not labeled regarding its contents or associated health hazards. In Bldg. PF-4, room 39, there is no health hazard warning on containers of isopropyl alcohol and hydroludric 142. The Painter's Storage Area, located in the basement of Bldg PF-4, has a bulk container of paint thinner that does not have a legible label.

- The hazards of nonroutine tasks, such as work on the HEPA filtration system, are not addressed in the generic TA-55 Hazard Communication Program.

- Not all workers employed at TA-55 have received hazard communication training. For example, the majority of the guard force assigned to TA-55 has not received basic hazard communication training, although these individuals are expected to act as first responders in the event of a chemical spill.

- Material safety data sheets are not available for all chemicals used at TA-55. Only about 90 percent of all chemicals have been adequately documented.

- The chemical inventory for chemicals used at TA-55 is not complete.

- TA-55 has not developed a chemical hygiene plan.

- See Concerns TSA-1, QV.5-2; TSA-2, PT.4-3; and TSA-1, TC.4-1.

CONCERN: **See Concern TSA-4, WS.3-1.**

FINDINGS:

- A comprehensive respiratory protection program has not been developed or implemented at TA-55.

- Mine Safety Appliances full-face negative pressure air purifying respirators are improperly stored. For example, in Bldg. PF-4 respiratory protection gear is stored in open plastic bags with the respirator resting on the elastomer face piece.

- There is no assurance that respiratory protective equipment used in Bldg. PF-4 is regularly cleaned.

- There is no reliable tracking or accountability system for respiratory protective equipment that is available and used in Bldg. PF-4. For example, full-face respirators with recall servicing dates of September 15, 1991, were available for use as late as September 30, 1991.

- TA-55 uses Duoflow line-supplied air respirators. This equipment has an escape feature which uses negative pressure HEPA filters. This respiratory protection device is used in work environments where toxic gases may be present. HEPA filter cartridges are not appropriate for protection from gases. In all cases, safe escape from these environments cannot be ensured.

- Compressed-gas cylinders marked "breathing air," located in Bldg. PF-4, room 42, are not identified to indicate the grade of air contained within the cylinders.

- Tube trucks, which provide a variety of industrial gases to the facility, have standard gas delivery line connectors which do not preclude the accidental connection of non-breathable gases into the supplied air respirator system.

- See Sections 4.5.1.15.2, PP.6, and 4.5.1.15.2, WS.3.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory is not in complete compliance with the requirements of 29 CFR 1910.134, Respiratory Protection, for equipment storage, maintenance, tracking/accountability, inspection, and comprehensiveness of the respiratory protection program.**
(TSA-1)
(WS.3-1)
(H1/C1)
CAT. II

FINDINGS:

- Individuals who are required to act as first responders to chemical spills are not trained. For example, some security personnel assigned to TA-55 respond to chemical spill emergencies but have not received the required training.

- See Concerns TSA-1, EP.3-1, and TSA-1, TC.4-1.

CONCERN: **See Concern TSA-3, WS.3-1.**

WS.4 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Workplaces should be free of uncontrolled physical hazards and should be in compliance with Department of Energy prescribed occupational safety standards.

Note: Noncompliance with this performance objective is documented utilizing the OSHA Form 1B format and compiled in Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- Numerous pieces of equipment have flexible cords that are used in place of permanent wiring. For example, in Bldg. PF-4, room 114, an electrical power strip and flexible cord are used as a substitute for fixed wiring.
- Flexible cords that have damaged insulation are being used. For example, in the Bldg. PF-5 warehouse storage bin Nos. 13 and 14 have flexible cords with damaged insulation.
- Numerous electrical disconnects are improperly labeled. For example, in Bldg. PF-4, next to room 106, electrical breaker box LP-56 has no identification of disconnecting means.
- Many electrical disconnects are blocked by equipment or furniture. For example, in Bldg. PF-4, room 126, electrical disconnect GB 126 is blocked by the control panel.
- Many electrical disconnects and boxes have unused openings. In Bldg. PF-9 (Station 402), an electrical outlet box has unused openings that are not effectively closed. In Bldg. PF-6, room 102, electrical panel LP-1 has unused openings that are not effectively closed.
- Several pieces of equipment are not electrically grounded. For example, in Bldg. PF-4, room 207, a converter for monitor AE834B is not provided with a permanent and continuous ground. Many electrical cable trays located in the basement of Bldg. PF-4 are not electrically grounded.

CONCERN: **See Concern TSA-4, WS.4-3.**

FINDINGS:

- In various buildings throughout TA-55, numerous instances of ineffective energy control programs were noted. For example, in Bldg. PF-4, rooms 38, 38E, and 327, employees working on Power-Trak 75-30 units, Robocal, and HIP are not protected from unexpected energizing, startup, or release of stored energy.

- In the basement and in rooms 124, 208, and 305 of Bldg. PF-4, employees working on annealing furnace, D.B. 211 and electrical disconnects are not protected from injury.

- In the basement and in rooms 38, 38E, 124, 208, 305, and 327 of Bldg. PF-4, management has failed to certify that employee training has been accomplished in accordance with 29 CFR 1910.147(c)(7)(i).

- In Bldg. PF-4, room 432, the DC motor speed control unit attachment plug is not locked out in such a manner that prevents it from being plugged into an electrical outlet.

- The TA-55 lockout/tagout procedure does not provide for periodic audit as required by 29 CFR1910.147(c)(6)(i).

- See also Section 4.5.1.15.1, PP.1.

- See Concern TSA-4, PP.2-2.

- The following concern was partially identified in the TA-55 self-assessment.

- The following concern was fully identified in the LANL self-assessment.

CONCERN: **(TSA-1) (WS.4-1) (H1/C1) CAT. II**

TA-55 at the Los Alamos National Laboratory is not in complete compliance with the requirements of 29 CFR Part 1910.147, Control of Hazardous Energy, relative to employee training, standardization of lockout devices, singularity of lockout/tagout devices, and means to enforce compliance with energy control procedures and programs.

FINDINGS:

- Machine guarding is deficient in several areas at TA-55.

- In Bldg. PF-5, carousels A & B have ingoing nip points that are not guarded and Space Saver K has an emergency shutdown kickplate that does not preclude a potential for whole body crushing.

- In Bldg. PF-4, rooms 125 and 126, the point of operation on the 10-Ton Western Sintering Presses is not guarded. This presents a potential for amputation.

- In Bldg, PF-4, rooms 39 and 42; Bldg PF-28, room B1; Bldg. PF-47; and Bldg PF-185, belts, pulleys, shafts, and other power transmission apparatus are not completely guarded.

- In Bldg. PF-42, rooms 105 and 206, there is no guarding for rotating parts for the Wilton, Craftsman, and Duracraft drill presses.

- Parts that could cause whole body crushing in the hydraulic system of the Viking Vehicle are not guarded.

CONCERN: See Concern TSA-4, WS.4-2.

FINDINGS:

- Emergency egress from Bldg. PF-4 is ineffective because of the fact that employees are trained to use only the east exits, not the west exits.
- In the basement of Bldg. PF-4, the emergency means of egress is not apparent because the arrows on the floor point in one direction, whereas the exit signs point in a different direction.
- Means of egress are not maintained to provide for safe and reliable exit through security doors, gates, and other exit points as required by 29 CFR 1910, Subpart E, Means of Egress.
- In Bldg. PF-5, the means of egress is not apparent at storage bins Nos. 11, 12, 13, and 14.

CONCERN: See Concern TSA-1, FP.2-1.

4.5.1.17 Fire Protection

4.5.1.17.1 Overview

Six of the seven performance objectives in the Fire Protection technical area were reviewed in this appraisal. FP.6 Fire Department Operations was not appraised by S&H Subteam 1. See Section 4.5.4.17.2, FP.6, for a discussion of Fire Department Operations. There are no concerns identified for FP.4 Impairment of Operations. The appraisal was conducted by means of interviews with TA-55 staff, Fire Protection and Utilities Group staff, and JCI fire protection maintenance personnel. Facilities visited and reviewed included facilities in TA-50, TA-55, and TA-61.

The overall LANL fire protection program was established by a LANL document entitled, "Fire Protection Program," dated April, 1991. The responsibility for direction and administration of the Fire Protection Program rests with the Fire Protection Officer assigned to the Fire Protection and Utility Group. Responsibility for the implementation of portions of the Fire Protection Program rests with such organizations as the Fire Protection and Utility Group, the Health and Safety Division, JCI, the Los Alamos Fire Department, and individual facility management.

The fire protection program is not being effectively implemented at TA-55. The responsibilities for maintenance and control of fire protection systems and devices in individual facilities are not well documented. There is no individual or position at TA-55 that has the documented responsibility for ensuring the adequacy and functionality of fire protection systems and devices. There is no distinct assignment of responsibilities for fire protection at TA-55. As a consequence, some valves in safety-class sprinkler systems are not being inspected, fire protection water supply valves are not being properly inspected, fire doors are found inoperable, modifications are not properly reviewed for fire protection impact, and required fire barriers are not provided or maintained. A 1987 TSA of TA-55 recommended that a thorough Life Safety Code evaluation be performed for TA-55. A thorough review was not performed, although the TSA recommendation was closed by Headquarters, DOE, as complete. The facility remains in noncompliance with numerous aspects of the Life Safety Code.

There is no established program at LANL to ensure that facilities comply with the requirements of NFPA 101, Life Safety Code, nor is conformance verified by periodic field inspections. Facilities are in substantial noncompliance with various requirements of the Life Safety Code.

Despite the acknowledgement that Bldg. PF-4 does not provide a safe haven as described in the final SAR, and despite the fact that the means of egress and other facility features do not comply with the Life Safety Code, TA-55 management currently requires that occupants of the Bldg. PF-4 be detained for up to 10 minutes in the event of a fire alarm signal. The facility configuration with respect to fire protection features and the fire hazards within the facility are not controlled to remain within the parameters of the final SAR to assure that the facility does not present an added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site or facility boundary.

There is no formal evaluation based on the current property values and current fire hazards in TA-55 that documents that the maximum fire loss limits established by DOE 5480.7 will not be exceeded. A thorough level of fire protection engineering review and approval is not evident in the planning and design of projects, modifications, and renovations.

As evidenced by the numerous deficiencies noted in the fire protection inspection, testing, and maintenance program, there is insufficient oversight provided by the Fire Protection and Utilities Group. The LANL fire protection inspection, testing, and maintenance program is not in accordance with the requirements of the NFPA and does not ensure the reliability of fire protection systems, some of which are defined as safety-class systems.

Few of the fire protection deficiencies identified by S&H Subteam 1 were also identified in the LANL self-assessment. The LANL self-assessment lacked the depth of review of fire protection performance objectives to disclose the deficiencies noted in this report.

4.5.1.17.2 Findings and Concerns

FP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Fire protection organization and administration should ensure the effective implementation and control of the fire protection program.

FINDINGS:

- The overall LANL Fire Protection Program is established by a LANL document entitled, "Fire Protection Program," dated April 1991. The responsibility for the direction and administration of the Fire Protection Program rests with the Fire Protection Officer in the Fire Protection and Utilities Group.
- Responsibility for the implementation of portions of the Fire Protection Program rests with such organizations as Fire Protection and Utilities Group, Health and Safety Division, JCI, the Los Alamos County Fire Department, and individual facilities management.
- The responsibilities for maintenance and control of fire protection systems and devices in individual facilities are not well documented. There is no individual or position at TA-55 having the documented responsibility for ensuring the level of compliance and functionality of fire protection systems and devices.
- At TA-55, some valves in safety-class sprinkler systems are not being inspected, fire protection water supply valves are not being properly inspected, fire doors are found inoperable, modifications are not properly reviewed for fire protection impact, and required fire barriers are not provided or maintained.

CONCERN: **See Concern TSA-4, FP.1-1.**

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

FINDINGS:

- The LANL document, "Fire Protection Program," dated April, 1991, provides neither policy nor implementing procedures for compliance with NFPA 101, Life Safety Code.
- Facilities at TA-55, TA-50, and other areas of the Laboratory are not in compliance with various aspects of the Life Safety Code, such as the number and arrangement of means of egress, marking of exits, provision and maintenance of fire barriers, separation of means of egress, operation and arrangement of doors and latching devices, provision of smoke detectors in ventilation systems, type and arrangement of stairs, provision and arrangement of guardrails, and other features.
- There is no established program at LANL to ensure that facilities comply with NFPA 101, Life Safety Code, nor is conformance verified by periodic field inspections.
- Despite the Category II recommendation from the 1987 TA-55 TSA, a thorough Life Safety Code review of TA-55 facilities was not conducted to discover and correct deficiencies.
- Means of egress are not maintained to provide for safe and reliable exit through some security doors and gates and other exit points as required by 29 CFR 1910, Subpart E, Means of Egress.
- See Section 4.5.1.16.2, WS.4, and, Section 4.5.1.11.2, SS.2.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.2-1) (H1/C1) CAT. II

At Los Alamos National Laboratory, TA-55 is in substantial noncompliance with various requirements of NFPA 101, Life Safety Code, and 29 CFR 1910, Subpart E, Means of Egress, in subject areas such as the arrangement of means of egress, marking of exits, provision and maintenance of fire barriers, separation of means of egress, operation and arrangement of doors and latching devices, provision of smoke detection in ventilation systems, and type and arrangement of stairs.

FINDINGS:

- The 1987 TSA of TA-55 recommended that a thorough Life Safety Code evaluation be performed for TA-55. A thorough review was not performed, although the TSA recommendation was closed by Headquarters, DOE, as complete. The facility remains in noncompliance with numerous aspects of the Life Safety Code.

- See Concern TSA-1, FP.2-1.

- The following concerns were partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.2-2) (H1/C1) CAT. II

The Department of Energy Technical Safety Appraisal system as implemented by the Nuclear Materials Technology Division and Los Alamos National Laboratory does not assure complete corrective action prior to closeout of significant (Category II) Concerns.

CONCERN: (TSA-1) (FP.2-3) (H1/C1) CAT. II

The Technical Safety Appraisal system as implemented by Headquarters, Department of Energy, does not assure complete corrective action prior to closeout of significant (Category II) Concerns.

FINDINGS:

- Bldg. PF-4 was intended to be designed for nonevacuation of occupants in the event of a fire alarm. In the event of a fire alarm, employees are instructed to congregate in the corridors of Bldg. PF-4, which were intended to be 2-hour fire resistance rated safe havens.

- During the course of the appraisal, it was determined that the corridors in Bldg. PF-4 do not qualify as providing a fire resistance rated separation from the adjoining laboratory areas and, thus, do not qualify as exit access corridors, horizontal exits, or areas of refuge as defined by the Life Safety Code.

- TA-55 management currently does not evacuate personnel in the event of a fire alarm. There are no compensatory measures provided which would allow for detaining occupants after receipt of a fire alarm signal.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.2-4) (H1/C1) CAT. II

Contrary to the requirements of the Life Safety Code for prompt evacuation, the evacuation procedures for Building PF-4 at Los Alamos National Laboratory cause occupants to be detained in the building for up to 10 minutes in the event of a fire alarm signal, even though safe havens are not provided.

FINDINGS:

- Emergency evacuation plans posted in LANL facilities are not reviewed by persons familiar with emergency means of egress and exiting requirements of the Life Safety Code.

- Posted emergency evacuation plans do not, in all cases, indicate egress routes which are in compliance with the requirements of the Life Safety Code.

- Emergency evacuation plans posted for Bldg. PF-4 indicate that in case of fire occupants are to evacuate

the building to the outside assembly area. The posted instructions are contrary to employee training and actual fire procedures that instruct occupants to exit individual laboratories and to assemble in corridors within the building.

- See Section 4.5.2.15.2, WS.4.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.2-5) (H1/C1) **Emergency evacuation plans at TA-55, as required by 29 CFR 1910.38, do not properly address security interfaces and worker protection and also do not agree, in all cases, with the means of egress requirements of NFPA 101, Life Safety Code.**

FP.3 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate protection to prevent any added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site or facility boundary.

FINDINGS:

- Automatic sprinkler protection is provided throughout most TA-55 facilities. However, glovebox 401-A was constructed in Bldg. PF-4 without a documented fire protection review or automatic sprinkler protection.

- Contamination control enclosures (tent enclosures) are constructed with ordinary lumber and combustible fabric sheeting, without mitigation of the increased fire hazard presented by these materials.

- A modification that included rerouting of the fire protection water supply for the Bldg. PF-5 warehouse was completed without documented fire protection engineering review.

- The actual configuration of the required fire walls in TA-55 are not well documented, and facility personnel are not familiar with the requirements for maintaining the integrity of these barriers. As a result, the fire resistance of the barriers has been compromised by design changes and maintenance operations. For example, Bldg. PF-1 corridor walls have been penetrated by copper pipes, conduits, and electrical outlets.

- TA-55 facility and operations personnel, Fire Protection and Utilities Group personnel, and JCI personnel are not thoroughly familiar with the fire protection systems provided for TA-55, nor are the functional requirements for these systems well documented. On two separate occasions during this appraisal, it took several hours to ascertain the correct positions of valves controlling automatic sprinkler systems for TA-55 buildings. One case involved valves PIVA 1395 and PIV 1395. The other case involved valves controlling automatic sprinkler systems in filter enclosures for Bldg. PF-4.

- The final SAR for TA-55 addresses fire safety, including safe confinement, and establishes a safe limit on combustible loading on the basis of the fire hazards analysis in the SAR. There is no facility policy or procedure which controls the amount of combustible material that may be present in the facility. There is no assurance that the combustible limit established by the final SAR is not exceeded.

- Considerable amounts of combustible plastic materials are being introduced in Bldg. PF-4 without documented consideration of the impact of the increased fire loading

or other fire aspects on the safe operation of the facility.

- Combustible radioactive waste is being stored in combustible containers in the yard area of TA-55. This combustible storage is not provided with fixed fire protection, presents a potential fire exposure to important facilities and equipment, and could result in uncontrolled release of contamination in the event of a fire.

- There is no documented policy, procedure, or physical evidence of systematic attempts to limit the amounts of combustible materials in Bldg. PF-4.

- See Concerns TSA-1, AX.3-1; TSA-4, PP.3-1, and TSA-2, OP.4-1, and Section 4.5.1.3.2, OP.4.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.3-1) (H1/C1) **At the Los Alamos National Laboratory, the configuration of TA-55 with respect to fire protection features and fire hazards within the facility are not controlled to remain within the parameters of the Final Safety Analysis Report as required by DOE 5480.5.**

FP.5 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A maximum credible fire, as defined in DOE 5480.7, Section 6.f., should not result in an unacceptable property loss.

FINDINGS:

- The final SAR, dated April 1978, documents that, based on the evaluated scenarios in the SARs, the maximum possible, and maximum credible, fire losses would not be expected to exceed the property value limits established by DOE 5480.7.
- The LANL-conducted fire loss analyses do not document that changes in property values or fire hazards have resulted in possible credible fire losses which may exceed limits established by DOE 5480.7.
- Estimated fire loss values resulting from the design basis fire in the TA-55 final SAR have not been escalated in terms of current dollar values.

CONCERN: **See Concern TSA-4, FP.5-1.**

FP.7 PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE: A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection.

FINDINGS:

- As the result of a facility modification, room 401-A in Bldg. PF-4 was built without a documented fire protection review and the room was constructed without automatic sprinkler protection.
- Contamination control enclosures (tent enclosures) are routinely constructed with ordinary lumber and combustible plastic fabric sheeting without control of the increased fire hazard presented by these materials.
- Rerouting of the fire protection water supply for the Bldg. PF-5 warehouse was completed without a documented fire protection engineering review.
- The Bldg. PF-5 warehouse storage arrangement was significantly modified without a documented fire protection engineering review of the potential impact of the modification.
- See Concerns TSA-4, PP.3-1; TSA-4, TS.3-1; TSA-2, OA.2-1; and TSA-1, FR.1-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.7-1) (H1/C1) **At Los Alamos National Laboratory, fire protection engineering review and approval is not evident in the planning and design of projects, modifications, and renovations as required by DOE 5480.7.**

FINDINGS:

- DOE 5480.7 requires that fire protection equipment and systems be inspected, tested, and maintained in accordance with National Fire Protection Association codes and standards.
- The LANL Fire Protection Program, established in April 1991, provides that the Fire Protection Officer in the Fire Protection and Utilities Group is responsible for assuring compliance with all fire protection requirements and for the proper maintenance of all fire protection systems. The Fire Protection Program also provides that the Fire Protection Engineering Coordinator is responsible for maintaining records that accurately reflect the status of fire protection systems and for reviewing all required fire protection maintenance and test procedures and field work efforts involving fire protection. Fire protection inspection, testing, and maintenance at LANL facilities are conducted by JCI.

- JCI has implemented unapproved procedures for inspection, testing, and maintenance of fire protection equipment and systems.

- The JCI fire protection inspection, testing, and maintenance procedures do not contain sufficient detail to assure that fire equipment is tested or maintained in accordance with NFPA requirements, manufacturers recommendations, or recommended industry good practice to ensure reliability.

- The JCI fire protection inspection, testing, and maintenance procedures do not contain sufficient detail to ensure that fire equipment is restored to proper operational status after tests.

- The JCI fire protection inspection, testing, and maintenance procedures do not contain sufficient detail to ensure that all required fire protection devices are included in the inspection and testing program. Note the following examples:

  - There is no listing of fire detectors in facilities to verify that all required devices are tested.

  - Not all sprinkler valves internal to buildings are assured of being inspected. Some inside valves on safety-class sprinkler systems in Bldg. PF-4 are not inspected periodically to verify their proper position.

- The JCI fire protection inspection, testing, and maintenance procedures make incorrect references to NFPA standards.

- Fire protection valve inspection records do not properly verify valve status. For example, valve PIVA 1395 outside Bldg. PF-3 was permanently shut in October, 1990. A new valve, PIV 1395 was installed in a different location and is required to be open. Inspection records before and after October 1990 indicate that PIVA 1395 (located south of Bldg. PF-3) is presently open (in fact, the valve is shut) and do not indicate the presence or status of the new valve PIV 1395 (located north of Bldg. PF-3). (The valve listing maintained by the Fire Protection and Utilities Group does not indicate the presence of Valve PIV 1395.)

- Records do not indicate which fire protection devices have been tested or maintained. It cannot be verified, in all cases, that an individual device has been tested or maintained as required.

- The JCI fire protection inspection, testing, and maintenance procedures do not contain acceptance criteria

that require corrective action when there is an indication of potential reduced system effectiveness. Note the following examples:

Drain test results for valve PIVA 1395 at Bldg. PF-5 indicates an increased pressure drop from 5 psi to 20 psi in tests performed on July 1, 1990, and on September 1, 1990, but no action was initiated to ascertain the reason for the apparent increased pressure loss in the piping.

The inspection record for the Halon fire suppression system protecting the process computer in TA-50 indicated a drop in cylinder weight from 152 pounds to 98 pounds between the October 8, 1984, and October 6, 1985, inspections. The inspection record indicated a subsequent weight drop from 98 pounds to 93 pounds between the May 9, 1988, and May 8, 1989, inspection. No investigation into the reason for the apparent loss of the fire suppression agent was initiated.

- On several occasions, required sprinkler system drain tests were not performed. Inspection records confirm the omission of the required tests, but supervisory review of the records did not result in any corrective action for the failure to perform the required tests.

- No records of waterflow tests (hydrant tests) for TA-55 could be produced during the course of this S&H Subteam appraisal.

- Copies of fire protection inspection and test records are not routinely provided to facility managers as assurance that required systems are functioning properly.

- Fire door inspections were suspended by the Fire Protection and Utilities Group in April 1991, and fire doors are not presently being inspected. Numerous fire doors were noted during the S&H Subteam appraisal that did not function properly.

- During the S&H Subteam appraisal, two gaseous fire suppression systems (a carbon dioxide system in TA-50 Bldg WM-1 and a Halon system in TA-50 Bldg. WM-37) were found to be out-of-service. Fire protection inspections failed to note these system impairments.

- See Concerns TSA-4, MA.2-1, and TSA-4, MA.8-1.

- The following concern was not identified in the LANL self-assessment.

CONCERN: **At the Los Alamos National Laboratory, the numerous deficiencies in the fire protection inspection, testing, and maintenance program at TA-55 reflects lack of oversight provided by the Fire Protection and Utilities Group and is not in compliance with National Fire Protection Association requirements to ensure the reliability of fire protection systems, some of which are defined as safety-class systems.**
(TSA-1)
(FP.7-2)
(H2/C1)
CAT. II

FINDINGS:

- On October 3, 1991, in response to questions posed about records by a S&H Subteam observer, a JCI employee altered the permanent inspection record for the Halon system protecting the process control computer for TA-50.
- In a memo dated October 7, 1991, the JCI Vice President/General Manager dismissed the significance of the alteration of the permanent inspection record for the fire suppression system referenced above by stating that the employee's "motives were not to deceive but to prevent misunderstandings," thus implying that altering of records is acceptable in this case.

CONCERN: **See Concern TSA-1, OA.3-2.**

FINDINGS:

- The Fire Protection and Utilities Group conducts periodic fire protection appraisals of the plutonium facilities, but the format and content of the appraisals do not ensure that DOE 5480.7 requirements for identifying increased fire hazards, ensuring compliance with referenced fire standards, evaluating property loss and programmatic impact of potential fires, and evaluating the effectiveness of fire loss control devices and activities are being met.

CONCERN: **See Concern TSA-4, FP.4-2.**

FINDINGS:

- The Final SAR for the Plutonium Handling Facility (TA-55), dated April 1978, states in Section 6.2.1.2 that "no fire dampers are installed in the exhaust duct at the firewall. This is an engineering deviation from the NFPA Fire Code." This is a documented deviation from the mandatory requirements of the NFPA code and the uniform Building Code, for which there are no exemptions existing or sought. There are no fire protection exemptions or exemption requests to DOE for plutonium handling facilities at LANL.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **At Los Alamos National Laboratory, exemptions from mandatory fire protection requirements have not been obtained in accordance with DOE 5480.4.**
(TSA-1)
(FP.7-3)
(H2/C1)

FINDINGS:

- The S&H Subteam has noted numerous deviations from mandatory fire code requirements at TA-55. Current LANL fire protection programs either do not identify these deficiencies or do not document, correct, or seek exemptions from the applicable standards.
- Fire barrier floors, 2-hour fire barrier walls, 4-hour firewalls, and fire doors are not maintained to preserve their required fire resistance ratings.
- Fire hose connections for fire department use operate at pressures in excess of 100 psi and are not provided with pressure reducing valves as required by NFPA 14, Standpipes and Hose Systems.
- Storage of waste oil in drums in the basement of Bldg. PF-4 is not in compliance with NFPA 30, Combustible Liquids Code.
- Siting of the flammable liquids lockers outside of Bldg. PF-4 is not in compliance with NFPA 30.
- The aboveground diesel fuel oil storage tanks for the diesel fire pumps for TA-55 are not in compliance with NFPA 30.
- Two-hour fire resistance fire rated construction is not provided to separate the incinerator from other occupancies in TA-50 Bldg. WM-37 as required by DOE 5480.7 and the Uniform Building Code.
- Storage of combustible radioactive waste in combustible wood containers in the yard area of TA-55 presents a potential fire exposure to the oil transfer piping for the auxiliary generator, exposes the air compressor to potential fire damage, and blocks the emergency exit for Bldg. PF-7.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.7-4) (H1/C1)

The Los Alamos National Laboratory Fire Protection Program, as implemented, does not effectively discover significant fire protection deficiencies for correction.

FINDINGS:

- Fire protection system drawings showing the current arrangement of internal and external fire protection piping and valves for TA-55 are not readily available for emergency use at the site, nor are the available drawings up-to-date.
- Operations control room operators are not familiar with the emergency operations of the fire protection systems for Bldg. PF-4.

- See Concerns TSA-2, OP.4.1, TSA-1, OP.6-2, and Section 4.5.1.3.2, OP.4.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.7-5) (H1/C2) **At the Los Alamos National Laboratory, there is insufficient documentation or knowledge of fire protection systems by operations personnel onsite at TA-55 to make effective use of the fire protection systems in the event of a fire emergency.**

FINDINGS:

- During this S&H Subteam appraisal, many requests for documentation of fire protection engineering reviews of projects for facility modifications could not be satisfied.

- Many records of fire protection design criteria or fire protection engineering reviews of projects either do not exist or are not retrievable.

- Fire doors in Bldg. PF-4 are not labeled by an accepted testing agency.

- Fire door labels applied to the steel doors by laboratory personnel reportedly were based on an evaluation report provided by Factory Mutual Research Corporation, which reportedly documents that the doors are equivalent to rated-fire doors in "certain" aspects.

- The Factory Mutual Research Corporation report, which clarified how the equivalency of the fire doors to the requirements of NFPA and Underwriters Laboratories was determined, was not available for review by the S&H Subteam.

- QA records to ensure that the fire door labels were applied to the doors in accordance with the Factory Mutual report were not available during this appraisal.

- Details about fire doors, such as the size of glazed openings and type of hardware on some of the doors which have been assumed to be fire-rated, are not in accordance with the requirements of NFPA 80 for 1-1/2-hour rated-fire doors, although the doors bear laboratory-applied labels indicating that they are fire doors.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.7-6) (H1/C1) **Fire doors in Building PF-4 at Los Alamos National Laboratory do not meet the requirements of NFPA 80, and there is insufficient documentation to ascertain that the doors, as installed, provide fire separation equivalent to that required by the fire codes.**

FINDINGS:

- Heat detectors in gloveboxes in Bldg. PF-4 are not installed in accordance with NFPA 72E, Fire Detectors.
- No documentation exists to demonstrate that the heat detectors in the gloveboxes, as installed in stainless steel thermowells or plastic insulated steel thermowells, satisfy the requirements of NFPA 72E or provide equivalent or acceptable fire response.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.7-7) (H2/C1)

Fire detectors in the gloveboxes in Building PF-4 at Los Alamos National Laboratory do not provide assurance of an acceptable level of warning in accordance with the NFPA 72E.

FINDINGS:

- The safety-class fire protection systems for Bldg. PF-4 are not designed as single-failure proof systems.
- The water supplies for the safety-class fire protection systems in Bldg. PF-4 are not qualified for the Design Basis Earthquake.
- The failure during design basis accidents of automatic sprinkler systems in TA-55 buildings that interface with the safety-class fire protection systems in Bldg. PF-4 will prevent the safety-class systems in Bldg. PF-4 from accomplishing their safety functions when required.
- See Concern TSA-1, NP.6-5.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (FP.7-8) (H1/C1)

The safety-class fire protection systems in Building PF-4 at Los Alamos National Laboratory do not comply with DOE 6430.1A.

4.5.1.18 Natural Phenomena Hazards

4.5.1.18.1 Overview

The seven performance objectives for the Natural Phenomena Hazard technical area are addressed in this appraisal. The appraisal focused on the high hazard facilities at LANL, including the Plutonium Facility (TA-55 Bldg. PF-4); in rooms 116 and 117 of the Plutonium Facility Support Building (Bldg. PF-3); and Sigma Complex (TA-3 Bldg. SM-66). The appraisal was conducted by document reviews, interviews, and walkdowns. Documents reviewed include SARs, technical specifications, criteria, and calculations. Interviews were conducted with facility operators and engineers familiar with the facility design and construction. General walkthroughs of the facilities were performed followed by detailed walkdown of sample systems. The appraisal addressed facility and system response to natural phenomena hazards, including earthquake, wind, tornado, flood, and lightning strike.

TA-55 has many design provisions in place for protection against hazards related to natural phenomena. Except for seismic concerns, natural phenomena hazards have been considered, and have significantly lower contribution to overall total risk. There is a general lack of concern at the facility for earthquakes, and scant attention is paid to design details and seismic performance considerations. TA-3 has almost no provisions for seismic hazards and gives minimal attention to the problem. This lack of concern for seismic hazards is evident on a sitewide basis. The large number of concerns developed from this appraisal is indicative of a pervasive problem; namely, LANL has placed a low priority on seismic safety, including design criteria, installation of new equipment, inspection, and planning for mitigation of accidents resulting from earthquakes.

The performance objective for seismic hazard response has not been met by any of the facilities appraised. Programs are in place for other hazards. None of the facility operators interviewed are prepared to respond to the review-level earthquake as defined in UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990. The review level earthquake is defined in UCRL-15190 as an earthquake having an annual frequency of exceedence of 2×10^{-4} for high-hazard facilities. It is contained in UCRL-53582, "Natural Phenomena Hazards Modeling Project: Seismic Hazard Models for Department of Energy Sites," November 1984. This earthquake is also defined as the safe shutdown earthquake in the TA-55 Bldg. PF-4 final SAR. Many operators stated that earthquakes were not likely at LANL, so there is no compelling need to be concerned. No emergency preparedness procedures or training for the facility occupants are provided for seismic hazards.

The appraisals for the remaining performance objectives were dominated by seismic hazard concerns. The appraisal for the other natural phenomena hazards (wind, tornado, flood, and lightning strike) generally resulted in no significant concerns. This appraisal did not include flood and tornado hazard at any of the facilities. These were screened out as having annual frequencies of occurrence less than 1×10^{-6}, in accordance with the guidance provided by UCRL-15910.

The TA-55 design included seismic qualification requirements for both Bldg. PF-4 and the equipment safety system installations. The Bldg. PF-4 structure

is ruggedly constructed to resist earthquake loads. However, the original seismic design requirements for safety class components and systems are not fully implemented. Appraisal findings address component anchorage and restraint details, operability considerations, and seismic systems interaction. The current design process is incomplete and lacks proper attention. The Design Group is responsible for natural phenomena hazards issues; it is not prepared to handle, in a reasonable timeframe, design peer reviews coupled with evaluating all existing facilities.

The TA-55 design contained provisions for tornado loads and wind-borne missiles. The tornado design resulted in a rugged wind design; as a consequence a detailed appraisal of high-wind hazards was not performed. Lightning strike concerns were also not examined in detail. After discussions with facility engineers, it was concluded that the facility lightning protection system was well designed and is functional.

TA-3 Bldg. SM-66 is substantially underdesigned for the review-level earthquake for an existing high-hazard facility. This is true of the building structure, as well as all of its equipment component installations. The seismic concerns outweighed the other natural phenomena events (lightning and wind) and received the bulk of the attention during the S&H Subteam appraisal of Bldg. SM-66. The structure is generally rugged for wind loads, and the lightning strike provisions appear to be well designed and functional.

The LANL self-assessment document identifies seismic deficiencies on a sitewide basis, but does not contain specific findings that may be addressed in an expedient manner. A Seismic Hazards Identification Task Force was formed at LANL in August 1990 in order to identify seismic concerns, to prioritize potential deficiencies, and to develop action plans for the resolution of those deficiencies. To date, many specific seismic concerns have been documented by this Task Force. These specific concerns do not appear in the LANL self-assessment. This observation raises concerns about the commitment to seismic safety at LANL.

4.5.1.18.2 Findings and Concerns

NP.1 NATURAL PHENOMENA HAZARDS SAFETY PROGRAM

PERFORMANCE OBJECTIVE: Each facility should have adequate measures of ensuring worker life safety and confinement of radioactive and chemical/toxic materials during and after the occurrence of any of the natural phenomena hazards that are applicable to the site on which the facility is located.

FINDINGS:

- No emergency response procedures are in place at Bldg. PF-4 for earthquake response. Operators interviewed do not know what immediate actions to take after an earthquake or what systems are available for their use.
- Operators interviewed at Bldg. PF-4 do not know what sequence to use to bring systems back on line in order to maintain a safe configuration after a design basis earthquake.
- There is no employee training and no written procedure at Bldg. PF-4 describing what action to take to ensure personnel safety during and after a design basis earthquake.
- Glovebox front-to-back and longitudinal seismic braces have been removed in many of the laboratory rooms in Bldg. PF-4.
- Laboratory room operators and technicians at Bldg. PF-4 state that they do not consider earthquakes a problem.
- The safe shutdown earthquake for Bldg. PF-4, as defined in the final SAR has peak ground accelerations of 0.38 g and is a significant event.
- Emergency procedures are not in place for earthquake response for hazardous gas operations in Bldg. PF-4, rooms 116 and 117. The hazardous gases include phosgene, chlorine, and hydrogen fluoride. Operators interviewed at Bldg. PF-3 do not know what immediate actions to take or what the likely consequences of a review-level earthquake might be.
- There is no employee training or documented procedure describing what action to take to ensure personnel safety during an earthquake at Bldg. PF-3.
- There is no confinement system for the hazardous gases in Bldg. PF-3, rooms 116 and 117.
- The only alarm system for hazardous gas leak detection is local. Digital monitors are located outside of rooms 116 and 117 in Bldg. PF-3. Personnel at TA-55 would not receive warning in the event of a gas leak following a natural phenomenon event.

- Gas leak detectors in Bldg. PF-3, room 117 were unrestrained; hence, the potential that they might be damaged during an earthquake was higher. Operators took corrective action to address this problem.

- No emergency procedures are in place for earthquake response at Bldg. SM-66. Operators interviewed do not know what actions to take after an earthquake or what some of the likely hazardous consequences might be.

- There is no employee training or written procedure describing what action to take during and after an earthquake. Training and procedures are particularly necessary at Bldg. SM-66 because of its nonrugged structure (nonductile reinforced concrete frame with unreinforced masonry infilled panels). Collapse of many internal unreinforced concrete block walls is likely at or below the review-level earthquake.

- Except for batteries for an evacuation alarm, there is no backup power supply for systems in Bldg. SM-66. These batteries are mounted to an unreinforced and unanchored block wall. Block walls perform poorly during earthquakes. It is likely that offsite power will be lost should an earthquake occur.

- A manually activated alarm is relied on to alert occupants in the event of an extreme hazard (such as formation of cyanide gas). There is potential for formation of cyanide gas during and after an earthquake due to sloshing of tank contents.

- There is general lack of concern for earthquakes among personnel in Bldg. SM-66.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.1-1) (H1/C2) **Personnel training, documented plans, and defined procedures necessary for response to a design basis earthquake are not in place at TA-55 Building PF-4; TA-55 Building PF-3, rooms 116 and 117; and TA-3, Building SM-66 at Los Alamos National Laboratory.**

FINDINGS:

- Facility hazard classifications are based on methods that have not been approved by DOE. These include several site-specific assumptions involving unmitigated release calculations.

- The hazard classification of the Chemistry and Metallurgical Research Building as moderate hazard does not consider personnel located at the building boundary for the duration of the accident.

- In accordance with the draft hazards classifications document, with no mitigating considerations taken for hazards, the Chemistry and Metallurgical Building would be classified as a high-hazard building.

- The method for evaluating radiological hazards was sent to the AL prior to October 1990. The hazard classifications document, including toxicological hazards, was submitted in September 1991. DOE has not concurred yet with the proposed methodology or the facility classifications cited in the draft.

- DOE is currently funding programs to review the LANL draft hazards classifications document.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.1-2) (H2/C1) **The current list of facilities classified as "high hazard" at Los Alamos National Laboratory does not include all facilities meeting the definition of high hazard, such as the Chemistry and Metallurgical Research Building, and the classification methodology does not comply with DOE 5481.1B.**

NP.2 SEISMIC ADEQUACY CONSIDERATIONS

PERFORMANCE OBJECTIVE: Systems, components, and equipment in each facility need to be adequately addressed for the seismic aspects of anchorage, structural integrity, operability, seismic systems interaction, and other special items, to ensure worker life safety and performance of safety class systems and components for the confinement of hazardous materials.

FINDINGS:

- The responsible designer of seismic restraints for a variable frequency drive control panel for the Zone 1 exhaust in Bldg. PF-4 did not know the performance objectives of the design (i.e., whether it must function during an earthquake, immediately after an earthquake, or just maintain structural integrity).

- There are no explicit seismic design criteria for new design work. The calculation for a variable frequency drive control panel does not reference design basis information beyond the general guidance provided in UCRL-15910, "Design and Evaluation of Department of Energy Facilities Subjected to natural Phenomena Hazards," June 1990. Acceptance criteria do not address key items such as allowable stresses, factors of safety, damping levels, load combinations, and modal and directional combination methodology.

- The design calculation for a variable frequency drive control panel does not meet the following standard seismic engineering practices:

  - The dynamic analysis results do not seem to be physically possible, and the model boundary conditions do not match the final recommended design.

  - Not all forces are accounted for in the determination of anchor bolt loads, and the calculation uses nonconventional methods.

  - The final design specified 3-1/2-diameters edge distance for the anchors, whereas the manufacturer recommends a minimum of 10-diameters edge distance spacing.

  - Chemical bond anchors are used instead of expansion-type anchors, with no consideration given to the environmental effects of the adhesive.

- Designers of a diesel fuel storage tank do not know whether the attached fuel lines to the tank have enough flexibility to accommodate tank motion during the design basis earthquake.

- Designers do not know whether a variable frequency drive control panel frame meets panel mounting requirements or

whether the resulting design matches the test configuration. Attachment bolts were not designed.

- The performance of final walkdowns is encouraged, but not required, to ensure compliance of seismic designs with as-installed conditions. This step is essential to ensure that all seismic concerns have been covered by the design.

- LANL has only two full-time equivalent engineers allocated to natural phenomena hazards evaluations. Their responsibilities include peer review of new seismic designs as well as evaluation of existing facilities.

- Kiva I at the Los Alamos Critical Experiments Facility does not meet seismic requirements for a moderate hazard facility. Engineering studies to evaluate structural upgrade options have not been performed. (See Section 4.5.2.11.2, EA.4.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.2-1) (H2/C2) **A comprehensive seismic safety program to design new facilities and review existing ones does not exist at Los Alamos National Laboratory.**

NP.3 ANCHORAGE

PERFORMANCE OBJECTIVE: Systems components, and equipment are properly configured and are anchored to the supporting structure so as to reduce vulnerabilities to excessive displacements and stresses caused by seismic loads on the systems overall, for the purpose of worker life safety and confinement of hazardous materials.

FINDINGS:

- Several observed components for the Train B power distribution system in Bldg. PF-4 are not anchored in compliance with standard industry seismic design practice. Examples are listed below. Operators took corrective action to address several of these items.

  - Large, heavy transformers in the switchgear rooms of the Bldg. PF-4 basement have very light anchorage relative to their size: (1) The north-side 13.2 kV to 460 V step-down transformer adjacent to EE-607 switchgear is anchored with two 3/8-inch anchor bolts, and (2) The parallel south-side 13.2 kV to 460 V step down transformer adjacent to EE-608 (south) switchgear is anchored with four 3/8-inch anchor bolts.

  - Transformers are not required to function in order for the Train B distribution system to supply power from the auxiliary diesel generator, but they are physically attached to the critical switchgear cabinets (EE-607 and EE-608). Movement of the transformers could affect the critical switchgear.

  - The south-side switchgear EE-607 is missing several anchor bolts. Thin washers are used on oversized holes in the switchgear cabinet base and form a poor load path for the anchorage.

  - The Bldg. PF-4 basement motor control center EE-611 (south-side) cabinets C and D are not bolted together. This makes it possible for the adjacent cabinets to bang into one another during seismic motion and cause tripping of motor starters. Motor control center cubicle bases are not consistently anchored.

  - Motor control centers EE-611 and EE-612 utilize thin washers on oversized holes in the base anchorage and provide a poor load path for anchorage. The location of the anchorage for the motor control centers is inconsistent; some cubicle bases are bolted to the floor and others are not.

  - The anchorage design for motor control centers EE-611 and EE-612 appears to be based on the assumption that the cabinets are in the rigid range of the design spectra (natural frequency greater than 7

hertz). This is not likely because the motor control cabinets are not anchored at their tops to the adjacent concrete wall.

- The lack of top-bracing and anchorage on motor control centers EE-611 and EE-612 allows a scenario in which the motor control centers strike the wall and become damaged or cause starters to trip during a seismic event.

- Failure of the Train B switchgear or motor control centers will render the air compressors and fans for the ventilation system inoperable.

- Elements of the switchgear system servicing the auxiliary diesel generator are not anchored in accordance with standard industry seismic design practice; examples include the following:

  - Switchgear cabinet EE-606 in Bldg. PF-8 is missing one of four anchor bolts. Installed anchors are through a bolted-on customized bracket not supplied by the switchgear manufacturer. The bracket does not provide a stiff and direct load path.

  - The battery rack for the standby batteries that power automatic operation of breaker Nos. 52.1, 52.2, and 52.3 (switchgear cabinet EE-606) in Bldg. PF-8 is not anchored. The battery rack is sitting on a sheet metal drip pan that is not positively attached to the floor. Longitudinal bracing on the front of the rack has been removed, and there are no end restraints for batteries on the rack.

  - Spare steel channel framing is stored on top of the EE-606 switchgear cabinet. No restraint mechanism is in place to prevent the framing from sliding off and falling during seismic motion.

  - Loss of anchorage integrity may render switchgear EE-606 inoperable. The switchgear is required to deliver electrical power from the facility auxiliary diesel generator to the Train B electrical distribution system. This power source is required to run the ventilation system when offsite power is lost.

- Elements of the compressed air system are not anchored in accordance with standard industry seismic design practice; examples include the following:

  - The water saver (air-cooling) cabinet anchorages (machine bolts to steel platform) outside of Bldg. PF-8 have missing nuts.

- The anchorage for the No. 3 air dryer inside of Bldg. PF-8 relies on a flexible load path that consists of dependance on the bending strength of a steel angle base frame member. There are missing anchor bolts on the No. 2 air dryer.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.3-1) (H2/C1) **At Los Alamos National Laboratory, safety system component anchorages do not comply with the seismic Class I operability requirements contained in the Building PF-4 Final Safety Analysis Report.**

FINDINGS:

- The basement of Bldg. PF-4 has many items of unanchored equipment, storage cabinets, emergency response equipment cabinets, carts, storage drums and boxes, and tool carts.

- Bldg. PF-3 has numerous occupancy seismic hazards such as unanchored bookshelves, cabinets, and many pieces of equipment. The suspended ceiling does not have seismic restraints.

- Unanchored tall and heavy equipment presents a life safety hazard during an earthquake. In addition to the possibility of direct injury to personnel by unanchored objects, unanchored items can block egress from Bldgs. PF-3 and PF-4, cause emergency systems to become inoperable, or spill flammable or toxic materials.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.3-2) (H2/C1) **At Los Alamos National Laboratory, miscellaneous pieces of nonsafety class equipment are not anchored in accordance with seismic Class II and III Uniform Building Code requirements as required in the Building PF-4 Final Safety Analysis Report.**

FINDINGS:

- Pressurized tanks containing phosgene gas in Bldg. PF-3, room 117, are restrained with safety chains intended for larger cylinders. The chains are too high to provide effective restraint for seismic motion of the smaller phosgene tanks. Operators took corrective action to address this problem.

- Tanks containing hydrogen fluoride gas in Room 116, Bldg. PF-3, are anchored to gypsum board walls and not directly to a structural load resisting element. The gas cylinders are restrained only at their tops; no chain is present near the bottom of a tank to prevent it from slipping out and falling during seismic motion. Operators took corrective action to address this problem.

- Many tanks stored on the exterior of Bldgs. PF-3 and PF-4 are restrained only at the top by loose chains. Both upper and lower safety chains are required for seismic restraint of tanks.

- The safety consequences of falling tanks include the release of hazardous gases to the local environment, as well as the potential for a generated missile should the top valve fitting on a pressurized tank break off.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.3-3) (H1/C3) **Building PF-3 at Los Alamos National Laboratory has pressurized tanks containing hazardous gases that could release their contents to the environment during a design basis earthquake.**

NP.4 STRUCTURAL INTEGRITY

PERFORMANCE OBJECTIVE: Systems, components, and equipment and the structures to which they are attached have adequate structural integrity to resist the applicable loads due to natural phenomena hazards, to ensure worker life safety and confinement of hazardous materials.

FINDINGS:

- The air start tank for the auxiliary diesel generator in Bldg. PF-8 is suspended from the ceiling with no bracing in the lateral direction. The attached compressed airline spanning the compressed air supply header is a hard link with no flexibility.

- There is no check valve between the Bldg. PF-8 auxiliary diesel air start tank and the supply header. A failure of the pressure boundary integrity in the connecting line will cause loss of the air-start capability for the auxiliary diesel generator in Train B, as well as loss of compressed air.

- The piping support brace for the compressed airline feeding the accumulator tank in Bldg. PF-8 has a missing anchor bolt at its connection to the ceiling. Without this anchor bolt, the brace cannot perform its function of restraining displacement of the line.

- The thermal expansion roller support for the compressed air piping supply line above compressor No. 3 in Bldg. PF-8 is broken and the piping is misaligned. The support cannot perform its intended function in its current condition.

- The compressed air piping between the air compressors and the first pipe support upstream of the accumulator tank for all three compressors in Bldg. PF-8 has no bracing. The piping has fragile appurtenances attached, such as tubing with sweated joints.

- The out-of service, bypassed water separator on compressor No. 1 has a missing hold-down strap and is restrained against lateral motion only by the attached piping.

- Due to minimal seismic design attributes of the Bldg. PF-8 compressed air supply piping, coupled with damaged and missing hardware, excessive motion of the piping may lead to loss of pressure boundary integrity at fragile joints of the system.

- Failure of the Bldg. PF-8 compressed air supply piping would lead to loss of compressed air that is needed for automatic operation of ventilation system dampers.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **(TSA-1)** **(NP.4-1)** **(H2/C2)**

At Los Alamos National Laboratory, seismic Class 1 operative systems (such as the Building PF-8 compressed air supply system and the Building PF-8 auxiliary diesel air-start system) do not comply with safety factors specified in UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990, and are not consistent with standard industry seismic design practices.

FINDINGS:

- Bldg. SM-66, a high-hazard facility, is a 1954-vintage, nonductile movement resisting concrete frame structure with unreinforced masonry infilled walls. The interior of the building has tall unanchored masonry block walls.
- Many of the exterior panels of Bldg. SM-66 have upper courses infilled with fragile glass brick panels.
- The seismic provisions in the building code used to design Bldg. SM-66 were shown to be deficient in similarly designed buildings that have experienced seismic motion. The Uniform Building Code has since undergone significant changes.
- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-1)** **(NP.4-2)** **(H1/C2)**

Building SM-66, a high-hazard facility at Los Alamos National Laboratory, does not meet structural design guidelines for seismic loading as recommended in UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.

NP.5 OPERABILITY

PERFORMANCE OBJECTIVE: Operability issues for systems, components, and equipment have been adequately addressed with respect to the effects of natural phenomena hazards, to ensure worker life safety and confinement of hazardous materials.

FINDINGS:

- In the electroplating shop at Bldg. SM-66 drainage capacity of the overflow sumps for cyanide and acid solutions is exceeded during normal rinse tank dump operations. During seismic shaking, it is likely that both acid and cyanide solutions will spill from open tanks due to sloshing. Cyanide gas may be formed as a result.

- The drainage line from acid baths to the acid isolation sump is comprised of pyrex and is elevated above a cyanide salt storage room. Cyanide salts are stored in cardboard containers in unanchored cabinets. During seismic shaking, failed drainage lines could cause acid to spill on cyanide salts in the basement. Cyanide gas may be formed as a result. Operators took corrective action by removing the cyanide salts from that location.

- The ventilation system to exhaust possible toxic gases has no backup power supply.

- There is no method for detecting the presence of cyanide gas in Bldg. SM-66. Operators took corrective action by ordering a detection device.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.5-1) (H1/C2)

At Los Alamos National Laboratory containment of cyanide gas is not assured by appropriate safety factors for design at the recommended review-level earthquake for high-hazard facilities, or earthquakes of lesser magnitude as recommended by UCRL 15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.

FINDINGS:

- An uninterruptible power supply battery storage rack in the basement of Bldg. PF-4 has missing anchor bolts (14 of 20 bolts are missing.) The few remaining bolts do not have the capability to restrain the rack from seismic loads.

- The static bypass switch for the uninterruptible power supply system in the basement of Bldg. PF-4 is mounted on roller drawers and does not have a positive latching mechanism in order to hold the switch in place during seismic motion.

- Spring nuts that are used to anchor distribution panel UA (in the Bldg. PF-4 basement) to a light metal strut frame are not fully engaged as specified by the manufacturer.

- Auto transfer switches for the Bldg. PF-4 uninterruptible power supply system are anchored using small 1/4-inch anchor bolts. Such anchor bolts are unusual for seismically qualified equipment.

- Lead calcium power supply batteries for the uninterruptible power supply system in Bldg. PF-4 are 15 years old. Batteries more than 10 years old become brittle, and plates could short out during seismic motion.

- An uninterruptible power supply system is required after a seismic event because loss of offsite power is likely. The final SAR states that the uninterruptible power supply system is a seismic Class 1 system.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.5-2) (H2/C1) **Components of uninterruptible power supply system for Building PF-4 at Los Alamos National Laboratory do not comply with the seismic Class I operability requirements specified in the Building PF-4 Final Safety Analysis Report.**

NP.6 SEISMIC SYSTEMS INTERACTION

PERFORMANCE OBJECTIVE: Systems interaction during seismic shaking has been adequately addressed for each hazardous or essential facility, to ensure worker life safety, function of essential systems, and confinement of hazardous materials.

FINDINGS:

- The raised computer floor in the Operations Center for Bldg. PF-4 has missing and loose bolts in the lateral bracing that supports floor-mounted equipment. The floor bracing is lighter than that typical of seismic qualified raised-floor systems.
- The suspended ceiling in the Operations Center for Bldg. PF-4 exhibits many details that indicate lack of concern for seismic effects, including the following:
  - Ceiling grid framing is supported by means of light-gauge vertical tie wires attached to shotpins in the overhead concrete ceiling. Shotpins are nonexpanding anchors.
  - The lateral bracing of the suspension system lacks compression struts.
  - There is no bracing in the longitudinal direction.
  - There is no independent support for overhead lighting attached to the ceiling grid.
  - The ceiling system is attached to all four walls and does not allow for differential motion of the walls during seismic motion.
- In the Operations Center for Bldg. PF-4 the fire protection piping sprinkler heads are in close proximity to the ceiling tiles, with no gap at sprinkler nozzles to allow for seismic-induced motion. An impacted sprinkler head could result in water spray because the system is charged.
- There are unrestrained bookcases and printer stands in the Operations Center for Bldg. PF-4.
- Essentially all items of equipment in Bldg. PF-4, room 429, with the exception of gloveboxes, are unanchored. This includes tool chests, fluorescent lighting fixtures on top of gloveboxes, equipment storage cabinets, structural steel framework used to support plexiglass secondary shielding, and portable control consoles.
- One Zone 2 exhaust fan in the basement of Bldg. PF-4 has missing anchor bolts on the belt housing.

- Zone 2 exhaust fans in the basement of Bldg. PF-4 are adjacent to freestanding masonry block walls.
- Zone 1 exhaust filter rooms 4, 8, 42, and 43 in the basement of Bldg. PF-4 are housed in concrete block rooms.
- The Zone 1 supply dryer 871 bypass is on an unanchored skid, and other subcomponents are not tied to the skid. On one support structure, two of the four support legs were shifted off the skid.
- The glycol storage drums adjacent to the cooling water pumps for the air compressors in Bldg. PF-8 are not restrained.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.6-1) (H2/C2) **At Los Alamos National Laboratory, seismic interaction effects were not evaluated for all seismic Class I systems (as defined in the Building PF-4 Final Safety Analysis Report), including the Operations Center, the ventilation system, and the compressed air system.**

FINDINGS:

- Bldg. SM-66 is served by a 2-inch gas main that has disassembled piping supports outside of the building. Operators took corrective action to address this problem.
- The gas main in the basement of Bldg. SM-66 has no seismic restraint except for that provided by the fragile threaded connection branch lines.
- Furnaces that are served by the gasline in Bldg. SM-66 are massive and unanchored. The attached gasline lacks flexibility to accommodate seismic-induced sliding of the furnace.
- Breaks in the gasline serving Bldg. SM-66 could lead to a major fire.
- Bldg. SM-66 has no backup fire-fighting system. Water for fire protection is supplied from the city water system, which may not be available after an earthquake.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.6-2) (H1/C2) **The potential for seismic-induced fire was not evaluated for Los Alamos National Laboratory Bldg. SM-66.**

FINDINGS:

- Fuel oil day tanks that supply fuel to the diesel-driven fire pumps in Bldgs. PF-10 and PF-11 are unanchored. A reliable fuel supply is required for operation of the pumps.
- The TA-55 fire water tanks do not have anchorage detailing to resist seismic overturning forces. Anchorage is provided to resist shear forces only. Uplift forces will be generated in the tank walls during response to the safe shutdown earthquake.
- Fire protection sprinkler heads in the laboratory rooms in Bldg. PF-4 do not have clearance to allow for seismic motion where they penetrate the sheetrock suspended ceiling. Sprinkler heads are prone to impact during seismic shaking.
- Longitudinal bracing details on the fire protection piping in the basement of Bldg. PF-4 allow relative movement between piping and supports.
- The following concern was fully identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.6-3) (H1/C2)

Fire protection piping system and components for TA-55 at Los Alamos National Laboratory do not comply with safety factors for seismic loading in UCRL-15910 "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.

NP.7 SPECIAL ITEMS

PERFORMANCE OBJECTIVE: Special items should be identified by the site and resolved according to applicable site natural phenomena criteria, to ensure worker life safety and confinement of hazardous materials.

FINDINGS:

- Two facilities containing radioactive material, the Ice House (TA-41) and Omega West Reactor (TA-2), are sited below a cliff that is about 200 feet high, with large fractured boulders near the top.
- The Ice House rock catcher is designed to stop boulders up to about 6 feet in diameter, but not the large, approximately 20-foot diameter boulders on top of the cliff.
- The Ice House rock catcher safety cable/spring system was not completely repaired after apparent heavy loading by past rock slides. The cables are loose, rendering them ineffective, and a damaged structural plate anchoring member has not been replaced.
- The rock catcher for the Omega West Reactor lacks fencing to catch small boulders and does not appear to have sufficient energy absorption capacity for large boulders.
- There is not sufficient distance between the cliff walls and the TA-2 and TA-41 facilities to allow for large seismic-induced landslides/rockslides.
- A drainage pipe about 40 inches in diameter is located at the base of the drainage culvert behind the Ice House. The pipe opening is susceptible to obstruction by debris during heavy rainstorms.
- The following concern was identified in the Omega West Reactor self-assessment.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-1) (NP.7-1) (H1/C2) **At Los Alamos National Laboratory, TA-41 and TA-2 slope stabilities, drainage, and rock catchers do not have safety factors required by the natural phenomena hazard evaluation guidance of UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.**

4.5.2 Reactor, Critical Assembly, and Tritium Facilities

4.5.2.1 Organization and Administration

4.5.2.1.1 Overview

The Organization and Administration technical area of the Safety and Health (S&H) Subteam 2 appraisal at Los Alamos National Laboratory (LANL) was performed by interviewing various levels of management from the Laboratory Director to section leaders. Working-level personnel at the tritium and reactor facilities were also interviewed. Facilities were visited and the appraisal emergency exercise staged by S&H Subteam 2 was observed. Applicable documents were reviewed and interactions and discussions were held with other Subteam 2 members and with Subteam 1, 3, and 4 members performing the Organization and Administration part of the appraisal. All TSA performance objectives and criteria pertaining to organization and administration were addressed. Concerns are included for seven of the eight Performance Objectives. OA.4 Corporate Support is covered in the S&H Subteam 4 report.

LANL management style has delegated much authority and autonomy to lower levels of the organization. This management style certainly provides the research staff with the maximum latitude of activity so as not to stymie the creativity and ingenuity of those performing research. However, this same latitude is also extended to the production and operating levels of LANL. This management system has led to an informality of operations which is not consistent with the Secretary of Energy's new safety culture. A long history of successful operation of LANL has also led to complacency in compliance with the evolving safety and health Orders, requirements, and standards and, furthermore, did not encourage striving for safety excellence.

Recognizing these shortcomings, LANL management established an Environment, Safety and Health (ES&H) Coordination Center in March 1990. Many changes have and are continuing to occur. One good initial effort was to institute a process for developing a centralized hierarchial system of policies, plans, and procedures for ES&H and quality. Another large effort was the finalizing of a first effort self-assessment and the development of a plan to continue self-assessment as an ongoing effort. However, at the time of this appraisal, the plan has not been institutionalized and the mechanism has not been put in place to accomplish this continuing effort.

The LANL self-assessment recognized many problem areas. The self-assessment is a broad brush effort to identify large omissions and noncompliance with Orders and regulations. In some cases the self-assessment concern is so broad that it is difficult to determine what the action plan will cover. In general, the LANL self-assessment was a good first effort that identified many shortcomings. All of the Organization and Administration concerns in this appraisal were either fully or partially identified in the LANL self-assessment.

A major concern is noted regarding the lack of a hierarchy of documentation from top-level policies down to implementing procedures. A second major concern is related to the high percentage of concerns which are noncompliant with Department of Energy (DOE) Orders or mandatory regulations.

A lack of policy and guidance is noted regarding the content and frequency of holding safety meetings, setting safety goals, plotting performance indicators, establishing line safety programs, reporting occurrences and events, and controlling documents.

LANL management has instituted several measures as a first step toward instigating a new safety culture; however, no formal program exists to instill in management personnel and staff a unified effort to achieve safety excellence. Deficiencies noted in this area include safety goals not being measurable, auditable, challenging, and achievable; safety issues not being trended; few, if any, definitive safety responsibilities being written in position descriptions; the annual performance evaluation not being followed up to ensure safety accomplishment; and infrequently scheduled safety meetings, whose frequency is not based on workplace hazards.

Other concerns noted herein include the lack of assurance that all management and staff have been trained and informed of the Drug-Free Workplace Program and the Employee Assistance Program, as well as the lack of a random drug-testing program that applies to management personnel and staff who are in a position where they could significantly endanger life or significantly affect the environment or public safety and health.

In summary, LANL management has recognized the need for a cultural change, although much work is needed to effect this change.

4.5.2.1.2 Findings and Concerns

OA.1 SITE/FACILITY ORGANIZATION

PERFORMANCE OBJECTIVE: Management should organize and manage the site/facility's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

FINDINGS:

- No LANL requirement or policy has been established regarding the holding of safety meetings at the following facilities: (1) the tritium facilities, that is, the Weapons Engineering Tritium (WET) (Test) Facility, Ice House, Tritium Salt Facility, and Tritium Systems Test Assembly; and (2) the reactor facilities, that is, the Los Alamos Critical Experiments Facilities (LACEF) and Omega West Reactor (OWR).
- One individual stated that LANL management only "recommends" holding regular scheduled safety meetings. At another facility, the ES&H plan requires holding safety meetings at least twice per year.
- Safety meetings are being held at a frequency varying from weekly to quarterly. Some are regularly held and others irregularly held. One facility reported that group level safety meetings are usually held yearly.
- At some safety meetings, attendance is mandatory, while at others, attendance is only required if the person doesn't have something more important to do.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.1-1) (H2/C1) **No requirement or policy has been established at Los Alamos National Laboratory regarding the holding of regularly scheduled safety meetings, and the frequency of safety meetings is not dependent on the potential hazards associated with the operation of the tritium and reactor facilities as required by DOE 5480.19.**

FINDINGS:

- Neither internal nor external unusual event and occurrence reports are used in safety meetings to learn from past experience.
- Tritium event reports are sent to some management personnel and staff but are not discussed in safety meetings.
- Safety goals are not discussed and promoted at safety meetings.
- See Concerns TSA-2, OP.6-1; TSA-2, FR.6-1; and TSA-2, PP.4-2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.1-2) (H2/C1)

At the Los Alamos National Laboratory, safety meetings are not being used as a means of learning from past experiences or experiences of others nor as a means of instilling a unified effort to attain a higher level of safety excellence at the tritium and reactor facilities as required by DOE 5480.19.

OA.2 ADMINISTRATION

PERFORMANCE OBJECTIVE: Administration programs and controls should be in place to ensure policies concerning health and safety are administered throughout the facility.

FINDINGS:

- At the tritium and reactor facilities, line safety audit programs are not defined and institutionalized.
- LANL management has not provided a policy or guidance for performing line safety audit responsibilities.
- Most divisions, groups, and sections have some combination of safety officers, safety coordinators, and safety committees. However, many of those assigned to these positions have had no special training regarding what to look for during safety audits and appraisals. Not all safety committees have a charter defining responsibilities and authorities of committee members.
- Some safety committees perform quarterly audits, but have no followup mechanism other than the next audit for correcting noted deficiencies.
- It was reported that tracking is sometimes performed by an outside organization. However, tracking is not always being performed.
- Some division safety committees perform audits on a 1- to 2-year frequency, but no action plan is required to correct the noted deficiencies.
- Some staff members are assigned to make periodic line safety walkthrough inspections; however, very little guidance has been provided, such as frequency of inspections, training, or followup.
- See Concern TSA-2, RP.1-3.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.2-1) (H2/C1) **At the tritium and reactor facilities, the line safety programs as required by SEN-6C-91, "Departmental Organization and Management Arrangements," are not well defined and the Los Alamos National Laboratory has not provided guidance regarding what is expected.**

FINDINGS:

- LANL issued a self-assessment report entitled "Los Alamos National Laboratory ES&H Self-Assessment Report," dated August 1991.
- Many divisions, groups, and sections also issued self-assessment reports; however, in some cases these higher level organizational reports were simply a

summation of the findings and concerns of lower level organizations.

- In one case, it was reported that the last Technical Safety Appraisal (TSA) performed by Headquarters, DOE, was used as the self-assessment findings for that unit.

- LANL has issued a self-assessment plan; however, the program to perform continuing self-assessments is not currently in place.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.2-2) (H2/C1) **At the Los Alamos National Laboratory tritium and reactor facilities, a program has not been institutionalized so that self-assessments will be an ongoing, continuing effort as required by the Secretary of Energy Notices and letters.**

FINDINGS:

- The lack of LANL safety policies or inadequate safety policies are noted in the following Concerns: TSA-2, OA.1-1; TSA-2, OA.3-1; TSA-2, MA.3-1; TSA-2, TS.4-1; and TSA-2, RP.3-2; and in Sections 4.5.2.3.2, OP.1, and 4.5.2.3.2, OP.8.

- The lack of LANL safety programs and systems or inadequate safety programs are noted in the following Concerns: TSA-2, OA.1-2; TSA-2, OA.2-1; TSA-2, OP.4-3; TSA-2, OP.6-1; TSA-2, MA.4-1; TSA-2, MA.5-1; TSA-2, MA.6-1; TSA-2, MA.7-1; TSA-2, AX.2-1; TSA-2, AX.3-1; TSA-2, AX.5-1; TSA-2, EP.1-1; TSA-2, TS.1-1; TSA-2, TS.3-1; TSA-2, PT.2-1; TSA-2, PT.6-1; TSA-2, FR.6-1; TSA-2, FR.6-2; TSA-2, RP.1-4; TSA-2, RP.2-1; TSA-2, RP.3-1; TSA-2, RP.4-1; TSA-2, RP.6-2; TSA-2, RP.7-2; TSA-2, RP.9-1; TSA-2, RP.10-1; TSA-2, RP.12-1; TSA-2, PP.2-1; TSA-2, PP.3-1; TSA-2, PP.4-3; TSA-2, MS.1-1; TSA-2, MS.2-2; and TSA-2, MS.4-2.

- The lack of safety guidance is noted in the following Concerns: TSA-2, OA.2-1; TSA-2, OA.5-1; TSA-2, OA.7-1; TSA-2, QV.6-1; TSA-2, QV.7-1; TSA-2, TS.4-1; TSA-2, FR.5-1; TSA-2, RP.1-3; and TSA-2, RP.7-1 and in Sections 4.5.2.3.2, OP.8, and 4.5.2.9.2, PT.1.

- The lack of safety plans are noted in the following Concerns: TSA-2, QV.1-2; TSA-2, QV.1-3; TSA-2, OP.3-1; and TSA-2, TC.1-1 and in Sections 4.5.2.3.2, OP.2; 4.5.2.7.2, EP.2; and 4.5.2.17.2, MS.3.

- The lack of safety procedures or inadequate safety procedures are noted in the following Concerns: TSA-2, OA.2-2; TSA-2, QV.1-2; TSA-2, QV.1-3; TSA-2, QV.1-4; TSA-2, QV.2-1; TSA-2, QV.5-1; TSA-2, OP.3-1; TSA-2, OP.3-2; TSA-2, OP.3-3; TSA-2, MA.2-3; TSA-2, MA.2-4; TSA-2, MA.3-1; TSA-2, MA.8-1; TSA-2, RP.8-3; TSA-2,

RP.8-4; TSA-2, MS.2-1; TSA-2, MS.2-2; and in Sections 4.5.2.3.2, OP.2; 4.5.2.7.2, EP.2; 4.5.2.9.2, PT.3; 4.5.2.9.2, PT.6; and 4.5.2.11.2, EA.2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.2-3) (H1/C1) **The Los Alamos National Laboratory does not have a hierarchy of documentation to provide the policies, programs, plans, procedures, and guidance needed at the tritium and reactor facilities to ensure consistent safety programs that meet the various Department of Energy Orders and requirements.**

OA.3 MANAGEMENT OBJECTIVES

PERFORMANCE OBJECTIVE: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

FINDINGS:

- Formal LANL goals include such objectives as "as low as reasonably achievable" (ALARA), having a drug-free workplace, and conducting operations safely.
- The tritium and reactor facilities reviewed have very few measurable, challenging, achievable, and auditable safety goals.
- At the WET Facility and the Ice House, personnel indicated that an action plan has been written to develop safety goals for 1992.
- Current group safety goals include making LANL a safe, accident-free place to work.
- Tritium Systems Test Assembly personnel stated that their goal is to limit tritium stack releases to 200 curies per year. Average releases for the past 7 years have been only 20 curies per year.
- The Tritium Salt Facility is currently releasing 350 to 400 curies of tritium per year, but it has no limiting goals.
- The Weapons Engineering Tritium (Test) Facility has a 400 curies-per-year tritium stack release limit, which is stated as a goal in the final safety analysis report (SAR).
- At one facility, it was reported that accidental tritium releases were buried in the normal release data.
- See Section 4.5.2.3.2, OP.1, and Concern TSA-2, PP.1-1.

CONCERN: **See Concern TSA-4, OA.3-1.**

FINDINGS:

- Of the 193 concerns in this S&H Subteam 2 report, 145 (75%) were judged to be compliance Level 1 (in other words, noncompliance with a DOE Order or mandatory requirement).
- A high percentage of these noncompliance concerns are because of a lack of a hierarchy of documentation (in other words, the lack of policies, procedures, plans, programs, and guidance regarding the implementation of DOE Orders and mandatory requirements).

- LANL management has focused its attention on production and research rather than on adherence to DOE Orders and mandatory requirements.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.3-1) (H1/C1) **Los Alamos National Laboratory management has not pursued safety excellence at the tritium and reactor facilities, which far exceeds mere compliance, as required by Secretary of Energy Notices and letters.**

OA.5 MANAGEMENT ASSESSMENT

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

FINDINGS:

- At the tritium and reactor facilities the reporting of occurrences and events is not uniform.
- At some facilities all incidents are reported to the Emergency Management Office, where the determination is made regarding reportability to DOE. At other facilities the group leader makes the determination regarding reportability to DOE, and only those occurrences or events that are determined to be reportable to DOE are reported to the Emergency Management Office.
- At the tritium facilities, management personnel stated that the reporting criteria in DOE 5000.3A are not clear since they believe that the criteria are not written for tritium facilities. Additional guidance has not been developed or provided regarding reportability of occurrences or events in tritium facilities.
- Tritium event reports are distributed to some management personnel and staff, but not to all. Event reports are not discussed in meetings.
- Reactor personnel reported that they do not receive occurrence and event reports from other DOE reactors to review for applicability to their facilities.
- See Concerns TSA-2, OP.2-3; TSA-2, OP.6-1; TSA-2, FR.6-1; and TSA-2, RP.1-4.

CONCERN: **See Concern TSA-3, OA.2-2.**

FINDINGS:

- Management personnel reported that LANL is in compliance with a SEN-29-91, "Performance Indicators and Trending Program For Department of Energy Operations," pilot program regarding the submittal of performance indicators and trending program information. However, this information is being submitted by the Laboratory Assessment Office from information normally submitted to management.
- Personnel in the facilities participating in the SEN-29-91 pilot reporting program do not get copies of the tracking and trending plots being sent to Headquarters, DOE.
- Very little tracking and plotting is being performed at the group or section level.

- See Section 4.5.2.3.2, OP.1, and Concerns TSA-2, TC.1-2; TSA-2, FR.6-2; and TSA-2, PP.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.5-1) (H3/C1)

At Los Alamos National Laboratory, operational data which reflects facility performance is not analyzed and trended as a means of improving the safety and performance of the tritium and reactor facilities as required by DOE 5480.19.

OA.6 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

FINDINGS:

- At the tritium and reactor facilities, management personnel and staff consider the elements of their annual performance evaluation to be part of their position description.
- Some management personnel and staff who have specific safety assignments may have safety as a specific, explicit element in their annual performance evaluation. However, for most management and staff, safety is implied or stated in very general terms in the annual performance evaluation.
- Some management personnel and staff stated that procedures and other working documents assign responsibility for safety.
- Not all annual performance evaluations are performed annually, some were reported to be many months behind.
- See Concerns TSA-2, TS.1-2, and TSA-2, RP.1-3.

CONCERN: **See Concern TSA-4, OA.6-1.**

FINDINGS:

- The name of the building manager is usually posted near the entrance to tritium and reactor facilities. A callout list usually includes the building manager and some alternates to notify when there is a problem in the facility. However, when the responsibility for space within a building is subdivided below the building manager level, the name of the responsible individual is not always posted near the assigned area.
- The safety authorities and responsibilities of building and area managers are not always defined in writing nor formally delegated and assigned.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.6-1) (H2/C2) **At Los Alamos National Laboratory, it is not always clear who is responsible for an area in the tritium and reactor facilities, and responsible individuals do not always understand the extent of their safety authorities and responsibilities pertaining to building or area management.**

OA.7 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support site/facility operations.

FINDINGS:

- LANL management has not provided definitive guidance to personnel at tritium or reactor facilities regarding document control; however, LANL Director's Policy No. 115 (DP No. 115), "Records Management and Document Control," was issued September 16, 1991.
- When criteria are developed for controlling documents and identifying what documents need to be controlled, it is at the group organization level.
- A specific document may have both controlled and uncontrolled copies in circulation. In some cases only a small number of copies (4 to 6) are controlled and kept up to date, although many uncontrolled copies are in circulation with no assurance of their accuracy.
- Currently, at one tritium facility the operational safety requirements (OSRs), standard operating procedures, operating instructions, and group quality assurance (QA) plans are not controlled, but it was reported that there are plans to have them controlled in the future.
- At one facility, operating aids are managed by informal supervisory control.
- In at least one facility, uncontrolled copies of controlled procedures are posted in the working areas, and it is a management responsibility to periodically check to assure that the operating procedures are the current revisions.
- In some cases when new procedures are issued, a new index does not accompany the issuance; therefore, it is not always easy to determine at a glance the latest issuance of a procedure.
- Some operating procedures are reviewed annually, but if there is no change to the procedure, there is no indication, such as date change, to inform the user that the procedure was reviewed.
- See Concern TSA-2, OP.3-3.

CONCERN: **See Concern TSA-4, OA.7-1.**

OA.8 FITNESS FOR DUTY

PERFORMANCE OBJECTIVE: The Fitness for Duty Program should be capable of identifying persons who are unfit for their assigned duties as a result of drug or alcohol use or other physical or psychological conditions and should provide procedures to remove them from such duty and from access to vital areas of the site or facility pending rehabilitation or remedial actions.

FINDINGS:

- LANL initiated a drug-free workplace program in January 1990.
- Approximately 400 protective force security personnel have been subject to random drug testing for nearly 5 years.
- Drug testing for about 45 LANL employees who assemble and test nuclear test devices was begun in September 1991.
- LANL management plans to include approximately 700 additional employees and subcontractors in a random drug-testing program to begin about March 1992.
- This expanded random drug-testing group will include tritium facility workers and operations and management personnel at the LACEF. However, current documented plans do not include management personnel and operators at the Omega West Reactor.
- The extent of the expanded random drug-testing program has not currently been agreed upon by DOE, LANL, and the University of California.
- It was reported that LANL management was told by the Albuquerque Field Office (AL) to reduce the number of participants in the random drug-testing program from an initial proposal of about 3000 to the currently proposed total of not quite 700.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.8-1) (H2/C2)

The random drug-testing program at Los Alamos National Laboratory does not include all those employees who are in a position where they could significantly endanger life or significantly affect the environment or public health and safety, including the management and staff at the Omega West Reactor.

FINDINGS:

- An information-training program was begun in 1990 to inform management about the drug-free workplace. Management personnel were then required to provide this training to their employees.

- Not all management personnel have received training regarding the drug-free workplace and the Employee Assistance Program.

- Several employees interviewed have received no training regarding a drug-free workplace or the Employee Assistance Program. Some have received a pamphlet to read, and most were aware that there is an Employee Assistance Program.

- A new training program for management personnel in the expanded random drug-testing program was started in September 1991. Again, management personnel are required to train their employees.

- Training to ensure effective implementation of a fitness-for-duty program is not complete at TA-55. (See Section 4.5.1.1.2, OA.8.)

- Training has not been completed for all supervisory personnel in the identification and handling of employees suspected of substance abuse. There is no documented requirement for such training to ensure that it will be performed on a continuing basis in the future. (See Section 4.5.4.1.2, OA.8.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OA.8-2) (H2/C2) **Not all management personnel and staff at Los Alamos National Laboratory have received training on the drug-free workplace and Employee Assistance Program, and there is no documented requirement that such training will continue to ensure periodic refresher training.**

4.5.2.2 Quality Verification

4.5.2.2.1 Overview

The scope of the Quality Verification appraisal included all seven performance objectives. The appraisal was conducted by interviews with LANL technical staff, quality assurance representatives, and Quality Operations Office personnel, and the review of pertinent documents which included QA programs, implementing procedures, and quality records. The sites and facilities appraised were TA-18, LACEF; TA-2, OWR; TA-21, Tritium Systems Test Assembly and Tritium Salt Facility; TA-16, Weapons Engineering Tritium (Test) Facility; and TA-41, Ice House.

The Quality Operations Office has sitewide responsibility for oversight activities that include audits, surveillances, and appraisals. However, the Quality Operations Office cannot perform an audit unless it is requested and funded by the organization to be audited. The Quality Operations Office reports to the Associate Director of Operations, which is not a high enough level. Consequently, independent quality review or audits are not routinely performed to verify compliance to DOE Orders and to ensure effective implementation of the quality program.

No documentation has been found to indicate that the DOE Los Alamos Area Office (LAAO) is ensuring the adequacy of the quality program by performing independent assessments of the reactors, critical experiments, and tritium facilities. Further, there is no indication of any LAAO involvement at the LANL or group level. None of the QA plans for the tritium and reactor facilities nor the LANL quality manual are reviewed or approved by DOE as required by DOE 5700.6C. Several specific quality concerns have been identified at the tritium and reactor facilities. No review or audit program exists to assess line implementation on a regular basis. No nonconformance and corrective action program exists to identify and correct defects. The material and item procurement and control system is not implemented and does not preclude the use of inappropriate items. LANL management has not demonstrated a commitment to ensure compliance to quality programs. QA plans are not effectively implemented since personnel from line through senior management do not understand their responsibility to attain and verify quality.

Most of the concerns developed in this appraisal were identified in the LANL self-assessment report, which covered all seven of the Quality Verification performance objectives. The self-assessment appears to have been conducted by individuals with expertise and knowledge.

The status of DOE 5700.6 at the time of this assessment made for a unique situation regarding hazard/compliance categorization. Because DOE 5700.6B has been revoked and DOE 5700.6C will not be implemented until February 1992, C1 ratings have been assigned only for those deficiencies that do not meet the requirements of either Order. For noncompliance to DOE 5700.6C, only a C2 rating has been assigned.

In summary, QA plans for tritium and reactor facilities are not being reviewed and modified so that they can be applied in a consistent manner throughout LANL. Management support has not been evident for resources for implementing QA plans. A cultural change is occurring, but considerable work remains to be done before the QA program can be fully implemented.

4.5.2.2.2 Findings and Concerns

QV.1 QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning quality are administered for each facility throughout the site.

FINDINGS:

- The Ice House QA plan is in draft form. The tritium and reactor facilities have developed QA plans approved by the group leaders. None of the QA plans have been reviewed and approved by DOE as required by DOE 5700.6B and DOE 5700.6C.
- There is no documentation available indicating that LAAO has been ensuring the adequacy of quality programs by performing independent assessments.

CONCERN: **See Concern TSA-4, QV.1-4.**

FINDINGS:

- The sitewide QA plan does not provide common direction for the implementation of QA plans. A draft LANL QA manual has been issued, but it has not been approved or implemented.
- QA plans that have been developed either do not have implementing procedures developed or the procedures are in draft.
- The implementation of the quality program plans varies across the facilities from being partly implemented to not implemented at all.
- Independent quality reviews or audits are not being routinely performed to ensure adequate oversight of the QA program.
- There are no documents that define QA records; therefore, the QA records are not being handled, stored, and protected as required by ASME NQA-1-1989.
- See Concerns TSA-2, MS.4-2; TSA-2, PT.3-1; and TSA-2, PT.11-1.

CONCERN: **See Concerns TSA-4, QV.1-1, and TSA-4, QV.1-2.**

FINDINGS:

- Group QA plans do not clearly assign responsibilities for each element of the plan.
- No method or direction has been developed on how to implement a QA plan.
- The following concern was identified in the LANL self-assessment.

CONCERN: **Quality assurance plans for tritium and reactor facilities at Los Alamos National Laboratory do not identify a mechanism to implement the plans or to assign implementing responsibility as required by ASME NQA-1-1989, Section 2.**
(TSA-2)
(QV.1-1)
(H3/C1)

FINDINGS:

- No nonconformance program has been implemented that would prevent the use of defective items.
- Evaluations of the impact on an item inspected or tested using equipment that is subsequently found to be out-of-tolerance are not being documented. Nonconformance reports are not being generated.
- See Concern TSA-4, MA.6-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: **Identification and control procedures for nonconformance items and processes are not in place at the Los Alamos National Laboratory tritium and reactor facilities as required by ASME NQA-1-1989, Section 16.**
(TSA-2)
(QV.1-2)
(H3/C1)

QV.2 PROCUREMENT AND SUPPLIER CONTROL

PERFORMANCE OBJECTIVE: Provisions should be established for the control of purchased material, equipment, and services; for selection and control of suppliers; and for assessment of procurement activities.

FINDINGS:

- The groups procure items using the Materials Management Division. Neither the Materials Management Division nor the group has a list of approved suppliers meeting the quality assurance requirements.
- Surveys are not performed to ensure that vendors have QA programs that meet group requirements.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (QV.2-1) (H3/C1) **The tritium and reactor facilities groups have not demonstrated procurement control over vendors which supply material, equipment, and services to Los Alamos National Laboratory as required by ASME NQA-1-1989, Section 4.2.**

QV.3 RECEIVING AND PRE-INSTALLATION INSPECTIONS

PERFORMANCE OBJECTIVE: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

FINDINGS:

- Only LACEF has a receiving inspection procedure. The LACEF procedure is not fully implemented.
- Most items are checked to see if there was shipping damage and to see if the proper number of parts were received.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (QV.3-1) (H3/C1) **The tritium and reactor facilities organizations at Los Alamos National Laboratory do not have documented evidence of conformance to technical requirements available before items are installed or used as required by ASME NQA-1-1989, Section 10.**

QV.4 CALIBRATION PROGRAM

PERFORMANCE OBJECTIVE: Provisions should be made to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- No effort is being made to evaluate the effect of using out-of-tolerance equipment to inspect or test other items.
- Equipment that is contaminated or in a contaminated area does not receive calibration update because LANL does not have a facility to calibrate contaminated equipment.
- See Concern TSA-2, MA.3-1, and Section 4.5.2.11.2, EA.4.

CONCERN: **See Concern TSA-4, QV.4-1.**

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

PERFORMANCE OBJECTIVE: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

FINDINGS:

- Identification and control procedures for hardware and materials are nonexistent.
- No controls are established to maintain either identification on the items or on the documents traceable to the item in a manner which ensures that the identification of items is established and maintained.
- See Section 4.5.2.4.2, MA.3 and Concern TSA-4, MA.3-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (QV.5-1) (H3/C1) **Items are not identified and controlled within the tritium and reactor facilities at Los Alamos National Laboratory to preclude the use of an item when its shelf life or operating life has expired or to preclude the use of an incorrect item as required by ASME NQA-1-1989, Section 14.**

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- Critical and noncritical items of equipment are not defined or identified.
- No clear direction has been given as to whether groups should or should not perform inspections on critical items.
- In some groups inspections on noncritical items are performed by personnel who are not qualified or certified.
- See Concerns TSA-2, PT.4-2, and TSA-2, RP.9-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (QV.6-1) (H3/C1) **Inspections are not being performed by qualified or certified personnel at the Los Alamos National Laboratory tritium and reactor facilities as required by ASME NQA-1-1989, Section 2.**

QV.7 CONTROL OF SPECIAL PROCESSES

PERFORMANCE OBJECTIVE: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, non-destructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

FINDINGS:

- No clear directions have been given to specify which individuals can perform welding.
- Some groups do their own welding or brazing using personnel who are not qualified or certified.
- See Section 4.5.2.4.2, MA.2.
- The following concern was identified by the LANL self-assessment.

CONCERN: (TSA-2) (QV.7-1) (H3/C1) **Welding or brazing at the Los Alamos National Laboratory tritium and reactor facilities is not being performed by qualified or certified personnel or with qualified procedures and equipment as required by ASME NQA-1-1989, Section 9.**

4.5.2.3 Operations

4.5.2.3.1 Overview

Reactors and Critical Facilities

The LANL facilities reviewed were the OWR (an 8-megawatt water-cooled research reactor facility) and LACEF, two widely separated facilities operated by two different organizations. LACEF contains three Kivas, buildings which house two or more criticality experimental assemblies in various stages of readiness for operation. Altogether there are 10 of these assemblies. They are known as the Big Ten, the Compact Nuclear Power System/Mars, Comet, Flattop, Godiva IV, Honeycomb, Planet, Sheba, Skua, and Venus. Godiva IV and Skua are fast-burst experiments. Sheba is a liquid, steady-state, and burst experiment. The remainder of the experimental devices are dry, low-power devices. In all, an extremely wide variety of experiments are possible. All of the experimental critical devices as well as OWR are classified by DOE as Class B reactors. All performance objectives in the Operations areas were reviewed, with the exception of OP.7 Shift Turnover. No shift operations take place at the LANL reactors.

The appraisal included reviewing the organization charts of the LANL, the manuals which contained the safety policy of LANL, SARs, the technical specifications for OWR and LACEF, and operating procedures (or experimental plans). Discussions and interviews were held with the line management at each facility as well as with the operators and crew members who do the hands-on operations. The assembly of the Flattop critical experiment core was observed and also its prestartup check, startup, operation, and shutdown. Similarly, a prestartup check of OWR, its approach to critical, and its steady-state operation were observed.

The appraisal performance objectives and criteria and the requirements of DOE Orders, especially DOE 5480.19, were compared to the operation of the facilities and associated documentation. The procedure consisted of a detailed briefing by the facility manager or his assistant, a detailed tour of the facility conducted by the facility manager or members of the operating or experimental staff, observations of operations, review of logbooks and procedures, and "digging" into records to follow lines of investigation when necessary.

OWR, with the exceptions cited in four concerns, is operated within the letter and intent of DOE 5840.19 for a Category B reactor. The area found to be most inconsistent with DOE 5480.19 is the lockout and tagout system. This requirement is in the process of being implemented sitewide. Concerns were also identified in the performance objective areas of facility status controls and operator stations and equipment.

The 10 critical experiments do not have individual SARs or separate technical specifications. One SAR in broad and general terms covers all experiments, and one technical specifications document provides broad and general requirements to cover all experiments which might possibly be done in the facility. Both the SAR and the technical specifications are deficient and outdated.

LACEF is operated by a group of scientists who essentially do all of the "hands on" work associated with the critical experiments. Historically, this community has operated somewhat at arms length from the remainder of the U.S. reactor community and has enjoyed a certain freedom of action that is largely unhindered by the formality and discipline which is so much a part of other reactors.

The management structure at both facilities, OWR and LACEF, is well documented and understood. Both facilities are operated with a small staff, making communication lines short. The interfaces with supporting groups, principally Johnson Controls World Services, Inc. (JCI), which performs the heavier maintenance activities on contract, are not a problem. The staff at OWR is sufficient to operate five 8-hour shifts per week. The staff at LACEF is sufficient for the work envisioned at present, although plans have not been developed for all experimental assemblies and some crew members are not fully qualified to operate all experiments. This is not a problem at present. Duties of the crew members who do the "hands on" work are defined. Knowledge possessed by the operating crew at OWR and the crew members at LACEF is exceptional.

A commendable action was observed at LACEF when an alert crew chief ordered an experimental operation shut down because a distraction was being created by the presence of a wasp in the control room.

At LACEF, the conduct of operations objective is not achieved. Much of the problem is associated with the attempt to have the technical specifications open enough to apply to any experiment that might be conceived for the facility. This openness is maintained in the experimental plan which is specific to an experimental device. An opportunity to improve formality exists in making the experimental plan more specific. Logbooks also demonstrate informality. The emphasis on technical specifications is far less rigorous than desired by DOE. Crew members are alert and attentive to the experimental device but are not sensitive to maintenance items. Root cause analysis is not conducted after a forced shutdown if it can be ascertained on the spot that no reactor safety problem exists. The use of unqualified crew members to support operations is carefully controlled.

The performance objective for operating procedures and documentation is not achieved at LACEF. The standard operating procedure for preparing experimental plans does not provide the needed formality. Lack of appropriate technical specifications is also a problem in achieving this objective. The concerns in this area suggest the need for many improvements.

In the area of facility status controls, both OWR and LACEF have compliance problems. OWR can adjust readily, but LACEF will be starting from the beginning in several areas, such as lock and tag, configuration control of device maintenance activities, control of facility modification activities, and device end-of-life issues (cracked rings). The Flattop assembly shows evidence of some chronic age-related problems, which are well known to facility personnel.

Operating stations and equipment are inadequate at OWR. The possibility of falling from basin ledge exists; the need for a certified shipping cask is obvious and has been identified.

Several findings concerning human factors were reported with regard to the control rooms in LACEF. Individually, these may not be of serious safety concern, but their presence has been the cause of inadvertent experimental interruptions.

The LANL ES&H self-assessment discusses broad findings in the areas of Operations, but they were so general that they did not specifically relate to the problems at LACEF. No self-assessment was performed for OWR, and management used the most recently conducted TSA in its place.

OWR management is making notable progress in achieving formality in the conduct of operations. The improvements possible at LACEF are considerable. Among the improvements requiring special attention are the evaluation of the cracked fuel ring in Godiva IV and the lack of formality associated with the verification of technical specifications; both are subjects of Category II concerns.

Tritium Facilities

In the appraisal of tritium areas at LANL, six of the eight performance objectives were addressed. OP.2 Conduct of Operations and OP.7 Shift Turnover could not be completely evaluated because no work was being performed in any of the tritium areas during this appraisal. Information was obtained through site visits; interviews with various levels (technicians through group leaders) of LANL employees; and by review of procedures, records, and reports regarding work and safety performance. The facilities appraised included the following: TA-3 Bldg. 16 (Ion Beam Facility), TA-16 Bldg. 205 (Weapons Engineering Tritium (Test) Facility), TA-21 Bldgs. 152, 209 (Tritium Salt Facility) and Bldg. 155 (Tritium Systems Test Assembly), TA-33 Bldg. 86 (High Pressure Tritium Laboratory), TA-35 Bldgs. 34 (Beta Decay Experiment) and 213 (Target Fabrication Facility), and TA-41 Bldg. 4 (Ice House).

LANL tritium-handling areas are staffed with knowledgeable and dedicated people. Staff turnover is low in most areas, which has resulted in a high-experience factor in those locations. This high level of technical expertise and creativity among staff members has had a negative effect regarding acceptance to new DOE Orders, and the laissez-faire attitude of management toward the independence of experimenters has not aided this acceptance. The commitment of upper level management to the new DOE culture is beginning to reach down to the lower levels, and these lower level people feel that the new policies will provide a safer place in which to work.

The facilities vary from old plants awaiting decommissioning (TA-33 Bldg. 86) to those that are not yet operational (TA-16 Bldg. 205). Facility housekeeping and orderliness appear directly related to age; the older the building, the worse the housekeeping. A review of the accident and exposure frequencies in the various tritium areas shows that the number of incidents is decreasing, but this is probably because the work in some areas is decreasing.

Throughout the various organizations, there are no doubts as to who is in charge and what steps are to be taken should a safety concern arise. There are findings regarding the absence of discrete and measurable goals and performance indicators used during the annual employee performance appraisals.

Although tritium operations were not being performed during the S&H Subteam visit, logbooks in control rooms and in laboratories were reviewed. All are dated, but some do not have operator signatures. Two technicians performed a simulated run at the Tritium Systems Test Assembly; the operators exhibited good knowledge of the procedure and how to perform it. Continued operations without a plan approved by management in TA-33 Bldg. 86 after its shutdown in October 1990 resulted in a Category II concern.

The quality and thoroughness of operating procedures vary from being very good (a noteworthy practice was generated regarding color print highlighting of safety- and quality- related steps) to being too vague to perform the work effectively in a defined manner (which led to a concern). Also, there is lack of formality and configuration control of procedures. Improper recordkeeping was noted in TA-33 Bldg. 86.

Building or facility managers are designated for the tritium facilities at LANL. The status of the buildings operating systems are known by those persons. Findings arose because the sitewide lockout and tagout system has not been implemented; building managers are left on their own to implement this control practice.

Tritium facilities vary from the not-yet-used to those awaiting decommissioning. The equipment slated for continued use was of a physical condition appropriate to support safe operations. However, poor housekeeping in some areas and an unawareness of equipment type which could better support safe work led to two concerns. Another concern was generated regarding lack of attention to TA-33 Bldg. 86, in which (programmatic) tritium operations have been suspended.

Operators are knowledgeable as to how and what is to be performed. There is a lack of safety- and work-related information disseminated to the workers. The activation of the Tritium Operations Working Group by the two major tritium-handling organizations is commendable because it has filled a gap that existed in information dissemination, but the group has not been in operation long enough to realize its full potential.

Although most controls and indicators are labeled and obvious, there is no sitewide policy for consistency in alarms, indicators, and the like. Some of the research areas are cramped and awkwardly laid out because of changing experimental needs, but no patently unsafe conditions due to crowding were in evidence.

A noteworthy practice was identified by the S&H Subteam regarding the "Operating Instructions for the D2-DT-T2 Gas Handling System No. 1" with warnings or other highlights to the operator printed in colored ink. Green signifies a step that must be addressed in order to satisfy quality requisition, red indicates that the step is critical to safety, and blue denotes safe or final condition. Also, the text in the operations instructions and the sign in the laboratory are printed in the same color.

The LANL self-assessment partially or completely addressed the concerns regarding tritium operations expressed in this report, with the exception of the TA-33 Bldg. 86 problem. Departmental self-assessments varied, but most were forthright in their conclusions regarding shortcomings, defining causes, and providing corrective courses to remedy the situations. The group self-

assessments were subsets of the departmental documents and had more detail but agreed with conditions noted during this appraisal. The LAAO self-assessment was not applicable to the operations performance objectives.

Overall, tritium operations at LANL are slowly changing from an atmosphere of academic freedom to one in which formality and structure are emphasized. Formality of operations, control of documentation, adherence to requirements, and performing according to DOE Orders are areas where improvements are needed and being addressed. The technical staff in tritium areas are knowledgeable in their disciplines, but cases exist where employees do not respect the hazards of their work with this material. Most tritium operations employees welcome the enhanced protocol that is now being instituted and believe that it will make for a safer and healthier workplace.

4.5.2.3.2 Findings and Concerns

OP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Operations organization and administration should ensure effective implementation and control of operations activities.

Tritium Facilities

FINDINGS:

- Discrete and measurable goals and performance indicators are not used at LANL.
- No sitewide policy associates safety-related performance with employee rewards.
- See Section 4.5.2.1.2, OA.2.

CONCERN: **See Concerns TSA-4, OA.3-1, and TSA-2, OA.5-1.**

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

Reactors and Critical Facilities

FINDINGS:

- The technical specifications for LACEF call for many surveillance items to be entered into the logbook. The logbook does not specify which entries apply to technical specifications.
- The technical specification requirements are not specific since they are meant to be broad enough to apply to all experiments which might be done in the entire facility (now 10 experimental devices).
- The experimental plans which are, in effect, the operating procedures for each device do not discuss which items are technical specifications, nor do they give a specific procedure for their measurement.
- The entry of July 7, 1991, in the Flattops logbook omits the checkmark in the space in which one of the surveillance verifications should have been noted.
- The master checklist (a memorandum from R. E. Anderson, dated August 8, 1990) by which an experiment is verified prior to start does not indicate which checklist items are related to technical specification compliance.
- Compliance with technical specifications is not auditable.
- No system is in place at LACEF to ensure compliance with all technical specifications.
- See Concern TSA-2, TS.2-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **Technical specification compliance for Los Alamos Critical Experiments Facility at Los Alamos National Laboratory cannot be demonstrated.**
(TSA-2)
(OP.2-1)
(H1/C1)
CAT. II

FINDINGS:

- Narrative entries in the LACEF experiment logbooks are not sufficient to tell when the approach to critical was begun, when the reaction became supercritical, or when it was shut down. Not enough narrative entries are made to ensure that maintenance items or difficulties are reported in the log.

- Entries are not always timed and are of little value in the reconstruction of an event; for example, the times for moving fuel components to and from the vault have not been entered.

- The addition of gas to an accumulator because of a slow leak was not entered in the logbook. The pressure of this accumulator is monitored by an instrument in the safety circuit (Kiva II, Flattop).

- There are no in-hand, one-time-use, initial-in-the-box, and time logsheets used to augment the information gathered on an experimental run.

- On the LANL instruction glued to the inside cover of logbooks, item No. 5, which requires the signature of a witness, has not been consistently implemented.

CONCERN: **See Concern TSA-4, OP.4-1.**

FINDINGS:

- At LACEF, the Flattop was inadvertently shut down because of the rapid operation of a rod control switch. This was not subject to an occurrence report because it was not a reactor safety problem. Technical specifications require that unusual occurrences be reported only in the event of a reactor safety matter.

- As reported in an entry dated April 23, 1991, on May 1st the Flattop experiment was found in a condition which allowed a control rod to be moved (along with the reflector blocks) off its "out" limit position. This condition was found during a maintenance test of the unloaded facility. This was treated as an unreportable condition for the reason stated in the above finding.

- The more stringent reporting requirements of DOE 5000.3A take precedence over an outdated technical specification.

- See Concerns TSA-4, RP.2-2; and TSA-3, OA.2-2.

- The following concern was not identified in the LANL self-assessment.

CONCERN: **(TSA-2)** **(OP.2-2)** **(H2/C1)** **Occurrence and incident reporting is not implemented for Los Alamos Critical Experiments Facility at Los Alamos National Laboratory as required by DOE 5000.3A.**

Tritium Facilities

FINDINGS:

- TA-33 Bldg. 86 was reported to be "nonoperational." Visits to that facility indicated that tritium has been moved in spite of the understanding that the facility was nonoperational.

- Three AL personnel acquainted with the facility indicated that they believed that no valve turning or gas movement in the tritium system was to be done. However, cognizant LAAO staff had the same understanding as LANL personnel and realized that some operations had to be performed to maintain the safety of the facility and to allow for an orderly recovery and cleanup of the tritium.

- Regarding the shutdown of TA-33 Bldg. 86 on October 25, 1990, Occurrence Report ALO-LA-LANL-LANL-1990-0150 is mixed in its description of what has and will happen, for example:

  - DESCRIPTION OF OCCURRENCE: "Suspension of (programmatic) tritium operations as an independent initiative" (paragraph 15).

  - IMMEDIATE ACTIONS TAKEN AND RESULTS: "Operations suspended" (paragraph 18).

  - DESCRIPTION OF CAUSE: "The basic cause for the laboratory to shutdown programmatic tritium operations at TA-33-86 and to proceed with a orderly recovery and clean up of the tritium at the facility is one of determining that it was no longer in the best interest of the University of California to continue to operate the old facility while awaiting DOE approval to start up the replacement facility (Weapons Engineering Tritium (Test) Facility" (paragraph 22).

  - EVALUATION: "The Laboratory's decision to suspend programmatic tritium operations at TA-33-86 is consistent with the University's and DOE's current philosophy on conduct of operations" (paragraph 23).

- According to statements by representatives of the Weapons Subsystems Group, personnel at the group level have not always had an opportunity to review the initial notification of occurrence reports prior to their issuance. However, there are two later versions (10-day and final reports) to which technical clarification could be made by group-level personnel.

- Two procedures of undefined risk are essential to maintain or enhance building safety. These were known before the final issuance of the TA-33 Bldg. 86 Occurrence Report but were not specifically identified.

- No plan has been approved by LANL and DOE for the cleanup of the TA-33 Bldg. 86 tritium facility. Neither LAAO nor AL has been party to the planning effort.

- On December 13, 1990, an accountability operation, a transfer to separate two programmatic lots of tritium,

was performed. No authorization for this operation was produced by LANL personnel.

- According to the Weapon Subsystems Group Leader, valve manipulation and gas (mainly helium-3) transfer work is being performed under a special work permit approved by the Weapons Subsystem Group and the Safety and Risk Assessment Group to relieve pressure on cryotraps. LAAO considers this operation to be part of the orderly recovery and cleanup activities.

- See Sections 4.5.2.6.2, AX.1; 4.5.2.6.2, AX.2; 4.5.2.4.2, MA.5; 4.5.2.4.2, MA.8; and 4.5.2.13.2, RP.9.

- See Concerns TSA-2, EA.2-2; TSA-4, FR.1-1; and TSA-2, FR.4-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.2-3) (H1/C1) CAT. II

Operations have been performed at Technical Area-33 Building 86 after its shutdown.

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

Reactors and Critical Facilities

FINDINGS:

- At LACEF, the standard operating procedure for preparing procedures does not specify safety limits, limiting safety control settings, and surveillance requirements as part of the experimental plan.
- No experiment-specific procedures for verifying technical specification items are required in the experimental plan.
- No facility-specific instruction for placing the source is required in the experimental plan.
- The specific sequence and description of the steps in the critical approach are not contained in the experimental plan.
- In-hand, one-time-use, initial-and-date, in-the-box-type logsheets are not employed as a means of providing assurance of adherence to procedures.
- Conditions requiring independent verification are not specified in the experimental plans.
- See Concern TSA-4, MA.8-1.

CONCERN: **See Concern TSA-1, OP.3-2.**

FINDINGS:

- At LACEF, the fenced-in area surrounding the Kiva must be searched prior to experimental operation. It is possible that this search may not be 100 percent effective because other small structures are in this area.
- The gate to the area is required to be closed but not locked by the guard after the search is completed.
- Should this gate be locked, the retreat of a person inadvertently left in the area would be difficult. Communication directly with the control room may not be possible.
- The crew members making the search were observed to linger at the gate until the guard had closed it in order to ensure that he did not lock the gate. This is a practice that has not been formalized by procedure.
- See Concern TSA-2, SS.1-1, and Section 4.5.2.12.2, FR.2.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.3-1) (H2/C1) **At Los Alamos National Laboratory, there is no formal procedure for an independent verification that the fence gate at a Kiva associated with the Los Alamos Critical Experiments Facility is left unlocked during experiments as required by DOE 5840.19.**

Tritium Facilities

FINDINGS:

- Operating procedures in TA-3 Bldg. 16 (Ion Beam Facility) do not identify operations in sufficient detail. A qualified operator cited a case where an important switch was not activated in a startup sequence which aborted a run; this switch activation was not called out in the procedure. Also, operator aids do not exhibit evidence of authorization or configuration control.

- An inadequate procedure was cited as the root cause in Occurrence Report ALO-LA-LANL-LANL-1991-0016, September 27, 1991, in which an employee in TA-41 Bldg. 4 sustained a tritium dose.

- The detail of operator instructions varies in TA-21 Bldg. 155 (Tritium Systems Test Assembly). Procedure TTA-TP-102-09, Rev. 0, June 25, 1990, provides only the desired result, whereas TTA-OP-108-03, Rev. 5, January 24, 1991, gives explicit and understandable direction to the operator. (The above two procedures govern specific segments of the tritium loop.)

- Operating procedures for boosting the tritium pressure and specifying what to do in case of power failure in the Tritium Beta Decay Experiment (TA-35 Bldg. 34) are concise and understandable but exhibit no issue authorization or configuration control information.

- A recent occurrence report (LANL-91-65) cites the absence of an O-ring on the boot flange as a contributing cause for a tritium release; the report deemed the procedure to be insufficiently detailed. ("There were not sufficient controls in place to assure that the presence of the O-ring was verified.")

- Some operations personnel are stymied when they attempt to acquire document designators for their procedures. One experimenter resorted to inventing his own document number to show some measure of configuration management.

- See Concerns TSA-4, OA.7-1, and TSA-4, MA.8-1.

CONCERN: **See Concern TSA-1, OP.3-2.**

FINDINGS:

- In TA-33 Bldg. 86, High Pressure logbook entry No. 001060 has a final entry on October 23, 1990. Signatures are missing on virtually all entries in this book.
- A pressure measurement was performed on November 7, 1990, according to looseleaf papers seen in TA-33 Bldg. 86. Process Book No. 7532 defines several removals, attachments, and valve manipulations, but one sample number does not agree with the looseleaf notes.
- Examination of building log book No. 24884 for TA-33 Bldg. 86 showed that the first four pages had been cut out of the book. Page 5 was dated April 1, 1991. It was later learned that this was the initial building logbook for TA-33 Bldg. 86.
- A bakeout was performed in TA-33 Bldg. 86 on January 9, 1991, on a virgin molecular sieve unit. Records were found in looseleaf form and were unsigned. As neither operating system was used, neither of the operating logbooks had entries for that date. An entry was made in Process Book No. 7532 on January 27, 1991, regarding the bakeout.
- The Weapons Subsystems Group Leader stated that there was an edict in early April from the Weapons Subsystems Group that no work was to be performed in TA-33 Bldg. 86 without an approved special work permit. Examination of Process Book No. 7532 showed that operations have been performed as late as September 27, 1991, and no citation of the appropriate special work permit is evident. Operator signatures are absent throughout the book.
- See Concern TSA-4, OA.7-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN:
(TSA-2)
(OP.3-2)
(H2/C1)

TA-33 Building 86 operations records at Los Alamos National Laboratory are not being kept in accordance with DOE 5480.19.

OP.4 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should know the effect of non-operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

Reactors and Critical Facilities

FINDINGS:

- An untagged, unlocked, and unlabeled 2-inch water pipe is located in Kiva II. This pipe has existed in this undesirable configuration for so long that no one can recall its purpose or use, and the facility drawings do not clearly show the pipe or its contents.
- The condition found on May 1, 1991, as noted in the Flattop logbook and discussed in the findings leading to Concern TSA-2, OP.3-2, is an undesirable configuration (rod movement allowed with reflector blocks off the "out" limits). Although this was attributed to vibration, it may be a condition in which an interlock was defeated for an old experiment. No record shows that this wiring was returned to its required status after that experiment.
- At OWR, as-built structural and utility drawings are not available as required by DOE 4330.41, DOE 5480.19, and ASME NQA-1-1989. (See Section 4.5.2.3.2, OP.5.)
- Controls are not in place at TA-3, TA-21, and TA-55 to ensure that operations personnel always know the operating status of systems and equipment for which they are responsible, which is not in compliance with DOE 5480.19. (See Section 4.5.1.3.2, OP.4.)
- TA-55 operations personnel do not always know the current design configuration of facility systems as required by DOE 5480.19 and DOE 5480.19. (See Section 4.5.1.3.2, OP.4.)
- See Concern TSA-4, MA.6-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.4-1) (H1/C1) **At the Los Alamos National Laboratory, configuration control is not being maintained as required by DOE 5480.19 and ASME NQA-1-1989.**

FINDINGS:

- At LACEF, in Kiva III, the Godiva IV experiment has developed a crack in one of its fuel rings.
- An interview with a retired staff member revealed that the experiment was purposely operated in a manner to

cause a crack so that the reactivity effect could be measured.

- There is a small clearance between the inside of the fuel ring and the safety block which must move downward and out of the core to effect the shutdown properly and limit the fission product buildup.
- Godiva IV could be operated with the possibility that displacement of a cracked fuel ring or cracked fragments from a ring could interfere with the movement of the safety block.
- The staff indicated that the effect of a portion of the cracked material becoming lodged within the clearance noted above and hindering the movement of the central portion of the device has not been formally evaluated or reported.
- Other than to observe the reproducibility of its reactivity values, no surveillance of the physical condition of the crack has been made.
- See Concerns TSA-2, FR.6-3; TSA-4, FR.1-1 and TSA-4, FR.2-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **At Los Alamos National Laboratory, the operation of Godiva IV with a cracked fuel ring has not been formally evaluated and approved as required by DOE 5480.6.**
(TSA-2)
(OP.4-2)
(H1/C1)
CAT. II

FINDINGS:

- Wire seals are used for status control of some small valves at OWR. These are not tagged and are not included in the lockout and tagout system.
- Tags without locks are used on some small breaker boxes to control energy sources. These boxes can be locked to control the switch position. The reactor staff was not aware of this situation because it was not evident from outside the box.
- No requirement exists for independent verification of system status after alterations for maintenance or tests.
- The OWR uses a site-specific procedure. During the appraisal, LANL AR 8-6 "lockout/tagout plan and procedures," August 20, 1991, arrived at the reactor, but there has been no opportunity for its review.
- LACEF employs no lockout and tagout system because of the belief that the using the console key to remove power to

all experimental controls is sufficient justification for ignoring this portion of DOE 5840.19.

- An untagged, unlocked, and unlabeled 2-inch water pipe is located in Kiva II. Large quantities of water should not be made available in the vicinities of these fast reactor assemblies.

- A lock is employed on the Flattop assembly to control the status of the plutonium core assembly. Other locks are employed on vaults, which are also not a part of the lockout and tagout system.

- See Sections 4.5.2.4.2, MA.2, and 4.5.2.15.2, WS.4.

CONCERN: **See Concerns TSA-1, OP.4-1, and TSA-4, PP.2-2.**

Tritium Facilities

FINDINGS:

- LANL AR 8-6 has not been implemented in tritium areas.

- Some tritium facilities have their own lockout/tagout systems, but these are not in compliance with Occupational Safety and Health Administration (OSHA) standards.

- See Sections 4.5.2.4.2, MA.2, and 4.5.2.15.2, WS.4.

CONCERN: **See Concerns TSA-1, OP.4-1, and TSA-4, PP.2-2.**

OP.5 OPERATION STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operation stations and facility equipment should effectively support facility operation.

Reactors and Critical Facilities

FINDINGS:

- Although as-built drawings of the reactor are maintained by the OWR staff, structural and utility drawings are not available in the as-built state.
- See Concern TSA-4, MA.6-2.

CONCERN: **See Concern TSA-2, OP.4-1.**

FINDINGS:

- At OWR, a basin is provided on the main experimental level of the building so that the end boxes can be sawed off of the fuel elements before shipping. Water is used as a radiation shield. This basin has four walls which extend approximately 4 feet above the floor level. The walls are approximately 10 inches thick, forming a ledge on which OWR operators stand to gain leverage for underwater operations. Such operations are common to a number of reactors and have been the subject of concern, primarily due to the possibility of the operator falling off the ledge and sustaining a serious injury. (Signs were immediately posted to prevent the practice described above.)
- See Sections 4.5.2.14.2, PP.3, and 4.5.2.15.2, WS.4.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.5-1) (H1/C1) **At Los Alamos National Laboratory, Omega West Reactor operators working on the unguarded basin ledges are in danger of falling.**

FINDINGS:

- At present, there is no certified cask for shipping spent fuel elements from the OWR.
- The spent fuel elements in storage at the OWR facility are equivalent to approximately 7 years of reactor operation.
- Although additional spent fuel can be stored in various places within the reactor tank and within the basin for some time to come, this is a serious condition because of the very long time delays usually experienced in cask certification.
- See Concerns TSA-2, PT.1-2, and TSA-2, PT.4-2.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.5-2) (H2/C2) **At Los Alamos National Laboratory, a certified cask is not available to ship spent fuel from the Omega West Reactor.**

Tritium Facilities

FINDINGS:

- Poor housekeeping was noted in several areas of TA-21 Bldg. 152 and TA-33 Bldg. 86.
- TA-41 Bldg. 4 exhibits marginal housekeeping.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.5-3) (H2/C1) **Contrary to DOE 5480.19, poor housekeeping is evident in many tritium areas at Los Alamos National Laboratory.**

FINDINGS:

- The Observations section of the TSA for TA-55 conducted in March 1987, described the potential problem of using glass vacuum gauge tubes as follows: "A new installation of a vacuum hot press for Pu-238 fuels research has a glass-enveloped Bayard-Alpert vacuum gauge tube outside of the glovebox enclosure but going directly into the chamber. This is a weak link safety-wise; there was a case at DP site where such a gauge broke and released contamination that required a three-week cleanup."
- Subsequently, another event occurred where an inadvertent pressurization of a bell jar in TA-55 resulted in gauge failure and a release of plutonium. An edict not to use glass Bayard-Alpert gauges was issued for all plutonium areas.
- There are glass-enveloped Bayard-Alpert gauges in use on tritium-containing equipment in TA-3 Bldg. SM-16.
- Occurrence Report ALO-LA-LANL-1991-0016, regarding LANL personnel tritium exposure, contains the following input from a DOE facility representative: "There is an apparent lack of consideration by the operating staff to 'expect the unexpected' when doing something new or different."
- Plastic (polyvinyl chloride pipe) exhaust lines are used on tritium-contaminated mechanical vacuum pumps in TA-3 Bldg. SM-16. The line was unlabeled (now corrected). Similar lines exist in TA-41 Bldg. 4.

- Sample bulbs have been removed from a mass spectrometer inlet line in the laboratory with no provisions for local tritium control. As is the case in many tritium operations, the operators assume that the tritium is in a gaseous state rather than in a more hazardous form such as tritiated oxide or ammonia. (See LANL report HSE-90-3, July 1990.)

- Liquid nitrogen has been introduced into a TA-16 Bldg. 205 glovebox equipped with a small bubbler which might not handle a potential overpressurization due to leaks in the nitrogen system.

- See Concerns TSA-2, OA.1-2, and TSA-2, EA.4-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.5-4) (H2/C2) **Some Los Alamos National Laboratory tritium operations personnel do not identify and correct inherent equipment weaknesses which could (and do) result in releases of radioactive material.**

FINDINGS:

- An earlier appraisal indicated that there were concerns about several broad safety areas in TA-33 Bldg. 86. Although action has been taken to close out these deficiencies, several significant items are still outstanding.

- TA-33 Bldg. 86 contains in excess of 1 megacurie of tritium (mainly on molecular sieves) as tritiated water and as gas in approved containers.

- A large amount of highly contaminated equipment was found in TA-33 Bldg. 86.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.5-5) (H1/C1) **At Los Alamos National Laboratory, TA-33 Building 86 has not always been afforded management attention commensurate with the hazards present.**

OP.6 OPERATOR KNOWLEDGE AND PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which they are responsible.

Tritium Facilities

FINDINGS:

- No program exists to disseminate lessons-learned information at LANL.
- Tritium operations groups do not, in general, make use of operational data (especially as they pertain to safety) from other organizations in planning their work.
- A recent (September 25, 1991) occurrence report states: "The lesson learned is the need to ensure that we do not utilize materials that are not properly certified." Since little attention is given to nonradioactive material control at LANL, this lesson could remain hidden from those who could use it most.
- LANL personnel do not employ trend analysis of accident or injury data from their work groups to identify safety problems.
- Workers are not aware of group or site safety performance problems.
- See findings that support Concern TSA-2, OP.5-5.
- See Concerns TSA-2, OA.1-2, and TSA-2, FR.6-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.6-1) (H2/C2) **Tritium operating or safety information from similar facilities (both onsite and offsite) such as lessons learned, unusual occurrence reports, and so forth, is not being disseminated to all workers at Los Alamos National Laboratory.**

OP.8 HUMAN FACTORS

PERFORMANCE OBJECTIVE: Human factors considerations should be incorporated in the design, layout, and operation of all facilities on the site in order to facilitate operator control, information processing, and the recognition and proper response to alarms, instruments, and other equipment.

Reactors and Critical Facilities

FINDINGS:

- No LANL or LACEF guidance is available concerning the implementation of human factors considerations.
- Rod position indication at LACEF (Control Room No. 2) is digital only, with no analog duplication. Relative positions of all rods cannot be determined at a glance. The possibility of attempting the insertion of a rod which is already inserted is evident.
- The inadvertent shutdown of Flattop was observed when an operator turned a poorly functioning switch too quickly and too far and reached a position on the switch that caused a scram.
- This switch was reported to have been functioning in this manner for a long period of time.
- The distance between the crew member operating the Flattop rod control switches and the computer display of the reactivity data made the crew member crane his neck to an unnatural position. It was reported that this was not the normal position of this computer display.

CONCERN: **See Concern TSA-2, OP.8-1.**

Tritium Facilities

FINDINGS:

- A sitewide policy does not exist for formatting controls, alarms, indicator lights, etc.
- In TA-21 Bldg. 209, a red light on the control panel indicates an open breaker, whereas a green light near the breaker itself indicates that it is open.
- LANL staff conceded that various alarms are employed in different buildings to indicate the same condition or expected occupant response.
- Color coding of control room monitors is different in two tritium handling facilities, TA-21 Bldg. 155 and TA-16 Bldg. 205.
- At LACEF, human factors considerations have not been applied to design and layout of control stations. (See Section 4.5.2.3.2, OP.8.)

- Human factors engineering is not routinely incorporated into the operating equipment of the TA-55 facility as required by DOE 5480.19.1. (See Section 4.5.1.3.2, OP.8.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (OP.8-1) (H2/C2) **Human factors considerations, including uniformity of controls, alarms, and indicators, have not been generally applied to tritium facilities at Los Alamos National Laboratory.**

4.5.2.4 Maintenance

4.5.2.4.1 Overview

All eight performance objectives in the Maintenance technical area were addressed in this appraisal. The appraisal was conducted by means of onsite inspections of TA-16 (Bldg. 205, the Weapons Engineering Tritium (Test) Facility); the TA-18 Los Alamos Critical Experiment Facility, TA-2 (OWR), TA-21 (Bldg. 155, Tritium Systems Test Assembly), TA-21 (Bldg. 209, Tritium Salt Facility), TA-33 (Bldg. 86, High Pressure Tritium Laboratory), TA-41 (Ice House), and the JCI electrical maintenance shop area and electrical/breaker test trailer. Interviews were held with senior program managers, maintenance managers, building managers, area coordinators, maintenance personnel, and Facilities Engineering Division personnel. Maintenance procedures and records, QA manuals, implementing documents and records, operating logbooks, and reports of past TSAs and self-assessments were also reviewed.

Responsibility for maintenance at LANL is divided between the Facilities Engineering Division (which works through the maintenance contractor, JCI) and various groups (which conduct programs throughout the LANL complex). Class A equipment, which includes items such as air-conditioning, heating, ventilation, power, installed service systems, and the buildings in which they are housed, are the responsibility of the Facilities Engineering Division and JCI. Class B equipment includes items purchased or built by the various programs for use in process systems and experiments and are the responsibility of program maintenance. Because the distinction between Class A and Class B equipment is determined by the source of the funds with which the items were purchased, the identification of an equipment classification is not always consistent.

A routine preventive maintenance program has been established by JCI for Class A equipment such as circuitbreaker testing, lubrication, backflow preventer maintenance, and emergency generator testing. Records are being maintained on a computer data base. Work is scheduled by Facilities Engineering Division in coordination with JCI. Preventive maintenance of Class B equipment is the responsibility of the group that manages the program using the equipment. Corrective maintenance of Class A and B equipment may be accomplished by JCI through the initiation of a "small job ticket," or Class B equipment may be repaired by program staff. It was difficult to assess actual preventive and corrective maintenance in progress because very few jobs, other than housekeeping activities, were being performed during the appraisal.

No sitewide maintenance policy has been issued by LANL management, although one is in preparation. JCI has developed a structured work control and scheduling system, but each program management group has unique systems for the administration and control of its programmatic maintenance responsibilities. For each type of maintenance, these systems vary from nonexistent to being in compliance with DOE 4330.4A. In one instance, two programs on the same site managed by the same group have major differences in the systems used to manage maintenance. The Tritium Systems Test Assembly uses systems which work, whereas the Tritium Salt Facility, separated from it only by a security gate, has essentially no conforming maintenance programs. The OWR also has control of its maintenance program for Class A and Class B equipment.

The High Pressure Tritium Laboratory is scheduled for decontamination and decommissioning. It is in the worst condition maintenance of all the facilities inspected. Housekeeping has been neglected, and there is no program for maintenance of the Class B equipment. A spot check of the Class A equipment, however, showed that it is being maintained according to the JCI preventive maintenance schedule.

A maintenance worker assigned to replace a stack tritium monitoring system pump in a radiation control area within the High Pressure Tritium Laboratory, did not notify the Radiation Protection Group prior to performing the work and did not sign out from the facility. This became the subject of an "off-normal" occurrence report. The subsequent investigation revealed that only one radiation work permit had been issued for the 23 radiation areas where this worker performs stack pump maintenance.

The Weapons Engineering Tritium (Test) Facility is a new facility which will take the place of the High Pressure Tritium Laboratory. It is still undergoing system tests and checkout. The operators have taken advantage of delays in startup to implement an effective maintenance program based on the best of several other programs. These programs will require revision as sitewide policy and directives are put in place.

The LANL self-assessment found serious deficiencies in all eight performance objectives of the Maintenance technical area. AL and LAAO reports confirm the LANL findings. Progress toward the resolution of these findings has begun.

The significant differences in the maintenance programs of the two different classes of equipment are primarily a result of the fact that no Director-level maintenance policy exists at LANL. Because the establishment of maintenance policies and procedures for Class B equipment has been assumed by group management, the uniformity and formality of maintenance practices for this equipment vary widely between groups. In some groups, practices and procedures which conform to DOE 4330.4A are nonexistent. Some groups, such as those operating the Tritium Systems Test Assembly and OWR have preventive maintenance programs which approach conformance and provide a basis upon which the Maintenance Management Office can build to develop uniform systems throughout LANL. An audit of actual maintenance work in progress was hampered by the lack of ongoing work during the appraisal. It appeared that only housekeeping operations and emergency work was in progress. The backlog of preventive maintenance conducted by the maintenance contractor, JCI, varied from up-to-date in some areas to as much as 2 years behind in others.

4.5.2.4.2 Findings and Concerns

MA.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

FINDINGS:

- No supervisor is assigned by JCI to verify performance of the field lubrication maintenance team. Spot checks by Facilities Engineering Division personnel have shown discrepancies between work checked off as completed and actual work performed.
- A JCI engineering department position for a quality control specialist to check JCI conformance with welding requirements has been vacant for 1 year.
- The responsibility for a 4-month delay in evaluating the need for a repair at LACEF to the Kiva II structure and two of its critical experiments could not be determined because no minutes or attendance lists are maintained at scheduling and task assignment meetings during the workflow process.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MA.1-1) (H2/C2) **Management supervision of worker performance and review of administrative practices at reactor facilities and of Los Alamos National Laboratory subcontractor Johnson Controls World Services, Inc., do not ensure effective implementation and control of maintenance activities.**

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

FINDINGS:

- No formal maintenance training program is in place for operators at the LACEF, although one is called for in the group QA manual.
- Maintenance training records for LACEF operators do not exist. (See Concern TSA-2, TC.5-1.)
- A training checkoff sheet shows that one Tritium Salt Facility operator/technician did not receive the approval of an instructor indicating his qualifications to change oil in a process vacuum pump, although he performs this activity.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MA.2-1) (H2/C1) **At Los Alamos National Laboratory, the maintenance training programs and training records for operators working on program (Class B) equipment at tritium and reactor facilities do not meet the requirements of DOE 4330.4A.**

FINDINGS:

- There is no independent verification of maintenance work by the operators on program (Class B) equipment for Los Alamos Critical Experiments Facility at Los Alamos National Laboratory.
- No independent verification of the satisfactory completion of maintenance work is conducted at the Tritium Salt Facility.

CONCERN: **See Concern TSA-4, MA.2-1.**

FINDINGS:

- Although there is a JCI welder certification program available for all LANL welders, group welders who work on process equipment in the Tritium Salt Facility and Tritium Systems Test Assembly are not certified.
- Only four LANL (non-JCI) welders have been certified under the JCI welding certification program.
- No independent verification of welder performance is performed at LANL. (See Concern TSA-2, MA.1-1.)

CONCERN: **See Concern TSA-2, QV.7-1.**

FINDINGS:

- The facilities inspected have lockout and tagout procedures which differ significantly in methodology and detail. This is particularly hazardous to JCI personnel who perform maintenance at several facilities at LANL.

- None of the lockout and tagout procedures conform with LANL AR 8-6 "Lockout/Tagout Plan and Procedure," issued August 20, 1991, which was to have been implemented by the LANL nuclear facilities by October 1, 1991 (and for other facilities by December 20, 1991).

- There is only one piece of equipment tagged out in the Tritium Salt Facility, although the log shows many active tags.

CONCERN: **See Concerns TSA-4, PP.2-2, and TSA-1, OP.4-1.**

FINDINGS:

- A JCI maintenance worker entered a radiological area in the High Pressure Tritium Laboratory and replaced a malfunctioning stack pump without contacting the radiological protection organization as required by LANL procedures.

- One radiation work permit has been issued for 23 radiation areas where stack pumps are installed.

- See Concern TSA-2, RP.3-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MA.2-2) (H2/C1) **Los Alamos National Laboratory procedures designed to achieve as-low-as-reasonably-achievable radiation exposures for maintenance workers are not being followed as required by DOE 4330.4A.**

MA.3 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- Program (Class B) spare parts in the Tritium Salt Facility are not stored, protected, and identified as required by DOE 4330.4A.
- Receiving inspection of program (Class B) parts at the Tritium Salt Facility relies on certification by the manufacturer, which accompanies the part.
- Spare parts belonging to JCI were stored in the bottom of the Tritium Systems Test Assembly emergency transfer switch cabinet, which is not an authorized storage location. (See Concern TSA-2, QV.5-1.)
- The Weapons Engineering Tritium (Test) Facility maintains its own spare parts inventory of program (Class B) equipment. Much of the equipment used is common to other tritium activities. If lack of a spare causes a program delay, there is no system to locate and obtain the required part from the inventory of another program.

CONCERN: **See Concern TSA-4, MA.3-2.**

MA.4 PLANNING, SCHEDULING, AND WORK CONTROL

PERFORMANCE OBJECTIVE: The planning, scheduling, and control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and effective manner.

FINDINGS:

- The repair of a bellows pump in the Tritium Salt Facility process equipment has been outstanding for 1 year, even though the required repair parts are on hand.
- The High Pressure Tritium Laboratory has not been inspected under the quarterly Facilities Engineering Division Facility Inspection Program for at least a year.
- Neither JCI nor LANL have generic plans for the conduct of Level 1 (safety-related) corrective maintenance.
- The Facilities Engineering Division boiler specialist uses the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VI, which recommends an annual inspection of boilers. Only those boilers known to be maintenance problems are inspected annually.

CONCERN: **See Concern TSA-4, MA.4-1.**

MA.5 CORRECTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

FINDINGS:

- The cooling duct to the Godiva IV critical assembly at the LACEF is frayed and may leak (the cooling system was not operating when inspected).
- The OWR core spray pump No. 2 has a mechanical seal leak. A work order was submitted, but no repair has been accomplished for 6 months. This pump is in a reactor safety system.
- The High Pressure Tritium Laboratory stack monitor is inoperative because of a failed pump. This was the second pump in this system to fail during the appraisal, which indicates a weakness in the corrective maintenance program for Class B equipment.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MA.5-1) (H2/C2)

Corrective maintenance at Los Alamos National Laboratory is not performed for tritium and reactor facilities in an effective and timely manner.

MA.6 PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

FINDINGS:

- There is no ongoing configuration control system for Class A electrical systems in the facilities. A JCI electrician must update the configuration using single line drawings prior to each facility maintenance evolution. (See Concern TSA-2, OP.4-1, and Section 4.5.2.3.2, OP.5.)
- The LANL Director's Policy on Configuration Management, dated September 1991, has not been implemented by the Engineering Division or by LANL managers.

CONCERN: **See Concern TSA-4, MA.6-2.**

FINDINGS:

- The LANL and JCI electrical equipment and breaker-testing program is 1 to 2 years behind schedule.
- The JCI lubrication maintenance program is 4 weeks behind schedule.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MA.6-1) (H2/C2) **The Facilities Engineering Division schedules for the electrical equipment and lubrication preventive maintenance programs at Los Alamos National Laboratory are not being followed by Johnson Controls World Services, Inc.**

MA.7 PREDICTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- Maintenance history records for program (Class B) equipment are not maintained at the LACEF other than those contained in logbooks.
- No attention is given to component age-related degradation in the maintenance program at the LACEF. (See Concern TSA-2, FR.6-2.)
- There is no predictive maintenance program at the Tritium Salt Facility.

CONCERN: **See Concern TSA-4, MA.7-1.**

MA.8 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Maintenance procedures and related documents should provide appropriate directions and guidance for work and should be used to ensure that maintenance is performed safely and effectively.

FINDINGS:

- The Tritium Salt Facility managers have not determined which of their program (Class B) equipment requires the preparation of maintenance procedures as specified by the Tritium Salt Facility quality assurance manual. Very few maintenance procedures for Class B equipment have been prepared.
- No preventive maintenance procedures exist for the low pressure process equipment (Class B) at the High Pressure Tritium Laboratory at TA-33 Bldg. 86. This equipment will be used during the decontamination and decommissioning program planned for the facility.
- JCI procedures for electrical equipment and breaker maintenance do not exist for all maintenance performed. Those procedures that do exist do not meet the requirements of DOE 4330.4A.
- Two sets of procedures are used during the preventive maintenance of the Tritium Systems Test Assembly diesel generator, one by the JCI maintenance team and one by the Tritium Systems Test Assembly Group. The Tritium Systems Test Assembly procedure meets the requirements of DOE 4330.4A, but the JCI procedures do not.
- A JCI electrician rewound a motor without reference to a written maintenance procedure. Also, there was no written test procedure for the rewound motor.
- A JCI electrician did not use a written test procedure during a breaker test.
- No written Tritium Salt Facility procedures have been established to ensure that the shelf life of spare parts is not exceeded.

CONCERN: **See Concern TSA-4, MA.8-1.**

4.5.2.5 Training and Certification

4.5.2.5.1 Overview

This assessment reviewed the following facilities: Tritium Systems Test Assembly, Tritium Salt Facility, Weapons Engineering Tritium (Test) Facility, Design Engineering Division, New Production Reactor Facility, the Ion Beam Facility, LACEF, and OWR. In addition, LANL radiation protection technician training was assessed. The appraisal was conducted by means of interviews with key training managers and supervisors, evaluation of selected procedures, assessment of training program manuals, review of lesson plans, monitoring of in-progress training, and evaluation of training records. Training facilities were assessed to evaluate the adequacy of the training aids, training environment, and accessibility of training reference material. Where programs or plans are in place to support the requirements of DOE 5480.20, the assessment used the criteria of that Order. The assessment addressed all the performance objectives except TC.8 Quality Control Inspector and Nondestructive Examination Technician, which is addressed in the S&H Subteam 1 and 4 reports. No training facility concerns were noted.

Training at the above facilities is not well organized. There has been little formal direction provided to the facility training coordinators by the LANL management. Each facility is establishing its own training plan based on DOE 5480.20, which requires submission of a training matrix to DOE by November 8, 1991, for approval. It is unlikely that LANL will meet this schedule. A memorandum dated October 16, 1991, from the DOE-Albuquerque Operations Office and presented to the TSA Team on October 22, 1991, authorizes the LANL an extension to April 1, 1992 for the matrix submittal for all facilities except, TA-55, Plutonium Facility. Some facilities have partially developed and implemented their training plans based on the DOE Order. Other facilities (Tritium Salt Facility) have not established any training plan. The Weapons Engineering Test Facility has a DOE-approval agenda for development of a training plan, which was approved as a part of their approval for startup of the facility. The draft LANL training manual which defines how each facility should establish its training plans, is still in draft form and has not been approved. LANL has not established a clear training implementation plan with realistic schedules and goals for these facilities to establish and implement the requirements of DOE 5480.20.

Interim measures that define methods to allow operations to continue while operators and staff are trained to the DOE requirements have not been formulated, except at OWR which is conducting training as required by DOE 5480.6. Training requirements have been established in some facilities for which no class or lesson plan has been created. Radiation protection technicians must complete a computer-based training program as part certification or recertification. Only 21 of about 100 technicians have completed this training. No schedule has been established for the remaining technicians to complete the course or lose their qualification. No LANL guidance has been provided to define how to handle these interim situations.

Development of the training process as defined in DOE 5480.20, paragraph 7.b., has been started in some of the facilities. Job and needs analysis are progressing slowly. No schedules or milestones have been established. LACEF is not performing a systematic analysis of jobs or tasks to be performed. Their position is that their training is equivalent to DOE 5480.20

requirements; however, no criteria have been established that demonstrate an equivalent systematic approach or analysis of jobs being performed.

Training records are required to be recorded in the LANL computer-based Employee Development System (EDS). The EDS is not being used by the facilities to document all training because of reported system inadequacies. Training records are maintained in a variety of methods, including hard copy, facility data base, and in one case two data bases. Because the EDS is not effective, LANL cannot readily ascertain individual training status or perform trending to ensure that facility and LANL training commitments are accomplished. LANL has recognized the shortcomings of the present system and is developing a second system (EDS-2) to improve documentation for sitewide training records. LANL should place a high priority on the use of this sitewide training data base. Until such time that all individual training records are documented in the data base, LANL is not able to assess fully the status of training, except by inspecting individual hard-copy training records.

The LANL self-assessment fairly characterized the status of training programs at the Laboratory. The assessment generalized most training deficiencies to encompass all LANL facilities. The assessment reflects that the LANL understands that training is not implemented in a systematic program across all Laboratory facilities.

Personnel at LANL tritium and reactor facilities have started developing a systematic approach to training in accordance with the requirements of DOE 5480.20. Job and task description assessments, formation of learning objectives, creation of lesson plans and on-the-job-training techniques, and methods of documentation are in process. None of these facilities have completed and fully implemented the training process as required by DOE Orders.

4.5.2.5.2 Findings and Concerns

TC.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administration should ensure effective implementation and control of training activities.

FINDINGS:

- Two facilities, the Tritium Salt Facility and the Weapons Engineering Tritium (Test) Facility, have not developed a training plan.
- The development of the training plan for the WET Facility is scheduled for July 1, 1992, and is part of "The Operational Startup Plan of Weapons Engineering Tritium (Test) Facility" approved by DOE.
- Facility training plans are required by the draft LANL training manual and policy guidance.
- See Concern TSA-2, PT.2-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.1-1) (H2/C1) **At Los Alamos National Laboratory, the Tritium Salt Facility and the Weapons Engineering Tritium (Test) Facility have not provided training plans to ensure that each employee is properly trained to perform his or her assigned tasks safely as required by DOE 5480.5 and DOE 5480.20.**

FINDINGS:

- LANL has installed a sitewide, computer-based Employee Development System for tracking, scheduling, and documenting training.
- Records are being maintained in a variety of manners, for example:
  - The Tritium Systems Test Assembly maintains a facility computer record of training conducted.
  - The Tritium Salt Facility does not maintain a facility computer record.
  - The Quality Operations Office maintains both Tritium Systems Test Assembly and Tritium Salt Facility training records, both in hard copy and in a computer based record.
  - The Tritium Systems Test Assembly and Tritium Salt Facility do not use the Employee Development System for all training record documentation.
- The draft LANL training manual requires the use of the Employee Development System for documenting conducted training.

- Several facility training coordinators have reported that they do not use the Employee Development System because it does not meet their needs, because they do not trust the system, or because they do not know how to use it.

- LANL does not trend facility training to ensure facilities are meeting their training commitments.

CONCERN: **See Concern TSA-4, TC.1-2.**

FINDINGS:

- The Ice House (WX-5) facility training plan requires personnel to be trained in courses that have not been developed.

- Fifteen of 19 required training courses have not been developed.

- This following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.1-2) (H2/C1) **Weapon Subsystems Group personnel at Los Alamos National Laboratory are not being trained in accordance with the Design Engineering Division training plan, DOE 5480.5, and DOE 5480.20.**

FINDINGS:

- An internal validation of required training accomplishment for all certified operators has not been conducted.

- The Tritium Systems Test Assembly training plan does not provide any requirement to validate all specified training is completed prior to operator certification.

- An inspection of certified operator training requirements, as prescribed by the facility training plan, indicated that one operator at the LACEF had not accomplished all specified training.

CONCERN: **See Concern TSA-4, TC.1-2.**

TC.2 REACTOR OPERATIONS

PERFORMANCE OBJECTIVE: The operator and reactor supervisor training and certification programs should be based on DOE 5480.6, Section 8.e., as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions. (Reactors Only)

FINDINGS:

- General training classes have been conducted in the OWR control room with the reactor in operation.
- The "at the controls" operator has been part of and received credit for attendance at these training sessions.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.2-1) (H2/C1)

Contrary to the requirements of DOE 5480.19, general training classes conducted in the control room of Los Alamos National Laboratory Omega West Reactor during reactor operation distract the operator from his or her primary function of "at the controls" operation of the reactor.

FINDINGS:

- Written examinations for certifying operators at the LACEF are subjective.
- No predetermined elements for correctness of answers have been established.
- Records of oral examination questions are not maintained.
- Te following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.2-2) (H3/C2)

At Los Alamos National Laboratory, examinations to certify operators for Los Alamos Critical Experiments Facility do not ensure a consistent minimum level of expertise from one examination to the next, and the content of oral examinations is not documented.

FINDINGS:

- The training required by the LACEF training plan has not been accomplished.
- An inspection of training records maintained by one certified operator indicated that four training modules had not been completed as required by the LACEF training plan. Provisions to correct this training deficiency were in progress during this appraisal.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.2-3)

(H2/C1)

At Los Alamos National Laboratory, not all certified operators are trained as required by DOE 5480.20 and the Los Alamos Critical Experiments Facilities training plan.

FINDINGS:

- The LACEF (TA-18) does not use lesson plans for the classroom phase of operator training.
- A class outline, detailing the content for that class, is the generally accepted script the instructor uses to teach the subject.
- Outlines for two operator training classes (Operator Training Module 4 and Accidents and Operation of Mars Critical Assembly) were not available for inspection.
- The lack of lesson plans or course outlines can cause inconsistencies and possibly a failure to introduce essential information.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.2-4) (H3/C2)

Formal lesson plans or class outlines that detail specific learning objectives do not exist at Los Alamos Critical Experiments Facility for some training classes.

TC.3 NUCLEAR FACILITY OPERATIONS OTHER THAN REACTORS

PERFORMANCE OBJECTIVE: The nuclear facility operator and supervisor training and certification programs should be based on DOE 5480.5, as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions. (Nuclear Facilities Only)

FINDINGS:

- The Tritium Systems Test Assembly test director, whose job function is similar to a shift supervisor, is not certified.
- No program or process has been implemented to train and certify the test directors.
- The following concern was identified in the Materials Science and Technology self-assessment.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.3-1) (H2/C1) **Tritium Systems Test Assembly test directors at Los Alamos National Laboratory are not certified as required by DOE 5480.5 and DOE 5480.20.**

FINDINGS:

- Training examinations for Tritium Systems Test Assembly operators, technical staff, and maintenance personnel are not controlled or administered in a formal manner.
- No method is in place at the Tritium Systems Test Assembly to prevent examination compromise.
- Oral examinations are not documented.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.3-2) (H3/C1) **The Tritium System Test Assembly staff at Los Alamos National Laboratory does not administer or control examinations in a formal manner as required by DOE 5480.20.**

FINDINGS:

- The training required by the recently developed and approved (September 24, 1991) Tritium Systems Test Assembly training plan has not been implemented.
- An inspection of one certified operator training record indicated that 13 training classes required by the new Tritium Systems Test Assembly training plan have not been completed.
- The Tritium Systems Test Assembly has not established a formal schedule to implement new required training.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.3-3) (H3/C2) **Not all subjects have been presented which are required in the training of certified operators at Tritium Systems Test Assembly by the new facility training plan; no schedule has been formulated to implement this training at Los Alamos National Laboratory.**

FINDINGS:

- Tritium contamination is present in much of the Ion Beam Facility equipment.
- None of the personnel at this facility have received tritium worker training.
- Training records at the Ion Beam Facility show that one technician has not received radiation worker training and that one secretary has not successfully completed the radiation worker training course.

CONCERN: **See Concern TSA-4, TC.4-1.**

TC.5 MAINTENANCE PERSONNEL

PERFORMANCE OBJECTIVE: The maintenance personnel training qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Operators at the LACEF receive preventive and corrective maintenance training for Class B equipment as part of on-the-job training.
- No documentation of the specific maintenance training has been provided in individual training records.
- See Concern TSA-2, MA.2-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.5-1) (H3/C1) **At Los Alamos National Laboratory, the Los Alamos Critical Experiments Facility does not document program (Class B) equipment maintenance training as required by DOE 5480.6 and DOE 5480.20.**

TC.6 CRITICALITY SAFETY

PERFORMANCE OBJECTIVE: Personnel should receive training in nuclear criticality safety consistent with their assigned tasks. (Reactors and Nuclear Facilities Only)

FINDINGS:

- Fissile material handlers at LACEF (TA-18) are trained at two different levels. One group is given fissile material awareness training (e.g., how to recognize and the purpose of tamper indicating devices). A second group is given a more comprehensive training for handling fissile material (e.g., how to install and remove tamper indicating devices). When trained, both groups are classified as fissile material handlers.

- Training record documentation is poorly organized. A portion of required training for some fissile material handlers could not be verified.

CONCERN: **See Concern TSA-4, TC.6-1.**

TC.9 RADIOLOGICAL PROTECTION PERSONNEL

PERFORMANCE OBJECTIVE: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- The Health and Safety Division, Health Physics Policy and Programs Group, is responsible for providing the basic training to support the requirements of DOE 5480.11 for all radiation protection technicians at the Laboratory.
- Training objectives to support about 150 identified performance-based training tasks for radiation protection technicians are incomplete.
- The lesson plans necessary to support classroom, performance- based training for radiation protection technicians are incomplete.
- Based on a limited sampling of the LANL-developed Interactive Computer Training Program, the team determined that the quality of this training is not adequate for radiation protection technician instruction.
- Radiation protection technicians are required to complete the computer-based training program produced by Resource Technical Services.
- Only 21 of approximately 100 LANL radiation protection technicians have completed the required recertification training. No formal schedule has been formulated to accomplish this training for the remaining radiation protection technicians.
- See Concern TSA-2, RP.1-1.
- No audits of the radiation protection technician training program were available for inspection.
- Typical industry practice is to audit training programs every 2 or 3 years.

CONCERN: **See Concern TSA-4, TC.9-1.**

TC.10 TRAINING FOR SUPERVISORS, MANAGERS, AND TECHNICAL STAFF

PERFORMANCE OBJECTIVE: Training programs for supervisors, managers, and the technical staff should broaden overall knowledge of processes and equipment and develop supervisory and management skills.

FINDINGS:

- A training program to enhance the skills and develop management and supervisory proficiency has not been established and implemented at the tritium facilities and LACEF.
- The Laboratory Training Office is in the process of developing a sitewide training course for managers, supervisors, and technical staff that meets the requirement of DOE 5480.20.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.10-1) (H3/C1) **At Los Alamos National Laboratory, Tritium facilities and Los Alamos Critical Experiments Facility managers, supervisors, and technical staff personnel do not receive the training necessary to broaden their overall knowledge and develop management proficiency as required by DOE 5480.20.**

TC.11 SIMULATOR TRAINING/FACILITY EXERCISES

PERFORMANCE OBJECTIVE: Simulator training and/or facility exercises should be conducted utilizing methods and techniques that are effective in developing and maintaining team and individual knowledge and skills in responding to abnormal and emergency events and in integrated operations. (Reactors and Nuclear Facilities Only)

FINDINGS:

- Facility exercises to enhance the skills and develop job-related knowledge in responding to abnormal alarms and emergency events are conducted annually by the tritium or reactor facilities.
- Normal industry practice is to conduct response to abnormal alarms, emergency procedure drills, and in house response to emergency events on a monthly or more frequent basis.
- This following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TC.11-1) (H2/C1) **Tritium and reactor operators are not periodically evaluated at Los Alamos National Laboratory to ensure proper operating team response to abnormal and emergency alarms as required by DOE 5480.20.**

4.5.2.6 Auxiliary Systems

4.5.2.6.1 Overview

An assessment of the reliability of the auxiliary systems at LANL was performed. This assessment considered functional requirement definition, procedures, training, maintenance, testing, and data trending of various auxiliary systems and processes. Personnel interviews, procedure reviews, and system walkdowns were conducted. All nine performance objectives in the Auxiliary Systems technical area were addressed in this appraisal. Facilities visited and reviewed included OWR, LACEF, Tritium Salt Facility, Tritium Systems Test Assembly, Weapons Engineering Tritium (Test) Facility, Target Fabrication Facility, High Pressure Tritium Laboratory at TA-33, and the Ice House at TA-41.

System descriptions and functional requirements specified in various SARs and OSRs or technical specifications are not consistently defined or documented for all the facilities. The Weapons Engineering Tritium Laboratory SAR constitutes an example of a comprehensive document that adequately describes systems function test requirements and operational requirements. Other facilities such as Tritium Salt Facility, Tritium Systems Test Assembly, the Ice House, and the High Pressure Tritium Laboratory do not have adequate OSRs related to surveillance requirements and limiting conditions for operation.

Effluents released from the above facilities consist mostly of tritium and argon-41. These effluents are not always accurately measured at some facilities such as the Target Fabrication Facility and the High Pressure Tritium Laboratory. An overall LANL program for trending tritium releases and comparison against established goals has not been established. Preliminary efforts are under way to establish the identity of all potential release paths and the adequacy of the installed instrumentation.

Small quantities of solid waste are generated; however, problems removing drums from the Tritium Salt Facility and the Tritium Systems Test Assembly are evident because of the unavailability of shipping containers and problems with shipment routes from the TA-21 area to storage locations. Formal waste minimization plans have not been fully implemented at LANL.

Ventilation systems at the tritium facilities are installed to provide a backup capability to ensure that airflow is directed from noncontaminated areas to contaminated areas. Some facilities do not contain the proper instrumentation to verify that this balance exists (e.g. the High Pressure Tritium Laboratory and the Tritium Salt Facility). Backup fans are not provided in the design of all ventilation systems. A review of the training and certification program for high-efficiency particulate air (HEPA) filter test personnel revealed that no formal program exists. Additionally, experimental test methods are used which are not recognized by current industry standards. LANL has not properly documented the justification for this process, nor has the Laboratory properly certified its test personnel. Only one individual at the Laboratory is presently trained, but not certified, to conduct testing for HEPA filters. Effluent monitoring for airborne release paths are not consistently installed at the facilities reviewed.

Electrical storms resulting in loss of normal electrical power are frequent occurrences at LANL. Vital electrical, emergency electrical, and water

systems at the Laboratory are in good condition; however, evaluation of some of the emergency and standby diesel generators and documentation of test and maintenance activities are not properly completed. Some facilities do not allow full testing of normal-to-emergency-power transfer devices.

Heat removal systems at most facilities are provided by forced draft mechanical cooling systems. These systems are reliable and generally contribute to an overall safe operation for heat removal evolutions.

Engineered safety systems are not well defined for all facility operations. The Tritium Systems Test Assembly provides a definition and categorization of engineered safety systems, which are referred to as "critical systems." The Laboratory also provides for definition of "critical systems" which can be confused with engineered safety systems. The terms are sometimes used interchangeably. "Critical systems" can also refer to those systems which are Class A equipment such as heating, ventilating, compressed-air systems, and in some instances effluent-monitoring equipment. The requirements for central monitoring of this "critical" equipment are not always uniformly applied.

Cleanup systems at the tritium facilities use precious metal catalysts and molecular sieves to remove and contain waste tritium. Not all tritium facilities employ these cleanup systems, for example, the Ice House and the TA-33 tritium facility.

The LANL self-assessment identified or partially identified most (seven of eight) of the concerns noted for auxiliary systems. The LANL assessment was apparently conducted by experienced personnel who were knowledgeable of tritium and reactor facilities.

Auxiliary systems in the above facilities span an entire spectrum of reliability, operational readiness, and material condition. OSRs and associated limiting conditions for operation and surveillance requirements are not structured in sufficient detail. Procedures for operation and maintenance of some systems are weak and lack detail. Some instrumentation is uncalibrated, and most system equipment is not labeled to allow for status control. Personnel in charge of maintaining and operating these systems are generally knowledgeable and aware of system problems and operating parameters. The good conditions that were observed appeared to be due more to the efforts of experienced and dedicated personnel than to a rigorous system of comprehensive safety analysis reports, procedures, training, and data documentation and trending.

4.5.2.6.2 Findings and Concerns

AX.1 SYSTEMS REQUIREMENTS

PERFORMANCE OBJECTIVES: Auxiliary systems should be considered under the same functional criteria for design, engineering, operations, maintenance, and modification as the structural, confinement, and primary process system of the facility.

FINDINGS:

- An SAR for the Tritium Salt Facility does not exist, although OSRs have been submitted for approval.
- The SAR for the Tritium Systems Test Assembly has OSRs that specify limiting conditions for operation of individual systems in order to verify system operational status, but the revised surveillance requirements are not approved.
- The SAR for the laboratory facilities at the Ice House is not complete, and appropriate limiting conditions for operation and surveillance requirements are not specified.
- An SAR does not exist for the High Pressure Tritium Laboratory.
- See Concern TSA-2, TS.2-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (AX.1-1) (H2/C1) **The safety analysis reports for the some tritium-handling facilities at Los Alamos National Laboratory do not have approved, detailed limiting conditions for operations and surveillance requirements as required by DOE 5481.1B.**

FINDINGS:

- The status of various systems at the Ice House cannot be determined because most valves, instrumentation, pumps, and compressors are not labeled.
- The status of various systems at the Tritium Salt Facility cannot be determined formally because most auxiliary system equipment is not labeled and formal system diagrams are not maintained.
- The status of various systems at the High Pressure Tritium Laboratory cannot be determined for auxiliary equipment.
- The following concern was not identified by the LANL self-assessment.

CONCERN: (TSA-2) (AX.1-2) **(H2/C2)**

The status of various auxiliary systems cannot be accurately determined for the High Pressure Tritium Laboratory, Tritium Salt Facility, and Ice House at Los Alamos National Laboratory.

AX.2 EFFLUENT HOLDUP AND TREATMENT

PERFORMANCE OBJECTIVE: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or as effluent gaseous or liquid releases are less than Department of Energy and Environmental Protection Agency standards and are as low as reasonably achievable.

FINDINGS:

- Instrumentation for monitoring releases for the High Pressure Tritium Laboratory process room has not been calibrated.
- Instrumentation to monitor any potential releases from a storage room containing tritium contaminated components at the High Pressure Tritium Laboratory has not been installed.
- The stack monitor at the TA-35 Target Fabrication Facility which monitors tritium releases is not installed properly, due to lack of proper design.
- See Concerns TSA-2, RP.8-4, and TSA-2, RP.9-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (AX.2-1) (H2/C1) **Assurance has not been provided that tritium effluent releases at Los Alamos National Laboratory tritium facilities are measured and quantified accurately in accordance with ANSI N13.1.**

AX.3 SOLID WASTES

PERFORMANCE OBJECTIVE: Solid hazardous wastes (including radioactive wastes) should be controlled to minimize the volume generated, and such wastes should be handled in a manner that provides safe storage and transportation.

FINDINGS:

- Goals have not been established at the tritium facilities for the reduction of solid wastes.
- A formal waste minimization program has not been implemented at LANL as required by DOE 5820.2A.
- Information or data on the amount of solid waste generated at the tritium facilities are not available.

CONCERN: **See Concern TSA-3, AX.3-1.**

AX.5 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is as low as reasonably achievable.

FINDINGS:

- A formal certification and training program for personnel involved in HEPA filter testing has not been established.
- Only one worker at LANL has been formally trained to test HEPA filters in accordance with ANSI N-510, but the worker has not been formally certified.
- HEPA filters are tested by a method which can be considered experimental but has not been documented as an equivalent methodology as discussed in ANSI N-510.
  - DOS aerosol (di-2-ethylhexel sebecate) is used but is not yet recognized by ANSI N-510.
  - A laser spectrometer is used for measuring and determining filter efficiency.
- The following concern was not identified by the LANL self-assessment.

CONCERN: (TSA-2) (AX.5-1) (H2/C1) **Personnel qualifications and methodologies for testing high-efficiency particulate air filters are not formally established at the Los Alamos National Laboratory as required by ANSI N-510.**

FINDINGS:

- The need for emergency power for ventilation systems at the Tritium Salt Facility has not been evaluated.
- No backup fans have been installed for the building ventilation systems at the Tritium Salt Facility.
- Loss of normal power events will result in the loss of all hood and building ventilation at the Tritium Salt Facility.
- At the Tritium Salt Facility, differential pressure instrumentation is not installed on fumehoods to give an indication of ventilation and negative pressures inside the hood.
- See Concern TSA-2, RP.6-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) **(AX.5-2) (H1/C2)**

The potential for tritium contamination exists in the Tritium Salt Facility at Los Alamos National Laboratory after a loss of normal ventilation.

AX.6 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

FINDINGS:

- The automatic transfer function from normal to emergency power is not tested either at the Ice House (TA-41 Bldg. 4), or at LACEF (TA-18 Bldg. 31).
- Data recorded on a quarterly basis for emergency or standby systems and on a yearly basis for maintenance procedures are not consistent in that no ranges are provided and the data are not always recorded in a uniform manner.
- Generic procedures are used for emergency generator testing and maintenance; therefore, important differences in individual installations are not reflected in procedures.
- See Concern TSA-4, TS.4-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (AX.6-1) (H2/C1) **Emergency and standby emergency power systems at the Los Alamos Critical Experiments Facility (TA-18) and the Ice House (TA-41) are not tested in accordance with the requirements of NFPA 110.**

FINDINGS:

- Fuel supply to the emergency and standby power diesel generators is not sampled prior to filling the underground storage tanks.
- No formal periodic fuel sampling program has been established for the individual facility underground storage tanks.
- The following concern was partially identified in the LANL self-assessment.

CONCERN:	**The fuel supply for emergency diesel generators at Los Alamos**
(TSA-2)	**National Laboratory is not verified to be of an acceptable**
(AX.6-2)	**quality prior to filling the tanks.**
(H2/C2)	

AX.8 ENGINEERED SAFETY SYSTEMS

PERFORMANCE OBJECTIVE: Engineered Safety Systems should be reliable and available to provide protection to the facility when required.

FINDINGS:

- No formal designation of engineered safety systems has been provided for the Tritium Salt Facility or the Ice House.
- LANL employs a "critical systems" concept which is used to determine monitoring for systems that affect facility operations during periods when the facility is not staffed.
- The Tritium Systems Test Assembly, SAR uses "critical systems" terminology for systems that are traditionally engineered safety systems.
- The criteria for "critical systems" is not uniformly applied at all facilities. For example:
  - OWR uses the Equipment Surveillance System (formerly referred to as systematic control, alarm, and monitoring) to monitor reactor parameters and radiation alarms.
  - Most facilities reviewed use the Equipment Surveillance System to monitor parameters such as boilers and compressed-air, heating, and ventilation equipment.
- See Concern TSA-2, RP.10-2.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (AX.8-1) (H2/C2) **The Los Alamos National Laboratory practice of monitoring plant and process parameters to determine whether problems exist at nonoccupied facilities is not uniformly applied to all tritium and reactor facilities.**

4.5.2.7 Emergency Preparedness

4.5.2.7.1 Overview

This appraisal addresses the first three performance objectives in the Emergency Preparedness technical area. The performance objectives assessed are EP.1 Organization and Administration, EP.2 Emergency Plan and Implementing Procedures, and EP.3 Emergency Response Training. The remaining performance objectives are addressed on a sitewide basis in the S&H Subteam 4 appraisal. Findings and concerns related to these performance objectives are contained in Section 4.5.4.7 and should be reviewed in conjunction with the material presented in this section.

The appraisal was accomplished through interviews with OWR and the Weapons Subsystems Group managerial staff tasked with emergency preparedness responsibilities. These interviews were conducted to determine how emergency preparedness programs and facility emergency response activities were conducted, managed, controlled, and maintained. This assessment included a review of the emergency plans for each of these facilities, including but not limited to the various sections pertaining to emergency preparedness, hazard and safety analyses, past exercise critiques, appraisals, training program documentation, and documentation supporting the requirements of the DOE 5500 series of Orders, the DOE 5480 series of Orders, DOE 5000.3A, and applicable American National Standards Institute (ANSI) standards and industry good practices.

The Emergency Management Office has developed a sitewide emergency plan that should have provided oversight and augmented emergency response capabilities in the event of an actual emergency or during exercise-related activities. The TA-41 Emergency Response Plan is not supported by emergency plan implementing procedures to support the sitewide emergency plan and to provide an integrated response with the Emergency Management Office. For both TA-2 and TA-41, emergency plan implementing procedures did not address such items as assignment of individual responsibilities, specific to the emergency action levels specific to the Design Engineering Division, notification and integration of response activities with the Emergency Management Office, provisions for the determination and initiation of onsite protective action recommendations, and the integration with the Emergency Management Office in their protective action recommendations for both onsite and offsite populations.

Emergency Management Organizations at both TA-2 and TA-41 have limited capabilities for responding to emergency conditions. The emergency preparedness organization at the TA-41 facility has not received emergency plan training to ensure that a coordinated emergency response with the Emergency Management Office exists for either TA-2 or TA-41. The Weapons Subsystem Group, Design Engineering Division, oversees activities at TA-41 and has made significant progress toward developing a division-wide emergency plan in compliance with the new DOE 5500 series of Orders. However, activity on this planning initiative stopped pending further guidance after issuance of a March 1991 directive from the LANL.

The existing emergency response training programs at TA-2 and TA-41 should be upgraded to address the requirements of the new DOE 5500 series of Orders. No training is provided which ensures the initial identification and

categorization of events, prompt initial notification, and the initiation of mitigative and corrective actions to minimize consequences to workers, public safety and health, and the environment.

The LANL self-assessment on emergency preparedness addressed all of the concerns identified in this report. The key concerns address the failure of Design Engineering Division and TA-41 to develop effective management and response capabilities. These organizations do not have emergency preparedness programs which provide the necessary protective actions for onsite and offsite populations, and they have poorly developed emergency planning training programs characterized by lack of adequate emergency action levels and emergency procedures and by insufficient emergency response team training.

4.5.2.7.2 Findings and Concerns

EP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, site/facility emergency response.

FINDINGS:

- The Design Engineering Division does not have an emergency preparedness program as required in DOE 5500.1A and DOE 5500.3A (and its predecessor DOE 5500.3).
- Building emergency managers have not received sufficient emergency preparedness guidance, instruction, or training to implement their emergency management plan and establish an effective command control during emergencies.
- Personnel assigned the responsibility for drafting, developing and coordinating the Design Engineering Division emergency preparedness program perform this function as additional duties, not as a full-time activity.
- No alternates have been designated to ensure a 24-hour emergency response capability.
- The Design Engineering Division has not identified technical support, operations, or maintenance teams for emergency responses.
- Emergency management and field emergency response teams have not received necessary specialized and emergency response training.
- The Emergency Management Office has not performed its emergency preparedness oversight requirements to include the necessary support for training, emergency plan development, and guidance as required by DOE 5500 series of Orders.
- The Design Engineering Division does not have a procedure in place to address methods for resolving cited emergency planning action items and concerns, thus ensuring prompt resolution.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (EP.1-1) (H2/C1) **The Design Engineering Division at Los Alamos National Laboratory does not have an emergency preparedness program that provides the necessary protective actions during emergencies for both onsite and offsite populations and that provides the necessary documentation and training required by DOE 5500.1B, DOE 5500.2A, and DOE 5500.3A (and its**

predecessor
DOE 5500.3).

EP.2 EMERGENCY PLAN AND IMPLEMENTING PROCEDURES

PERFORMANCE OBJECTIVE: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

FINDINGS:

- Personnel at the Design Engineering Division have started to draft a facility emergency plan using the guidance of the new DOE 5500 series of Orders; however, they were directed to stop work, pending further guidance to be given by the Emergency Management Office.
- The Design Engineering Division has not developed an emergency planning zone for its credible emergencies.
- Not all responsibilities for each member of the emergency response organization and support teams are addressed in the Design Engineering Division emergency plan.
- The following concern was identified in the LANL self-assessment.

CONCERN: **See Concern TSA-4, EP.2-2**

FINDINGS:

- In accordance with DOE 5500.3A, emergency action levels provide the basis for classification of emergencies and the prompt initial actions and notifications required to be made by emergency response personnel and organizations.
- The Design Engineering Division and TA-2 have not established site-specific emergency action plans that, in accordance with DOE 5500.3A, must be specifically identified in procedures and must be readily observable and recognizable by responsible personnel.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (EP.2-1) (H2/C1) **At Los Alamos National Laboratory, the emergency plans of the Design Engineering Division and Omega West Reactor do not consider site-specific emergency action levels as required by DOE 5500.3A (and its predecessor DOE 5500.3).**

FINDINGS:

- Emergency plan implementing procedures have not been developed to support the provisions of the Design Engineering Division and TA-2 emergency plan.
- The emergency plan implementing procedures and emergency plan were reviewed for security classification before they were distributed.
- The Design Engineering Division has not developed controlled and approved checklists for easy reference during an emergency.

- The Design Engineering Division emergency plan and implementing procedures have not been crossed-referenced to the DOE 5500 series of Orders.

- See Concern TSA-4, EP.2-5.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (EP.2-2) (H2/C1)

Emergency plan implementing procedures At Los Alamos National Laboratory TA-41 tritium facility and Design Engineering Division have not been developed as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

EP.3 EMERGENCY RESPONSE TRAINING

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- Feedback from previous drills and exercises, cited improvement areas, and past appraisals have not been used as training tools during the development of emergency response training.
- The Design Engineering Division depends on the capabilities of the Emergency Management Office to provide the expertise to conduct its emergency response training. LANL does not provide this service.
- See Concern TSA-4, EP.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (EP.3-1) (H1/C1)

The Design Engineering Division at Los Alamos National Laboratory has not provided sufficient emergency response team training for all members of the Division emergency response organization as required by DOE 5500.3A (and its predecessor DOE 5500.3).

4.5.2.8 Technical Support

4.5.2.8.1 Overview

This appraisal addressed seven of the eight performance objectives in the Technical Support technical area. TS.6 Packaging and Transportation of Hazardous Materials was appraised as a separate discipline. TS.8 Criticality Safety for the LACEF was appraised by S&H Subteam 1. Criticality safety for the Weapons Subsystems Group Underground Vault was appraised jointly by Subteams 1 and 2. Criticality safety for the OWR was appraised by Subteam 2.

The appraisal was conducted through interviews with personnel at OWR, LACEF, and the various groups that work with tritium. Engineering for modification work in these facilities was discussed with representatives of the Safety and Risk Assessment Group, Health and Safety Division. This group has the responsibility to ensure that formal modification work has been reviewed by all required disciplines.

Documentation reviewed included SARs and the associated technical specifications for LACEF and the OWR, OSRs for the Tritium Salt Facility and the underground vault in TA-41 Bldg. 1 and a number of procedures.

Technical support is provided by personnel within the diverse experimental groups at LANL. These personnel are competent in designing experiments and modifying experimental equipment. They require and obtain assistance from outside engineering, safety and health, and environmental groups for more complex or specialized work.

Concerns identified in this appraisal reflect deficiencies in that current SARs and technical specification or OSR documents do not exist. Each group either prepares its own SARs or works in conjunction with consultant groups that formalize the documents.

Other concerns address the lack of (1) a LANL policy which would promote the recommendation of good local programs for site-wide adoption, (2) a program for control of experiment modifications, (3) formal job descriptions for nonsupervisory positions, and (4) a program to ensure that surveillance data are properly obtained. Contrary to the requirements of the applicable DOE Orders, an additional concern addresses the storage of fissile and combustible material in the OWR vault.

The LANL self-assessment report was prepared by personnel who were apparently knowledgeable of LANL facilities and operations but who were less familiar with DOE Orders and mandatory standards.

Technical support for experimental activities and for the reactor facilities are primarily provided by personnel who are highly qualified from a technical point of view (i.e., the experimenters and operating personnel). For extensive or complicated support, assistance must be obtained from specialists in other LANL organizations. The problem with self-support is that independent review will not be provided, national standards may not be applied, and a false sense that everything has been addressed will persist. In this appraisal, four of the seven concerns were associated with lack of management guidance or lack of policy and the other three involved noncompliance with DOE Orders.

4.5.2.8.2 Findings and Concerns

TS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The technical support organization and administration should ensure effective implementation and control of technical support activities.

FINDINGS:

- A number of organizations have good practices or policies that have not been adopted for sitewide use at LANL. Note the following are examples:
  - The "Weapons Engineering Tritium (Test) Facility Improvement/Difficulty Report (WIDR)" system which records off-normal events and tracks responses to completion.
  - The Safe Operations Program (WX-5-GP-91-009-U) in the Weapons Subsystems Group which outlines a program for (1) reviewing proposed activities and changes to existing activities, (2) providing a format for preparation and approval of standard operating procedures, and (3) performing the ALARA responsibilities of group supervisors.
- One of the above organizations reported that a good program was suggested to management for acceptance sitewide at LANL. Management did not respond.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (TS.1-1) (H3/C2) **Los Alamos National Laboratory does not have a program in place to provide a mechanism for promoting good practices or policies for sitewide use.**

FINDINGS:

- Most formal job summaries are listed in general terms, such as "scientist," so that flexibility exists for personnel to move freely from one job assignment to another. These descriptions are not definitive.
- Annual personnel performance appraisals for nonsupervisory positions include summaries of work to be completed in the following appraisal period. These summaries are looked upon as job descriptions but job assignments often change without new definitive job descriptions being formalized.
- See Concern TSA-2, OA.6-1, and Section 4.5.2.3.2, OP-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TS.1-2) (H3/C2)

At Los Alamos National Laboratory, detailed written job descriptions are not provided for professional positions in the reactor and tritium facilities.

TS.2 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and be properly and effectively used to support safe operation of all facilities on the site.

FINDINGS:

- The following organizations do not have SARs and the associated technical specifications or OSRs that meet the requirements of DOE 5480.5, DOE 5480.6, and DOE 5481.1B:
  - LACEF,
  - Target Fabrication Facility,
  - Tritium Systems Test Assembly,
  - Tritium Salt Facility, and
  - Tritium facilities at the Ice House.
- The Ion Beam Facility handles quantities of tritium that could make it a nuclear facility if accelerator facilities were not excluded by DOE 5480.5. A safety assessment should be published assessing the need for a SAR.
- The OWR has an approved SAR and technical specifications, but these are being revised to meet current DOE Order criteria.
- LANL AR 1-6, as cited in The Laboratory Manual, Chapter 1, "Environment, Safety and Health," (ES&H Manual), does not reference the applicable DOE Orders for preparation of SARs.
- Current operations are based on the approved but out-of-date SARs and technical specifications for OWR and LACEF. Tritium facility operations are based on either approved SARs or safety assessment documents and corresponding OSRs that need to be updated.
- See Concern TSA-2, AX.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (TS.2-1) (H2/C1) **The tritium and reactor facilities at Los Alamos National Laboratory have not maintained current safety analysis reports and technical specifications or operational safety requirements as required by DOE 5480.5, DOE 5480.6, and DOE 5481.1B.**

FINDING:

- Safety analyses or safety assessments have been made for the above facilities and drafts have been submitted to

DOE for approval. Some LANL facilities have been waiting for more than a year to receive DOE comments on draft safety documents.

- The following concern was partially identified in the AL self-assessment.

CONCERN: (TSA-2) (TS.2-2) (H2/C1) **Safety analysis reports for facilities at Los Alamos National Laboratory are not receiving timely review by Department of Energy organizations to ensure that the requirements of DOE 5480.5, DOE 5480.6, and DOE 5481.1B are met.**

TS.3 FACILITIES MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that assure proper design, review, control, implementation, and documentation in a timely manner.

FINDINGS:

- Modifications are designed predominately by personnel who will use the modifications. Reviewers of the design are specified by the scientists initiating the work. Modifications are installed under the supervision of the initiators.
- Checkout and operation of the modified equipment is performed by the initiating organization, often without independent review. Formal operational readiness reviews are not documented.
- Some modifications have been made without formal engineering design, which eliminates the review ensuring that applicable codes are met and that drawings are updated.

CONCERN: **See Concern TSA-4, TS.3-1.**

TS.4 EQUIPMENT PERFORMANCE TESTING AND MONITORING

PERFORMANCE OBJECTIVE: Effective equipment performance testing and monitoring should be performed by technical support groups to ensure that equipment and system performance is within established safety parameters and limits.

FINDINGS:

- A review of selected procedures for the tritium facilities and LACEF revealed that the technical specification and OSR items were not identified in the procedures.
- Surveillance test data, such as "as found" and "as left" readings, are not recorded in procedures so that trends may be analyzed.
- Guidance for preparation of procedures to ensure that necessary surveillance data are recorded is not provided by LANL management.
- See Concerns TSA-2, OP.2-1; TSA-2, AX.6-1; TSA-2, RP.8-1; and TSA-2, RP.8-2.

CONCERN: **See Concern TSA-4, TS.4-1.**

TS.8 CRITICALITY SAFETY

PERFORMANCE OBJECTIVE: Specialized support for criticality safety issues should be fully integrated into the operation of the reactor and the handling and storage of fuel by facility personnel. (Reactors Only)

FINDINGS:

- The OWR fuel storage vault is no longer used for reactor fuel assemblies. Some fissile material (a few fuel plates used for training purposes) is stored in the vault. The vault, which is about 8 by 8 feet, also contains combustible material. The storage of fissile and combustible materials in the same repository is forbidden by DOE 5480.5 and DOE 5480.6.

- The vault also contains such items as lead bricks, topaz, aluminum sleeves for in-reactor irradiations, and other items that should be stored for safe-keeping elsewhere.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (TS.8-1) (H2/C1) **Contrary to the requirements of DOE 5480.5 and DOE 5480.6, fissile and combustible materials are stored in the Omega West Reactor vault at Los Alamos National Laboratory.**

4.5.2.9 Packaging and Transportation

4.5.2.9.1 Overview

This appraisal included 11 of the 12 performance objectives for the Packaging and Transportation technical area. PT.7 Intra-Building Movements did not receive an indepth review because of overlap and prioritization of criteria. Information was obtained by (1) reviewing policies, procedures, the QA plan, shipment documentation, self-assessments, external and internal audits; (2) interviewing hazardous material packaging and transportation personnel and investigating activities at TA-16, Weapons Engineering Tritium Facility; TA-18, Pajarito Site; TA-2, OWR; TA-21, Tritium Salt Facility and Tritium Systems Test Assembly; TA-33, Tritium Handling Facility; TA-41, Weapons Subsystems Laboratory; and (3) interviewing personnel and observing the activities of the Safety and Risk Assessment Group.

LANL management has been taking an objective look at packaging and transportation activities across the Laboratory. Lessons learned from the Lawrence Livermore National Laboratory Tiger Team appraisal, the Lawrence Livermore National Laboratory appraisal of the LANL packaging and transportation program, and internal investigative committees were all considered. A joint application development document was issued internally on April 19, 1991, which identified areas needing improvement. However, a comprehensive action plan has not yet been approved by management for implementation.

The lack of an established hierarchy of internal LANL packaging and transportation requirements documents has created administrative confusion and organizational uncertainty within the Materials Management, Health and Safety, and Operational Security and Safeguards Divisions and the Waste Management Group, relative to which organization is or should be in charge of the overall packaging and transportation program at LANL.

Personnel at the facility working group level are unclear about organizational interfaces as well as about the more stringent DOE and Department of Transportation requirements for transporting hazardous materials on public roads. However, their willingness to strive for program improvements and excellence is commendable.

The well-prepared Materials Management Division self-assessment and the ES&H self-assessment identified many of these problems. In some cases corrective action is already under way. LANL plans to reorganize transportation responsibilities. Until this reorganization is complete, group responsibilities are defined, and the revision of the Onsite Transportation Manual is complete, group level hazardous material/waste plans and procedures cannot be completed. Therefore, management approval of a comprehensive action plan is imperative.

LAAO has not played an active role in oversight of LANL packaging and transportation activities. With seven major areas of LANL oversight responsibilities, it is unlikely that all packaging and transportation activities will receive increased coverage without additional resources being assigned to the area office. The lack of sufficient staff was also identified in the LAAO self-assessment.

Several deficiencies have been identified by the Packaging and Transportation appraisal. Packaging and transportation activities are fragmented. The availability of approved containers is not regularly assessed throughout LANL to allow planning for future needs and prevent adverse operational effects when approved containers are not available for use. Packaging and transportation training requirements are not clearly defined, and training is not always consistent from facility to facility. Packaging and transportation activities do not have independent QA oversight to ensure that DOE 5700.6B and ASME NQA-1-1989 requirements (such as those related to operating procedures, training, and records) are being met. Hazardous waste materials stored at the Tritium Salt Facility and TA-33, do not meet storage and inspection requirements of 40 CFR. Operating procedures and QA program requirements have not been established for the 89001 container as required by the DOE Offsite Transportation Certificate. Identification and storage of compressed gas cylinders do not meet the requirements of 40 CFR or DOE 5480.3. No container maintenance program has been established for reusable shipping containers. Hazardous material shipment records are not in compliance with 49 CFR or DOE 5480.3. Independent internal safety audits or appraisals have been conducted for packaging and transportation activities. AL and LAAO oversight do not meet the followup verification requirements of DOE 5482.1B and DOE 5700.6B.

4.5.2.9.2 Findings and Concerns

PT.1 ADMINISTRATION AND ORGANIZATION

PERFORMANCE OBJECTIVE: Management should develop and implement a system of policies and directives that will provide for effective implementation of Department of Energy Orders, particularly DOE 5480.3, DOE 1540.2, Federal and State regulations, and good industrial practices, in operations involving packaging and transportation of hazardous materials.

FINDINGS:

- No transportation safety committees have been established at the tritium facilities, TA-18, or at OWR to review and coordinate interrelated facility hazardous material packaging and transportation activities.
- The Onsite Transportation Manual does not provide guidance to the tritium facilities, TA-18, and OWR for shipments made along or across public roads, which must comply with Department of Transportation (DOT) requirements.
- Requirements for hazardous material packaging and transportation are fragmented between six manuals.
- The responsibility to notify packaging and transportation users of regulatory changes has not been defined by appropriate procedures.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.1-1) (H2/C1) **Packaging and transportation activities at Los Alamos National Laboratory are fragmented and do not ensure consistency or compliance with DOE 5480.3.**

FINDINGS:

- LANL does not perform annual inventories of reusable containers to plan for future container needs.
- Annual container inventories are not performed at TA-18, TA-41, or TA-33 as required by the HAZPACT Quality Assurance Manual.
- Some Laboratory Type B containers are not currently authorized for offsite shipment. However, to meet DOT requirements, Type B containers are being used in conjunction with road closures for shipments made on site over public roads. This practice has an adverse impact on facility operations at TA-55, TA-35, TA-41, TA-18, and TA-3.
- The Tritium Systems Test Assembly has no certified Type B containers for shipping tritium waste. This will create an operations and storage impact.

- See Concern TSA-4, PT.12-1.

- The following concern was partially identified in the LANL self- assessment.

CONCERN: (TSA-2) (PT.1-2) (H3/C1)

At Los Alamos National Laboratory, annual inventories of reusable shipping containers are not being performed by the tritium facilities, TA-18, or Omega West Reactor to anticipate present and future container needs as required by the HAZPACT Quality Assurance Manual.

PT.2 TRAINING

PERFORMANCE OBJECTIVE: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE 5480.3 and 49 CFR.

FINDINGS:

- Training requirements have not been established for personnel who transport hazardous material.
- LANL AR-3-5 presents a list of available driver training courses. However, the drivers are not required to demonstrate proficiency in all courses. Line management selects which courses their drivers will attend.
- Training requirements have been established for radioactive material packagers and Safety and Risk Assessment Group personnel. However, requirements have not been established personnel handling for nonradioactive hazardous materials.
- Not all radioactive material packagers and supervisors receive radioactive material packaging training.
- No system is in place to ensure retraining on radioactive material every two years as required by the HAZPACT Quality Assurance Manual.
- The HAZPACT Quality Assurance Manual does not provide guidance to facility managers for additional training by referencing requirements established in DOE 5480.3 and 49 CFR.
- The Radioactive Materials Packaging Certification course has been discontinued. Retraining requirements will have to be identified by line management.
- No centralized system has been established at LANL to maintain all packaging and transportation training records.
- See Concerns TSA-2, TC.1-1, and TSA-4, PT.2-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.2-1) (H2/C1) **The Los Alamos National Laboratory has not established a packaging and transportation training program to meet DOE 5480.3, 49 CFR, or ASME NQA-1-1989.**

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures the quality assurance requirements of the applicable Department of Energy Orders, especially DOE 5700.6B, and ASME NQA-1-1989 are met.

FINDINGS:

- Chemical and mixed waste management procedures for the Waste Management Group are not reviewed by the Safety and Risk Assessment Group as required by LANL AR-10-3.
- Tritium packaging and shipping procedures for TA-55 tritium activities have not been reviewed by the Safety and Risk Assessment Group.
- Independent QA preshipment checking or shipment oversight of packaging and transportation activities was not evident at TA-16 Bldg. 205; WET Facility; TA-18, Tritium Systems Test Assembly and Tritium Salt Facility; TA-33 Bldg. 86; and TA-41.
- Tritium Systems Test Assembly and Tritium Salt Facility procedures do not identify waste shipment interface or record retention requirements.
- Because the Safety and Risk Assessment Group provides technical support for packaging and transportation activities, their surveillances and inspections are not independent.
- See Concerns TSA-2, QV.1-2, and TSA-4, PT.3-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.3-1) (H2/C1) **At Los Alamos National Laboratory, no independent quality assurance oversight of packaging and transportation activities is performed as required by DOE 5700.6B and ASME NQA-1-1989.**

PT.4 REGULATORY COMPLIANCE

PERFORMANCE OBJECTIVE: All packaging and transportation operations involving hazardous materials should be conducted in compliance with the applicable Federal and State regulations, including those of the Department of Transportation, the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and the Environmental Protection Agency.

FINDINGS:

- Hazardous waste material is stored for longer than 90 days at TA-33.
- Satellite storage areas are not posted at Tritium Systems Test Assembly, Tritium Salt Facility, and TA-33.
- Weekly inspections of storage areas are not performed.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.4-1) H2/C1) **At Los Alamos National Laboratory hazardous waste material stored at the Tritium Salt Facility and TA-33 do not meet the storage and inspection requirements of 40 CFR.**

FINDINGS:

- Leak tests are performed on the 89001 vessel by personnel with no documented leak test qualification as required by ASME NQA-1-1989 and DOE 5700.6B.
- TA-41 Bldg. W-4 does not have a facility-specific packaging and transportation operating procedure as required by the DOE Offsite Transportation Certificate for the 89001 container.
- TA-41 Bldg. W-4 uses a Rocky Flats Plant procedure for operations related to the 89001 container.
- Independent QA inspections of the 89001 container are not performed as required by the DOE Offsite Transportation Certificate.
- See Concern TSA-2, OP.5-2.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.4-2) (H2/C1) **At Los Alamos National Laboratory, TA-41 Building W-4 does not have facility-specific procedures or a quality assurance program for use of the 89001 container as required by the Offsite Transportation Certificate issued by the Department of Energy.**

FINDINGS:

- Gas cylinders are stored unprotected from the sun and other elements.
- Not all gas cylinders are marked for contents at TA-33.

- Empty gas cylinders are stored with full cylinders.
- Some cylinders display unauthorized labels.
- Not all empty cylinders are tagged empty.
- See Concerns TSA-4, WS.3-1; TSA-4, QV.6-5; and TSA-4, PT.8-3.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.4-3) (H2/C1) **At Los Alamos National Laboratory, compressed gas cylinders stored at the Tritium Handling Facility in TA-33, do not meet storage and identification requirements of 40 CFR and DOE 5480.3.**

PT.6 OPERATIONS

PERFORMANCE OBJECTIVE: Sitewide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted practices.

FINDINGS:

- LANL AR-1-3, "Standard Operating Procedures and Special Work Permits," dated October 30, 1987, does not require the Safety and Risk Assessment Group to review standard operating procedures for packaging and transportation at tritium facilities, TA-18 and OWR.
- The tritium facilities, TA-18, and OWR procedures do not provide clear delineation of the process flow or management or management systems for making waste shipments. For example, a shipment of asbestos waste being prepared at the Tritium Salt Facility requires three different organizations to complete portions of the transfer form. Interface responsibilities are not identified for making such a shipment.
- Where facility-specific procedures exist for packaging and transportation activities, assignment of responsibilities is not clearly stated as required by ASME NQA-1-1989 and DOE 5480.3.

CONCERN: **See Concern TSA-4, PT.6-1.**

FINDINGS:

- A maintenance program for reusable containers is not defined and implemented for the tritium facilities, TA-18, and OWR.
- See Concerns TSA-2, QV.1-3, and TSA-4, PT.12-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **(TSA-2) (PT.6-1) (H2/C1)**

A maintenance program has not been established at Los Alamos National Laboratory for reusable shipping containers as required by DOE 5480.3 and 49 CFR.

PT.10 RECORDS

PERFORMANCE OBJECTIVE: Records of hazardous materials movements, transfers, and shipments should be prepared and maintained to ensure compliance with Department of Energy and other regulatory requirements and to provide an auditable trail of actions.

FINDINGS:

- Shipment record retention requirements have not been established at TA-18, the tritium facilities, or OWR.
- The hazardous material transfer form does not require documentation of drum numbers for those containers not having serial numbers or tamper-indicating devices. This creates a problem for hazard communication because the content of a specific container cannot be identified from the form if there are multiple entries of the same type of container or identification number.
- If a problem arises with a drum transported on site, the content of a specific container cannot be traced.
- The Safety and Risk Assessment Group has detected approximately 100 documentation errors per month on hazardous material transfer forms.
- Shipment records retained by tritium facility shippers do not document receipt of shipments.
- A spot check of hazardous material transfer forms for the tritium facilities, TA-18, and OWR identified numerous documentation errors, such as certification statements not signed, errors in proper shipping name, and incomplete recording of required data.
- The Onsite Transportation Manual does not require use of the hazardous material transfer form.
- Documentation errors were identified in the 1989 AL appraisal of LANL packaging and transportation activities.
- See Concerns TSA-4, PT.8-4, and TSA-4, PT.10-1.
- The following concern was identified LANL self-assessment.

CONCERN: (TSA-2) (PT.10-1) (H2/C1) **Hazardous material shipment records at Los Alamos National Laboratory do not comply with 49 CFR and DOE 5480.3.**

PT.11 APPRAISALS AND INTERNAL AUDITS

PERFORMANCE OBJECTIVE: Periodic packaging and transportation safety appraisals of contractors by the Field Office and independent internal packaging and transportation safety audits by each contractor, required by DOE 5480.3, are conducted in accordance with DOE 5482.1B.

FINDINGS:

- The HAZPACT Quality Assurance Manual does not require independent audits of the tritium facilities, TA-18, and OWR hazardous material packaging and transportation activities.
- The health and safety audits conducted by the Safety and Risk Assessment Group are not independent because they provide technical support to the packaging and transportation program.
- See Concern TSA-4, PT.3-3, and TSA-2, QV.1-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PT.11-1) (H3/C1) **No independent internal safety audits or appraisals of packaging and transportation are conducted at Los Alamos National Laboratory as required by DOE 5480.3, DOE 5482.1B, and DOE 5700.6B.**

FINDINGS:

- LAAO has not developed an oversight plan for LANL.
- The LANL Appraisal Management Center deficiency report, dated October 9, 1991, indicates that 45 completed actions have not been verified for closure on the AL March 1988 appraisal.
- LANL occurrence reports are not routed through the LAAO.
- LAAO has no method of tracking open action items at LANL.
- See Concerns TSA-4, PT.3-5, and TSA-4, PT.3-6.
- The following concern was identified in the LAAO and AL self-assessments.

CONCERN: (TSA-2) (PT.11-2) (H3/C1) **Los Alamos Area Office and Albuquerque Field Office oversight of Los Alamos National Laboratory packaging and transportation activities does not meet the requirements of DOE 5482.1B and DOE 5700.6B for followup verification of corrective actions.**

4.5.2.10 Security/Safety Interface

4.5.2.10.1 Overview

The Security/Safety Interface technical area of the S&H Subteam 2 appraisal was performed by interviewing personnel and observing an unannounced evacuation drill, as well as the participation of security personnel appraisal in the emergency exercise. The Ice House vault, Hillside vault, Kiva II, and Kiva III were entered for the purpose of observing the responses of protective force personnel relative to these highly secured areas. Applicable documents were also reviewed. All four performance objectives and the criteria pertaining to Security/Safety Interface were addressed, with concerns identified in two performance areas.

In some cases, the show of force (automatic rifles, handguns, and vehicle-mounted automatic weapons) was substantiated. Some personnel expressed a certain amount of fear and concern at working under such conditions. There was also some concern expressed that the level of security force might have been too high for the potential risk involved. In some cases, facility management personnel were not conversant regarding how to reduce the security coverage when the risk was reduced.

At LACEF, the protective force security post orders require the presence of security personnel when the Kivas are unlocked. When work which may take considerable time is required in the Kivas, security personnel sometimes lock the Kiva doors with the workers inside. This practice is acceptable because the workers can get out by using crash bars on the inside of the doors. When security personnel leave under these circumstances, the security orders require that the perimeter gate be latched but not locked. Some security personnel, however, lock the gates when leaving. This practice increases the potential hazard to workers if they need to vacate the Kiva and perimeter fence in a hurry.

The protective force security personnel at the tritium and reactor facilities at times use excessive acceleration and speed in security vehicles when responding to alarms. This places personnel who are walking on the roadways at unnecessary risk.

At the Tritium Systems Test Assembly and Tritium Salt Facility, no formal system is in place to keep facility post orders current with changing potential hazards, nor has a feedback system been established to keep facility management personnel informed of changes to the post orders.

The LANL self-assessment process used the TSA Performance objectives and criteria to perform the appraisal. The concerns identified were, in most cases, broad and sweeping. The self-assessment was apparently fairly comprehensive in identifying issues that apply across LANL. However, specific issues that may only be applicable to one or two Technical Areas were not addressed. One of the concerns in this section was partially identified in the LANL self-assessment report; the other concern was not.

4.5.2.10.2 Findings and Concerns

SS.1 SAFETY OF IMPROVEMENTS

PERFORMANCE OBJECTIVE: Security/safeguards improvements and modifications should not create or increase hazards that would impede the safe, reliable operation or shutdown of any facility on the site in normal, abnormal, or emergency situations.

FINDINGS:

- At LACEF the security post orders allow protective force personnel to leave during extended work periods in the Kiva building but require locking only the building doors and latching (but not locking) the perimeter fence gate. This system allows personnel to vacate both the building and enclosure fence in the event of an emergency.
- It was reported that when personnel at the LACEF are performing work that requires an extended period of time in the Kiva buildings, protective force personnel sometimes lock the doors to the Kiva, lock the gate in the perimeter fence, and leave. Personnel working in the Kiva are thus locked inside.
  - With the doors to the Kiva locked, personnel can vacate the building by mean of the crash bars on the door, although access from the outside is prevented.
  - With the perimeter fence gate locked, access to and from the enclosure is prevented.
- LACEF management reported that the problem described above has been discussed with security management but continues to recur intermittently.
- Excessive acceleration and speed, which is a violation of security post orders, by protective force response vehicles at the tritium and reactor facilities subject facility personnel to an unnecessary risk while walking along the roadways.
- See Concern TSA-2, OP.3-1.
- The following concern was not identified in the LANL self- assessment report.

CONCERN: (TSA-2) (SS.1-1) (H2/C1) **Protective force personnel at the tritium and reactor facilities at Los Alamos National Laboratory do not always follow post order requirements, which puts facility personnel at risk.**

SS.4 SAFETY OF SECURITY ACTIVITIES

PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous processes and materials should be identified and understood by all involved parties.

FINDINGS:

- At the Tritium Systems Test Assembly and Tritium Salt Facility, no mechanism is in place to remind management to provide input to security post orders regarding changes in potential hazards associated with these facilities.
- At some facilities, security personnel periodically send the post orders to management to update potential hazards that could be encountered, whereas at other facilities this does not occur.
- There is no feedback system to inform facility management when the post orders have been revised with respect to changes in potentially hazardous conditions within the facility.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (SS.4-1) (H2/C2) **At the Los Alamos National Laboratory Tritium Systems Test Assembly and the Tritium Salt Facility, no formal system has been established to keep security post orders current with potential hazards nor has a feedback system been developed to inform facility management when security post orders are changed.**

4.5.2.11 Experimental Activities

4.5.2.11.1 Overview

All four performance objectives for the technical area involving Experimental Activities were addressed during this appraisal. Very little distinction exists between "experimental activities" and "operations" at OWR, LACEF, and many of the tritium facilities. OWR operations consist largely of irradiation of samples, for which the facility was designed. It has been almost 2 years since an experiment has been run at OWR. At LACEF, experimental plans are, in effect, the operating procedures for each critical assembly.

The appraisal included review of policies and procedures related to review of experiments, documentation of reviews, and experimental setups, as well as interviews with chairpersons of the facility safety committees, facility managers, line management, experimenters, and the chairperson of the Los Alamos Reactor Safety Committee. Previous TSAs of the OWR and the Tritium System Test Assembly were reviewed.

A detailed appraisal of the procedures and policies of the Tritium System Test Assembly, Tritium Salt Facility, Ice House, and WET Facility was conducted because they are the major users of tritium. The Ion Beam Facility and the Target Fabrication Facility were also reviewed. A recurring safety review is provided by the Health and Safety Division through its regular program, and an assessment is provided through the Laboratory Assessment Office, which reports to the Director's Office. LANL does not have an independent safety review committee for the tritium facilities as required by DOE 5480.5.

Proposed experiments in the OWR and LACEF follow a chronological pathway mandated by well-understood policies and directives. At OWR, all but the most routine irradiations are reviewed and approved by the facility safety committee and line management. At LACEF, all experimental plans are in the process of revalidation and approval by the facility safety committee and line management in the aftermath of an extended shutdown period. The OWR and LACEF personnel operate the reactors and experiments according to experimental proposals provided by programs requesting experiments. In some cases, the Reactor Safety Committee does not have the opportunity to review proposed experiments before they are run.

In broad and general terms, the LANL self-assessment identified concerns related to essentially all of the DOE performance objectives and criteria for performing self-assessments. The LANL self-assessment discussed broad findings in the area of Experimental Activities, but they were so general that they did not relate to review of reactor experiments by the Reactor Safety Committee and to specific problems with the tritium facilities. The self-assessments of the tritium organizations varied but did not identify shortcomings in experimental activities. No self-assessment was performed for the OWR and the facility used the last TSA in its place. Many of the experiments at the tritium facilities have been shut down for months for safety review or have been affected by the status of the High Pressure Tritium Laboratory. When it becomes operational, the WET Facility will not conduct experiments during its initial phase. For the most part, the experiments conducted in the Tritium System Test Assembly are essentially operations. At the Tritium System Test Assembly supervisors and operators generally conduct the activities, be they operations or experiments. When individuals outside

the Tritium Science and Technology Group or outside LANL conduct experiments, they must meet the training and procedure review requirements of the Tritium System Test Assembly organization. In addition, these outside individuals must work under close observation by Tritium System Test Assembly personnel.

In summary, review and approval of experimental activities at the LANL reactors are well defined, well understood, and generally meet DOE requirements. At the tritium facilities, however, LANL does not have an independent committee with the indepth technical competence to review experiments as required by DOE 5480.5.

4.5.2.11.2 Findings and Concerns

EA.2 EXPERIMENT CATEGORIES

PERFORMANCE OBJECTIVE: All proposed experiments should be approved by an independent Safety Review Committee before they are performed.

FINDINGS:

- The Reactor Safety Committee has responsibility for independent, continuing safety surveillance and evaluation of reactor operations and experiments.
- The Reactor Safety Committee makes recommendations to the ES&H Council regarding approval for new experiments that are outside the bounds of previously approved experiments.
- Proposed experiments are reviewed and approved by line management and may be run before the Reactor Safety Committee is aware of them.
- The former chairperson of the Reactor Safety Committee recognized that the committee needs timely information and recommended that minutes of facility safety committees be provided directly to all members of the Reactor Safety Committee.
- The newly appointed chairperson of the Reactor Safety Committee expressed concern that the annual reviews required by the Reactor Safety Committee Charter may not be sufficient to cover all proposed activities.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (EA.2-1) (H2/C1) **Contrary to the requirements of DOE 5480.6, the Reactor Safety Committee at Los Alamos National Laboratory does not always have an opportunity to review and recommend approval of experiments before they are run.**

FINDINGS:

- Proposed tritium experiments are reviewed at the group level.
- Test plans used to develop standard operation procedures are reviewed by the group.
- Standard operating procedures for tritium operations are reviewed by the Health and Safety Division without using independent subject matter experts.
- Once standard operating procedures are approved by the group leader, they can be used without review and approval.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (EA.2-2) (H2/C1)	Los Alamos National Laboratory does not have an independent safety committee to review tritium experiments and operating procedures as required by DOE 5480.5.

EA.4 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments performed in any facility on the site should not present undue risk or significantly increase the risk previously evaluated for the facility or the site.

FINDINGS:

- Gloveboxes in the Tritium System Test Assembly have safety pressure release bubblers that are smaller than those found in standard industry practice.
- Liquid nitrogen is being piped into vessels inside gloveboxes in the Tritium System Test Assembly.
- A liquid nitrogen pressure flash resulting from a line break or leak can cause a significant pressure increase which could blow off glovebox fronts or gloves.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (EA.4-1) (H1/C1) **At Los Alamos National Laboratory, Tritium experiments which use liquid nitrogen were conducted without risk analyses as required by DOE 5481.1B.**

FINDINGS:

- LANL policy does not require that measuring devices used to monitor safe operations be calibrated.
- Tritium experimental conditions are monitored with uncalibrated measuring devices such as pressure transducers and temperature thermocouples.
- Uncalibrated instruments are used to shut down unsafe conditions.
- Measuring devices are monitored by the computer systems in the Tritium System Test Assembly and WET Facility as part of their safety protection system.

CONCERN: **See Concern TSA-4, QV.4-1.**

FINDINGS:

- The Kivas at LACEF were studied for seismic adequacy. Kivas II and III meet current design guidelines for natural phenomena events for moderate hazard facilities. The preliminary results indicate that Kiva I meets guidelines only for general purpose facilities.
- An experiment supporting the New Production Reactor Program is being constructed in Kiva I, and additional slab tank experiments may be run in Kiva I.
- Kivas I, II, and III are designated as moderate hazard facilities.

- Engineering studies to evaluate structural upgrade options for seismic resistance at Kiva I have not been performed.

CONCERN: **See Concern TSA-1, NP.2-1.**

4.5.2.12 Site/Facility Safety Review

4.5.2.12.1 Overview

All six performance objectives for the technical area involving Site and Facility Safety Review were addressed during this appraisal. The appraisal was conducted by (1) reviewing documentation related to the organization and implementation of the independent review and appraisal system; (2) interviewing line management, health and safety staff, safety committee chairpersons, facility personnel, and the Executive Secretary of the ES&H Council; and (3) evaluating organizations responsible for regulations and appraisal activities.

The documents reviewed included those related to policy, the appraisal program, major safety committee charters, safety committee minutes, conduct of operations, self-assessments, specific facilities visited by the appraisal team, safety reviews, and health and safety programs. Numerous facilities were toured and inspected, including the OWR, LACEF, and other facilities located in TA-18, the tritium facilities in TA-33 Bldg. 86, TA-41, Bldg. 4, Tritium Systems Test Assembly, Tritium Salt Facility, Target Fabrication Facility, and Ion Beam Facility.

The appraisal and review programs for the OWR and LACEF are well documented, with clear lines of authorities and responsibilities. A layered appraisal system covers appraisal and reviews by line and laboratory management and by the Health and Safety Division. This provides for independent review of the internal review system. OWR and LACEF have chartered active safety committees that provide safety advice to facility management on a wide range of topics, with particular emphasis on experiments, irradiations, equipment, and operations. Group and division offices perform inspections of the facilities on at least an annual basis. AL appraises reactor safety with satisfactory coverage and frequency. The Reactor Safety Committee provides an annual independent review of the OWR and LACEF. The Reactor Safety Committee annual reviews are technically very good and cover all aspects of ES&H as required by DOE 5480.6. The Reactor Safety Committee also makes several special reviews of revisions to SARs, technical specifications, and other topics, as deemed appropriate by the Committee or as requested by the operating groups. The Los Alamos Nuclear Criticality Safety Committee provides an annual independent review of nuclear criticality safety for locations at the OWR, including the LACEF and tritium facilities where special nuclear materials are used or stored. (Note: Results of the appraisal of nuclear criticality safety are in the S&H Subteam 1 report.)

Based on this review of the reactor appraisal system, operation of the Reactor Safety Committee should be improved and the ES&H Council needs to fulfill its responsibilities by approval or disapproval of Reactor Safety Committee recommendations and by providing approved recommendations to the facilities for action.

Although appraisal and review programs are in place for the reactors, similar programs have not been established for tritium facilities. Independent safety review committees (above the group level) are not in place as required by DOE 5480.5. AL has conducted some nuclear facility safety appraisals for tritium facilities as required by DOE 5480.5 and DOE 5482.1B.

Operating experiences and age-related phenomena and degradation of the tritium facilities, OWR, LACEF, and TA-18 facilities need to be tracked and reviewed.

In summary, triennial appraisals of how well the safety review systems are working have been performed regularly but have been directed toward the reactors and nuclear criticality safety. Triennial appraisals have addressed neither the role of independent ES&H coverage in the overall safety review system for facilities other than reactors nor the need for independent reviews of ES&H coverage by individuals with indepth technical competence related to the tritium facilities. Tritium operations at LANL are slowly changing toward greater formality. Many tritium facilities personnel do not consider the full danger of handling tritium because they usually work with tritium in its gaseous phase and do not account for the potential danger of tritiated water or oil.

4.5.2.12.2 Findings and Concerns

FR.1 SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: A Safety Review Committee should be available to review safety questions and the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, DOE 5480.6, and/or DOE 5482.1B, Section 9.d.

FINDINGS:

- The tritium facilities have group safety committees to advise facility management on safety issues. Many of the operations are small, with essentially all personnel involved in all aspects of the operation.
- Review by the group safety committees cannot be considered independent because of the involvement of members in all phases of the operations.
- LANL has not provided an independent safety review committee for tritium facility operations.

CONCERN: See Concern TSA-4, FR.1-1.

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

FINDINGS:

- Extensive security enhancements have been established over the last several years at the TA-18 site where LACEF, the Hillside vault, and offices are located.
- Review of LACEF safety committee records and discussion with committee members and managers from the TA-18 site revealed that TA-18 site personnel were not given an opportunity to review the safety impact of the security enhancements.
- The Deputy Division Leader, Nuclear Technology and Engineering, noted that security enhancements are mandated largely by DOE, with little or no opportunity for review by the operating groups.
- At LACEF, no alternate egress gate is available in the event of an accident at the front gate.
- See Concern TSA-2, SS.1-1.

CONCERN: **See Concern TSA-4, SS.2-1.**

FINDINGS:

- At LACEF, the west side of Kiva II has been settling for the past 4 years. To date, the floor on the west side has settled about 1/2 inch.
- The Flattop critical assembly in Kiva II is not level.
- The experimental plans for operation of Flattop, Big Ten, and Comet in Kiva II have been revalidated and approved during the past few months. The effect of the uneven floor was not considered in the revalidations.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (FR.2-1) (H2/C2) **At the Los Alamos National Laboratory the effects of uneven floor settling on the safe operation of the critical assemblies in Kiva II of the Los Alamos Critical Experiments Facility has not been evaluated.**

- The Ion Beam Facility handles large quantities of tritium (in excess of 10 grams). The quantities of tritium used in this facility could make it a nuclear facility if accelerator facilities were not excluded by DOE 5480.5.
- Neither an SAR nor a safety assessment is available for the Ion Beam Facility. A draft preliminary hazard assessment is available.

- LANL tritium technical support by the Ion Beam Facility staff is not used.
- Equipment and instruments which have been exposed to tritium are not marked as required by industry good practice.
- Radiation control work procedures as required by ALARA (DOE 4330.4A) are not in evidence.
- Accident analysis involving tritiated organics and tritiated water have not been performed.
- The following concern was not identified is the LANL self-assessment.

CONCERN: (TSA-2) (FR.2-2) (H1/C1) **Los Alamos National Laboratory is not performing comprehensive safety evaluations of the operation of the Ion Beam Facility to ensure that good operating and as-low-as-reasonably-achievable practices are being applied as required by DOE 5481.1B.**

FR.3 OPERATION OF SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: Review of site/facility activities by the Safety Review Committee should ensure achievement of a high degree of safety.

FINDINGS:

- The LANL Reactor Safety Committee performs annual independent reviews of reactors.
- The results of the required annual reviews and recommendations are included in the minutes of the review meeting.
- There is no formal transmittal of the minutes of the Reviews of the Reactor Safety Committee. The minutes are routed to the reactor operations, committee members, and the ES&H Council by a simple distribution slip.
- Minutes of the reviews are not issued in a timely manner, nor do the minutes reflect the issue date. Issuance of the review minutes may occur from 3 to 9 months after the review.
- The annual reviews have not always been performed with the required quorum of 6 members.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (FR.3-1) (H3/C1) **The Los Alamos National Laboratory Reactor Safety Committee does not always comply with the requirements of its charter and DOE 5480.6.**

FINDINGS:

- The LANL Reactor Safety Committee minutes, including recommendations, are routed to the ES&H Council.
- Contrary to the Reactor Safety Committee Charter, the LANL ES&H Council has not approved or disapproved any recommendations and has not sent the approved recommendations to facility division and group leaders for implementation.
- An understanding exists at OWR and LACEF that Reactor Safety Committee recommendations should be addressed by the next annual review.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (FR.3-2) (H3/C1) **The Environment, Safety, and Health Council is not approving or disapproving the recommendations of the Los Alamos National Laboratory Reactor Safety Committee.**

FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management as specified in DOE 5480.5 and DOE 5480.6.

FINDINGS:

- Annual reviews of the tritium facilities have not been conducted by independent tritium subject matter experts versed in the technology being reviewed.
- The Health and Safety Division Leader did not fully recognize the need for annual reviews by independent tritium experts.
- There is a plan to have annual reviews of the tritium facilities by external (outside of LANL) tritium subject matter experts by establishing the External Tritium Advisory Committe (ETAC). A charter has been developed and the first review is planned in March, 1992.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (FR.4-1) (H2/C1) **Annual operating reviews of the tritium facilities at Los Alamos National Laboratory are not conducted using independent individuals with indepth technical competence as required by DOE 5480.5 and DOE 5482.1B.**

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

FINDINGS:

- Triennial appraisals of the safety review systems have not identified the lack of a tritium safety review committee.
- Laboratory management of the triennial appraisal system has not addressed the role of an independent safety review system for the tritium facilities.

CONCERN: See Concern TSA-4, FR.5-1.

FR.6 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experiences should be evaluated, and appropriate actions should be undertaken to improve safety and reliability.

FINDINGS:

- Operating experiences, occurrence reports, incidents and accidents, and equipment performance data are not routinely collected and shared among the organizations operating the LANL tritium and reactor facilities.
- DOE-wide tritium and reactor experiences are not effectively distributed by LANL to management and staff.
- See Concerns TSA-2, OA.5-1, and TSA-2, OP.6-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (FR.6-1) (H2/C1) **Los Alamos National Laboratory has not established a program for the collection, evaluation, and dissemination of operating experiences to the tritium and reactor and facility staff.**

FINDINGS:

- Many of the tritium and reactor facilities (OWR and LACEF) have been in existence for several decades. Some are showing the effects of age (e.g., the floor in Kiva II is settling and cracked).
- OWR has a formal program assessing the probable life of the reactor, and a modest program has recently been initiated to evaluate the aging components on the Comet, Flattop, and Big Ten assemblies in Kiva II. This program may be expanded to include the Kiva itself.
- Information regarding degraded performance, maintenance, reliability, and in-house occurrence experiences are not collected in a consistent fashion at the tritium facilities, OWR and LACEF. The available information is not tracked or trended for use by management.
- See Section 4.5.2.5.2, MA.7.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (FR.6-2) (H2/C2) **Los Alamos National Laboratory has not established a comprehensive program to track and review age-related phenomena and degradation for the tritium and reactor facilities.**

FINDINGS:

- At LACEF, the Godiva IV machine in Kiva III has developed a crack in one of its fuel rings.
- A new fuel ring for Godiva IV is being procured.

- Radiation levels in the Godiva IV fuel have decayed because of the extended shutdown of LACEF.
- Management is considering restarting the Godiva IV assembly for training before replacing the cracked ring, thereby increasing the radiation levels.
- After the potential restart with the cracked ring, Godiva IV will be shut down for ring replacement. An ALARA assessment of the proposed restart and ring replacement is not planned.
- See Concern TSA-2, OP.4-2.

CONCERN: **See Concern TSA-1, RP.11-1.**

4.5.2.13 Radiological Protection

4.5.2.13.1 Overview

All 12 performance objectives in the Radiological Protection technical area were addressed in this appraisal. However, findings and concerns in RP.4 External Radiation Exposure Control Program are included in other technical areas. Data was gathered through site visits, interviews with operational personnel, radiation protection technicians, Health and Safety Division personnel, and health physicists and through review of LANL policies, procedures, standard operating procedures, and internal correspondence regarding conduct of radiation protection. Data also came from management's description of responsibilities deriving from DOE 5480.11.

Tritium facilities include the following: TA-3 Bldg. 16 (Ion Beam Facility), TA-16 Bldg. 205 (WET Facility), TA-21 Bldg. 155 (Tritium Systems Test Assembly), TA-21 Bldg. 209 (Tritium Salt Facility), TA-33 Bldg. 86 (High Pressure Tritium Laboratory), TA-35 Bldg. 34 (Beta Decay Experiment), TA-35 Bldg. 213 (Target Fabrication Facility), and TA-41 Bldg. 4 (Ice House). Additional facilities included in the appraisal were TA-2 Bldg. 1 (OWR), TA-18 (Pajarito Site), and TA-3 Bldg. 40 (Radiological Calibrations Facility).

The radiation protection functions in the facilities visited by S&H Subteam 2 demonstrate the nonuniformity of the radiation protection program at LANL. The reasons for this nonuniformity are apparently numerous; for example, until recently the health physics operating groups were geographically controlled and philosophically separate. Consequently, the programs were operated differently. In several instances a vacuum appears to exist at LANL in the implementation of the more conservative requirements of DOE 5480.11. Management has unilaterally instituted changes which are contrary to DOE 5480.11 and/or LANL requirements. Management develops standard operating procedures, radiation work permits, and special work permits without review or approval of the Health and Safety Division.

Posting and contamination control in tritium facilities is nonuniform (even when the facilities are in the same division). This nonconservative aspect of the program coupled with the absence of timely tritium smear and bioassay analyses makes the quality of radiation worker protection hard to quantify. In addition, it will be difficult or impossible to demonstrate that exposures are ALARA and that timely response will be taken in the event of an undetected tritium release.

An occurrence identified by S&H Subteam 2 at the Ion Beam Facility, involving maintenance of a highly contaminated building vacuum pump, demonstrated the apparent absence of management concern for the conduct of a conservative radiation protection program. This occurrence, coupled with the decision that it was not reportable under DOE 5000.3A and LANL requirements, has led to a strong concern on the part of the S&H Subteam as to whether continued safe operation of the facility from a radiation protection point of view can be assured.

Operations staff in some of the tritium facilities apparently believe they are dealing only with tritium gas, in which case, the risk to workers would be extremely low because tritiated water or tritiated organics would not be present. At TA-41 Bldg. 4, management does not appear to have accepted the

lessons learned from a Class C incident that occurred in May 1990. Staff continually tried to impress the S&H Subteam with the assurance that they are the experts and that the risk from exposure to tritium gas is minimal.

Many of the concerns identified in this S&H Subteam 2 report relate to an inadequacy in allocation or reallocation of physical and human resources to and within the Health and Safety Division. Operating organization management and personnel continually complain that they cannot obtain timely support from the Health and Safety Division. However, in only a few instances has management provided direct funding to increase health and safety support. Some of the same organizations have provided direct support for the senior health and safety personnel that they are adding to their own groups under the "safety and radiation protection officer" concept. This new effort has further led to the nonuniformity of the radiation protection program at LANL rather than improvement. For at least the past 4 years, the Health and Safety Division has identified the need for a new centralized calibration facility to meet the tough new requirements of DOE 5480.11, ANSI N323, and DOE 5480.15. LANL may be the only major DOE site which does not have either a new calibration facility or approval for constructing one.

The LANL self-assessment marginally addressed the concerns identified by S&H Subteam 2. The Health and Safety Division self-assessment dealt primarily with management responsibilities of the division. They were not asked to provide an independent assessment of the sitewide problems in the area of radiation protection. Thus, the LANL self-assessment suffered because there was inadequate input from the excellent staff of health physics professionals available at LANL.

While there is some isolated improvement in radiation protection in the facilities visited by S&H Subteam 2, the overall quality of the program is lower than in the past. The increased emphasis on line management responsibilities has added to the attitude of some managers that they do not need direct support and approval from the safety professionals. The attitude of "don't call us, we'll call you" appears to be stronger than in the past. If management does not want the review or approval of the Health and Safety Division they simply do not request it. LANL management must make a substantial commitment toward the upgrade of the radiation protection program if the Laboratory is to be fully committed to the quality program currently envisioned in the DOE Orders and by the Secretary of Energy.

4.5.2.13.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities.

FINDINGS:

- Radiation protection technicians are not being provided a formal radiation protection technician training course as required by DOE 5480.11.
- Some radiation protection technicians have received no job-specific training after joining LANL.
- Some radiation protection technicians do not understand the requirements of DOE 5480.11 and have not received special instruction on these requirements.
- Some radiation protection technicians do not demonstrate proper knowledge of how to use sources for checking instrument operation. Their demonstrated knowledge of the use and interpretation of results from radiation protection instrumentation is nonuniform. Misuse and misinterpretation of instrument results could in some instances result in an overexposure.
- Management has not provided the resources for proper training of radiation protection technicians.
- Training of radiation protection technicians was identified as one of the DOE 5480.11 implementation problems.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.1-1) (H2/C1) **Los Alamos National Laboratory radiation protection technicians have not been trained to meet minimum requirements specified in DOE 5480.11.**

FINDINGS:

- At the Ion Beam Facility, where an incident occurred during this appraisal, the responsibilities of the radiation protection technician are divided among seven buildings. Line management has requested full-time support at this facility.
- Management personnel at several facilities complained that they do not get radiation protection technicians assigned to their facilities in response to their requests.
- Approximately 100 radiation protection instruments are out of calibration at one building. One of the

explanations for not returning the instruments for recalibration was the amount of time required.

- The number of tritium smears that are counted has increased by 75 percent over the past 3 years. It takes from 2 to 5 weeks to get the smear processed. Currently, there is a backlog of nearly 3000 samples even though at least one-half person year in overtime is being expended.

- A counting room used in the smear- and air-sample counting laboratory is located in a hallway between two rooms in which smearable contamination exceeds the limits specified by DOE 5480.11, Appendix 2. The presence of alpha contamination in the counting room could bias results or could result in the room being shut down. This is reportedly the only space available for this valuable, important resource for the contamination control program. In comparison, in the counting room at TA-55 Bldg. PF-4, only clean protective clothing is permitted and the area is not a contaminated area.

- Approximately 12 temporary radiation protection technicians are being used by LANL to supplement the available staff of radiation protection technicians. These temporary radiation protection technicians are required to provide valuable health physics support with only limited plant-specific training.

- The calibration of high-level, portable, fixed radiation (TA-2) and criticality (TA-55) detection instruments cannot be properly performed because of the limited dose rate available in the old LANL calibration facility.

- The health physics groups have identified the shortfall of people and facility resources through their organization self-assessment.

- Line management oversight of the LANL Radiation Protection Program for radiation-producing devices does not ensure that all requirements of mandatory standards in DOE 5480.11 are implemented. Responsibility is not defined or assigned to ensure that the radiation safety officer and qualified expert requirements associated with accelerators and radiation-producing machines are implemented in accordance with ANSI 43.1, ANSI 43.2, and ANSI 43.5. (See Section 4.5.3.13.2, RP.1.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.1-2) (H2/C1) **Management at Los Alamos National Laboratory has not implemented a high-quality radiation protection program as required by SEN-6D-91 and DOE 5480.1B.**

FINDINGS:

- Safety and radiation protection officers are being assigned to various levels in operating groups, divisions, and directorates.
- Many of the safety and radiation protection officers were senior staff hired from the Health and Safety Division; thus, they understand health and safety requirements and can and do institute changes in radiation protection without the involvement of Health and Safety Division personnel.
- A few safety and radiation protection officers reported that they did not need to seek approval from the Health and Safety Division for changes in standard operating procedures, etc. In addition, they did not need to accept recommendations from Health and Safety Division.
- In the standard operating procedure for one radiation generating machine, line management is permitted to authorize continued operation of a malfunctioning unit without obtaining approval from the Health and Safety Division or the presence of a radiation protection technician.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.1-3) (H2/C2)

Los Alamos National Laboratory has not defined the responsibilities and authorities of safety and radiation protection officers and their relationship with the Health and Safety Division.

FINDINGS:

- DOE 5000.3A requires that occurrences and off-normal events be reported, even when the event did not result in personnel exposure and/or release of radioactive material to the environment.
- LANL developed DOE 5000.3A categorization criteria to be used by facility management in deciding whether an off-normal event is reportable.
- There is no oversight required by Health and Safety Division staff or higher management when facility management decides that the incident is not reportable.
- S&H Subteam 2 discovered a building vacuum system in the basement of the Ion Beam Facility that had been opened in violation of the standard operating procedure and LANL AR 1-3, "Standard Operating Procedures and Special Work Permits," dated October 31, 1987. Tritium contamination in excess of the LANL smearable tritium contamination limit of 10^3 D/M/100 cm^2 (1000 disintegrations per minute per 100 square centimeters) was found on the outside of the vacuum pump and piping. The level of contamination was in excess of 10^6 D/M/100 cm^2. Operations had no

current measurement of the contamination level in the oil, and they have not established a limit above which the oil must be replaced.

- The Health and Safety Division staff recommended that this occurrence be reported since several of the LANL Categorization Criteria (DOE 5000.3A reporting criteria) were applicable.

- Management made a decision that this occurrence was not reportable under DOE 5000.3A since "the bioassay of the individual involved has indicated no contamination" and "no detectable release has been measured."

- See Concern TSA-2, OA.5-1.

CONCERN: **See Concern TSA-4, RP.2-2.**

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

PERFORMANCE OBJECTIVE: The internal audit program for both routine operations and unusual radiological occurrences should provide adequate performance assessments.

FINDINGS:

- LANL has an internal audit program that meets the criteria and requirements of DOE 5482.1B.
- The Health and Safety Division performed audits in 1989 and 1990. A tracking system is in place which provides the status of the findings from these audits.
- The audit and tracking system does not include review of standard operating procedures for correctness, approval by Health and Safety Division, or to determine whether standard operating procedures are current.
- A printout dated August 14, 1991, lists 52 action items with their due dates and status. To date, 22 items have been completed.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.2-1) (H3/C2) **The internal audit system at Los Alamos National Laboratory does not include all elements of the Radiation Protection Program to ensure prompt action.**

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

FINDINGS:

- LANL has a policy on posting controlled and radiological areas in administrative requirements (See LANL AR 3-7, "Radiation Exposure Control," dated January 11, 1991) which parallel the requirements of DOE 5480.11.
- This policy does not include the criteria for determining how to establish a comprehensive posting and control program in the workplace. Consequently, posting primarily reflects the practices established at each building.
- Posting is inconsistent throughout LANL; sometimes it is inconsistent within a building, and sometimes it is also inconsistent within buildings operated by the group.
- LANL management failed to provide the necessary resources to assure that the posting requirements were uniformly implemented in the zoning and posting of each facility.
- Some signs are prepared and posted by line management in a facility without input by the Health Physics Operations Group and the Health Physics Policy and Programs Group. These signs do not meet DOE 5480.11 requirements.
- Posting intended for use within buildings, which is based on DOE 5480.11, has been inappropriately used on fences outside buildings.
- Posting on the fence outside the Ion Beam Facility Building was changed to "Controlled Area" during the appraisal. However, no control over visitors or private vehicles was instituted. Subsequently, the signs were removed.
- Management, radiation workers, and radiation protection technicians are not trained in the new posting requirements.
- The LANL DOE 5480.11 Compliance Plan, Rev. 2, made the following commitments:

  - All work areas will be evaluated for sign requirements (April 20, 1990).
  - Signs and labels will be provided and installed (July 31, 1990).

  These commitments were not met.

CONCERN: See Concern TSA-4, RP.3-1.

FINDINGS:

- At LANL yellow rope, tape, and paint are used for many purposes (e.g., to control entry and to seal packages). It is not uniformly used to identify a special radiation area or condition.
- Step-off pads are used at several locations where shoe covers are required. Instructions are not always available on or near the pad.
- In some locations, step-off pads are not used as required by DOE 5480.11, even though shoe covers are required.
- Tools used in maintenance work involving radioactive material contamination are not uniquely identified to prevent use in an uncontrolled area.
- A yellow rope is used at TA-2 Bldg. 1 (outside the building) to prevent personnel from exiting a potentially contaminated area and proceeding directly into an uncontrolled area. Staff have reportedly removed this temporary barrier several times. Thus, contamination control requirements are violated. The two signs posted at this location ("Control Area" and "Radiation Area") are incompatible.
- Personnel at TA-18 were working in a posted contamination area wearing blue protective clothing in violation of LANL policy.
- In most tritium facilities at LANL, hoods and gloveboxes are posted as contamination areas and the surrounding areas are posted as controlled areas. In actual practice, the space in front of these hoods is treated by operations as a contamination area. Protective clothing must be changed frequently (as often as every 15 minutes) and the used clothing is to be placed in a receptacle located close to the hood and glovebox. This practice is inconsistent with the existing posting.
- At the Ion Beam Facility, the S&H Subteam 2 passed through controlled and contamination areas without any clear demarkation. This included an unenclosed area in which smearable tritium contamination in excess of 10^6 D/M/100 cm^2 is routinely found. No special posting or other warning was available to show the presence of high levels of tritium contamination.
- See Concerns TSA-2, MA.2-4, and TSA-2, WS.4-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.3-1) (H2/C1)	The contamination control policy at Los Alamos National Laboratory tritium facilities does not cover all required elements, does not meet the requirements of DOE 5480.11 for control, does not provide positive control of personnel in contaminated areas, and is not rigorously enforced.

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

FINDINGS:

- Records are not provided at some workplaces to demonstrate that warning lights and interlocks are fail-safe for radiation-generating machines (e.g., x-ray radiography units).
- Radiation protection technicians assigned to buildings where these units are housed are unaware of the results of the annual leakage survey and interlock test.
- Posting at the machines was nonuniform and, in most cases, did not identify the purpose or requirements of the warning lights. This does not meet DOE 5480.11 requirements for control of potentially high radiation levels.
- Neither the Health Physics Policy and Programs Group radiation- producing device control office nor the Health Physics Operations Group is required to approve standard operating procedures or the annual review and update of such procedures.
- The interlocks on an x-ray radiography machine at the Tritium Salt Facility could be bypassed and the machine operated without proper shielding. Additional administrative controls were in place to prevent deliberate tampering. However, S&H Subteam 2 continues to be concerned about the absence of a positive physical control. The standard operating procedure for this machine permits the operation of the unit even if it is malfunctioning without obtaining a special work permit from the Health Physics Operations Group and without the presence of a radiation protection technician. The Health Physics Policy and Programs Group radiation-producing device control office did not have a copy of the current standard operating procedure for that installation because it was not on the distribution list for the procedure.
- See Concern TSA-3, RP.4-4.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.4-1) (H1/C1) **The Los Alamos National Laboratory x-ray safety program does not provide the level of protection required by DOE 5480.11 for potentially high levels of radiation.**

RP.5 EXTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The routine and accident personnel radiation dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- In many of the buildings where tritium operations are conducted, there are no external radiation areas as defined by DOE 5480.11. Even so, personnel in the tritium facilities are assigned external dosimeters which are processed on a monthly basis.
- Annual doses in most cases for these personnel are less than 100 mrem.
- Positive or negative errors can be introduced in the annual dose records when the dosimeters are used for control of dose rather than measurement for compliance.
- See Concern TSA-4, RP.5-X.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.5-1) (H3/C2) **A documented basis has not been provided for choosing the processing frequency of or need for external dosimetry for personnel in the tritium facilities at Los Alamos National Laboratory.**

FINDINGS:

- Personnel Nuclear Accident Dosimeters are assigned to personnel entering TA-18 as required by DOE 5480.11.
- The International Atomic Energy Agency Safety Series Bulletin No. 152 suggests the need for developing a quick-sort method to be applied in the event of a criticality incident to quickly identify persons who are exposed.
- One quick-sort method involves the direct survey of Personnel Nuclear Accident Dosimeters.
- Radiation protection technicians have not been trained to survey Personnel Nuclear Accident Dosimeters after a suspected criticality incident to separate highly exposed personnel.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.5-2) (H2/C2) **A method to use Personnel Nuclear Accident Dosimeters for quickly identifying personnel who are exposed has not been developed at the Los Alamos National Laboratory.**

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

- The engineered controls for airborne tritium contamination ranged from superior in a new facility (e.g., the WET Facility) to marginal in some old facilities.
- Vacuum systems and pumps are not contained in enclosures (e.g., hoods and gloveboxes); thus, personnel can come into direct contact with tritium-contaminated oil and airborne contamination.
- Not all hoods or gloveboxes are posted correctly as to airflow conditions and restrictions.
- With the exception of the WET Facility, documented studies of airflow in the workplace were not available to identify the airflow patterns and problem areas.
- See Concern TSA-2, AX.5-2.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.6-1) (H2/C2) **Los Alamos National Laboratory cannot demonstrate that engineering controls in tritium facilities will minimize internal tritium exposure.**

FINDINGS:

- Airflow studies have not been performed and documented to demonstrate proper location and number of air monitors for tritium as suggested by DOE 5480.11, except at the WET Facility.
- Tritium air monitors do not have a uniform alarm setpoint, and no written justification was available for the alarm setpoints that were chosen.
- No air samples are collected to quantify the levels of airborne tritium contamination in the workplace. At the WET Facility, a portable bubbler sampler is available for special work.
- It takes from 2 to 5 weeks to obtain the results of analyses of tritium smears rather than overnight. The number of smears for tritium contamination has increased by approximately 75 percent over the past 3 years. There is a current backlog of approximately 3000 samples.
- Routine tritium bioassay samples scheduled by the field may remain in the field for several weeks rather than being turned in immediately after they are provided.

- Even if the tritium bioassay samples are returned on schedule, the results may be delayed for 2 to 5 weeks.

- The need for additional resources (staff and equipment) to cope with the backlog has been identified by the Health and Safety Division but has not received management approval.

- See Concerns TSA-2, RP.7-1, and TSA-2, RP.7-2.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.6-2) (H2/C1) **The internal contamination control program at Los Alamos National Laboratory relies primarily on administrative controls to maintain tritium exposures as low as reasonably achievable instead of obtaining quantitative data from airborne, surface, and bioassay samples results.**

FINDINGS:

- At the building housing the Ion Beam Facility, a vacuum system was dismantled without the presence of a radiation protection technician or the issuance of a radiation work permit.

- The vacuum system was left open to the air with only aluminum foil covering the open pipes. The power to the vacuum pump was not locked out to prevent inadvertent activation.

- No special air or surface contamination sampling was performed during the work.

- Levels of surface contamination equal to greater than 10^6 D/M/100 cm^2 were detected during a followup survey after S&H Subteam 2 identified the problem.

- The area surrounding the vacuum pump was a controlled area leaving no place to establish control to prevent the spread of contamination.

- The area occupied by the vacuum pump was not properly posted as a contamination area which contained high levels of contamination. In addition, there were no barricade, warning sign, or step-off pad to effect control over the potential spread of contamination.

- A LANL employee was potentially exposed to substantial quantities of tritium contamination (i.e., oxide and organic bound) at the Ion Beam Facility. The facility does not provide proper controls and protection or require bioassay analyses for potentially exposed personnel.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.6-3) (H1/C1) CAT. II

At Los Alamos National Laboratory, the contamination control program at the Ion Beam Facility does not provide necessary protection for radiation workers against internal tritium exposure as required by DOE 5480.11.

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- DOE 5480.11 contains specific requirements for a bioassay program for all radiation workers who are likely to receive 100 mrem annual effective dose equivalent as a result of internal exposure.
- If proper decisions are to be made, applications of the above requirements to work situations and potential exposures requires the direct involvement of health physics personnel who are knowledgeable about internal dose evaluation.
- Because of constraints on the internal dosimetrists time and the large number of buildings where internal exposure is possible, the Internal Dosimetry Program has not been upgraded to meet the requirements at all facilities.
- Some line managers are determining who should be placed on the bioassay program without direct input by the Health Physics Operations Group and the Health Physics Policy and Programs Group staff.
- Management at TA-33 Bldg. 86 decided that a spot tritium bioassay sample was to be collected from each individual who enters the building. Instructions were prepared by line management without the knowledge or involvement of LANL internal dosimetrists.
- See Concern TSA-2, RP.6-2.
- The following concern was identified by LANL in their self-assessment.

CONCERN: (TSA-2) (RP-7-1) (H2/C1) **DOE 5480.11 requirements for tritium internal dosimetry are not uniformly applied throughout all buildings at Los Alamos National Laboratory and are not defined by internal dosimetrists in all cases.**

FINDINGS:

- As a result of a Class C incident in at TA-41 Bldg. 4 (dated May 1990), one of the causes of the increased dose was a delay in processing bioassay samples and, therefore, a delay in treatment brought about by the level of exposure.
- A chain-of-custody program for bioassay samples was initiated as a result of the above incident.
- Appendix G of LANL AR 3-6, "Personnel Radiation Dosimetry," dated August 30, 1991, requires chain-of-custody control of bioassay samples. This requirement places the responsibility on operations management for

appointing a custodian and an alternate to conduct the program.

- The chain-of-custody requirement for bioassay samples involves staff signing for receipt of the sample container and the sample custodian signing when the sample is returned.

- Line management at some facilities has not accepted responsibility for conducting the chain-of-custody program. Consequently, the responsibility was placed on radiation protection technicians. In several instances, radiation protection technicians are not permanently located in the building where bioassay samples are to be left, making it difficult to conduct an effective program.

- Radiation protection technicians were trained in the new chain-of- custody requirements; however, a few do not properly conduct the program. At TA-35 Bldg. 2, several overdue bioassay samples were found. Three of the samples were dated July 1991 (almost 4 months before they were found). Several others were dated September 16, 1991. Sample labels were not properly completed, and some samples were not sealed. The chain-of-custody program was not functioning properly.

- At TA-18, several bioassay samples were left beyond the 1-week pickup requirement.

CONCERN: **See Concern TSA-4, RP.7-2.**

FINDINGS:

- It is a common industry practice to pick up tritium bioassay samples the same day they are submitted and process them within 48 hours in order to conduct an effective contamination control program.

- At LANL, tritium bioassay samples are picked up from field locations once a week (on Tuesdays). Normally these samples are processed on the following Friday, and the results are available the following week (1 to 2 weeks after the sample is submitted by the staff person).

- Some studies indicate that varying amounts of tritium may be held up in the polyethylene container when timely (within a few hours) processing of samples does not occur. This retention process can be reversed if an extra step is introduced into the analytical procedure.

CONCERN: **See Concern TSA-2, RP.6-2.**

RP.8 FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE OBJECTIVE: Personnel dosimetry and radiological protection instrumentation used to obtain measurements of radioactivity should be calibrated, used, and maintained so that results are accurately determined.

FINDINGS:

- ANSI N323 requires the type, acceptance, and performance testing of radiation protection instrumentation. Testing of instruments at a factor of two to 10 times the top range is required to determine whether the instrument will saturate (paralyze) and, thus, not respond at all.
- ANSI N42, paragraphs 17a, b, and c, further defines testing criteria and procedures in support of ANSI N323.
- The Health Physics Measurement Group has not established a comprehensive performance and acceptance program. Many of their instruments receive only limited testing of performance capabilities.
- The Health Physics Measurement Group does not have the capability to calibrate and test instruments used to measure high dose equivalent rates (such as the Eberline RMS-II) which are used to detect a criticality event.
- The Eberline RMS-II which is used as a criticality detector in some facilities (e.g., TA-55 Bldg. PF-4) may saturate (paralyze) if exposed to a high dose rate. These instruments were not tested using gamma dose of a sufficient level to determine whether equivalent rates could occur. If it does, the instrument might paralyze during a critical radiation event, even though the alarm setpoint is at the low end of the range.
- See Concern TSA-2, RP.8-5.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.8-1) (H1/C1) CAT. II

Los Alamos National Laboratory does not have the capability to calibrate and test the Eberline RMS-II to determine whether instrument performance meets the requirements for a high-range instrument used for emergency warning and evacuation by workers.

FINDINGS:

- The Health Physics Measurement Group does not use available resources to calibrate and test portable instruments used to measure high dose equivalent rates.
- A teletector similar to the one used at LANL has exhibited problems with saturation (paralyzing) which can result in a downscale (or zero) reading. A serious overexposure occurred in a U.S. nuclear facility as a result of this problem.

- See the findings for Concern TSA-2, RP.8-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.8-2) (H1/C1) **Los Alamos National Laboratory does not use available resources to calibrate and test portable high dose equivalent rate instruments to determine proper instrument performance as required by ANSI N323.**

FINDINGS:

- As a result of findings from the TA-55 TSA in 1987, LANL established an inventory system for use in identifying and retrieving overdue instruments. The Health Physics Measurement Group procedures require that radiation protection instruments be returned at a set frequency for maintenance and recalibration.

- At one LANL facility, approximately 100 radiation detection instruments have been identified as being overdue for 1 to 2 years. Reasons for the delay included (1) too few instruments to make the exchange, (2) too much time to get instruments recalibrated, and (3) a preference for field calibration.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.8-3) (H2/C1) **Radiation protection instruments at Los Alamos National Laboratory are not being returned for calibration and maintenance as required by ANSI N323 and Health Physics Measurements Group procedures.**

FINDINGS:

- LANL AR 3-1, "Radiation Protection Program," dated August 30, 1991, requires the review and approval of the purchase of all instruments used for radiation protection purposes.

- Chirpers (electronic dosimeters) were purchased by operations management at one site for use by visitors entering the facility. These devices were not purchased through, calibrated by, or tested at the calibration facility.

- Tritium room air monitors were purchased at TA-41 Bldg. 4 by operations personnel without support from calibrations staff or calibration and testing at the calibration facility.

- Against the advice of calibrations personnel, a portable passive hand-held tritium survey instrument was purchased by operations. It was not calibrated and tested by calibrations personnel. Operations did not mark it "use for test and evaluation purpose only."

- One tritium room air monitor was installed without an air sample pump.

- One new stack air monitor was equipped with a moisture trap by operations without contacting the Health Physics Measurement Group. This omission made the calibration invalid.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.8-4) (H2/C1) **Operations management purchases radiation protection instruments without review, approval, testing, and calibration by the Health Physics Measurements Group as required by Los Alamos National Laboratory AR 3-1.**

FINDINGS:

- ANSI N323 requires the use of check sources that can be referenced to the instrument calibration for periodic checks. Some check sources cannot be referenced to the calibration.

- Results of periodic (i.e., daily, weekly, etc.) instrument checks are to be recorded to demonstrate continued proper operation. Instrument response checks are not performed uniformly at all buildings.

- Some check sources will drive an instrument off scale when they should be checking the alarm setpoint on an instrument used for qualification rather than quantification.

- Some instruments (e.g., tritium air monitors and high-range gamma detectors) are "calibrated" in the field under less than ideal conditions. The "calibration" is not always performed under fixed geometric conditions. Not all scales can be calibrated. A quality control program has not been established to demonstrate the continued quality of calibration under nonideal conditions.

- Maintenance is performed in the field for some instruments such as the Eberline RMS-II used for criticality detection. The maintenance program is not the same as the one conducted in the Health Physics Measurement Group. Records of maintenance as required by ANSI N323 are not generated and maintained by the Health Physics Measurement Group. Testing of electronic rise time, a requirement of ANSI 8.3, is not routinely performed to ensure that electronic components have not deteriorated. This same test was not performed on the new Eberline RMS-IIs when they were received.

- Operational response checks of tritium monitors, including stack monitors, are not routinely performed as required by ANSI N323. (See Concern TSA-1, RP.8.)

- Source checks of portable health physics instruments used at accelerator facilities are not performed in accordance with the requirements of ANSI N323. (See Section 4.5.3.13.2, RP.8.)

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.8-5) (H2/C1) **Calibration, maintenance, and periodic source checks of fixed and portable radiation protection instruments at Los Alamos National Laboratory do not meet ANSI N323 requirements.**

RP.9 AIR MONITORING

PERFORMANCE OBJECTIVE: Air monitoring systems through selection, location calibration, and maintenance should ensure reliable estimates of air activity for radiological control purposes.

FINDINGS:

- Except at the WET Facility, no air samples are collected from tritium facilities to quantify levels of airborne radioactive material contamination in the workplace, even though the potential exists to exceed 10 percent of the derived air concentration.
- Except at the WET Facility, the location selected for air monitors is not based on airflow studies.
- Not enough air monitors are available to cover all of the tritium areas. Some air monitors are not calibrated at the calibration facility, and some are not calibrated at all.
- LANL instrument response checks for room and stack air monitors do not provide a good indication of proper operation and are not referenced to the calibration in accordance with ANSI N323 requirements.
- The requirements for proper location of air samples and air monitors are described in ANSI N13.1.
- Written bases have not been provided for establishing the alarm setpoint, and setpoints vary from building to building.
- See Concern TSA-2, AX.2-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.9-1) (H2/C1)

The Los Alamos National Laboratory air-sampling and monitoring program does not meet the requirements contained in DOE 5480.11, ANSI N13.1, and ANSI N323.

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

FINDINGS:

- No consistent radiation monitoring survey program that includes an established frequency and location for surveys is in evidence in the Health Physics Operations Group.
- No training program has been established to ensure that routine dose rate and contamination surveys are conducted in a consistent manner.
- The Health Physics Measurements Group has not prepared a field manual for use by radiation protection technicians that explains proper use and interpretation of all radiation protection instruments.
- Facility air monitor alarm points used in accordance with the requirements of DOE 5480.11 to warn workers that airborne radioactive material contamination levels have exceeded an action level, are not always set at a uniform level. The setpoint may vary from monitor to monitor even in the same building.

CONCERN: **See Concern TSA-4, RP.10-1.**

FINDINGS:

- DOE 6430.1A, Section 1300-6.5.7, requires that, in addition to local alarms, radiation monitoring systems (criticality alarms and room and stack air monitors) "shall have central (i.e., control room or radiation monitoring office) readout and alarm panels that are assessable after a design basis accident (DBA) to evaluate internal conditions."
- LANL has developed a systematic control, alarm, and monitoring (SCAM) system which meets the intent of DOE 6430.1A and is staffed 24 hours a day.
- The decision to place critical building alarms on the SCAM system is left to operating management rather than being required. Radiation instrumentation alarms from two buildings (TA-2 and TA-35 Bldg. 213) are involved in the system.
- Most room, stack, and return air monitors do not feed into a central location that can be occupied during an accident.
- See Concern TSA-2, AX.8-1.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (RP.10-1) (H2/C1) **Alarm signals from critical building radiation monitoring instrumentation at Los Alamos National Laboratory are not routed to a continuously staffed central location as required in DOE 6430.1A.**

RP.12 RECORDS

PERFORMANCE OBJECTIVE: Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

FINDINGS:

- ANSI N13.6 requires that all standard operating procedures, radiation work permits, and special work permits, involving the control of work with radiation or radioactive material be included in an occupational exposure record system.
- LANL standard operating procedures are not being routed to the Health Physics Policy and Programs Group for inclusion in occupational exposure records.

CONCERN: See Concern TSA-1, RP.12-1.

4.5.2.14 Personnel Protection

4.5.2.14.1 Overview

The Personnel Protection appraisal addressed all five performance objectives through inspection of selected LANL tritium facilities and reactors; reviewing LANL policies, procedures, and internal reports; and interviewing Health and Safety Division personnel and other LANL employees.

During the past year, numerous audits have been performed to identify safety and health deficiencies at LANL. The audits resulted in issuing and revising many important LANL administrative requirements in the ES&H Manual, but these changes have not been implemented and employees have not been trained accordingly. Two examples include the new Lockout/Tagout Plan and Procedure (LANL AR 8-6) and the revised electrical safety document (LANL AR. 7-1).

LANL has many electrical deficiencies that must be corrected. There are electrical receptacles and switches located in damp locations without ground fault circuit interrupter protection. In all tritium reactor and facilities inspected, there are disconnect switches in electrical panels that are not identified as to what they control and cannot be locked in the open position as required in the OSHA standards. LANL employees have not received lock and tag training, although this has been an OSHA requirement for over a year. The LANL Lockout/Tagout Plan and Procedure was issued on August 20, 1991, but a training program has not been developed.

Healthy working conditions are not being maintained by the operations groups. Asbestos insulation on pipes was not completely sealed. Containers of hazardous chemicals were found without proper identification, and some chemicals did not have material safety data sheets available. Hazardous operations that require a standard operating procedure or special work permit do not require sign-off approval by the Health and Safety Division.

A formal documented procedure has not been established to ensure that safety and health deficiencies observed during audits are corrected. LANL does not require a safety and health review of all potentially hazardous activities. The LANL hazardous communication training program has not been validated; employees are not tested to ensure adequate training.

There are numerous recordkeeping irregularties related to injury and illness on the 1989, 1990, and 1991 OSHA 200 Log. Numerous entries in the log were not recorded within 6 working days, and some entries have been erased rather than having a line drawn through the entry as required. Not all incidents and events are being investigated to determine probable cause and judgment of needs.

The Facilities Engineering Division directs construction activity at LANL but does not have a safety and health professional on its staff to perform oversight. Construction employees were observed performing activities that did comply with all LANL safety requirements.

The LANL occupational safety data is not used by upper management to evaluate present performance, identify trends, or set goals. LANL safety performance is not compared with that of similar DOE operations to evaluate lessons learned.

The AL and LAAO self-assessments partially addressed some of the listed or referenced concerns. The LANL self-assessment addressed findings which led to two referenced or listed concerns and partially addressed four referenced or listed concerns. The concerns related recording practices for injuries and illnesses recording practices were not addressed.

LANL has made a major effort to improve compliance with safety and health standards by identifying hazards and revising critical safety and health procedures. Many of the identified hazards have not been corrected or eliminated, and employees have not been trained to comply with the revised procedures. In order for LANL to bring its personnel protection program into compliance with DOE Orders and OSHA regulations, deficiencies must be corrected and employees and supervisors must be trained to recognize, correct, and report workplace hazards.

4.5.2.14.2 Findings and Concerns

PP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

FINDINGS:

- Safety performance at LANL is not compared with that of similar DOE operations to evaluate lessons learned.
- LANL upper management does not set safety performance goals. Safety data or trends are reviewed only once per year.
- See Concern TSA-3, PP.4-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (PP.1-1) (H2/C2) **Los Alamos National Laboratory does not establish, implement, and enforce safety performance goals.**

PP.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the personnel protection program.

FINDINGS:

- LANL administrative requirements cited in the ES&H Manual were revised in the past 4 months but have not been completely implemented, and personnel have not been trained. Examples of revised LANL ARs include the Electrical Safety (LANL AR 7-1) and the Lockout/Tagout Plan and Procedure (LANL AR 8-6).
- The LANL safety and health QA plan has been written and issued but is not being used by safety and health personnel.
- The sitewide hood and sweep exhausts labeling program is not in compliance with LANL AR 8-3. There are inconsistencies in labeling of nonstandard hoods in the Target Fabrication Facility and the Ice House.

CONCERN: **See Concerns TSA-4, PP.2-1, and TSA-4, PP.2-6.**

PP.3 MANAGEMENT OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Chemical, physical, and other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

FINDINGS:

- LANL line management personnel perform walkthrough inspections to identify health and safety deficiencies. However there is no formal followup to assure that deficiencies are corrected. The following are examples of deficiencies:
  - Most of the electrical disconnect switches in electrical panels cannot be locked open as required in 29 CFR 1910.147 and 29 CFR 1910.133. This condition exists in all of the tritium facilities and reactor buildings inspected.
  - Personnel protection equipment is not being stored to prevent contamination in the work areas of the Tritium Salt Facility, Tritium Systems Test Assembly, Target Fabrication Facility, and OWR.
  - Asbestos insulation was not sealed on overhead pipe in TA-41 Bldg. 30, room 105.
  - Electrical devices are installed in damp locations without ground fault circuit interrupter protection.
  - Containers of liquids are without appropriate labels in several rooms in the OWR, Tritium Salt Facility, TA-18 Bldgs. 30 and 127, and High Pressure Tritium Laboratory.
  - A chemical that is a suspect carcinogen is not properly labeled in room G-104 at the Target Fabrication Facility.
  - Material safety data sheets are not available on some materials stored at OWR, Target Fabrication Facility, TA-3 Bldg. 16, and TA-18 Bldg. 127.
- A safety and health review of all potentially hazardous activities is not required at LANL and is not always performed.
- In the ES&H Manual, hazardous operations requiring a standard operating procedure or a special work permit (LANL AR 1-3) "Standard Operating Procedures and Special Work Permits," dated October 30, 1987, do not require sign-off approval by the Health and Safety Division.
- LANL did not have a comprehensive program to ensure that purchase orders are reviewed to identify potential safety and health concerns.

CONCERN: **See Concern TSA-4, PP.3-1.**

PP.4 SURVEILLANCE OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

FINDINGS:

- LANL does not have an approved procedure for accident and incident investigation reporting and recordkeeping. The Bureau of Labor Statistics, "Recordkeeping Guidelines for Occupational Injuries and Illnesses," was not implemented by LANL until January 1, 1991, to classify, record, and report occupational injuries and illnesses. Implementation was required on January 1, 1990.

- Some entries on the OSHA 200 Log that were made more than 6 working days after the injury occurred. One injury was not recorded until 9 months after it occurred.

- Some entries on the OSHA 200 Log were erased rather than being left on the log with lines drawn through them as required by 29 CFR 1904.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (PP.4-1) (H3/C1) **Los Alamos National Laboratory is not recording injuries and illnesses as required by 29 CFR 1904.**

FINDINGS:

- Incidents and events are not always investigated by LANL to determine probable causes and judgments of needs.

- An approved procedure does not exist to require that all accidents and incidents be investigated in accordance with DOE 5480.4

CONCERN: **See Concern TSA-1, PP.4-1.**

FINDINGS:

- Construction activity at LANL is directed by the Facilities Engineering Division without a LANL safety and health professional on their staff.

- The construction contractor does not comply with LANL requirements as specified in the ES&H Manual. During the appraisal, the S&H Subteam observed the following:

  - A construction employee was working on a 110-volt AC electrical receptacle in Tritium Salt Facility without locking and tagging the power source. There was a danger tag on the outside of the electrical panel and the circuit was open.

  - Outside of Tritium Systems Test Assembly, two construction employees were working on the top of a

dump truck approximately 10 feet above the ground without fall protection. A LANL supervisor who observed this situation stopped the job.

- See Section 4.5.1.15.2, PP.3.

CONCERN: **See Concerns TSA-4, WS.5-1, and TSA-4, WS.5-2.**

PP.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Written programs, of sufficient quality to comply with all Department of Energy prescribed occupational safety and health standards, should be available.

FINDINGS:

- The LANL hazard communication training program consists of a series of videotaped lectures with worksheets. This program has not been validated, and there is no written examination to determine whether the employees are knowledgeable of chemical and biological stresses that may be encountered in their work environment as specified in 29 CFR 1910.1200.
- LANL employees have not received lock and tag training as required in 29 CFR 1910.147. The LANL Lockout/Tagout Plan and Procedure was issued on August 20, 1991, but the training program has not been developed.
- Not all LANL employees are required to attend site safety meetings. Some LANL groups do hold safety meetings.
- See Sections 4.5.2.3.2, OP.4; 4.5.2.15.2, WS.3; and 4.5.1.3.2, OP.5.

CONCERN: **See Concern TSA-4, WS.3-1.**

4.5.2.15 Worker Safety and Health (OSHA) Compliance

4.5.2.15.1 Overview

A comprehensive safety and health compliance appraisal (OSHA-type) covering general industry standards was conducted at LANL to determine compliance with existing OSHA regulations as adopted by DOE. Noncompliance findings were documented and discussed with management representatives at the end of each day. All performance objectives were evaluated, except for WS.1 Management of Health and Safety Concerns and WS.2 Surveillance of Safety and Health Concerns. These concerns were evaluated by other S&H Subteam members.

Thirty buildings related to tritium reactor and facilities were inspected for compliance with OSHA regulations. Evaluation criteria was based on OSHA general industry standards, 29 CFR 1910. Additional information was gathered from personal interviews with supervisory, operations, and maintenance personnel.

The inspection covered major process, service, laboratory, maintenance buildings, storage areas, other material storage areas, hazardous waste disposal and decontamination areas, laboratories, and process buildings. These buildings encompass most of the hazardous workplaces. A less comprehensive sample of office buildings and other low-hazard areas was also conducted.

A total of 179 noncompliance issues were identified. Of these, 172 were considered serious and 7 were classified as other than serious. Table WS-2 provides a summary of the buildings inspected, the number of noncompliance issues noted, and the OSHA noncompliance classification of each. Appendix F is a tabulation, by building, of all noncompliances with OSHA standards and the classification of each. Figure WS.2 shows the breakout of findings by area of noncompliance. Thirteen concerns were identified during the appraisal.

Procedures and information or instructions for entry into confined space is not available at LANL facilities.

Deficiencies and noncompliances noted during the inspection (Appendix F) were being corrected almost as soon as they were identified. This action is commendable; however, a long-term solution involves evaluating the root cause for the noncompliance. There were no imminent danger situations noted during the inspection. The paragraphs that follow indicate the significant deficiencies.

Emergency eyewash stations are not always provided in areas where their use was required by a material safety data sheet or operating instruction. Several locations where acids, corrosive liquids, and other hazardous materials are being used or handled do not have emergency eye and shower units available. In several locations, only bottled water (1 liter in capacity) was available, which does not meet the minimum requirements for flushing.

Table WS-2

Technical Area Inspections and Noncompliance Information

Location		Number of Noncompliances			
		Serious	Other-Than-Serious	Willful	Imminent Danger
Team 2	TA-16	24	2	0	0
Team 2	TA-18	43	4	0	0
Team 2	TA-2	16	0	0	0
Team 2	TA-21	52	1	0	0
Team 2	TA-3	4	0	0	0
Team 2	TA-35	2	0	0	0
Team 2	TA-41	31	0	0	0
TOTAL		172	7	0	0
Percentage		96.09	3.91	0.00	0.00

Total Noncompliances 179

Procedures and information or instructions for entry into confined spaces is not available at LANL facilities. Requirements for compliance with the hazard communication standard are deficient. Material safety data sheets are not always available for hazardous chemicals being used. Material Safety Data Sheets are not readily available for review. New materials are introduced into the workplace with no evidence of personnel training or familiarization with material safety data sheets, and materials transferred from their original containers are not identified and labeled.

Fixed industrial stairs, which are fabricated in-house or purchased from a vendor, do not meet the minimum design requirements as required by OSHA. Several ladders have no midrail on the open side, and riser height and tread depth do not coincide with the specific angles as outlined in OSHA. Some metal ladders are equipped with insufficient grab bars for use when climbing or descending, and some wooden ladders have deteriorated to the extent they are no longer safe to use. Open-sided platforms are not protected by standard guardrails. In addition, a roof edge where personnel are required to perform surveillance activities is not guarded by standard guardrails, exposing workers on the roof to a fall hazard.

Not all buildings evaluated have emergency escape routes posted. Some buildings which were posted did not have emergency lighting or it would not function. Almost all buildings evaluated have extensive problems with electrical panel boxes, flexible cords, unlabeled circuit breakers, frayed

wiring, and missing coverplates or knock-outs on electrical components. In addition, portable power tools have torn and frayed wiring or have noninsulated cases with no grounding. No equipment was observed being used in this condition. Finally, locks and tags that identify hazards and are used to control hazardous energy do not conform to the OSHA Lock and Tag Program.

Two previous LANL self-assessments did not identify any specific OSHA noncompliances and would not be useful in developing an effective action plan. The third assessment addresses specific OSHA findings; however, this information is in a data base of approximately 45,000 findings and does not allow easy comparison of those specific findings identified during this appraisal. Review of LANL self-assessment documents indicates that all of the concerns described by the S&H Subteam had been previously identified. However, the current status of the findings could not be determined.

Although the safety and health staff is dedicated, formal training for safety and health professionals and management personnel is sporadic, haphazard in selection, and may not necessarily contribute to the professional advancement of the individual or a better understanding of the requirements at the local level. Overall, the LANL occupational safety program is making progress toward regulatory compliance with mandated DOE ES&H regulations and procedures. However, significant effort is needed to bring LANL into full compliance.

4.5.2.15.2 Findings and Concerns

WS.3 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Site/facility operations should comply with Department of Energy prescribed standards for the evaluation and control of occupational health hazards.

NOTE: Noncompliance with this performance objective is documented using the OSHA Form 1B format and compiled in Appendix F to this report.

FINDINGS:

- LANL does not have approved procedures for entry into confined spaces. For example, TA-21 Bldg. 223, the Acid Waste Stream Building, does not have a procedure for confined space entry. Also, the Elevator Machine Room, TA-41 Bldg. 30, is not labeled as a confined space.
- The Ice House vault contains hazardous substances. The area is ventilated; however, atmospheric conditions in the vault are not monitored prior to entry.
- Confined spaces in tritium facilities and reactors, are not monitored in all cases for hazardous atmospheres prior to entry.

CONCERN: **See Concern TSA-4, PP.6-4.**

FINDINGS:

- Material safety data sheets (MSDS) are not available for all materials. For example, in TA-18 Bldg. 30, room 101, sodium hypochlorite does not have an MSDS.
- Labeling of hazardous materials does not comply with 29 CFR 1910.1200. Flammable material containers stored in the flammable materials cabinet in TA-2 Bldg. 1, hallway 100-E, provide an example.
- Not all subcontractor employees have received hazardous communication training. Some employees who are given the training are not provided with information about new materials which are introduced into the workplace.
- See Sections 4.5.2.14.2, PP.3, and 4.5.2.14.2, PP.5.

CONCERN: **See Concern TSA-4, WS.3-1.**

FINDINGS:

- Emergency eyewash and deluge showers do not meet requirements for required locations. For example, in TA-2 Bldg. 44 employees handle acids, corrosives, etc. There is no eyewash and deluge shower in this area.

- Emergency eyewash and deluge stations do not meet requirements for flushing capabilities. For example, in TA-16 Bldg. 205 an emergency eyewash station consisted of two 32-ounce bottles of sterile solution.

CONCERN: **See Concern TSA-4, WS.3-2.**

WS.4 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Workplaces should be free of uncontrolled physical hazards and should be in compliance with Department of Energy prescribed occupational safety standards.

NOTE: Noncompliance with this performance objective is documented using the OSHA Form 1B format and compiled in Appendix F to the Tiger Team Report.

FINDINGS:

- Equipment was not tagged with the proper warning for safety problems. For example, a drill press in TA-21 Bldg. 155, room 5523-A, was not tagged appropriately.
- An elevator machine room (pit) in TA-41 Bldg. 30, room 250, does not have posted safety instructions to warn personnel of the hazards.

CONCERN: **See Concern TSA-4, WS.4-1.**

FINDINGS:

- A smooth finished concrete floor in TA-21 Bldg. 209, room 177, had water covering approximately 20 percent of the area with no posted warning signs. The water was leaking from an overhead pipe onto the floor.
- Standard guard railing is not provided to protect employees from falling. For example, in TA-21 Bldg. 155, room 5501, the north end of mezzanine had a section of guardrail missing. In TA-21 Bldg. 155, the roof edge was not guarded.
- Handrails are not in compliance for open-ended platforms. For example, on the roof of TA-21 Bldg. 155 access to the Liquid Nitrogen Dewers and the area access platform near the south end of the building do not have handrails.
- Fixed industrial ladders do not comply with 29 CFR 1910.27, "Fixed Ladders." For example, an access ladder to the roof of Bldg. 155 in TA-21 is unstable and loose at the top.
- Ladders are not provided with a cage or safety device as required. For example, in TA-2 Bldg, 1, the brick smoke stack is approximately 40 feet high and has no cage or ladder safety device.

CONCERN: **See Concern TSA-3, WS.4-1.**

FINDINGS:

- Ingoing nip points are not guarded. For example, vertical belt sanders have no guards in TA-16 Bldg. 450, room 2, TA-2 Bldg.1, room 117 (equipment No. 238662); and TA-3 Bldg. SM-105, room 161-B (equipment room).
- Chucks on drill presses are unguarded. For example, drill presses with no guards were found in TA-41 Bldg.

30, room 264 (Mechanical Shop), and TA-3 Bldg. 30, room 161-B (equipment room).

- Portable powered hand tools do not have abrasive wheel guards. For example, in TA-41 Bldg. 4, room 239, in the gray storage cabinet, a Rockwell No. 781 heavy-duty disc sander (No. 37577) does not have a protective guard.

CONCERN: **See Concern TSA-4, WS.4-2.**

FINDINGS:

- Emergency exit routes are not provided with artificial illumination. Note the following examples:
  - TA-16 Bldg. 450, room 5 (light No. 25 does not work),
  - TA-21 Bldg. 155, room 5501 (several exit routes from this room are not equipped with artificial lighting); and
  - TA-18 Bldg. 30, the main hallway (labeled as emergency exit route) was not equipped with any artificial lighting.
- Emergency exit routes are not clearly defined in TA 16 Bldg. 450, lower floor; TA-21 Bldg. 14, room 5501 and near the administrative office; and TA-2 Bldg. 1, room 117, east exit door.
- Exits are not continuous and free from obstructions. Note the following examples:
  - In TA-21 Bldg. 155, the east exit from Room 5513 had an 8-inch drop (step) with no posted warning;
  - In TA-2 Bldg. 1, the north exit from the second floor led into a high radiation zone which required special entry permits; and
  - In TA-41 Bldgs. 1 and 6, vault area, the exit route was obstructed by a flammable storage cabinet and the exit door itself measured 64 inches high.
- Also see concern TSA-2, FP.2-1.

CONCERN: **See Concern TSA-4, FP.2-3.**

FINDINGS:

- Load ratings for cranes are not identified in accordance with 29 CFR 1910.179, "Overhead and Gantry Cranes." One is in TA-21 Bldg. 155, room 5501, Kranco overhead crane. Another is in TA-18 Bldg. 30, room 101.
- The following concern was identified in the LANL self-assessment.

CONCERN: **Tritium and reactor facilities at Los Alamos National Laboratories are not in compliance with 29 CFR 1910, Subpart N, Material Handling and Storage, for appropriately identifying load ratings and inspections of hoist and rigging equipment.**
(TSA-2)
(WS.4-5)
(H1/C1)

FINDINGS:

- Compressed gas cylinders are not properly secured. For example, in TA-18 Bldg. 28, a liquid propane bottle near the west end of the facility is unsecured, and in TA-41 Bldg. 1, room 102, xenon cylinders are stored beneath a storage shelf.
- Compressed gas cylinders are not labeled in accordance with Compressed Gas Association pamphlets C-6-1968 and C-8-1962 (e.g., in TA-41 Bldg. 4, room 104).
- Compressed gas cylinders containing flammable and nonflammable gases are not stored in accordance with Compressed Gas Association pamphlets C-6-1968, C-8-1962, and CGA P-1-1991.
- See Concern TSA-2, PT.4-3.
- The following concern was identified in the LANL self-assessment.

CONCERN: **Tritium and reactor facilities at Los Alamos National Laboratory do not comply with 29 CFR 1910, Subpart H, Hazardous Materials, for storage, labeling, and securing of compressed gas cylinders.**
(TSA-2)
(WS.4-6)
(H2/C1)

FINDINGS:

- Flexible cords are used in lieu of permanent wiring. For example, in TA-35 Bldg. 213, room F-6, east wall, three extension cords have been used since 1984. Also, in TA-21 Bldg. 155, room 5501, temporary power cords for the Experimental Mezzanineare are routed through corrugated metal surfaces for approximately 50 feet to power "times square" signs.
- Electrical disconnect panels are not properly labeled (e.g. in TA-16 Bldg. 248, electric panel LP1, and in TA-18 Bldg. 30, room 101, distribution panels PP-B, PP-C, and LP-14).
- Unused openings in cabinets, boxes, and fittings are not effectively closed (e.g.) in TA-16 Bldg. 248 electrical panel No. 1, and in TA-41 Bldg. 311 (guardhouse, main hallway).
- Flexible cords are being used with damaged insulation; (e.g. in TA-18 Bldg. 23, room 1, west wall, portable tool box, and in TA-21 Bldg. 229, a "hot plate" in a storage cabinet near the entrance door has a damaged cord). In TA-16 Bldg. 450, room 7, in the tool box located to the left of the door, two electric tools have frayed or

broken wiring (metal sheath stripper and super duty 1/4-inch drill motor PN No. 127021).

- Portable power tools have electric cords pulled away from the handle, exposing the wiring. For example, in TA-18 Bldg. 28, room 4; a Black and Decker 3/8-inch drill located in a "Snap-On" tool chest was frayed.

- See Concerns TSA-2, PP.3-1, and TSA-2, MA.3-2.

CONCERN: **See Concern TSA-4, WS.4-3.**

FINDINGS:

- Lockout and tagout procedures are not in compliance with OSHA standards. For example, in TA-2 Bldg.1, room 116-A, a breaker in panel 21-CDD-A is tagged with a device which would not provide a breaking strength of 50 pounds; the tag does not identify the hazard, and there is no lockout of the breaker.

CONCERN: **See Concern TSA-4, PP.2-2.**

FINDINGS:

- There is no ventilation provided during welding operations in TA-18 Bldg. 30, room 101.

CONCERN: **See Concern TSA-3, WS.4-4.**

4.5.2.16 Fire Protection

4.5.2.16.1 Overview

This appraisal addressed six of the seven performance objectives in the Fire Protection technical area through inspections of selected buildings and interviews of site personnel responsible for operational areas. FP-6 Fire Department Operations has been addressed by S&H Subteam 4 and is not discussed in this report. Areas visited included the tritium facilities, LACEF, OWR, and the Nuclear Advanced Technology facilities in TA-18. This appraisal also reviewed compliance with requirements and guidelines contained in DOE 5480.4, DOE 5480.7, and DOE 6430.1A, the National Fire Protection Association (NFPA) codes and standards, and the Highly Protected Risk concept set forth in DOE 5480.7. Concerns are noted for five of the performance objectives.

The fire protection program at LANL is under the Facilities Engineering Division in the Fire Protection and Utilities Group. In addition to having the responsibility for all fire protection at LANL, the fire protection group performs design reviews, property loss and risk evaluation appraisals, preparation and review of fire protection standards, and consultation to laboratory organizations. The responsibility for inspection, test, and maintenance of fire suppression and detection systems, including other related fire safety equipment, is performed by JCI.

The last previous sitewide appraisal of the LANL fire protection program for Headquarters, DOE, was the independent fire protection survey conducted by Factory Mutual in 1989. There were 99 Factory Mutual recommendations as the result of this independent fire protection survey. A draft action plan has been prepared by LANL and transmitted to the LAAO.

A large number of safety surveys have been made of various facilities during the past 2 years. Most of these included some aspect of fire protection but none covered the full scope, nor did they address applicable codes, standards, and DOE requirements.

The LANL self-assessments did not fully address the listed concerns. The LANL self-assessment report was prepared by personnel who were apparently knowledgeable of LANL facilities and operations but were less familiar with governing regulations and DOE Orders.

In summary, LANL resources are insufficient to implement fully the LANL fire protection program or to implement DOE fire protection requirements in accordance with DOE 5480.7. Sprinkler systems are not installed in all appropriate locations, and those that are installed are not inspected in accordance with NFPA 13. Egress paths are not provided in some buildings as required by DOE Orders, and in some cases marked exit paths are blocked. Combustible material is not properly stored in some locations. No fire suppression systems are provided in some buildings where fires could cause financial losses above those specified in DOE 5480.7.

4.5.2.16.2 Findings and Concerns

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

FINDINGS:

- Formal Life Safety Code inspections have not been conducted at LANL.
- Examples of Life Safety Code egress violations are as follows:
  - The Class B fire doors do not meet the requirements of NFPA 80 in the corridor between TA-21 Bldgs. 209 and 152.
  - Equipment is stored and used in the corridors in TA-21 Bldg. 209, second floor; TA-41 Bldg. 6; TA-18 Bldg. 30; and TA-18 Bldg. 147.
  - Means of egress from the south side of TA-21 Bldg. 155 are blocked by the outside security fence.
  - Turnstiles, such as the one between TA-21 Bldgs. 155 and 152, do not qualify as acceptable exits as specified by NFPA 101 Life Safety Code.
  - TA-21 Bldgs. 155 and 152 are not separated by a fire-rated barrier wall.
  - The means of egress from the basements of TA-18 Bldgs. 30 and 127 consist of an open vertical stair and an open ladder, neither of which complies with the Life Safety Code.
  - There is only one exit from TA-18 Bldg. 1 and from the office area of TA-18 Bldg. 129.
- The following areas have unprotected vertical stair openings that are not enclosed with 1-hour fire-rated barriers:
  - Outside the control room from the first to second floor, TA-2 Bldg. 1, OWR.
  - Otowi Building, stairwell to cafeteria;
  - Pajarito School Complex, 3400 Arizona Street, Los Alamos; and
  - TA-41 Bldg. 4, outside the group office.
- Dead-end travel distance to an exit exceeds Life Safety Code requirements in TA-41 Bldg. 4.

- The emergency lighting in the equipment room (Room 128) of TA-41 Bldg. 4 was inoperative.

- No exit sign is posted in the basement fitness room of TA-41 Bldg. 30, and there is no sign at the bottom of the stairs in TA-41 Bldg. 30 to indicate that no exit exists on that level. The stairway exit in TA-41 Bldg. 30 from the second floor is not suitably identified.

CONCERN: **See Concern TSA-4, FP.2.1.**

FP.3 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate protection to prevent any added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site or facility boundary.

FINDINGS:

- LANL fire hazard analyses have been made for only about one-half of the facilities required to have SARs.
- Fire hazard analyses reports in SARs are not approved by the Fire Protection and Utilities Group.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (FP.3-1) (H2/C1)

Fire hazard analyses for the tritium and reactor facilities and TA-18 buildings at Los Alamos National Laboratory are not performed in accordance with DOE 6430.1A.

FP.4 IMPAIRMENT OF OPERATIONS

PERFORMANCE OBJECTIVE: The site should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

FINDINGS:

- There is no fire suppression system in TA-2 Bldg. 44, the OWR Auxiliary Equipment Facility. Loss of this building would curtail operations for more than 3 months.
- TA-18 Kiva II does not have a fire hydrant. The distance to the nearest fire hydrant exceeds DOE 6430.1A requirements.
- The area below the raised floor in the control room in TA-21 Bldg. 155 does not have smoke detectors as required by DOE 5480.7 or NFPA 75.
- The control room, TA-21 Bldg. 155, is not isolated with 1-hour fire barrier walls or doors as required by DOE 5480.7.
- The Class B fire doors in the corridor between TA-21 Bldgs. 209 and 152 do not meet requirements of NFPA 80.
- Equipment is stored and used in the corridors in TA-21 Bldg. 209, second floor; TA-41 Bldg. 6, TA-18 Bldg. 30, and TA-18 Bldg. 147.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (FP.4-1) (H2/C1)

Contrary to DOE 5480.7, some tritium and reactor facilities support facilities at Los Alamos National Laboratory have no fire suppression systems, early warning smoke detection systems, fire hydrants, or fire-rated barriers to prevent curtailment of operations for periods of 3 months or more.

FP.5 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A maximum credible fire, as defined in DOE 5480.7, Section 6.f., should not result in an unacceptable property loss.

FINDINGS:

- See findings supporting Concern TSA-2, FP.4-1.
- TA-41 Bldg. 30 and TA-2 Bldg. 44, with occupancy of laboratories and offices, do not have fire suppression systems to prevent a $1,000,000 fire loss as required by DOE 5480.7.
- The following concern was identified in LANL self-assessment.

CONCERN: (TSA-2) (FP.5-1) (H2/C1)

Some tritium and reactor facilities have no fire suppression systems, early warning smoke detection systems, early warning smoke detection systems, and fire-rated barriers to prevent a critical fire loss of $1,000,000 or more as required by DOE 5480.7.

FP.7 PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE: A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection.

FINDINGS:

- Automatic sprinklers are not installed or inspected in the following areas in accordance with NFPA 13:
  - The laboratory exhaust hood in TA-21 Bldg. 209, room 109 (flammable liquid is stored in the storage locker below the hood).
  - The exhaust hood in TA-21 Bldg. 209, room 179B (used for welding operations);
  - TA-21 Bldg. 213 (used for storing combustibles consisting of wood pallets, cardboard boxes, and methane gas cylinders); and
  - The cryogenic vacuum pump house inside TA-21 Bldg. 155.
- Sprinkler heads in portions of TA-21 Bldg. 152 are obstructed.
- There is no fire suppression system in the Mechanical Equipment Room in TA-2 Bldg. 63, OWR, and in the under-stairway storage area outside the control room in TA-2 Bldg. 1.
- There is no automatic smoke detection in TA-2 Bldgs. 50 and 4.
- The sprinkler system under the stairway in the high bay area of TA-41 Bldg. 4 does not supply necessary coverage and is not in compliance with NFPA 13.
- There is no sprinkler system for the Solution High Energy Burst Assembly Building, Kiva I, in TA-18; under the outside canopy of TA-18 Bldg. 127; and under the stairway in the machine shop room, TA-18, Bldg. 30.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (FP.7-1) (H1/C1) **Some fire protection suppression systems have not been provided in the tritium facilities and reactor support facilities in TA-18 at Los Alamos National Laboratory; others systems already installed do not meet the requirements of DOE 5480.7.**

FINDINGS:

- LANL does not meet applicable fire protection standards.

- A waiver could be requested for some fire protection deficiencies, such as for the unprotected stair opening at the Pajarito School Complex.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (FP.7-2) (H2/C1) **Los Alamos National Laboratory has not requested fire protection exemptions from the Albuquerque Field Office in accordance with DOE 5480.4.**

FINDINGS:

- Combustible and miscellaneous items are stored outside TA-21 Bldg. 213. This storage obstructs access to the sprinkler post indicator valve and manual fire alarm pull station.

- Two pallets containing combustible material from the instrumentation room are improperly stored in TA-18 Kiva III.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (FP.7-3) (H1/C1) **Combustibles at Los Alamos National Laboratory are not being stored in accordance with DOE 5480.7.**

4.5.2.17 Medical Services

4.5.2.17.1 Overview

This assessment addressed all five performance objectives in the Medical Services technical area. Inspections were made of all four LANL health services facilities, the Los Alamos Medical Center emergency department and decontamination area, and the LANL Wellness Center. Interviews were held with the Health and Safety Division Leader; the Occupational Medicine Group Leader; the Deputy Group Leader; managers of Mason and Hanger-Silas Mason, Inc. (M&H) and JCI, physicians, nurses, medical records clerks, and medical administrative personnel; the president of the local chapter of the International Guard Union of America; and LANL employees. The appraisal emergency exercise was observed first in the field and later in the TA-3 Bldg. SM-409 medical facility. The S&H Subteam also reviewed compliance with requirements and guidelines contained in DOE 5480.2.

Responsibility for LANL medical services is assigned to the site Medical Director, who is a group leader in the Health and Safety Division. The Medical Director reports administratively through three management levels to the LANL Director via the Health and Safety Division. On September 5, 1991, the site Medical Director was notified of his appointment to the LANL ES&H Council, which is composed of top-level managers who have the responsibility for policy decisions as well as ES&H oversight. Previous Headquarters, DOE, reviews and a LANL-requested review have recommended that the level of reporting be elevated to improve access to the Medical Director and the effectiveness of medical services.

The LANL Occupational Medicine Group protects employees from health hazards by providing occupational medical services for the 9500 employees of LANL, for the 400 protective force personnel employed by M&H, for the 47 LAAO employees for the 1500 JCI personnel, and for the 108 employees of Los Alamos County. As such, it is responsible for detecting and treating occupational illness and injury and monitoring the health of the work force through periodic examinations and clinical sick call visits. In addition, it oversees the Employee Assistance Program, which also conducts psychological assessment in support of human reliability programs. These programs include the Personnel Assurance Program and the Personnel Security Assurance Program. It also provides medical input into health promotion and wellness programs, furnishes emergency medical services to the site employee population, offers medical advice to employees and management regarding ability to work, and provides professional guidance and consultation to contractor management on health-related issues. In addition, it provides urine specimen collection and medical review officer services in support of the LANL drug testing program.

The Occupational Medicine Group employs seven full-time-equivalent physicians and three physician's assistants, six registered nurses, one clinical psychological as well as two counselors, four data-processing personnel, two epidemiologists, and 11 administrative and records personnel. Occupational Medicine Group personnel have proper postgraduate medical education and all physicians and nurses are provided Radiation Emergency Action Center/Training Site of Oak Ridge (REAC/TS) training. The group has no safety engineers, health physicists, or industrial hygienists. The full range of services are provided on first shift, 5 days per week, and on nights and weekends, on-call emergency services are available. The Occupational Medicine Group interfaces

and has memoranda of understanding with the Los Alamos Medical Center in Los Alamos and the Española Hospital 20 miles away. Ambulance services are provided through the Los Alamos Hospital; emergency medical technicians are supervised by the Chief of the Emergency Department of the Los Alamos Medical Center, located less than 1 mile from TA-3.

The Occupational Medicine Group is involved in an excellent occupational case management, which is a cooperative effort in concert with risk management. Effective statistics and trend analysis are maintained, which demonstrate the effectiveness of this program.

The Occupational Medicine Group is developing and using an in-house computer system which effectively generates the permanent medical record and maintains medical test and diagnostic data indefinitely. The system enhances data security and confidentiality.

Sixteen concerns were found by S&H Subteam 3, of which the self-assessment conducted by the LANL Health and Safety Division had identified six, partially identified seven, and had not identified three. The LAAO and LANL self-assessments identified two and partially identified 14 concerns, respectively.

Medical care and advice is provided by a qualified, trained, experienced, and motivated staff and meets the standards of medical care expected under codes for professional ethics. Nevertheless, problems exist, as does the need to furnish a full measure of occupational medical services in manner that assures both timely delivery and compliance with all relevant federal regulations. These problems will be solved when the mission of DOE 5480.8, "Occupational Medical Programs," is understood by LANL management; when formality of operations increases; and when the related disciplines of industrial hygiene, radiation protection, and safety exchange information freely.

4.5.2.17.2 Findings and Concerns

MS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation and control of the medical services program.

FINDINGS:

- LANL management has not complied with the recommendations of previous Headquarters, DOE, and LANL-requested reviews. All recommended that the level of reporting be elevated to improve access to the Medical Director and the effectiveness of the Occupational Medicine Group. The Medical Director reports administratively through three levels to the LANL Director via the Health and Safety Division. The appointment of the site Medical Director to the ES&H Council is a partial move toward compliance.

- LANL has not provided an effective management mechanism for keeping the site Medical Director abreast of and involved with all new physical, chemical, and biological agents and new processes or changes in existing processes introduced onto the worksite as required in DOE 5480.8, paragraph 7.

- LANL management has not provided an effective, comprehensive mechanism for identifying worksite hazards and those employees who may be exposed to those hazards so that the Occupational Medicine Group can perform special health examinations and health monitoring as required in DOE 5480.8. Also, the examinations required by OSHA or examinations recommended by the National Institute of Occupational Safety and Health can not be accomplished.

- The Occupational Medicine Group, by necessity, has assumed a management role by asking supervisors and employees to provide information about their work environments. This information is not always confirmed by other health professionals in the Health and Safety Division.

- The Medical Director estimates that 1500 employees are exposed to potential hazards that require medical surveillance examinations, but these personnel have not been identified to the Occupational Medicine Group.

- LANL management has not provided a method to inform the site Medical Director when an employee changes jobs so that his or her health status and physical fitness capabilities are evaluated on the basis of the demands of the new job as required in 5480.8.

- The number of nurses in the Occupational Medicine Group does not meet the guidelines outlined in DOE 5480.8, paragraph 7.f.(4)(a), (b), and (c). Analysis indicates a deficit of approximately four full-time-equivalent registered nurses. The deficiency of professional staffing has resulted in the following:

  - A 1 year backlog exists for performing voluntary periodic examinations. This amounts to between 3000 and 4000 examinations.

  - Medical examiners and nurses are not taking time for plant visits to become familiar with employee job tasks, worksite environments, and related health hazards as required in DOE 5480.8.

- The design of and amount of space in the medical facility building (TA-3 Bldg. SM-409) does not meet the requirements of DOE 5480.8 when measured against the needs of current work load, the needed increase in staffing, and the resumption of voluntary periodic examinations. (See Concern TSA-2, MS.3-3.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.1-1) (H1/C1) **Los Alamos National Laboratory management has not implemented an occupational medical program or its support systems of sufficient depth and scope to comply with DOE 5480.8.**

FINDINGS:

- The memorandum of understanding with the Española Hospital is dated 1986 and requires updating.

- No signed memorandum of understanding is in force with St. Vincent's Hospital in Santa Fe.

- See Concern TSA-4, EP.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.1-2) (H2/C1) **At the Los Alamos National Laboratory, appropriate arrangements and agreements with offsite providers of medical support are not complete as required in DOE 5500.3A.**

FINDINGS:

- There is no system in place to document that medical personnel have had the required DOE, contractor, and job-specific training required by OSHA (29 CFR 1910.120).

- See findings supporting Concern TSA-2, MS.3-4.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.1-3) (H1/C1)	Medical personnel at Los Alamos National Laboratory are not fully trained, and the training program is not documented in accordance with 29 CFR 1910.120.

MS.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support of the medical services for the facility and site.

FINDINGS:

- The LANL Emergency Preparedness Plan inappropriately states that the Occupational Medicine Group is required to conduct radiation monitoring for internal and external radiation.
- The Occupational Medicine Group has no written occupational medical plan as required by DOE 5480.8.
- Policies and procedures of the Occupational Medicine Group do not cover all principle medical processes. Examples include the following:
  - Primary medical forms such as Form 1-1.A are not generated, used, circulated, and filed as appropriate;
  - Procedures do not ensure that medical x rays are of high quality and administered with minimal exposure to the patient; and
  - "Record of Employment" forms are not always completed in medical records.
- Medical policies and procedures are not designated as (?) controlled documents.
- Medical policies and procedures are not dated, revisions are not numbered, and signed approvals are not provided.
- There is no system to ensure the timely review of medical policies and procedures.
- The following concern is partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.2-1) (H2/C1) **Procedures to ensure the uniformity and adequacy of medical services at Los Alamos National Laboratory are not accurate or complete as required by DOE 5500.7.**

FINDINGS:

- Protective force personnel are not always disqualified when indicated, nor are the wavier provisions of 10 CFR 1046.11 always followed.
- Only the Occupational Medicine Deputy Group Leader is approved by Headquarters, DOE, as a designated physician to examine protective force personnel under the provisions of 10 CFR 1046. Other physicians and

physician's assistants perform the examinations without the signature of the designated physician.

- The next-of-kin notification procedure was not followed during the appraisal emergency exercise.
- The radiologist's readings of chest x-rays taken for beryllium medical surveillance are not recorded on the B-code sheet as required by Occupational Medicine procedures.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **Systems are not in place at Los Alamos National Laboratory to ensure compliance with procedures and effective preventive actions.**
(TSA-2)
(MS.2-2)
(H3/C2)

FINDINGS:

- The narcotics drawer was found unlocked in an open unattended room in violation of 21 CFR 1301.71 and 21 CFR 1301.75.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **Narcotics at Los Alamos National Laboratory are not protected as required by 21 CFR 1301.71 and 21 CFR 1301.75.**
(TSA-2)
(MS.2-3)
(H2/C1)

MS.3 MEDICAL TREATMENT

PERFORMANCE OBJECTIVE: Medical treatment should be available and provided by qualified, competent staff, and adequate facilities should be available.

FINDINGS:

- No written occupational medical plan exists which identifies the services needed to support facility and site operations as required by DOE 5480.8. (See Concern TSA-2, MS.1-1.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.3-1) (H2/C1) **At Los Alamos National Laboratory, the medical services needed for support facility and site operations are not formally identified.**

FINDINGS:

- Medical and nursing staff are used for administrative functions at the expense of direct clinical services such as the voluntary periodic examinations. This is the result of a hiring freeze which has caused a shortage of administrative personnel.
- The Employee Assistance Program staff is not sufficient for the size of the population served or to provide psychological assessment to support the human reliability programs being implemented.
- Regular workplace visits have been curtailed because of the work load and because of inadequate administrative and nursing staffing. (See Concern TSA-2, MS.1-1.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.3-2) (H2/C1) **At Los Alamos National Laboratory, the full compliment of medical staff needed to support the site and facility is not available as required by DOE 5480.8.**

FINDINGS:

- When analyzed against the current work load, the need for increased staffing and the resumption of voluntary periodic examinations, TA-3 Bldg. SM-409 will not suffice as a medical treatment facility for the site.
- Medical records storage does not meet the requirements of DOE 1324.2. Records are stored in a separate room on open shelves. In the event of a fire, these sensitive, one-of-a-kind records will receive extensive water damage or may be destroyed.
- The waiting room in the TA-3 Bldg. SM-409 medical facility is too small for the population served; therefore, patients must use hallways for waiting areas.

This partially obstructs hallways which are primary emergency routes for evacuation.

- Nurses take employees' private information in the hallway, thereby threatening the privacy of the patients.
- There is no medical decontamination facility for the following reasons:
  - There is no holding tank, rendering the showers and drains inoperative for radiological or chemical decontamination.
  - There is insufficient space to handle two victims, as demonstrated during the emergency drill, which could result in the potential spread of contaminants.
- The TA-3 Bldg SM-409 medical facility does not have efficient storage space for clean supplies, contributing to the spread of contaminants because clean supplies are distributed from contaminated areas.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.3-3) (H1/C1) **The medical facility at Los Alamos National Laboratory cannot support patient care and does not meet the requirements of DOE 5480.8.**

FINDINGS:

- New personnel are not examined when hired as required by DOE 5480.8. Preplacement evaluations are conducted only by review of a pre-hire questionnaire.
- Workers requiring medical surveillance examinations are not being selected based on systematic surveys of workplace hazards.
- There is a 1-year backlog of voluntary periodic examinations. These examinations are vital for monitoring the health of the workforce.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.3-4) (H2/C1) **At Los Alamos National Laboratory, the medical screening and testing to ensure that the health of new and continuing employees is adequately monitored does not extend to all employees and is not in accordance with DOE 5480.8 and DOE 5500.3A.**

FINDINGS:

- Medical personnel required to use respirators (surgical or dust masks) are not medically cleared or trained in

respirator use as required by 29 CFR 1910.134 and ANSI 288.2 (1969).

- Management does not provide industrial hygiene services, such as complete toxicologic monitoring data, to the Occupational Medicine Group as required by 29 CFR 1910.156.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.3-5) (H2/C1) **At Los Alamos National Laboratory, existing systems do not ensure that all required special medical assessments are performed for medical hazards associated with work in accordance with 29 CFR 1910.**

FINDINGS:

- There is no Occupational Medicine Group representative at the Emergency Operations Center to provide input on medical issues such as thyroid blocking agents, the priority of medical care recommendations, or protective recommendations.

- There is no plan to ensure that thyroid blocking and chelation agents are available for employees and the public. (See Concern TSA-4, EP.7-1.)

- Emergency management did not provide timely industrial hygiene and health physics assistance for the appraisal emergency exercise.

- The Emergency Operations Center established no communications link with the Occupational Medicine Group at the beginning of the appraisal emergency exercise as required in DOE 5480.7.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.3-6) (H1/C1) **Los Alamos National Laboratory has not ensured quality medical advice and care in the event of an emergency as required by DOE 5500.3A.**

MS.4 REVIEW AND AUDIT

PERFORMANCE OBJECTIVE: Policies, procedures, and practices for medical services should be reviewed and audited periodically to ensure continued effectiveness of the medical services.

FINDINGS:

- No official responsible for oversight in the area of occupational medicine has been designated by either LAAO or the ALO.
- The LAAO and the LANL self-assessments rated the occupational medical services as satisfactory, but they reflect few of the problem areas found during this assessment.
- The following concern was identified in the LAAO self-assessment.

CONCERN: (TSA-2) (MS.4-1) (H2/C1) **The Los Alamos Area Office do not have oversight mechanisms in place for the adequate control of occupational medicine at Los Alamos National Laboratory.**

FINDINGS:

- The site Medical Director has no system in place to ensure implementation of medical services changes when required by changes in the site activities or when required by changes in the availability of supporting medical services. The Laboratory Director has not provided an effective management mechanism to involve health services on all new physical, chemical, and biological agents and new processes introduced into the worksites as required in DOE 5480.8.
- Management has no system to ensure that the Occupational Medicine Group be involved in site facility changes or hazards as required by DOE 5480.8.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.4-2) (H3/C1) **A system is not in place at Los Alamos National Laboratory to ensure that medical policies are reviewed when there are changes in site hazards as required by DOE 5480.8.**

FINDINGS:

- A system has not been implemented to track medical service provider, DOE, LANL, or professional licensing training requirements.
- There is no system in the Occupational Medicine Group to document responses to emergencies.
- No periodic audit of randomly selected medical records is performed by the site Medical Director.

- There is no system to track complaints, lessons learned, or noncompliance with policy.

- The following concern was partially identified in the LANL self- assessment.

CONCERN: (TSA-2) (MS.4-3) (H2/C1) **Medical personnel activities at Los Alamos National Laboratory are not adequately audited or documented as required by DOE 5500.3A.**

MS.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of the medical hazards that may be encountered in their work environment and of the medical services that are available.

FINDINGS:

- Employees are not notified of their or their designated representative's right of access to their medical records as required by 29 CFR 1910.20, Employee Access to Exposure and Medical Records.
- There is no record of annual communication made to employees regarding their, or their designated representative's, right of access to their medical records as required by 29 CFR 1910.20.
- There is no system to ensure that the Privacy Act and 29 CFR 1920.10 are readily available to employees for examination as required by the Privacy Act of 1974 and 29 CFR 1010.20.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-2) (MS.5-1) (H3/C1) **Employees are not informed of their right to access and copy medical records and records of exposure as required by the Privacy Act of 1974 and 29 CFR 1910.20.**

4.5.3 Accelerators

4.5.3.1 Organization and Administration

4.5.3.1.1 Overview

This appraisal considered all eight performance objectives in the Organization and Administration technical category. Judgments were based on (1) discussions with management, supervisory, and operations personnel in all organizational units in which accelerators or accelerator beams are used as primary research devices; (2) reviews of management-related documents in these organizational units; and (3) tours of the various accelerator facilities and discussions with the respective operations personnel pertaining to the details of management control and oversight of the operations. Concerns were cited against six of the eight performance objectives.

The appraisal did not include the organization and administration of those organizational units in which accelerators are used only as incidental tools in performing their activities. Thus, this appraisal focused primarily on the Medium Energy Physics, Physics, and Accelerator Technology Divisions; Clinton P. Anderson Meson Physics Facility (LAMPF); and Manuel Lujan, Jr., Neutron Scattering Center (LANSCE).

For the most part, organizational structures are clear and the responsibilities and authorities of management personnel are understood throughout the organizations concerned. Job descriptions in the conventional sense are documented at the times the jobs are posted. They are also reviewed and updated each year during the individual jobholder's performance appraisal. Management sponsors and promotes traditional safety programs (regular safety meetings, safety bulletins, etc.) in all accelerator organizations. Recently, Los Alamos National Laboratory (LANL) management has become more proactive in promoting the understanding that all employees are responsible and accountable for environment, safety, and health (ES&H), and management in the accelerator organizations is following this lead. However, neither the Albuquerque Field Office (AL) nor top-level LANL management has provided all necessary guidance and oversight to the LANL accelerator organizations for many Department of Energy (DOE) mandated activities.

A system of administrative controls that will ensure an acceptable ES&H program is not uniformly enforced by all accelerator organizations. The Accelerator Technology Division has formally established all the components of a fully functional administrative control system (although the final safety analysis report for Phase 1 of the Ground Test Accelerator (GTA) is still not approved). However, other accelerator organizations have not progressed this far. Also, incident reporting throughout the accelerator organizations is limited to events that clearly exceed the guidelines stipulated in DOE 5000.3A. No formal system has been documented and implemented to deal with incidents (including near-misses) that do not exceed the threshold established by the guidelines cited in the DOE Order. In addition, top-level LANL management has not provided the necessary guidance and oversight to ensure proper procedural controls of all accelerator operations.

LANL has recently initiated a commendable effort to define management ES&H program objectives, including those for the accelerator organizations. This effort is only a few months old. The Medium-Energy Physics Division has

published its goals as FY 92 strategies; these goals are well defined but not always measurable, a fact that will complicate the assessment of progress at the end of the fiscal year. Most of the other accelerator organizations have not yet published their goals.

A sitewide program encourages audit and oversight of ES&H activities by management. In most accelerator areas, this policy translates into two inspections per year by division or center management and "regular" inspections by group safety officers, although the term "regular" is not quantified. The uniformity and effectiveness of the program suffers because no guidance has been provided to define requirements for ES&H assessment by division or center management and supervision.

Job qualification requirements are reevaluated, and updated if necessary, each time a position is posted by an accelerator organization. Long-range staffing plans are not formally documented by management at each accelerator unit; however, all of these units do have estimates of their staffing needs for the next few years. The major new requirement will be for a staff sufficient to meet increased demands imposed by emphasis on the enhanced ES&H program. A uniform performance appraisal system, which appears to be well understood and accepted, is in place; however, a formal career development program for technical employees is needed to ensure continuity of managerial and professional excellence.

In general, document control has not received the level of management attention needed to ensure that field documents for accelerator units are maintained current. The Accelerator Technology Division has an acceptable system; however, the Medium-Energy Physics Division, LANSCE, and the Ion Beam Facility (IBF) have no formal document control system.

A minimal, though acceptable, fitness-for-duty program is in place in all accelerator organizational units. Interviews with managers and supervisors confirmed that these personnel have been trained to detect behavior typical for substance abusers. Interviews with operations personnel confirmed that they have all been briefed on the fundamentals of the LANL substance abuse policies and on the help available to addicted persons through the Employee Assistance Program.

The LANL self-assessment includes a comprehensive treatment of the Organization and Administration technical category. Moreover, this section was organized in a way that facilitated comparison of the results of the Tiger Team Assessment in this area with those of the LANL self-assessment. Of the six concerns addressed to LANL and presented in the report, three were fully identified in the LANL self-assessment, two were partially identified, and one was not identified. The one concern addressed to AL and presented in this report was partially identified in the AL self-assessment.

4.5.3.1.2 Findings and Concerns

OA.1 SITE/FACILITY ORGANIZATION

PERFORMANCE OBJECTIVE: Management should organize and manage the site/facility's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

FINDINGS:

- The overall management system for accelerator facilities at LANL does not provide control over packaging and transportation activities as required by DOE 5480.3. (See Concern TSA-3, PT.1-1.)
- There is no independent safety oversight of packaging and transportation activities for accelerator areas as required by DOE 5480.1B and DOE 5482.1B. (See Concern TSA-3, PT.1-2.)
- LANL has not implemented a management system for accelerator facilities to ensure that operations personnel and experimenters execute their respective responsibilities for safety. (See Concern TSA-3, EA.1-1.)
- There is no LANL policy or procedure that defines those accelerator experiments subject to independent safety review required by DOE 5482.1B. (See Concern TSA-3, EA.2-1.)
- LANL has not prepared or implemented an occupational safety and health program that addresses the administrative requirements of DOE 5483.1A. (See Section 4.5.3.14.2, PP.1.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (OA.1-1) (H2/C1) **The Los Alamos National Laboratory top management has not provided all necessary guidance and oversight to the accelerator organizations for many activities mandated by the Department of Energy.**

FINDINGS:

- AL has not managed functional appraisals in accordance with the requirements of DOE 5482.1B and AL 5482.1A. (See Concern TSA-3, PP.4-3.)
- AL does not perform quality assurance (QA) overview activities of the Los Alamos Area Office (LAAO) or LANL accelerator activities as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989. (See Section 4.5.3.2.2, QV.1 and Concern TSA-4, QV.1-3.)
- The following concern was partially identified in the AL self-assessment.

CONCERN: (TSA-3) (OA.1-2) (H2/C1)	The Albuquerque Field Office has not provided all necessary guidance or oversight to the Los Alamos Area Office and the Los Alamos National Laboratory accelerator organizations for many activities mandated by the Department of Energy.

OA.2 ADMINISTRATION

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning health and safety are administered throughout the facility.

FINDINGS:

- The safety analysis for LAMPF is in preparation, in compliance with AL 5481.1B, Chapter I, paragraph 3.C.(2). However, it is incomplete and is not scheduled for completion and approval until March 1993.
- No operational safety requirements (OSRs) for LAMPF have been published, although currently used limits are cited in existing procedures and manuals.
- A revised final safety analysis report (SAR) for LANSCE is nearing completion but has not yet been approved; Chapter 8 on OSRs is currently being revised.
- No safety analysis has been prepared for the IBF, as required by AL 5481.1B, Chapter I, paragraph 3.C.(2). However, a preliminary hazards analysis, which will ultimately lead to an approved safety analysis, has been completed.
- The final SAR for Phase 1 of the GTA is not yet approved.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (OA.2-1) (H2/C1) **At the Los Alamos National Laboratory, approved administrative controls (safety analyses, operational safety requirements, or their equivalents) are not available for all accelerator facilities or operations as required by AL 5481.1B.**

FINDINGS:

- The Medium-Energy Physics Division has no documented system for reporting incidents that do not appear to violate the threshold defined by DOE 5000.3A; these less serious incidents, which are also reportable under DOE 5480.19, Chapter VI, are not routinely reported or examined.
- A protocol for incident reporting is included in the LANSCE ES&H manual; however, the protocol needs to be revised to formalize methods for reporting and investigating incidents and for tracking defined corrective actions.
- The reporting system for low-level incidents in the IBF is very informal, such reports often appearing only as an entry in operator logbooks.
- No LANL management guidance has been provided for establishing incident control systems to address incidents below the threshold established by DOE 5000.3A.

- The reporting of occurrences and events is not consistent at the tritium and reactor facilities, and incident reports from similar facilities are not being studied as a means of enhancing safety. (See Section 4.5.2.1.2, OA.5.)

- Not all accelerator organizations have formal reporting systems to deal with incidents below the threshold defined in DOE 5000.3A.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (OA.2-2) (H2/C1) **The occurrence reporting system for incidents at the Los Alamos National Laboratory is inconsistent at some facilities and incomplete at others in that less serious incidents are not always reported and investigated as required by DOE 5000.3A and DOE 5480.19.**

FINDINGS:

- Most LANL organizations responsible for accelerator operations have not yet developed and implemented formal procedures to control special processes, as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 9. (See Concern TSA-3, QV.7-1.)

- The development, control, and contents of procedures at LANL accelerator facilities do not meet the requirements of DOE 5480.19. (See Section 4.5.3.3.2, OP.3.)

- Operating procedures for the packaging and transportation of hazardous materials and of radioactive and mixed wastes are not properly implemented and controlled in the accelerator areas. (See Concern TSA-3, PT.6-1.)

- The procedures and process used to implement radiation protection programs at accelerator facilities do not ensure that the requirements of DOE 5480.11, mandated American National Standards Institute (ANSI) standards, and the LANL ES&H Manual are met. (See Section 4.5.3.1.13, RP.3.)

- Safe operating procedures related to work within confined spaces in accelerator activities at LANL do not conform with ANSI Z117.1-1989. (See Concern TSA-3, PP.2-1.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (OA.2-3) (H2/C1) **The Los Alamos National Laboratory management has not provided the necessary guidance and oversight to the accelerator organizations to ensure proper procedural controls.**

OA.3 MANAGEMENT OBJECTIVES

PERFORMANCE OBJECTIVE: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

FINDINGS:

- Most of the goals stipulated as "strategies" for FY 91 and FY 92 in ES&H S^2-91-1435 "ES&H Policy, Vision, Goals, Objectives, Strategies," dated July 16, 1991, are qualitative and, therefore, not readily measurable.
- Goals cited under "FY 92 Strategies" for the Medium-Energy Physics Division, and included in the DIR-91-56, "Manager's ES&H Status Book" (no document date), are general and were not formulated to be readily measurable.
- Most of the other accelerator organizations have not yet published ES&H goals for FY 92.

CONCERN: **See Concern TSA-4, OA. 3-1.**

OA.5 MANAGEMENT ASSESSMENT

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

FINDINGS:

- The ES&H assessment program of Medium-Energy Physics Division management includes two inspections per year by the Director's Office and "regular" inspections by group safety officers; however, the term "regular" has not been quantified, and program details are still in draft form.
- The Physics Division has drafted, but not yet finalized, plans to define its system for ES&H audits by managers.
- Neither the Research Directorate nor LANL has provided guidance with respect to minimum requirements for ES&H assessment by division or center management.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (OA.5-1) (H2/C2) **No Los Alamos National Laboratory guidance has been provided to define requirements for environmental, safety, and health assessment by accelerator organization management.**

OA.6 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

FINDINGS:

- The Medium-Energy Physics Division has no formal program for its employees to enhance their career development.
- LANSCE management has recognized its lack of a formal career development program as a deficiency and considers it an action item to be addressed.
- LANL has no required formal program for the career development of potentially promising managers.
- The Human Resources Directorate is working to develop formal program concepts for enhanced career development on a sitewide basis.
- A group of midlevel managers from accelerator organizations reported that the existing career development effort does not adequately prepare personnel for advancement.
- There is no formal development program that includes ES&H training for staff and managers within the Nuclear Materials Technology Division to ensure that fully qualified candidates will be available for management positions. (See Section 4.5.1.1.2, OA.6.)
- LANL has addressed neither the classification, salary grade, and growth opportunities for its ES&H positions nor the consequences of staff transfers resulting from restructuring of nonexempt positions. (See Concern TSA-4, OA.6-2.)
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (OA.6-1) (H3/C2) **The Los Alamos National Laboratory has no career development programs to ensure continuity of professional and managerial excellence.**

OA.7 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support site/facility operations.

FINDINGS:

- The Medium-Energy Physics Division has no formal document control system.
- LANSCE has not established a document control system.
- The IBF controls safe operating procedures and maintains them current but, otherwise, has no formal document control system.
- The lack of formal document control precludes assurance that all field documents are the most current version.
- See Concern TSA-3, TS.2-2.

CONCERN: **See Concern TSA-4, OA.7-1.**

4.5.3.2 Quality Verification

4.5.3.2.1 Overview

The scope of the Quality Verification appraisal included all seven performance objectives. The appraisal examined accelerator operations and related accelerator support facilities. The appraisal was conducted by (1) interviewing AL staff, LAAO staff, and LANL staff and crafts personnel; (2) observing onsite activities in progress; and (3) reviewing pertinent documentation, including the Los Alamos National Laboratory Quality Assurance Manual, QA plans, related implementing procedures, and supporting records. Facilities reviewed during this appraisal included 16 of 21 accelerator facilities located in seven technical areas.

Documentation and implementation of the QA requirements varied greatly at LANL. In each of the areas appraised, the success of QA programs depends on the efforts of the individuals developing the programs, not on the direction received from upper management. The Quality Verification appraisal resulted in 12 concerns supported by many findings. Overall QA implementation at the accelerators facilities is substantially deficient. QA leadership or direction on the part of LANL managers and oversight from DOE have been ineffective.

The status of DOE 5700.6 at the time of this appraisal made for a unique situation regarding hazard/compliance categorization. Since DOE 5700.6B has been revoked, and because DOE 5700.6C will not be implemented until February 1992, C1 compliance ratings have been assigned only for those deficiencies that do not meet the requirements of either Order. For noncompliance with DOE 5700.6C, only a C2 compliance rating has been assigned.

No objective evidence was produced to indicate that AL has performed any oversight activities for QA programs involving accelerators. In addition, AL has not conducted formal QA overviews of the LAAO, and QA program requirements for accelerators have not been formally transmitted to the operating contractor.

No oversight program for QA has been implemented at LAAO. Although LAAO has assigned a part-time QA engineer to interact with LANL personnel on matters related to QA, no oversight procedures have been developed and oversight has not been accomplished or scheduled.

The QA Program at LANL has recently been rewritten to satisfy the requirements of DOE 5700.6C. The new QA Manual was issued to all LANL divisions for review and comment on September 9, 1991. This document will become effective on January 6, 1992; however, full implementation is not scheduled for 3 years. Based on interviews with accelerator personnel, the requirements of this manual are not well understood and are, therefore, not readily accepted. QA indoctrination and training related to these requirements have not been scheduled, and in some accelerator facilities, upper management support for implementation has not penetrated to the operations level.

QA staffing for most of the reviewed facilities was insufficient to accomplish the QA requirements specified in DOE Orders. The responsibility for QA has generally been assigned to individuals with little or no formal training or experience in the QA discipline. QA representatives at LANL are usually

responsible for a variety of other duties, a situation that sometimes results in conflicting priorities and hinders the implementation of QA program activities.

QA plans have not yet been written for several LANL accelerator facilities. Those that have been written are based on DOE 5700.6B and impose the basic requirements of ASME NQA-1-1989. In most cases, QA plans simply repeat the requirements of ASME NQA-1-1989, without attempting to identify either organizational relationships or responsibilities and authorities related to the implementation of QA requirements. In most cases, QA plans do not reflect independent verification as part of the QA responsibility of line management and do not reflect full consideration of all related elements. QA plans for LANL accelerator facilities lack specificity in most instances and are usually not implemented. There are, however, a few isolated areas where program requirements have been partially implemented. The efforts of the Advanced Nuclear Technology Group and the Ground Test Accelerator Programs indicate that these organizations understand the requirements of a QA program. The programs being developed by these two groups are significantly better than those of other accelerator organizations.

A formal system is not in place for the QA evaluation of potential suppliers. A quality-related list of approved suppliers has not been developed, and receiving and pre-installation inspections of procured items, parts, and systems are seldom accomplished. The responsibility for inspection is generally left to the discretion of the user.

A consistent calibration policy is not in place for accelerator facilities. Although several groups have initiated calibration programs, the calibration of precision measuring and test equipment is often left to the discretion of the user. Identification and control of hardware and materials were not addressed in most of the QA plans reviewed, nor was control of shelf-life items. In addition, formal nonconformance reporting systems have not been implemented at all facilities.

Independent inspection of in-process parts and assemblies is not being accomplished. Although several groups use procedures and certified personnel to perform special processes, the use of qualified procedures, personnel, and equipment has not been implemented for most accelerator operations.

LANL conducted a comprehensive self-assessment of its implementation of the quality verification performance objectives used for the current appraisal. There is good correlation between the LANL self-assessment findings and the concerns identified by the Tiger Team Assessment. LANL considered the lack of a formal quality program to be a key concern. On the other hand, the self-assessments conducted by AL and LAAO did not adequately address the quality verification area and did not fully identify the concerns identified in this assessment.

4.5.3.2.2 Findings and Concerns

QV.1 QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning quality are administered for each facility throughout the site.

FINDINGS:

- AL does not have a formal, written QA plan.
- Formal guidance for the implementation of QA for accelerator facilities has not been issued by AL.
- AL has not conducted a formal QA audit of the accelerator facilities at LANL for 3 years.
- Required audits and surveillances of the LAAO and LANL were not performed by AL.

CONCERN: **See Concern TSA-4, QV.1-3.**

FINDINGS:

- LAAO does not have a formal, written QA plan.
- Formal guidance for the implementation of QA for accelerator facilities has not been issued by LAAO.
- LAAO has not developed an overview schedule to conduct audits and surveillances of LANL.
- LAAO has not developed an audit or surveillance procedure for the conduct of oversight activities.
- LAAO has not conducted any documented audits or surveillances of activities carried out by LANL.

CONCERN: **See Concern TSA-4, QV.1-4.**

FINDINGS:

- The QA plan for the Medium-Energy Physics Division was issued on July 5, 1991, but has not been implemented.
- The Physics Division Quality Management Plan has not been issued.
- The Ion Beam Facility Group has not developed and issued a quality program plan.
- A quality program plan does not exist for the Fabrication and Assembly Group. This group will use the Weapons Engineering Division Quality Operation Plan when it is issued.
- Standard Operating Procedure, "Calibration Plan/Quality Manual," the QA plan for the Hydrodynamics Group, was approved on August 2, 1991, approximately 1 year after it was prepared.

- The QA plan for the Explosives Applications Group, "Quality Assurance and Calibration Plan M-8 Explosives Application," dated December 17, 1990, has been issued; however, it has not been approved by the Division Leader.

- The Free Electron Laser Technology Group has not developed a quality assurance plan.

- None of the eight groups in the Medium-Energy Physics Division have developed QA plans.

- The QA programs that have been initiated are the result of individual effort, not the influence of upper management.

- QA representatives for accelerator facilities do not have the surveillance plans and audit schedules needed to establish effective oversight of their facilities.

- Most approved QA plans do not include independent verification of quality-related activities.

- Independent audits of accelerator line organizations by the Quality Operations Office at LANL are conducted only when requested by the line organization and have not been performed during the past 3 years.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.1-1) (H2/C1)

Los Alamos National Laboratory has not developed and implemented an effective quality assurance program, has not ensured that accelerator organizations have developed and implemented quality assurance programs, and does not perform oversight of accelerator organizations quality assurance activities as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.

FINDINGS:

- Many QA representatives lack the necessary training to function effectively in their assigned duties as required by the LANL Quality Assurance Plan.

- Indoctrination and training to assure that suitable proficiency is achieved and maintained by personnel performing activities affecting quality has not been accomplished at LANL accelerator facilities.

- Quality program officers for all eight groups of the Medium-Energy Physics Division were appointed in September 1991. Only three of these officers have any previous experience related to QA.

- See Concerns TSA-3, TC.4-1, and TSA-3, TS.1-2.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.1-2) (H3/C2) **The organizations responsible for accelerator operations do not have trained quality assurance professionals to ensure that quality assurance plans are developed and implemented as required by the Los Alamos National Laboratory Quality Program Plan, dated March 29, 1989.**

QV.2 PROCUREMENT AND SUPPLIER CONTROL

PERFORMANCE OBJECTIVE: Provisions should be established for the control of purchased material, equipment, and services; for selection and control of suppliers; and for assessing the adequacy of procurement activities.

FINDINGS:

- Formal procedures for procurement and supplier evaluation have not been developed by the following accelerator organizations:
  - Ion Beam Facilities Group,
  - Condensed Matter and Thermal Physics Group,
  - Fabrication and Assembly Group,
  - Advanced Nuclear Technology Group,
  - Explosives Application Group,
  - Free Electron Laser Technology Group, and
  - Medium-Energy Physics Division.
- A uniform accelerator program is not in place to assure and verify that procurement of new items/parts or spare replacement parts are subject to QA program controls, appropriate codes and standards, or specific technical requirements.
- Current practices at LANL accelerator facilities inappropriately assign responsibility for checks of procurement documentation to the requisitioner or to line management, not to a qualified inspector.
- Supplier audits are performed by the Quality Operations Office on request. There is no objective evidence that any accelerator facility has requested this service. There is no requirement to mandate supplier audits for areas where they should be performed.
- A formal evaluation program for suppliers does not exist for LANL accelerator facilities. Approved supplier lists have not been developed, and since few inspections have been performed and documented, reliable supplier performance histories are not available.
- QA personnel are not assigned to track and assess the adequacy of procurement activities.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.2-1) (H2/C1)	Formal procedures for procurement and supplier control have not been developed, implemented, and assessed by Los Alamos National Laboratory accelerator organizations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Sections 4 and 7.

QV.3 RECEIVING AND PRE-INSTALLATION INSPECTIONS

PERFORMANCE OBJECTIVE: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

FINDINGS:

- Formal procedures for receiving and pre-installation inspections have not been developed by the following accelerator organizations:
  - Ion Beam Facilities Group,
  - Condensed Matter and Thermal Physics Group,
  - Fabrication and Assembly Group,
  - Hydrodynamics Group,
  - Explosives Application Group,
  - Free Electron Laser Technology Group, and
  - Medium-Energy Physics Division.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.3-1) (H2/C1) **Formal procedures for receiving and pre-installation inspections have not been developed and implemented by most Los Alamos National Laboratory organizations responsible for accelerator operations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 8.**

QV.4 CALIBRATION PROGRAM

PERFORMANCE OBJECTIVE: Provisions should be made to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- Contrary to the requirements of DOE 5700.6C and ASME NQA-1-1989, LANL has not implemented a uniform calibration policy to control instruments, gages, tools, and other measuring and test equipment used at the accelerator facilities. Each facility establishes its own requirements, without providing independent assurance that calibration activities will comply with applicable industry codes and standards.
- Examples of calibration deficiencies include inadequate status marking, incomplete records, and lack of verification that calibration schedules have been maintained.
- Formal calibration plans, programs, and procedures have not been developed by some accelerator groups.
- The calibration procedure for the Explosives Applications Group is described in its QA plan. However, specific calibration procedures with established tolerances do not exist, and the accuracy of the standard being used is not always adequate.
- The Standards and Calibration Group does not send copies of calibration data to groups responsible for the equipment being calibrated unless the information is specifically requested.
- Evaluation of the prior use of out-of-tolerance equipment is not being performed by the groups using the equipment.
- The Hydrodynamics Group does not keep calibration data for each item calibrated, nor does it maintain calibration data for all of its standards.
- Equipment due for calibration in 1988 and 1989 was found in an experimental area controlled by the Condensed Matter and Thermal Physics Group.
- The Fabrication and Assembly Group performs calibration of micrometers, but the group does not have a procedure for this activity.

CONCERN: **See Concern TSA-4, QV.4-1.**

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

PERFORMANCE OBJECTIVE: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

FINDINGS:

- Formal procedures for the identification and control of hardware and materials have not been developed by the following accelerator organizations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 5:
  - Ion Beam Facilities Group,
  - Condensed Matter and Thermal Physics Group,
  - Fabrication and Assembly Group,
  - Hydrodynamics Group,
  - Advanced Nuclear Technology Group,
  - Explosives Application Group,
  - Free Electron Laser Technology Group, and
  - Medium-Energy Physics Division.
- Procedures to address the shelf life of degradable materials have not been developed by the following accelerator organizations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 13:
  - Ion Beam Facilities Group,
  - Condensed Matter and Thermal Physics Group,
  - Fabrication and Assembly Group,
  - Hydrodynamics Group,
  - Advanced Nuclear Technology Group, and
  - Explosives Application Group.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.5-1) (H2/C1) **Items and hardware are generally not identified and controlled by Los Alamos National Laboratory accelerator organizations to indicate status, maintain quality, and prevent inappropriate use as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 8.**

FINDINGS:

- Formal nonconformance procedures have not been developed by the following accelerator organizations as required by

DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 15:

- Ion Beam Facilities Group,
- Condensed Matter and Thermal Physics Group,
- Hydrodynamics Group,
- Advanced Nuclear Technology Group,
- Explosives Application Group,
- Free Electron Laser Technology Group, and
- Medium-Energy Physics Division.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.5-2) (H2/C1) **Procedures have not been developed and implemented to identify and control nonconforming items for Los Alamos National Laboratory accelerator facilities as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 15.**

FINDINGS:

- Suspect bolts were found installed at the Ballistics Test Facility, which is controlled by the Explosive Applications Group.
- Suspect bolts were found in material storage areas controlled by the Engineering and Maintenance Group, Ion Beam Facilities Group, and Explosives Application Group.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.5-3) (H2/C2) **Accelerator organizations have not taken appropriate action in response to the March 4, 1991, memorandum on substandard and counterfeit fasteners that was issued by the Quality Operations Office of the Los Alamos National Laboratory.**

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluation inspection results.

FINDINGS:

- Formal inspection procedures have not been developed by the following accelerator organizations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 5:
  - Ion Beam Facilities Group,
  - Condensed Matter and Thermal Physics Group,
  - Fabrication and Assembly Group,
  - Hydrodynamics Group,
  - Advanced Nuclear Technology Group,
  - Explosives Application Group,
  - Free Electron Laser Technology Group, and
  - Medium-Energy Physics Division.
- The following concern was identified by the LANL self-assessment.

CONCERN: (TSA-3) (QV.6-1) (H2/C1) **Los Alamos National Laboratory accelerator organizations have not developed and implemented inspection procedures as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 10.**

QV.7 CONTROL OF SPECIAL PROCESSES

PERFORMANCE OBJECTIVE: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

FINDINGS:

- Formal procedures for the control of special processes have not been developed by the following accelerator organizations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 9:
  - Ion Beam Facilities Group,
  - Condensed Matter and Thermal Physics Group,
  - Hydrodynamics Group,
  - Explosives Application Group, and
  - Medium-Energy Physics Division.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (QV.7-1) (H2/C1) **At the Los Alamos National Laboratory, most accelerator organizations have not developed and implemented formal procedures to control special processes as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 9.**

4.5.3.3 Operations

4.5.3.3.1 Overview

This appraisal reviewed the conduct of operations for accelerator facilities at LANL and addressed all eight of the applicable performance objectives. Findings and concerns were developed for five of these objectives. Concerns were not developed in the areas of operator knowledge and performance, shift turnover, or human factors. No accelerator was engaged in shift activities during the appraisal. The scope of the appraisal included interviews with facility staff and observations at 12 of the 21 accelerator facilities. Most of the accelerator facilities were not operating during the course of this appraisal. Some were in an extended planned shutdown unrelated to the Tiger Team Assessment. For the 2 months immediately preceding the appraisal, most accelerator personnel were engaged in housekeeping activities and in writing and developing procedures. Housekeeping activities overwhelmed the routine waste management program at LANL, and numerous salvage areas were evident around the site.

About 2 months before the start of the appraisal, LANL staff initiated an aggressive new program for developing and implementing "formality of operations," which LANL views as encompassing the "conduct of operations" program required by DOE 5480.19. This effort began with 3 days of training for LANL managers, including a practical field exercise. The quality of this training was excellent. Many LANL staff members expressed enthusiasm for the process because of a perception created during training that formality of operations would save money. Past activities, for which informality of operations at accelerators has resulted in the need for expensive repairs (shielding at LAMPF, ventilation at LANSCE, Pulsed Intense X-Ray (PIXY) accelerator repairs, etc.), provide evidence of the need for more formality.

After the initial effort, the new program of formality can best be characterized as highly informal. Since the training sessions, LANL has emphasized the development of global policy statements that, although helpful, do not provide the staff with urgently needed guidance. During field interviews, LANL personnel seem to have nowhere to turn to learn about such issues as the required contents of procedures, mandatory requirements for some operations, or even such details as the alarm levels to be used in stack monitors. In "Report of Management and Operational Assessment of Los Alamos National Laboratory," conducted by Burns and Roe in March and April of 1991, two recommendations were made concerning operations: first, to develop a clear LANL policy on conduct of operations and, second, to develop a sitewide "plan and supporting procedures for implementation of the conduct of operations policy at all levels." LANL has not taken decisive action on the second recommendation. There appears to be no central authority in place to consider even such basic issues as procedure control and numbering. Slow implementation of the new policy of formality and reversals of decisions made early in the process could lead to a loss of enthusiasm for all concerned.

LANL has developed an implementation plan for DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities." The implementation plan established May 1992 as the deadline for LANL to determine when it would be able to comply with the Order. LANL has set a tentative date for compliance of July 1993, hardly an aggressive schedule.

Operations at accelerators fall into three basic categories: (1) large accelerators whose hazards and scope of operations have historically demanded many of the elements set forth in DOE 5480.19; (2) small accelerators whose personnel are moving rapidly to implement a formal conduct of operations; and (3) small accelerators whose personnel are awaiting direction to implement a formal conduct of operations. Operations at all accelerators have suffered from a lack of direction and external review.

The large accelerators, including LAMPF and the GTA, have many strong program elements that support implementation of DOE 5480.19. Personnel at these two facilities know what is expected of them and have begun to implement missing program elements. However, division of responsibilities between groups at LAMPF, the Weapons Neutron Research (WNR) Facility, and LANSCE contributes to operational weakness. This division and the subsequent lack of review, along with informal definition of interfaces between these groups, has resulted in excessive reliance on active electronic devices in lieu of passive shielding. This kind of solution has resulted in significant expenditures to retrofit "passive shielding" at LAMPF.

Several smaller accelerators organizations are moving rapidly to implement DOE 5480.19. The limited guidance from upper management in many areas is producing divergent approaches with respect to procedures, safety systems, and operations--as exemplified at the Ion Beam Materials Laboratory (IBML), the Integrated Test Stand/Dual Axis Radiographic Hydro Test (ITS/DARHT) facility, and the Free Electron Laser (FEL) in Bldg. WA-161. Despite the vigor and willingness of accelerator personnel to incorporate a new safety culture, the limited external review, particularly with respect to barriers and interlocks, resulted in significant findings against some of the accelerators; laser safety at FEL and target area radiation shielding and interlocks at ITS/DARHT provide examples.

The implementation of a formal conduct of operations at other small accelerators suffers from limited staffing and lack of guidance from upper management. The LANL self-assessment identified only three of the six issues required for the full implementation of DOE 5480.19. The need to develop common guidance for conduct of operations at accelerator facilities, however, did not receive sufficient attention in the self-assessment.

4.5.3.3.2 Findings and Concerns

OP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Operations organization and administration should ensure effective implementation and control of operations activities.

FINDINGS:

- Although no interface agreement exists, organizational responsibility for control of the primary beam pipe changes four times in the area of the two targets for the Weapons Neutron Research Facility. The Weapons Neutron Research Facility group can remove the beam pipe, which results in increased air activation.
- Interface agreements are not in place to specify the roles and responsibilities of the groups that operate or use Proton Beams LAMPF, including LANSCE and the Weapons Neutron Research Facility.
- Basic systems and operations (e.g., shielding, interlocks, recordkeeping, lockout/tagout, maintenance, logbooks, etc.) differ between groups.
- When responsibility for D-Line and the Proton Storage Ring transferred to the Medium-Energy Physics Division, changes were required to provide an acceptable degree of safety of operations. These changes included addition of radiation interlocks, and reducing the commingling in cable trays of the wiring for safety interlocks with the nonsafety run permit system.
- When responsibility for D-Line and the Proton Storage Ring transferred to the Medium Energy Physics Division, insufficient shielding was found. As a result, substantial funds were spent upgrading the shielding to reduce the accidental dose to below 100 rem in the event of failure of active safety components.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.1-1) (H2/C2) **At the Los Alamos National Laboratory, failure to coordinate the interfaces between organizations responsible for operating all components of the Clinton P. Anderson Meson Physics Facility; the Manuel Lujan, Jr., Neutron Scattering Center; and the Weapons Neutron Research Facility adversely affects safe operation of these facilities.**

FINDINGS:

- The machine placement for the permanent location of the portable linear accelerator at TA-18 is not controlled with positive locking devices or interlocks.
- When either the TA-8 or the TA-18 linear accelerator is used in portable field radiography, the operator does not

record the placement of the device or postings and barriers used to limit access to the radiation area.

- Operators of portable linear accelerators do not conduct surveys and postings and are not trained to operate portable survey instruments.

- Health Physics Operations Group personnel record linear accelerator placement, barriers, and posting but are not required to be present when a linear accelerator is operated. Both portable linear accelerators are capable of continuous operation, producing from 200,000 to 300,000 rem per hour at 30 centimeters.

- Operators of the portable linear accelerator at TA-8 Bldg. WA-23 log only those machine operations that result in radiographic images.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.1-2) (H2/C1) **At the Los Alamos National Laboratory, the separation of responsibilities for the operation of portable linear accelerators--including survey access control and posting--has diminished the responsibility of the line organization for maintaining safe operations as required by DOE 5480.19.**

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

FINDINGS:

- Passive shielding for Line L1 of the LANSCE beam delivery system is insufficient to protect against accidental beam loss. Accidental loss can result in more than 3000 rem per hour fields, exceeding LAMPF policy.
- LAMPF has studied the issue of shielding in the past; however, the methods used for design and review were insufficient to discover all problem areas.
- The GTA will require added shielding to prevent high radiation levels under failure conditions of active safety systems.
- The barrier fence for the beam stop at the ITS/DARHT facility is not substantial and does not prevent access to a very high radiation area.
- The beam stop for the Free Electron Laser located at Bldg. WA-161 is obtained by directing the electron beam into the floor with a magnet. The magnet current is interlocked with a current comparator circuit. No active external radiation monitors are available.
- LANL has not effectively implemented policies or guidelines detailing the requirements for shielding and barriers.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.2-1) (H1/C1) **Los Alamos National Laboratory has not implemented policies for the design, installation, testing, and operation of barriers; moreover, accelerator operations do not ensure that the dose limits of DOE 5480.11 and ANSI N 43.1 are met.**

FINDINGS:

- No accelerator at LANL has implemented DOE 5480.19.
- LANL did not establish a timely schedule for compliance.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.2-2) (H2/C1) **Operations at accelerators at the Los Alamos National Laboratory are not conducted in accordance with the requirements of DOE 5480.19.**

FINDINGS:

- During a recently observed response to an alarm at the IBF, the reconfiguration of the building air was delayed and no evacuation was ordered.

- The setpoint on the tritium monitor at the IBF was reset by operations staff without ES&H review or approval. The calculation that was shown to the appraiser was written on a desk pad. Personnel were unable to provide any technical basis for the stack alarm or vault alarm setpoints.

- IBF personnel declined either to attempt to reset the alarm or to purge the monitor, noting that the monitor was ES&H equipment and that they lacked the proper training. IBF personnel, however, had modified the alarm setpoint.

- During the response to the tritium alarm, IBF personnel declined to fix a jammed strip chart recorder for the stack tritium monitor readings, based on lack of training and lack of system ownership. Later, the ES&H technicians who responded to a request for service for the tritium alarm also declined to fix the jammed strip chart recorder because of lack of ownership.

- See Concern TSA-3, AX.1-3.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.2-3) (H2/C1)

At the Los Alamos National Laboratory, the response to off-normal conditions at the Ion Beam Facility is not conducted in accordance with DOE 5480.19.

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

FINDINGS:

- Operating procedures for the secondary beamlines at LAMPF are out-of-date.
- Engineering support procedures in use at accelerator facilities are not controlled documents. Procedures were missing from manuals used by the support staff at LAMPF.
- Cave sweep procedures have not been established for IBF, and operations personnel stated that alternate sweep sequences were permissible at the discretion of the staff.
- The Operations Group at the Betatron (TA-8 Bldg. WA-23) has no procedure for testing the interlocks. When debriefed, two qualified operators described different methods for conducting the same test.
- No procedure has been developed for handling flaky or degraded targets at IBML.
- Detailed procedures have not been developed for conducting interlock tests on safety systems for liquid hydrogen targets used at accelerator facilities.
- Before issuance of the 1991 LANL procedure on locks and tags, the Operations Group had conducted a lockout/tagout once (over 15 years ago) at the Betatron facility in TA-8 Bldg. WA-23.

CONCERN: **See Concern TSA-1, OP.3-2.**

FINDINGS:

- Operators of the TA-8 linear accelerator log only those machine operations that result in radiographic images.
- When used in portable field radiography, the logbook for the TA-18 linear accelerator does not record the placement of the device or of postings and barriers used to limit access to the radiation area.
- All bypasses at LAMPF are removed at the end of an operating period. The board where bypasses are kept has none remaining in use. Yet, the bypass installation and removal logbook at LAMPF indicates that several bypasses have not been removed.
- Some entries into the operations logbook at GTA are recorded in pencil.

- Pulsed High Energy Radiographic Machine Emitting X-Rays (PHERMEX) personnel have no knowledge of DOE records retention requirements. Logbooks from the 1960s are kept in a desk and have never been microfilmed.

- After a high tritium alarm at IBF, an informal debrief was held in the control room. No formal notes were taken. The information was not recorded in the logbook.

CONCERN: **See Concern TSA-4, OP.4-1.**

OP.4 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should know the effect of non-operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- A system is not in place to ensure that the environmental qualification of monitors at LAMPF has been established and that use of the radiation monitors is restricted to conditions for which the devices are qualified.
- The interlock system for the portable linear accelerator at TA-18 uses radiation monitors with Geiger-Muller detectors that cannot monitor pulsed radiation from an electron linear accelerator. These devices do not perform their intended safety function.
- The Betatron in TA-8 does not have any radiation area monitors.
- Radiation detectors at the IBF have not been evaluated to determine whether they must be part of the interlock system.
- See Concern TSA-3, AX.1-4.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (OP.4-1) (H1/C1) **At the Los Alamos National Laboratory, continuous radiation monitoring systems, for which appropriate monitoring equipment is readily available, are not designed or installed at accelerators in accordance with ANSI N43.1.**

OP.5 OPERATION STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operation stations and facility equipment should effectively support facility operation.

FINDINGS:

- Personnel at LAMPF were not trained to use the portable survey instruments provided as a convenience at exits.
- No external dose survey meter is available at the Betatron in TA-8.
- The ion chamber survey instrument used at IBML does not have sufficient sensitivity to measure activity at DOE release limits, and personnel are not formally trained in the use and proper documentation of surveys.
- Operations personnel at portable linear accelerators are neither trained nor equipped to monitor for radiation. Health Physics Operations Group personnel do perform monitoring but are not required to be present during operation.
- See Concerns TSA-3, TC.4-1, and TSA-3, RP.1-2.

CONCERN: **See Concern TSA-2, RP.8-5.**

4.5.3.4 Maintenance

4.5.3.4.1 Overview

The appraisal for the Maintenance technical area for accelerator facilities at LANL addressed all eight performance objectives. Material for the appraisal was obtained from interviews with maintenance managers, building managers, group leaders, supervisors, and craftspersons. In addition, information has been gained by review of maintenance policy, programmatic policy, and procedural documentation and by onsite inspection of real property and facility equipment. Of the 21 identified accelerator facilities, 13 were visited. This included inspections at maintenance shops, welding booths, lubrication areas, tool shops, and related structures.

Responsibility for maintenance at LANL is divided between the Facility Engineering Division (which works through the maintenance contractor, Johnson Controls World Services, Inc.(JCI)) and the various groups that conduct programs at sites throughout the LANL complex. Class A equipment (which includes items such as air-conditioning, heating, ventilation, power, plumbed-in service systems, and the buildings in which they are housed) is the responsibility of the Facilities Engineering Division and JCI. Class B equipment includes items purchased or built by the various programs for use in their process systems and experiments. Such equipment is a maintenance program responsibility. Because the distinction between Class A and B equipment is determined by the source of the funds with which the items are purchased, the rationale for the classification of an individual item is not always apparent. The Facilities Engineering Division and JCI programs for routine preventive maintenance of Class A equipment (e.g., circuitbreaker testing, lubrication, backflow preventer maintenance, and emergency generator testing) have been established. A conversion to automated recordkeeping is currently under way. Scheduling is accomplished by the Facilities Engineering Division in coordination with JCI. Preventive maintenance of Class B equipment is the responsibility of the group that manages the program using the equipment. Corrective maintenance of Class A and B equipment may be accomplished by JCI through the initiation of a "small job ticket," or Class B equipment may be repaired by program staff.

No sitewide maintenance policy has been issued by senior LANL management, although one is in preparation. JCI has developed a reasonably structured work control and scheduling system, but each program management group has unique systems for the administration and control of its programmatic maintenance responsibilities.

Inspections conducted at several LANL buildings and facilities reveal that most equipment critical to safe operations has been well maintained. Facility inspection policies are being implemented in some groups to identify deficiencies for correction in order to upgrade and maintain real property. Many groups have no formal work control or tracking system in place, thereby providing low visibility for equipment deficiencies and maintenance activities. The accelerator facilities have not achieved compliance with the maintenance objectives set forth in DOE 4330.4A and in "Albuquerque Operations Office Guidance for Maintenance Management Program," a lengthy AL memorandum issued December 12, 1990.

The Building Manager Program utilized by accelerator groups is not consistently applied and lacks formality of function. This has led to some buildings being poorly maintained for housekeeping or tracking deficiencies; that is, housekeeping is poor and facility/building deficiencies are not tracked.

Maintenance procedures do not always contain sufficient detail or carry appropriate approval to ensure that work is performed in a safe and controlled manner. Existing corrective and preventive maintenance procedures do not always include certification of work completion or post-maintenance testing requirements.

The limited number of maintenance policies currently in place for LANL accelerator programs do not include the elements necessary to achieve compliance with DOE 4330.4A and with the December 1990 AL guidance document. Several groups have no formal maintenance program whatsoever. Others have no formal program for tracking and trending performance. Still others have no consistent method for implementing a graded approach for maintenance. Finally, the maintenance backlog that characterizes the LANL accelerator program is not being formally addressed in a consistent manner.

There is no formal, consistent program in place to generate and retain maintenance records as required by DOE 1324.2A and by the December 1990 AL guidance document. However, the Communications and Records Management Division provided input for record retention periods as defined in the LANL Quality Assurance Manual (currently in draft form, with implementation scheduled for January 1992), which addresses most of the requirements of DOE 1324.2A.

Lockout/tagout programs vary widely from group-to-group within the accelerator organizations. Not all groups have appointed lockout/tagout coordinators as required by ES&H memorandum CC-91-1641, dated August 20, 1991. Not all groups have established independent verification of lockout/tagout configuration. This problem is further complicated by the fact that LANL does not have a formal integrated structure (communications, programs, etc.) to ensure that each accelerator group participates in the program.

The Building Manager Methodology currently being used by the Safeguards Assay Group is good. The Safeguards Assay Group appoints "stewards," who are responsible for individual rooms and who have the authority to generate deficiency notices for applicable items. The program uses an electronic data base to track deficiency notices through completion, prioritization of deficiencies to expedite closure, and a continuing overview of steward activities by the Building Manager. This methodology appears to be working extremely well and is reflected in the physical condition of the buildings inspected.

The LANL self-assessment found major concerns in all eight performance objectives associated with maintenance. The AL and LAAO reports confirm the LANL findings. It should be noted that progress toward the resolution of these findings has commenced.

4.5.3.4.2 Findings and Concerns

MA.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

FINDINGS:

- For accelerator facilities, LANL has not established sitewide maintenance requirements, goals, objectives, or performance indicators as defined in DOE 4330.4A, Chapter I, Section 3.1.1, and "Albuquerque Operations Office Guidance for Maintenance Management Program," Chapter I Section 4.1.1, an AL memorandum issued December 12, 1990.

- LANL has not established any sitewide standards or other requirements for the conduct of maintenance on equipment used purely for programmatic purposes (Class B equipment) at accelerator facilities. Each division has been responsible for determining its own maintenance standards for programmatic equipment. Divisions can choose to conduct this maintenance themselves or use the services of the LANL support contractor.

- Administrative controls and procedures are not employed for all maintenance activities conducted by accelerator divisions at LANL as specified by DOE 4330.4A, Chapter I, Section 3.1.2, and "Albuquerque Operations Office Guidance for Maintenance Management Program," Chapter I, Section 4.1.3, dated December 12, 1990.

CONCERN: **See Concern TSA-4, MA.1-1.**

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

FINDINGS:

- Maintenance activities at the Weapons Neutron Research Facility (TA-53) are not always performed by qualified personnel or under the direct supervision of personnel who are qualified.
- There is no signature approval requirement for satisfactory completion of maintenance at the GTA (TA-53) and PIXY (TA-36).

CONCERN: **See Concern TSA-4, MA.2-1.**

FINDINGS:

- LANL has not established a lesson-learned format for maintenance activities performed on equipment used for purely programmatic purposes (Class B equipment) at accelerators.
- Formal lessons-learned programs are not in place at the Weapons Neutron Research Facility (TA-53), GTA (TA-53), or the Electronics Test Laboratory.
- See Concern TSA-3, FR.6-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (MA.2-1) (H3/C2) **At the Los Alamos National Laboratory, facility and industry experiences are not being readily distributed to maintenance personnel at accelerator facilities in a lessons-learned program format as defined in DOE 4330.4A, Chapter 1, Section 3.7.7.**

FINDINGS:

- The lockout/tagout coordinator at the Kappa Site (TA-36) has not had any training for the duties required.
- The lockout/tagout coordinator for TA-16 Bldg. 202 is not appointed in accordance with LANL policy and does not employ independent verification for lock and tag being attached to equipment or devices at the facility.
- Numerous accelerator groups are not appointing lockout/tagout coordinators as required by ES&H memorandum CC-91-1641, dated August 20, 1991.
- Personnel at the PIXY, TA-36 Bldg. 85, affixed a lockout-type device without proper instruction or training and without informing the lockout/tagout coordinator.
- See Concern TSA-3, TS.2-2.

CONCERN: **See Concern TSA-4, PP.2-2.**

FINDINGS:

- Welders who work on programmatic equipment at the Weapons Neutron Research Facility (TA-53), PHERMEX (TA-15), and PIXY (TA-36) are not certified.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **Welders who have not been trained and certified are performing work on programmatic (Class B) equipment for accelerator facilities at Los Alamos National Laboratory.**
(TSA-3)
(MA.2-2)
(H2/C2)

MA.3 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- No formal receiving inspection program is in place for materials or components at PIXY (TA-36). As a result, counterfeit or rejected bolts (marked as KS) were found in parts bins at the facility during a field inspection. These bolts had previously been the subject of a memorandum from the Quality Operations Office dated, March 4, 1991, directing that the bolts not be used.
- There is no formal receiving inspection program for materials or components in place at the GTA (TA-53) or PHERMEX (TA-15).
- See Concern TSA-3, QV.3-1.

CONCERN: **See Concern TSA-4, MA.3-2.**

FINDINGS:

- There is no formal program to assure that measurement and test equipment is maintained in a current state of calibration at PHERMEX (TA-15). During field inspection at Bldg. 313, two Tektronix amplifiers (Model 7A29) were found with out-of-date calibrations. No notice was affixed to these devices to prevent their use.
- Numerous accelerator groups have torque wrenches that do not have decals bearing current calibration data.
- Formal training for calibration of torque sensing devices is not provided at the Proton Storage Ring Facility (TA-53). During field inspection of related shop buildings, it was discovered that personnel, despite their lack of training and knowledge about requirements for maintaining the calibration of standard devices, use a torque sensing standard to verify torque wrench performance.
- See Sections 4.5.3.2.2, QV.4, and 4.5.3.6.2, AX.9.
- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-3) (MA.3-1) (H2/C2)**

At the Los Alamos National Laboratory, no formal program exists at the accelerator facilities for calibration activities as defined in DOE 4330.4A, Chapter I, Section 3.5.4, and "Albuquerque Operations Office Guidance for Maintenance Management Program," Chapter I, Section 4.5.6, dated December 12, 1990.

FINDINGS:

- There is no formal internal audit method in place for the LANL Calibration Program, conducted by the Standards and Calibrations Laboratory. During field inspection at TA-3 Bldg. SM-39, two electronic devices were found to be past due for calibration. One of these devices had been

recently checked for calibration, but documentation had been marked "Not Applicable" for the decal. A LANL calibration coordinator had no explanation for this inconsistency.

- See Sections 4.5.3.2.2, QV.4, and 4.5.3.6.2, AX.9.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (MA.3-2) (H2/C2)

The Los Alamos National Laboratory Calibration Program, conducted by the Standards and Calibration Laboratory, does not have an internal audit program as defined by DOE 4330.4A, Chapter I, Section 3.5.4, and "Albuquerque Operations Office Guidance for Maintenance Management Program," Chapter I, Section 4.5.6, dated December 12, 1990.

MA.4 PLANNING, SCHEDULING, AND WORK CONTROL

PERFORMANCE OBJECTIVE: The planning, scheduling, and control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and effective manner.

FINDINGS:

- No LANL standards or requirements exist for planning, scheduling, and controlling maintenance for Class B equipment at accelerator facilities.
- Planning and scheduling for maintenance activities at accelerator facilities are not formalized.
- Maintenance activities at numerous accelerator facilities are performed without formal checklists or work packages.
- The backlog of maintenance is not tracked formally at accelerator facilities.

CONCERN: See Concern TSA-4, MA.4-1.

MA.5 CORRECTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

FINDINGS:

- Field inspection of the Weapons Neutron Research Facility (TA-53 Bldg. 372) revealed the following deficiencies:
  - A horizontal, formed channel in the building structure has had 4 to 5 feet of the channel material removed at about the center of the channel length. This modified channel is not "boxed back" to the balance of the framework for the building, thereby reducing the ability of the building to withstand windloading, etc.
  - Two or three metal pipes with flanges (10 to 12 inches in diameter, 3 to 4 feet long) were stored in an area with no indication of status (e.g., retain for future use, excesses, route to salvage, etc.)
- Field inspection of the GTA (TA-53 Bldg. 365) revealed that welding electrodes are stored in the bottom of a cabinet with the shelf immediately above the electrodes laying directly on them. This could reduce the quality of the welding electrodes to a indeterminate level.
- Field inspection of PIXY (TA-36 Bldg. 85) revealed that the piping weld on a 1-1/2-inch diameter horizontal process pipe for "marx generator" exhibits excessive weld buildup and undercut, thereby rendering the quality of the weld suspect. Neither the building manager nor staff had a method to determine who performed this welding activity.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (MA.5-1) (H2/C2) **At the Los Alamos National Laboratory, responsibilities of building managers at accelerator facilities are not clearly defined as described in DOE 4330.4A, Chapter I, Section 3.7.4, and "Albuquerque Operations Office Guideline for Maintenance Management Program," Chapter I, Section 4.6.3, dated December 12, 1990.**

MA.6 PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

FINDINGS:

- Preventive maintenance at the GTA (TA-53), Electronics Test Laboratory (TA-53), and PIXY (TA-36) are not formal programs.
- The building manager at PHERMEX (TA-15) does not maintain a formal record to verify that preventive maintenance activities are scheduled and completed, even though numerous offsite contractors may be performing the work.

CONCERN: See Concern TSA-4, MA.6-1.

MA.7 PREDICTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- Before September 1991, no maintenance records were generated at the Betatron facility (TA-8).
- Maintenance records are retained by offsite contractors performing some of the maintenance activities at PHERMEX, which places constraints on implementing an evaluation of equipment performance.
- Age-related degradation of systems, components, and structures is not addressed in a formal manner at LANL accelerator facilities.
- See Concerns TSA-3, AX.1-4, TSA-4, TS.4-1, and Section 4.5.3.8.2, TS.4.

CONCERN: **See Concern TSA-4, MA.7-1.**

MA.8 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Maintenance procedures and related documents should provide appropriate directions and guidance for work and should be used to ensure that maintenance is performed safely and effectively.

FINDINGS:

- Generation and retention of maintenance records are not addressed in a formal manner at LANL accelerator facilities.
- The Materials Management Division at LANL has not defined applicable retention periods for records (including those reflecting maintenance activities) as required by DOE 1324.2A.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (MA.8-1) (H3/C1) **Los Alamos National Laboratory has not established requirements to record maintenance activities at accelerators as defined by DOE 4330.4A, Chapter I, Section 3.4.9, and has not established a centralized records retention program that meets the applicable requirements of DOE 1324.2A.**

4.5.3.5 Training and Certification

4.5.3.5.1 Overview

This appraisal addressed the Training and Certification technical area for LANL accelerator facilities, including seven of the 11 performance objectives. TC.2 Reactor Operations, TC.3 Nuclear Facility Operations Other Than Reactors, TC.6 Criticality Safety, and TC.11 Simulator Training/Facility Exercises were not appraised because they do not apply to accelerator facilities. Concerns were identified in six of the seven performance objectives related to training and certification. However, three of the performance objectives (TC.5 Maintenance Personnel, TC.8 Quality Control Inspector and Nondestructive Examination Technician, and TC.9 Radiological Protection Personnel) are discussed within the context of other sections of this report. No concerns related to training facilities and equipment were identified.

The appraisal comprised (1) tours of accelerator facilities; (2) interviews with personnel, including managers, instructors, employees; (3) observation of classroom training; and (4) reviews of training policies and procedures, training records, examinations, training materials at six accelerator facilities, as well as the Employee and Organization Development Group and Safety and Risk Assessment Group training organizations. Courses evaluated included General Employee Training, Hazard Communication, Radiation Worker Training-Generic, equipment operator certification (cranes and fork lifts), several site-specific orientations, accelerator operator training, and the university-level education program. Additional technical training topics were evaluated in connection with other appraisal disciplines.

Senior management at LANL only recognized the need for a formal training program during the past year. As a result, the training system is currently being formulated at the policy and procedure level. Therefore, the LANL training program does not yet meet the requirements of DOE Orders, Federal regulations, or industry practices in connection with formal training for personnel at accelerator facilities. To date, efforts to institute a compliance-driven training program have been tentative; for example, LANL Director's Policy No. 113, "Training," dated September 1991, charges the Laboratory Training Office with responsibility for the training program. However, the program, as defined by Director's Policy No. 113, "provides guidance" rather than "sets requirements" for training efforts. LANL has provided almost no specific instruction to supervisors and managers regarding their responsibilities for employee training and training programs. In many cases, although some training is conducted, the training programs themselves are weak or nonexistent. Thus, training required for worker safety in such key safety areas as radiation protection, occupational safety, hazard communication, and hazardous waste is not always provided. The practice of exempting users, researchers, or affiliates at LANL from training requirements or supervision by a trained employee-escort is especially serious. Similarly, employees may have training or retraining requirements waived indefinitely at the discretion of their manager.

Some accelerator facility operating organizations, recognizing the need for formality in training and training documentation, have independently initiated their own programs. The Training and Certification appraisal found good programs for LANSCE and the Free Electron Laser and accelerator operator

training at LAMPF. To their credit, these organizations have documented the need for improvements, which they plan to initiate promptly.

Programs supporting the university-level education of employees are excellent. LANL encourages advanced studies leave and actively supports the programs of the Los Alamos Center for Graduate Studies. Opportunities to attend classes through video link are made available to employees.

The LANL self-assessment identified the need for substantial improvements to the training program and the need to bring the Laboratory into compliance with DOE requirements. However, LANL has not yet developed a system that will effect the required changes, and this omission has sometimes allowed a "business as usual" attitude to persist.

4.5.3.5.2 Findings and Concerns

TC.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administration should ensure effective implementation and control of training activities.

FINDINGS:

- The training program at LANL does not specify training responsibilities for those who are not LANL employees (e.g., users, researchers, or affiliates). Because some organizations do not have systems in place to ensure that required training for offsite users is defined and provided, users may place themselves or plant facilities in danger.
- Often the "visitor-users" or affiliates using radiation-generating devices do not receive the radiation worker training required for LANL workers performing similar tasks.
- The LANL ES&H draft training matrix, dated September 3, 1991, lists "Hazards Reported" at the facility as "none specified" or "not reported" for about 60 percent of the buildings.
- LANL has not implemented an instructor qualification program. A draft program ("Training Staff Qualification Program," August 1991) has been prepared but not approved.
- At most accelerator facilities, job task analyses have not been prepared, and guidance in the proposed document, "Procedures for Preparing an Environment, Safety and Health Training Plan," October 1991, is general.
- See findings in support of Concern TSA-3, TS.1-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (TC.1-1) (H2/C2) **The Los Alamos National Laboratory accelerator organizations have not established training and qualification/certification requirements that are based on assigned job tasks for each work classification.**

FINDINGS:

- Most accelerator facilities do not formally document on-the-job training.
- LANL established a centralized training record system, the Employee Development System, in April 1991. Users of the system still consider records on the system to be incomplete and unreliable.
- See findings in support of Concern TSA-3, AX.6-1.

CONCERN: See Concern TSA-4, TC.1-2.

FINDINGS:

- No clear assignment of enforcement authority for training requirements, instructor qualifications, and good training practices has been established. Conflicting assignments are provided in the following documents:
  - LANL Director's Policy No. 113, "Training," dated September 1991;
  - LANL AR 1-4, "Environment, Safety, and Health Training," dated July 19, 1991; and
  - LANL Administrative Manual (AM) 402, "In-House Training Programs," dated November 8, 1991 [sic].
- The responsible organization for coordinating or overseeing safety-related training is unclear. Conflicting assignments are provided in the following documents:
  - LANL Director's Policy No. 113,
  - LANL AR 1-4,
  - The proposed LANL training manual, and
  - LANL AM 402.
- The ambiguity described above caused representatives of JCI mistakenly to believe that their contact organization for all LANL training was the Employee and Organization Development Group.
- The LANL training manual clarifies the organizational responsibilities for training, but the document has not yet been approved.
- JCI training personnel state that communications between JCI and LANL related to training issues, reviews, and records "lack formality" and are "sporadic."
- Comprehensive internal audits of training and training records are not conducted at LANL accelerator facilities. Self-auditing of training and training records is not conducted at some LANL accelerator facilities.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (TC.1-2) (H2/C2) **The organizational structure and training system at Los Alamos National Laboratory, including responsibilities and authorities of personnel involved in managing, supervising, and implementing training, is neither well defined nor well understood by personnel in accelerator organizations.**

TC.4 GENERAL EMPLOYEE/PERSONNEL PROTECTION TRAINING

PERFORMANCE OBJECTIVE: General employee and personnel protection training programs should ensure that site/facility personnel, subcontractors, and visitors have an understanding of their responsibilities and expected safe work practices and have the knowledge and practical abilities necessary to effectively implement personnel protection practices associated with their work.

FINDINGS:

- The General Employee Training (GET) Program, implemented for new employees in September 1991, is not yet available to members of the workforce hired before the implementation date. The program is not offered to visitors, users, or affiliates who will be on the site for less than 10 days, even though they may work unescorted at some accelerator facilities.

- Interviews with LANL employees revealed the following information:

  - User-visitors staying less than 10 days do not even receive GET, let alone radiation worker training.

  - There is no way to enforce an escort policy at some accelerators.

  - Facility safety procedures are not dependably enforced for users.

  - Host organizations generally do not self-audit training given to users so that classes may be missed, not scheduled, or overlooked.

- The Human Resources Directorate offers about 450 courses, apart from the university-level courses. Although formal tests would not be appropriate in every case, only one, GET, evaluates student performance through administration of a formal test. In the rest of these courses, performance is informally evaluated by the instructor.

- The Health and Safety Division offers about 100 courses that are taught in person by instructors. The radiation worker course includes a formal test, and about one-half of the courses have less formal evaluations in the form of quizzes or workbooks.

- Training evaluation techniques do not effectively measure either the knowledge acquired or the practical abilities of workers at accelerator facilities.

- LANL has no policy on the amount of time an employee may take to obtain the training specified by administrative requirements set forth in the ES&H Manual, and training is not necessarily required before a job assignment is made.

- LANL has no policy preventing an employee from continuing to work after a requalification date has passed.

- Training is not completed before assigning accelerator organization personnel to tasks that require special knowledge and skills, including training required by DOE 5480.11.

- Welding personnel are not certified. (See findings in support of Concern TSA-3, MA.2-2.)

- Training in shipping of hazardous materials is not complete. (See findings in support of Concern TSA-3, PT.2-1.)

- At some accelerator facilities, job-specific training in as-low-as-reasonably-achievable (ALARA) principles, in maintenance of auxiliary power supply equipment, and in operation of heat removal systems is not provided. (See findings in support of Concerns TSA-3, AX.3-1, and TSA-3, AX.6-1, and Section 4.5.3.15.2, WS.3.)

- Spill coordinator training is not fully implemented. (See findings in support of Section 4.5.3.15.2, WS.3.)

- Training of accelerator personnel in emergency procedures and emergency management is incomplete. (See findings in support of Concerns TSA-3, EP.1-1, and TSA-3, EP.3-1.)

- Lockout/tagout training is not yet available, but some lockout/tagout coordinators have already been appointed. (See findings in support of Concern TSA-4, PP.2-2.)

- Some operators of x-ray generating machines have not been trained in radiation protection, and some radiation workers have not received the radiation protection training required by specific LAMPF procedures. Some personnel are not defined as radiation workers, despite working with intense x-ray sources and depleted uranium. (See findings in support of Concerns TSA-3, RP.1-1, and TSA-3, RP.1-2, and Section 4.5.3.13.2, RP.8.)

- At some accelerator areas, security inspectors do not receive site-specific training. (See findings in support of Section 4.5.3.10.2, SS.4.)
- Operators of portable radiographic equipment are not properly trained. (See findings in support of Section 4.5.3.3.2, OP.5.)

- Fire department staff do not receive proper confined space entry training. (See findings in support of Concern TSA-4, PP.6-4.)

- Quality-related training at accelerator facilities is not provided. (See findings in support of Concern TSA-3, QV.1-2.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (TC.4-1) (H1/C1) CAT. II

Accelerator facility personnel at Los Alamos National Laboratory have not received the initial and continuing safety training, including that required by DOE 5480.4 and DOE 5480.11.

FINDINGS:

- The LAAO has not assessed the training program for personnel at LANL accelerator facilities.

- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-3) (TC.4-2) (H2/C2)

The Los Alamos Area Office has not enforced requirements to develop, conduct, or evaluate training for accelerator facilities at Los Alamos National Laboratory.

TC.10 TRAINING FOR SUPERVISORS, MANAGERS, AND TECHNICAL STAFF

PERFORMANCE OBJECTIVE: Training programs for supervisors, managers, and the technical staff should broaden overall knowledge of processes and equipment and develop supervisory and management skills.

FINDINGS:

- LANL senior management has identified the need for a supervisory core training course. The course is under development and is not implemented.
- See findings in support of Concerns TSA-3, OA.6-1; TSA-3, TS.1-2; and TSA-3, TC.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (TC.10-1) (H3/C2) **At the Los Alamos National Laboratory, some programs for initial and continuing training for supervisors, managers, and technical staff at accelerator facilities have not been established.**

4.5.3.6 Auxiliary Systems

4.5.3.6.1 Overview

This appraisal addressed the Auxiliary Systems technical area for the LANL accelerators. The appraisal considered functional requirements, procedures, training, maintenance, testing, data trending, and ALARA goals. The evaluation also included system walkthroughs, personnel interviews, and data and document reviews. All nine performance objectives in the Auxiliary Systems technical area were addressed in this appraisal, and 11 of the 21 identified accelerator facilities were observed.

Although the auxiliary systems have been specifically defined for reactors, this is not the case for accelerators. Most accelerators have ventilation and coolant systems, but auxiliary power systems vary from battery packs to gas or diesel generators, depending on the size and use of a particular accelerator. The status of auxiliary systems depends on the age and complexity of the facility. In general, auxiliary systems for accelerators lack formality regarding description, procedures, training, interface communication with service groups, trending of data, development of performance objectives for goals and trends, calibration of water processing equipment, removal of old unused ancillary auxiliary equipment, and human engineering good practices. Personnel training for some accelerator activities is informal (i.e., learned on the job). However, the information needed to develop on-the-job-training criteria has not been compiled.

Descriptions and functional requirements for auxiliary systems are not completely addressed in safety or hazard analyses. The GTA at LANL already has an approved SAR, but similar documents for other accelerators are still in the process of being drafted. Further, drawings for accelerators are sometimes incomplete and do not reflect design modifications, nor is there a formal system to cross-reference such design modifications to the original drawings. Finally, programs for monitoring and performing surveillances have not been developed to detect the long-term degradation and aging of auxiliary systems and components associated with accelerators.

Effluents at LANL accelerators are primarily in the form of airborne radioactivity, although under abnormal conditions there is also the potential for liquid releases. Maintenance conditions at exhaust effluent stacks, the absence of effluent stack sample nozzle descriptions, and incomplete monitoring of effluent paths all raise doubts concerning the accuracy of quantitative releases of radioactivity for some accelerator facilities.

Ventilation systems at the accelerators vary in design and complexity, ranging from natural draft to multiple building systems that include separate effluent exhaust systems. High-efficiency particulate air (HEPA) filters have been installed in exhaust systems at some facilities. Existing ventilation systems have not been analyzed in order to assure that they provide airflow that maximizes the protection of the worker at ALARA levels. Meteorological data are not being used to predict downdrafts of radioactive effluents from exhaust stacks.

The accelerators in general do not rely on an auxiliary emergency power system or auxiliary water coolant system. Auxiliary water systems are used to protect facility equipment. Surveillance and maintenance are not consistently

performed for water systems in accelerators. In-line monitoring is not included in coolant water systems that have the potential of releasing radioactive water to the environment prior to detection.

Coolant cleaning systems are basically deionization units. Equipment observed by S&H Subteam 3 is in reasonably good condition; however, a formalized system is not in place to check and calibrate resistivity meters, water totalizer meters, and differential pressure devices.

Accelerators at LANL are categorized as Level 2, 3, or 4, which allowed the accelerator facilities self-assessments to be conducted without addressing either the objectives or the criteria for auxiliary systems (reference "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites," Nonnuclear Facilities Category 2 Guidelines, September 25, 1990). However, some accelerator groups (e.g., the Operations Group at LAMPF) did address the auxiliary systems in their group assessment. The LANL self-assessment for category Level 1 did address auxiliary systems. The LANL self-assessment identified the majority of the concerns noted for auxiliary systems. The LANL assessment appeared to be conducted by experienced personnel who were knowledgeable about auxiliary systems.

4.5.3.6.2 Findings and Concerns

AX.1 SYSTEMS REQUIREMENTS

PERFORMANCE OBJECTIVE: Auxiliary systems should be considered under the same functional criteria for design, engineering, operations, maintenance, and modification as the structural, confinement, and primary process system of the facility.

FINDINGS:

- No approved SAR currently exists for the IBF, PHERMEX, LAMPF, or the Betatron.
- The December 4, 1990, draft preliminary hazard assessment for the IBF lacks details that address auxiliary systems.
- The draft safety analysis for LAMPF requires revision to include identifications and descriptions for auxiliary systems.
- See Concerns TSA-3, TS.2-1, and TSA-3, OA.2-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.1-1) (H2/C1) **Auxiliary system descriptions for accelerators at the Los Alamos National Laboratory are not addressed in existing or proposed safety assessments or safety analysis reports as required by AL 5481.1B.**

FINDINGS:

- There are no programs to maintain as-built drawings of auxiliary exhaust systems at any of the observed accelerator facilities.
- The original drawings for the IBF are available; however, documented operational criteria are not provided for its auxiliary systems.
- Formal updated drawings for LAMPF exhaust fan FE-3 are not available. Also, formal descriptions of the operation and interlocks for FE-3 are not available.
- Documentation is sometimes missing for accelerator auxiliary systems, including those for ventilation, water, and electrical power.
- The PIXY does not maintain a formal system to correlate changes between original drawings and as-built configurations.
- See Section 4.5.3.8.2, TS.3.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.1-2) (H2/C2) **Updated drawings and other formal documentation for accelerators at Los Alamos National Laboratory are not always available.**

FINDINGS:

- There is no controlled formal procedure for actions to be taken in the event of a tritium spill at the IBF, TA-3 Bldg. SM-16.
- There are no written procedures prescribing actions to be taken in the event of a radioactive gas buildup at Bldg. MPF-3 due to a loss of main exhaust flow from LAMPF.
- Meteorological data are not evaluated for possible inversion conditions, and written procedures do not prescribe actions to be taken in the event of an atmospheric inversion when LAMPF is in operation and a ground-level radiation situation exists.
- Written procedures do not prescribe the actions to be taken in the event that the experimental area cooling tower serving LAMPF, the Proton Storage Ring, LANSCE, and the Weapons Neutron Research Facility becomes contaminated.
- See Concerns TSA-4, TS.2-2, and TSA-3, OP.2-3, and Section 4.5.3.8.2, TS.2.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.1-3) (H2/C2) **Procedures are not provided for accelerator facilities at Los Alamos National Laboratory to assure that off-normal conditions in an auxiliary system will be detected or that compensatory actions will be taken.**

FINDINGS:

- Documentation is not available to describe programmatic monitoring, surveillances, services, and age-related degradation of auxiliary systems at observed accelerators.
- At Bldg. SM-16, exhaust stack FE-14 had an inoperable tritium monitor and FE-16 had a tritium flow indicator that was inoperable.
- The FE-14 and FE-16 exhaust stacks at the roof location of Bldg. SM-16 have unplugged sample ports, and FE-14 has a hole in the fan to the stack vibration decoupler.
- There are holes in the exhaust stack vibration decouplers at the Proton Storage Ring fan FE-2, LAMPF fan FE-3, and Betatron ventilation fan FC-1.

- Two lengths of copper tubing remain coupled to the FE-14 exhaust stack, with no assurance of being sealed to prevent air leakage.

- A nonfunctional damper control attached to exhaust stack FE-2 at Bldg. MPF-7 (which serves LANSCE, the Proton Storage Ring, and the Weapons Neutron Research Facility) has not been removed.

- Fan FE-3 on LAMPF main exhaust stack ES-1 has differential pressure meter connection lines that are broken, resulting in stack leakage and an inoperable flow indicator.

- LAMPF cooling tower MPF-60 has a broken flexible conduit, rusting pipe connections, disconnected lightning rod connections, and the motor control center is overdue for maintenance checks.

- The Proton Storage Ring cooling tower is no longer in use; however, it is potentially available for reuse. There is no formal layup program to maintain facility integrity.

- The PHERMEX uninterrupted battery power supply system did not pass its functional load test but remains in service.

- See Concerns TSA-3, TS.5-1, and Section 4.5.3.4.2, MA.7.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.1-4) (H2/C2) **Auxiliary systems for most accelerators at Los Alamos National Laboratory are not being maintained to assure that they will perform their intended functions.**

FINDINGS:

- The group occupying Bldg. SM-16, IBF, does not receive data gathered by Health Physics Operations Group personnel who service the building. Also, the IBF does not have a formal trend program related to its tritium releases.

- The Health Physics Operation Group does not perform trends on data gathered at the IBF or at the other observed accelerator facilities.

- Programmatic considerations for monitoring age-related degradation, services performed, and surveillance information on auxiliary systems for trends have not been established at LAMPF, at the IBF, or at the Ballistic Test Facility.

- See Section 4.5.3.8.2, TS.4.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.1-5) (H2/C2) **Formal trending programs for auxiliary systems at Los Alamos National Laboratory are not in place at accelerator facilities.**

AX.2 EFFLUENT HOLDUP AND TREATMENT

PERFORMANCE OBJECTIVE: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or as effluent gaseous or liquid releases are less than Department of Energy and Environmental Protection Agency standards and are as low as reasonably achievable.

FINDINGS:

- Missing effluent monitors in exhaust stacks at Bldg. SM-16 have not been justified by an evaluation.
- An effluent monitoring program was not found that would monitor tanks TA-53-144 or TA-53-145 at the LANSCE facility for low-level radioactive waste leakage.
- Observations of the maintenance status of monitored exhaust stacks indicated a lack of attention that could affect actual effluent quantitative determinations. (See Concern TSA-3, AX.1-4.)
- Hose connections to the copper sample lines off the LAMPF main exhaust stack sample points to the detectors are loose, and all clamps are not in place (Bldg. MPF-3M, room 105).
- See Concern TSA-3, TS.5-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.2-1) (H1/C1) **Accelerator facilities at Los Alamos National Laboratory do not measure and record data continuously and do not monitor all effluent pathways in accordance with DOE 5400.1 and ANSI N42.18-1974.**

FINDINGS:

- Effluent stacks for the IBF are not equipped with engineered features to minimize the release of tritium.
- Engineering evaluations addressing the adequacy of the current manual actuation of ventilation systems at the IBF in the event of a tritium release have not been performed.
- Not all effluent stacks at Bldg. SM-16 are monitored. The total amount of curies in effluent for Bldg. SM-16 is not known.
- The absence of in-line radiation monitors at the experimental area cooling tower that serves LAMPF, the Proton Storage Ring, LANSCE, and the Weapons Neutron Research Facility present the possibility of unmonitored loss of potentially radioactive water to the environment. Engineered features are not provided to halt the automatic blowdown of water from the experimental area cooling tower.

- Goals have not been established to minimize the release of radioactive substances at IBF, LAMPF, the Proton Storage Ring, or LANSCE.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.2-2) (H2/C2) **The evidence does not indicate that engineered features are being used to minimize releases at Los Alamos National Laboratory.**

AX.3 SOLID WASTES

PERFORMANCE OBJECTIVE: Solid hazardous wastes (including radioactive wastes) should be controlled to minimize the volume generated, and such wastes should be handled in a manner that provides safe storage and transportation.

FINDINGS:

- Data have not been evaluated to establish a baseline for reduction of solid radioactive waste at the IBF or at LAMPF.
- Training in ALARA principles has not been formalized at LANL accelerators.
- Annual goals have not been established for solid radioactive waste minimization at accelerator facilities.
- See Sections 4.5.2.6.2, AX.3, and 4.5.3.1.2, OA.3, and Concern TSA-4, OA.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.3-1) (H2/C1) **An As-Low-As-Reasonably-Achievable Program addressing radioactive solid wastes has not been formally and fully developed at Los Alamos National Laboratory as required by DOE 5820.2A.**

AX.5 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is as low as reasonably achievable.

FINDINGS:

- In Bldg. SM-16, the ventilation damper control switch for manual actuation to convert air recirculation to full makeup in the event of a tritium spill is not easily seen. Also, the damper control switch chassis has extraneous features no longer in use.
- Equipment once used in conjunction with LAMPF main exhaust stack ES-1 remains in place, but it is no longer in use.
- There are no formal procedures for posted operator aides at any of the observed accelerators, except for ITS/DARHT.
- TA-3 Bldg. SM-208 houses heating and cooling equipment for the IBF but either lacks labels or has notations that are not related to the equipment.
- TA-53 Bldg. MPF-3, Section M, room 105, houses the monitoring instrumentation for the LAMPF main exhaust stack, effluent stack ES-1, and dioctyl phthalate (DOP) dispersion tubing. The monitors, the effluent stack sample entrance lines, and the DOP tubing do not have labels and direction notations.
- See Concern TSA-3, AX.1-4.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.5-1) (H2/C2) **A formal system status control program is not in place for ventilation systems at Los Alamos National Laboratory accelerator facilities.**

FINDINGS:

- Documented evaluations justifying the ventilation design for Bldg. SM-16 are not available.
- Differential pressure measurements are not being made for airflow determination between potentially contaminated areas and clean areas at IBF, LAMPF, the Proton Storage Ring, or LANSCE.
- There are no differential pressure monitors in place to indicate that airflow is from clean to less-clean areas at Bldg. SM-16 or at MPF-3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (AX.5-2) (H1/C2) **Los Alamos National Laboratory cannot assure that ventilation systems will provide airflow from clean to less-clean areas at accelerators.**

AX.6 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

FINDINGS:

- Diesel electric generator documentation is not available for training provided to personnel in the Ion Beam Facility Group.
- Management at the Ion Beam Facility Group is not aware of tests or checks that can be performed on diesel fuel quality.
- Management of the Ion Beam Facility Group is not aware of a documented surveillance program for the diesel unit.
- See Concerns TSA-3, TS.1-2, and TSA-3, TC.1-2.
- The following concern was partially identified by the LANL self-assessment.

CONCERN: (TSA-3) (AX.6-1) (H2/C2) **A formalized program has not been established for training, operation, or surveillance required to maintain auxiliary power supply equipment for the Ion Beam Facility at Los Alamos National Laboratory.**

AX.7 HEAT REMOVAL SYSTEMS

PERFORMANCE OBJECTIVE: The heat removal systems should reliably remove heat as required from the reactor or process equipment important to safety.

FINDINGS:

- Formal procedures have not been developed for the operation of heat removal systems at LAMPF.
- An established program is not in place to obtain manufacturers' changes nor to modify the manuals based on subsequent modifications.
- The drawings for accelerators have not been updated to as-built status for the water coolant systems by the Field Operations Group, Facilities Engineering Division.
- Formal job task analyses have not been performed, and formal on-the-job-training programs are not in place for operating heat removal auxiliary systems.
- See Concern TSA-3, AX.5-1.
- The following concern was identified in LANL self-assessment.

CONCERN: (TSA-3) (AX.7-1) (H3/C2) **A formal configuration control program is not in place for auxiliary heat removal systems at Los Alamos National Laboratory.**

AX.9 COOLANT CLEANUP SYSTEMS

PERFORMANCE OBJECTIVE: Recirculating coolants should be cleaned continuously or intermittently to minimize the buildup of contamination and reduce corrosion.

FINDINGS:

- The water coolant systems at LAMPF are not formally described, nor are bounding conditions formally specified.
- The makeup water is totalized using standard water meters. Water meters are not calibrated at any of the observed accelerators.
- No formal procedure or instruction has been found that specifies the frequency of water-meter or resistivity-meter readings or that establishes a protocol to report unusual data.
- A program is not in place to calibrate resistivity meters used to determine the purity of coolant water (exception ITS/DARHT).
- See Concern TSA-3, MA.3-1.

CONCERN: **See Concern TSA-4, QV.4-1.**

4.5.3.7 Emergency Preparedness

4.5.3.7.1 Overview

This appraisal addresses the first three performance objective in the Emergency Preparedness technical area. The performance objectives assessed are EP.1 Organization and Administration, EP.2 Emergency Plan and Implementing Procedures, and EP.3 Emergency Response Training. The remaining performance objectives are addressed on a sitewide basis in the S&H Subteam 4 appraisal/report. Findings and concerns related to these performance objectives are contained in Section 4.5.4.7.2 and should be reviewed in conjunction with the material presented in this section. Because of time restrictions, only 2 of the 21 identified accelerators were sampled for the Emergency Preparedness technical area. The appraisal used the categories of high-hazard facilities and number of occupants as a basis for this selection.

The appraisal was conducted through interviews with the managerial staff at LAMPF (TA-53) and the IBF (TA-3) who are tasked with emergency preparedness responsibilities. These interviews were conducted to determine how emergency response activities and the site Emergency Preparedness Program were conducted, managed, controlled, and maintained. This appraisal included a review of emergency plans for each of these facilities--including, but not limited to, the various sections pertaining to emergency preparedness at these facilities, hazard and safety analyses, past exercise critiques, appraisals, training program documentation, and supporting documentation against the requirements of the DOE 5500 series of Orders, the DOE 5480 series of Orders, DOE 5500.3A (and its predecessor DOE 5500.3), and applicable ANSI standards and industry good practices.

The Emergency Management Office, has developed a sitewide emergency plan that, when fully implemented, should provide oversight and augmented emergency response capabilities to assist these facilities in the event of an actual emergency or during exercise-related activities. The facility-specific emergency response plans in their current form are not supported by emergency plan implementing procedures, nor do they support the LANL sitewide emergency plan or provide for an integrated response by a specific facility with the Emergency Management Office in the event of an actual emergency. For both LAMPF and the IBF, emergency plan implementing procedures should address such items as the assignment of individual responsibilities, site-specific emergency action levels, notification and integration of response activities with the Emergency Management Office, provisions for the determination and initiation of onsite protective action recommendations, and coordination with the Emergency Management Office to offer protective action recommendations for both LANL personnel and offsite populations.

LAMPF and IBF emergency management organizations each appear to have the capability to respond to emergency conditions at their own facilities. However, the emergency preparedness organization at both facilities lack the necessary procedural guidance and emergency response training to ensure a coordinated emergency response in cooperation with the Emergency Management Office.

Existing training programs for emergency plans at LAMPF and the IBF do not address the requirements of the DOE 5500 series of Orders. Training is not provided that ensures the initial identification and categorization of events,

prompt initial notification, and the initiation of mitigative and corrective actions to minimize consequences to workers, public health and safety, and the environment.

Of the four concerns developed, all were partially identified in the LANL self-assessment. The joint LAMPF (TA-53) and IBF (TA-3) self-assessment report, dated August 1991, recognized most of the problem areas identified by this appraisal. This self-assessment was handicapped by a lack of knowledge about the DOE 5500 series of Orders. In general, the LANL self-assessment process needs improvement, which can be accomplished by a thorough emergency preparedness training program provided by the Emergency Management Office and an effective oversight program by LAAO for all accelerator facilities.

4.5.3.7.2 Findings and Concerns

EP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, site/facility emergency response.

FINDINGS:

- Building emergency managers have not received sufficient emergency preparedness guidance, instruction, or training to implement their emergency management plans and to establish effective command control during emergencies.
- Emergency management and field emergency response teams have not been given the necessary emergency response training to ensure their capability to perform emergency duties.
- At present, the LAMPF and IBF emergency plans do not identify technical support, operations, or maintenance teams.
- The Emergency Management Office does not provide emergency preparedness guidance to these facilities to include the necessary support for training and emergency plan development as required by the DOE 5500 series of Orders.
- Facility managers at LAMPF and IBF do not have procedures in place to address the methods used to resolve cited emergency planning action items and concerns, thus ensuring prompt resolution.
- The individuals assigned the responsibility for drafting, developing, and coordinating emergency preparedness programs at both LAMPF and the IBF perform these functions in addition to other duties, not as full-time activities.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (EP.1-1) (H2/C1)

Emergency preparedness programs for the Clinton P. Anderson Meson Physics Facility and the Ion Beam Facility at Los Alamos National Laboratory do not provide the documentation and training capabilities required to ensure protection for both onsite and offsite populations during emergencies in accordance with the requirements of DOE 5500.1B, DOE 5500.2B, and with DOE 5500.3A (and its predecessor DOE 5500.3).

EP.2 EMERGENCY PLAN AND IMPLEMENTING PROCEDURES

PERFORMANCE OBJECTIVE: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

FINDINGS:

- Emergency plans, action levels, planning zones, and responsibilities for LAMPF and the IBF have not been developed in accordance with the new DOE 5500 series of Orders.

CONCERN: **See Concern TSA-4, EP.2-2.**

FINDINGS:

- Emergency plan implementing procedures have not been developed to support the provisions of the LAMPF and IBF emergency plans.
- The LAMPF and IBF emergency plans do not include controlled and approved checklists or other mechanisms to ensure that all appropriate emergency actions are taken.
- The LAMPF and IBF emergency plans and implementing procedures have not been cross-referenced to the DOE 5500 series of Orders.
- See Concern TSA-4, EP.2-5.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (EP.2-1) (H2/C1) **The Clinton P. Anderson Meson Physics Facility and the Ion Beam Facility at Los Alamos National Laboratory have not developed emergency plan implementing procedures as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).**

EP.3 EMERGENCY RESPONSE TRAINING

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- The LAMPF and IBF emergency management organizations depend on the Emergency Management Office to supply the expertise required for their emergency response training, and this service has not been provided.
- Improvement areas cited from previously conducted drills and exercises and past appraisals have not been used as training tools during the development of emergency response training at LAMPF or the IBF.
- Emergency preparedness training at each of these facilities does not address emergency management training for those key facility managers or personnel tasked with an emergency response role in the initial identification and categorization of events, prompt initial notification, and initiation of mitigative and corrective actions to minimize consequences to workers, public health and safety, and the environment.
- See Concern TSA-4, EP.3-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (EP.3-1) (H2/C1)

The Clinton P. Anderson Meson Physics Facility and the Ion Beam Facility at Los Alamos National Laboratory have not implemented training programs and activities to meet the requirements of DOE 5500.3A (and its predecessor DOE 5500.3); furthermore, management and support personnel at these facilities have not been trained in emergency management requirements and responsibilities outlined in the DOE 5500 series of Orders.

4.5.3.8 Technical Support

4.5.3.8.1 Overview

Five of the eight performance objectives within the Technical Support area are included in this appraisal of accelerator facilities at LANL. They include TS.1 Organization and Administration, TS.2 Procedures and Documents, TS.3 Facility Modifications, TS.4 Equipment Performance Testing and Monitoring, and TS.5 Environmental Impacts. TS.7 Reactor Engineering and TS.8 Criticality Safety were not considered applicable to the accelerator facilities. See Section 4.5.3.9 of this report for information related to TS.6 Packaging and Transportation of Hazardous Materials.

The information and data collected in this appraisal were generated from facility reviews, procedure and document assessments, and interviews and walkthroughs conducted at 15 of the 21 identified accelerator facilities. Interviews were conducted with the Medium-Energy Physics Division, Accelerator Technology Division, LANSCE, Physics Division, Advance Nuclear Technology Division, and Dynamic Testing Division. Additional interviews were conducted with accelerator support organizations, including the Facility Engineering Division, Environmental Management Division, and Health and Safety Division.

Document reviews at the above-identified facilities included facility modification packages; standard operating procedures; safe operating procedures (hazards analysis); safety assessments for the ITS/DARHT and the Accelerator Development Laboratory facilities; final SARs for LANSCE, the Weapons Neutron Research Facility, the Proton Storage Ring, and GTA; AL policies and Orders; engineering reviews for LANSCE operations; operating occurrence reports; LANL administrative requirements; and "Guide to ES&H Management Structure (GEMS)."

Generally, technical support for the LANL accelerator facilities is provided within each of the divisions and groups. Several of the accelerator organizations, however, were unfamiliar with the technical support functions (defined by DOE 5480.20), including supervision and performance in such areas as surveillance, testing, analyzing plant data, planning and evaluating facility modifications, program reviews, startup engineering, safety review, and technical problem resolution.

The Facility Engineering Division provides some common technical support for accelerator facility maintenance and modifications programs. The primary responsibilities of the Facility Engineering Division include Class A equipment, components, and systems. The accelerator organizations perform major maintenance and modifications on accelerator operating systems and support equipment, which includes Class B equipment. A high degree of formality and program control was identified in facility modifications and drawing configuration on Class A equipment and systems. A lower level of control was identified on Class B system modification programs, even though the level of importance of the equipment and systems is, in most cases, equal or greater.

Technical personnel assigned to the accelerator organizations are highly qualified and experienced. Significant knowledge of operating systems and safety is also indicated, based on the complexity of the technology deployed and the demonstrated operating history of the accelerator facilities.

Significant efforts have been expended to develop and implement formality and conduct of operations and to establish new programs for integrating ES&H policies within the accelerator organizations. ES&H program managers have been assigned within the accelerator divisions, and facility coordinators have been established in such areas as ALARA, waste management, spill control, building management, safety, and waste minimization. Extensive activities are also under way to assist with the establishment of a new DOE Order on accelerator safety and to develop operational safety requirements, safety analysis reports, and operating practices consistent with those for DOE reactor and nuclear facilities.

Several technical support weakness were identified within the LANL accelerator organizations, including the absence of a DOE Order compliance and audit system. The absence of program controls was also identified in the areas of facility modification programs, documentation and configuration management, procedures, operational safety reviews, development of safety assessments and SARs, programs to monitor and trend equipment performance, operational readiness reviews, training programs for technical support staff, and noncompliance with effluent monitoring requirements at several accelerator facilities.

A significant concern was identified with the operation of LANSCE Flight Path No. 5, which was operated on July 31, 1991, without an independent safety assessment. This appraisal determined that neither shielding analysis nor pretest verification was performed to assure that facility shielding requirements and guidelines were met. Post-test calculations indicated potential exposures to personnel access areas between adjacent flight paths could be as high as 1000 millirem per hour during normal operation.

Additional concerns were identified with the time period and delay in completing safety assessments and SARs as required by AL 5481.1B. Eighteen of 21 accelerator facilities have not met the AL Order requirement. Another concern relates to the adequacy of effluent stack monitoring at several accelerator facilities. No documentation or basis is provided for LAMPF that demonstrates all potential sources (>0.1 millirem per year) are being monitored in accordance with 40 CFR 61 and ANSI N16.1.

No formal self-assessment was performed for technical support functions within the accelerator organizations. The Operations and Support Group, Medium-Energy Physics Division, performed a partial self-assessment, but it was not included in the Division self-assessment. The decision not to perform a technical support self-assessment may have resulted in failure to identify several major concerns associated with training and qualifications, procedure and document controls, facility modifications, SAR compliance, equipment performance monitoring, and compliance problems with accelerator stack monitoring programs. Four of the 11 concerns identified in this technical support section were not identified in the LANL self-assessment.

The primary causal factor identified with Technical Support concerns can be attributed to an absence of clear policies, direction, and understanding of the importance of technical support functions in the safe and reliable operation of complex systems and facilities. Secondary causal factors can be attributed to an absence of comprehensive programs, procedure controls, and training. Comprehensive and structured programs must address requirements, methods, and responsibilities for performing technical support functions

within these organizations. The existing equipment modifications and configuration management programs within the accelerator organizations at LANL rely heavily on the knowledge and judgment of the staff, placing a heavy burden on individual abilities to assure that proper reviews and process steps are completed. This reliance on the judgment and ability of individual staff members is not consistent with formality of operations. Procedure controls and training as identified in DOE 5480.20 are also essential to assure that technical support personnel can perform their functions and tasks effectively.

4.5.3.8.2 Findings and Concerns

TS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The technical support organization and administration should ensure effective implementation and control of technical support activities.

FINDINGS:

- Personnel at most accelerator facilities did not recognize technical support functions established in DOE 5480.20 for supervision and performance in surveillance, testing, analyzing plant data, planning modifications, program reviews, and technical problem resolution.
- Neither industry-accepted standards nor DOE Orders have been used to determine the qualifications, experience, and training requirements for technical support staff and their respective support disciplines.
- The majority of the accelerator facilities and organizations do not clearly define technical support functions, responsibilities, or authorities.
- The LAMPF and IBF emergency plans do not identify technical support team members.
- Minimal understanding of the applicable DOE Orders was indicated by several accelerator organizations, and no regulatory oversight, audit, or compliance system was identified.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (TS.1-1) (H3/C2) **At the Los Alamos National Laboratory, the selection, qualifications, experience, functional responsibilities, and staffing requirements for technical support are not clearly defined and are not being implemented for the accelerator facilities in accordance with DOE 5480.20 and ANSI 3.1.**

FINDINGS:

- No formal training program exists for personnel performing technical support functions within the accelerator divisions at LANL.
- The majority of the observed facilities have no specialized training for technical support staff in the areas of (1) facility organization and administrative requirements; (2) facility systems; (3) DOE Orders, applicable codes, and standards; (4) configuration and document control; (5) facility safety assessments and SARs; (6) material, maintenance, and modification control; (7) ALARA and waste minimization programs; and (8) QA/quality control practices.

- Several of the accelerators (IBF, LAMPF, LANSCE) have no programs for training, operations, and surveillance on support equipment, auxiliary systems, and related systems requiring maintenance.

- See Concerns TSA-3, AX.6-1; TSA-3, TC.1-1; and TSA-3, PT.2-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (TS.1-2) (H2/C2) **At the Los Alamos National Laboratory, no formal training programs exist within the accelerator divisions and facilities that meet technical support training program guidelines described in DOE 5480.20.**

TS.2 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and be properly and effectively used to support safe operation of all facilities on the site.

FINDINGS:

- AL 5481.1B, issued January 27, 1988, required all LANL facilities and operations using accelerators to prepare either a safety assessment or SAR. Currently, none of the accelerator facility safety assessments or SARs meet the requirements for completeness and format.
- A final SAR was previously prepared for the Weapons Neutron Research Facility, LANSCE, and the Proton Storage Ring facilities (dated March 1983, with an addendum in July 1987). This final SAR does not reflect current conditions at the three facilities, and DOE approval to the addendum has not been provided.
- The safety assessments on ITS/DARHT and the Accelerator Development Laboratory, Bldg. 227, did not identify facility deviations from the General Design Criteria nor provide the basis for acceptance of these deviations.
- The GTA Final SAR did not provide a comparison of the General Design Criteria and facility design requirements in accordance with Table 1.1 of AL 5481.1B, nor did it provide the basis for acceptance to these deviations.
- A LAMPF SAR is scheduled to be completed after March 1993. This target date is more than 5 years after the AL 5481.1B was issued.
- See Concerns TSA-3, OA.2-1; TSA-3, AX.1-1; TSA-3, FP.3-1; and TSA-3, OP.2-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (TS.2-1) (H2/C1) **Safety assessments and safety analysis reports have not been completed for most of the Los Alamos National Laboratory accelerator facilities, and those completed do not meet the requirements of AL 5481.1B and DOE 5481.1B.**

FINDINGS:

- Based on field inspections, over 20 standard operating procedures used by technical support groups in the Medium-Energy Physics Division have exceeded the 1-year annual review cycle established in LANL AR 3-1. Standard Operating Procedure No. 231 was last reviewed and approved on March 11, 1987.
- Medium-Energy Physics Division Standard Operating Procedure No. 140, "Loading, Transport and Disposal of the A6 Insert," dated March 20, 1990, both exceeded the

required annual review date and referenced a nonapproved SAR for packages for use of an insert cask.

- Six of the safe operating procedures (or hazard assessments) identified within the Accelerator Technology Division exceeded the 1-year annual review cycle.

- Several outdated procedures are currently in use at accelerator facilities (LAMPF, LANSCE, the Weapons Neutron Research Facility, GTA) that do not reflect current conditions and risks. No program and procedure controls are in place to assure that operators do not use outdated procedures.

- Special work permits are frequently used in lieu of outdated procedures, but they do not provide an equivalent level of assurance with respect to previous changes to facility systems and components.

- See Concerns TSA-3, AX.1-3, and TSA-3, PT.6-1.

CONCERN: **See Concern TSA-4, TS.2-2.**

FINDINGS:

- Operation of the LANSCE Flight Path No. 5, conducted on July 31, 1991, did not include an adequate preoperational review:

  - No documented safety assessment was conducted.

  - No shielding analysis was conducted.

  - The cave shielding did not meet the LANSCE shielding guidelines and configuration requirements.

  - No verification and documentation assured that the proposed test would fall under the safety envelope for operation of the facility.

- Subsequent to the test cited above, shielding calculations indicated that potential exposure to personnel entering the space between the adjacent flight paths could be as high as 1000 millirem per hour.

- Assembly of the shield cave at LANSCE Flight Path No. 5 was not verified or documented to ensure that it met the proposed shielding configuration guidelines.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (TS.2-2) (H1/C1)	At the Los Alamos National Laboratory, safety review programs and controls are not in place at the Manual Lujan, Jr., Neutron Scattering Center and the Weapons Neutron Research Facility to ensure that facility operations are properly evaluated as required in DOE 5482.1B, DOE 5480.4, and DOE 5481.1B.

TS.3 FACILITIES MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that assure proper design, review, control, implementation, and documentation in a timely manner.

FINDINGS:

- No formally documented and approved accelerator facility modification and configuration program exists for most of the Class B accelerator systems and components.
- Modifications to the control center for the Betatron Building, WA-23, completed in 1975 are not reflected in any facility documents, electrical schematics, and engineered drawings.
- The LAMPF modifications for "Shaft 46 Sand Shielding" and "Hydrogen Injector Upgrade" did not have initial independent safety reviews to assure that the proposed changes were consistent with the safety envelope for the facility.
- The modification process sequence, approvals, and documentation requirements rely heavily on the knowledge and judgment of the lead engineer rather than on a comprehensive modification program.
- No documented design review and assembly verification was performed on the cave construction for the LANSCE Flight Path No. 5 (See Concern TSA-3,TS.2-2.)
- No as-built and drawing update system is in place for most of the accelerator facilities. At LAMPF, the IBF, and the Betatron, several original system drawings have never been issued and modification records are not being maintained. No plans were identified to correct this problem.
- See Concern TSA-3, AX.1-2.

CONCERN: **See Concern TSA-4, TS.3-2.**

FINDINGS:

- No formal readiness review program exists for LANL accelerator facilities.
- Pre-operational readiness reviews have been performed on new facilities like GTA and ITS/DARHT, but no criteria have been defined for performing readiness reviews after modifications to existing facilities.

CONCERN: **See Concern TSA-4, TS.3-3.**

FINDINGS:

- Most of the identified accelerator facilities have not demonstrated that their software control programs meet

DOE 1330.1C requirements for computer software management, including validation and verification.

- The "Accelerator Technology (GTA) Computer Software Quality Plan," Appendix D, revised July 1991, does not meet the requirements of ASME NQA-1-1989 and the LANL Quality Assurance Program.

- MP-1-3501, "LAMPF Control System Development Standard," dated February 1, 1985, has not demonstrated compliance with DOE 1330.1C, ASME NQA-1-1989 and ASME NQA-2, and DOE 5700.6B.

- The Accelerator Development Laboratory does not have computer software control programs that meet the requirements of DOE 5700.6B and DOE 1300.1C.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (TS.3-1) (H2/C1) **Several of the accelerator facilities that use computer software programs for diagnostics and control functions have not demonstrated compliance with DOE 1330.1C, the Los Alamos National Laboratory Quality Assurance Program, ASME NQA-1-1989, and ASME NQA-2 for software management validation and verification.**

TS.4 EQUIPMENT PERFORMANCE TESTING AND MONITORING

PERFORMANCE OBJECTIVE: Effective equipment performance testing and monitoring should be performed by technical support groups to ensure that equipment and system performance is within established safety parameters and limits.

FINDINGS:

- Most accelerator facilities have no formal equipment performance testing, monitoring, and trending programs for their Class B equipment that meets the intent of DOE 4330.4A
- The equipment performance data being collected for Class B equipment that is vital to the availability of accelerator and x-ray facility operations are not sufficient to be audited by a third party and do not provide sufficient information on age-related degradation.
- Most accelerator organizations do not have approved procedures or personnel who are sufficiently trained and qualified to meet the equipment performance monitoring requirements of DOE 4330.4A.
- For most Class B equipment and systems at accelerator facilities, no formal prioritization and classification of equipment, that is important to safety or to facility performance and availability, have been performed.
- See Section 4.5.3.4.2, MA.7, and Concern TSA-3, MA.8-1.

CONCERN: **See Concern TSA-4, TS.4-1.**

TS.5 ENVIRONMENTAL IMPACT

PERFORMANCE OBJECTIVE: The impact on the environs from the operation of each facility on the site should be minimized.

FINDINGS:

- No documentation or performance data exist to demonstrate that all potential effluents and stack releases from LAMPF are being monitored in accordance with requirements. The requirement specifies that potential sources having offsite exposures that can exceed 0.1 millirem per year are required to have effluent monitors.
- Physical conditions, maintenance programs, design features, and operational parameters make the stack monitoring at several of the accelerator facilities suspect in accurately measuring release rate.
- Effluent monitors are not installed in all exhaust stack monitors at IBF, Bldg. SM-16. No basis or facility analysis has been provided to assure that this facility meets 40 CFR 61.
- Several accelerator facilities, including LAMPF, IBF, LANSCE, and the Proton Storage Ring do not have qualified stack monitoring systems that meet ANSI N13.1 requirements for isokinetic sampling systems.
- See Concern TSA-3, AX.1-4, and TSA-3, AX.2-1.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA.3) (TS.5-1) (H2/C1) **At the Los Alamos National Laboratory, no documented basis has been provided to demonstrate that several accelerator facilities are being monitored for effluents in accordance with DOE 5480.11, 40 CFR 61, and ANSI N13.1.**

FINDINGS:

- The Health Physics Operations Group, which provides facility effluent monitoring and measurement support to LAMPF and several other accelerator facilities, does not participate in the DOE Laboratory Quality Program and interlaboratory comparison programs as required by DOE 5400.1, Chapter IV, Section 10.c.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA.3) (TS.5-2) (H2/C1)

At the Los Alamos National Laboratory, the Health Physics Operations Group, which provides effluent measurement support to the accelerator facilities, does not participate in the Department of Energy Laboratory Quality Assurance interlaboratory comparison program as required by DOE 5400.1, Chapter IV, Section 10.c.

4.5.3.9 Packaging and Transportation

4.5.3.9.1 Overview

Eleven of the 12 performance objectives in the Packaging and Transportation technical area were addressed in this appraisal. Because of minimal activity for accelerator facilities, the PT.7 Intra-Building Movements objective was not addressed. Information for this appraisal was obtained by (1) reviewing policies, procedures, plans, manuals, self-assessments, waste management coordinator information, and other written information made available at the time of the appraisal; (2) interviewing packaging and transportation as well as safety and environmental management personnel, waste management coordinators, and managers of facilities; and (3) visiting and observing waste management coordinators and packaging and transportation activities at LANL accelerator facilities. During the appraisal, observations were conducted of packaging and transportation activities at 16 of the 21 identified accelerator facilities and of the TA-54 Chemical and Radioactive Waste disposal areas. Although not required for this appraisal, additional onsite interviews were also conducted with personnel from the Safety and Risk Assessment Group, the Waste Management Group, and the Environmental Protection Group because of their interaction with waste management coordinators.

Some packaging and transportation and waste management coordinator activities appear to be performed safely, and some good work is clearly being accomplished. However, the fragmented organizational structure and the absence of QA plans and safety oversight are serious concerns. These problems were evident during the appraisal and could lead to serious safety problems if left uncorrected.

Eight concerns related to packaging and transportation activities were identified during the appraisal. The overall management system for accelerator facilities does not provide control over packaging and transportation. Independent safety oversight is not provided for accelerator areas. Formal training and qualification programs have not been established in the accelerator areas for packaging and transportation employees or waste management coordinators, and these personnel have not received comprehensive training. QA plans have not been developed for packaging and transportation in the accelerator areas. A system has not been established to ensure that all hazardous wastes in the accelerator areas are packaged and transported in accordance with Federal and State regulations. Operating procedures for packaging and transportation and waste management coordinators are not properly implemented and controlled in the accelerator areas. Onsite transportation of hazardous materials for accelerator areas is not formally documented in detailed standards and procedures. Finally, independent safety appraisals are not conducted for accelerators.

A LANL self-assessment was completed in August 1991. Six of the concerns established by this Packaging and Transportation appraisal were fully identified and two concerns were partially identified in the LANL self-assessment. Several group and division self-assessments were also conducted.

Plans are under way to correct many of the deficiencies identified by the LANL self-assessment, including establishment of a central packaging and transportation organization. Also of notable interest is an employee handbook prepared by the Safeguards Assay Group. This handbook provides guidance for

all aspects of work performance to employees in this group. Each chapter of the handbook is discussed thoroughly during safety meetings, thus providing a mechanism for training and problem solving.

Major efforts under way toward reorganization, quality assurance verification, training, procedures development, and the preparation of the new onsite manual are commendable. These efforts will provide a significant safety improvement for packaging and transportation and waste management coordinators in the accelerator areas.

4.5.3.9.2 Findings and Concerns

PT.1 ADMINISTRATION AND ORGANIZATION

PERFORMANCE OBJECTIVE: Management should develop and implement a system of policies and directives that will provide for effective implementation of Department of Energy Orders, particularly DOE 5480.3, DOE 1540.2, Federal and State regulations, and good industrial practices, in operations involving packaging and transportation of hazardous materials.

FINDINGS:

- A central organization has not been created to coordinate packaging and transportation activities at LANL.
- Packaging and transportation activities are fragmented and are carried out by many organizations in the accelerator areas.
- A control system has not been established to ensure that all persons involved in packaging and transportation have ready access to current procedures and regulations.
- Management oversight of packaging and transportation and waste management coordinator activities is insufficient.
- See Concern TSA-4, PT.1-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.1-1) (H2/C1) **The overall management system for accelerator facilities at Los Alamos National Laboratory does not provide control over packaging and transportation activities as required by DOE 5480.3.**

FINDINGS:

- There is no independent safety oversight of packaging and transportation activities, including hazardous waste activities, as required by DOE 5480.1B and DOE 5482.1B.
- Packages are checked by the same organization that provides packaging instructions, which constitutes a conflict of interest.
- ES&H oversight of line functions is not provided as required by DOE 5480.1B.
- See Section 4.5.3.12.2, FR.1, and Concerns TSA-4, PT.3-3, and TSA-4, FR.1-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.1-2) (H2/C1) **At the Los Alamos National Laboratory, independent safety oversight has not been provided for packaging and transportation activities in accelerator areas as required by DOE 5480.1B and DOE 5482.1B.**

PT.2 TRAINING

PERFORMANCE OBJECTIVE: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE 5480.3 and 49 CFR.

FINDINGS:

- Formal training programs are not in place for packaging and transportation employees and waste management coordinators.
- Formal certification or recertification programs and procedures are not in place for packaging and transportation employees and waste management coordinators.
- On-the-job training requirements are not identified or documented.
- Job task analysis is not in place to determine training and qualification requirements for waste management coordinators and other packaging and transportation employees.
- See Concerns TSA-3, TS.1-2; TSA-3, TC.4-1; and TSA-4, PT.2-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.2-1) (H2/C1) **At the Los Alamos National Laboratory, formal training and qualification programs are not in place in the accelerator areas for packaging and transportation employees to perform their duties as required by DOE 5480.3 and by 49 CFR 100-199 and 391-396.**

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures the quality assurance requirements of the applicable Department of Energy Orders, especially DOE 5700.6B, and ASME NQA-1-1989 are met.

FINDINGS:

- A QA plan has not been developed for packaging and transportation.
- QA plans have not been developed for operations performed by waste management coordinators.
- The LANL Quality Assurance Manual was distributed by the LANL Director; however, the QA program will not be implemented until January 6, 1992.
- Independent QA audits are not required for the accelerator areas, nor were any available for review.
- A system is not in place for internal audits of packaging and transportation activities.
- The LANL HAZPACT Quality Assurance Manual has not been updated to agree with the new LANL Quality Assurance Manual.
- See Concerns TSA-4, PT.3-1, and TSA-4, PT.3-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.3-1) (H2/C1) **At the Los Alamos National Laboratory, quality assurance programs for packaging and transportation in the accelerator areas did not meet the requirements of DOE 5700.6B and will not meet those of DOE 5700.6C.**

PT.4 REGULATORY COMPLIANCE

PERFORMANCE OBJECTIVE: All packaging and transportation operations involving hazardous materials should be conducted in compliance with the applicable Federal and State regulations, including those of the Department of Transportation, the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and the Environmental Protection Agency.

FINDINGS:

- Hazardous wastes were observed to be improperly packaged and identified.
- A procedure does not exist to ensure and measure compliance with applicable Federal and State regulations.
- A system has not been developed to ensure that packaging and transportation personnel and waste management coordinators have access to the most recent DOE Orders, Department of Transportation regulations, or other Federal regulations.
- See Concern TSA-4, PT.4-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.4-1) (H2/C1) **At the Los Alamos National Laboratory, a system has not been developed to ensure that all hazardous wastes in the accelerator areas are packaged and transported in accordance with Federal and State regulations as required by DOE 5480.3.**

PT.6 OPERATIONS

PERFORMANCE OBJECTIVE: Sitewide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted practices.

FINDINGS:

- A procedures manual has not been developed for packaging and transportation and for waste management coordinators.
- Procedures are not consistent, and they reflect the diversity of the many organizations involved in packaging and transportation activities.
- Not all packaging and transportation procedures are documented, controlled, and current.
- Procedures in the accelerator areas are not always available or coordinated with other groups involved in packaging and transportation.
- Standard Operating Procedure No. 133 for the LAMPF Cask Trailer, dated August 19, 1987, has not been updated and is currently being used with a special work permit.
- See Concerns TSA-4, TS.2-2, and TSA-4, PT.1-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.6-1) (H2/C2) **At the Los Alamos National Laboratory, operating procedures for the packaging and transportation of hazardous materials and of radioactive and mixed wastes are not properly implemented and controlled in the accelerator areas.**

PT.8 ONSITE TRANSFERS

PERFORMANCE OBJECTIVE: Onsite transfers of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted safety practices.

FINDINGS:

- The LANL Onsite Transportation Manual has not been updated.
- Procedures for onsite transportation of hazardous materials are not always available, and they are not consistent between organizations.
- A SAR for packaging has not been approved for the LAMPF Cask Trailer, which is used to transport high radiation material from LAMPF to TA-54. (See Concern TSA-4, PT.6-1.)
- The written roadblock procedures do not contain documented safety standards for road closures. (See Concern TSA-4, PT.8-2.)
- Standards or requirements for onsite transportation of hazardous materials have not been established. (See Concern TSA-4, PT.8-1.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.8-1) (H2/C2) **At the Los Alamos National Laboratory, onsite transportation of hazardous materials for accelerator areas is not formally documented in standards and procedures.**

PT.11 APPRAISALS AND INTERNAL AUDITS

PERFORMANCE OBJECTIVE: Periodic packaging and transportation safety appraisals of contractors by the Field Office and independent internal packaging and transportation safety audits by each contractor, required by DOE 5480.3, and are conducted in accordance with DOE 5482.1B.

FINDINGS:

- Independent internal safety appraisals have not been performed for packaging and transportation and hazardous waste coordinator activities.
- See Concern TSA-3, TS.2-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PT.11-1) (H3/C1) **Independent safety appraisals have not been performed by the Los Alamos National Laboratory organization responsible for accelerators as required by DOE 5480.3.**

4.5.3.10 Security/Safety Interface

4.5.3.10.1 Overview

This appraisal addressed all four performance objectives in the Security/Safety Interface technical category. The scope of the appraisal, however, was limited to the one security zone in TA-53--specifically, that zone within its perimeter security fence operated by the Accelerator Technology Division. Other accelerator facilities (or facilities that use accelerator beams) are either located in nonsecurity zones or are located in security zones that were appraised by other S&H Subteams. Concerns were cited against two of the four performance objectives.

Judgments in this appraisal were based on (1) discussions with LANL management and operations personnel (primarily Accelerator Technology Division personnel) responsible for activities within the Accelerator Technology Division security zone; (2) discussions with Mason & Hanger (M&H) management and operations personnel who are responsible for the protective force, including the president of the guards' union local; (3) limited discussions with LANL operational security personnel, especially those responsible for maintenance of security equipment; (4) inspection of security facilities and equipment in TA-53; and (5) review of M&H General Security Orders and Station Orders for guard stations located within TA-53.

Because no special nuclear materials are stored within TA-53, and because of limited security facilities (two guard stations and a perimeter fence around the one security zone), there has been very little activity in security/safeguards improvements and modifications. Discussions with Accelerator Technology Division management and operations personnel indicated, however, that a system has been established to ensure both security and safety review of design and construction of security facilities or modifications thereto. The Construction Project Management, Field Operations, Safety and Risk Assessment, Industrial Hygiene, and Security and Safeguards Support Groups must all collaborate with the Accelerator Technology Division personnel on design and construction followup of any security facility modifications. Complete project files are maintained by the Construction Project Management Group.

Emergency access to and egress from the Accelerator Technology Division security zone are prescribed in the M&H General Security Orders and in the Station Orders for guard stations controlling access to and egress from the Accelerator Technology Division security zone. However, several deficiencies were noted in access/egress control. Specifically, (1) Station Orders do not completely reflect current practices, (2) emergency egress is not assured under all conceivable conditions, and (3) alternative emergency evacuation routes required for special conditions have not been posted.

The probability for security/safeguards emergencies in TA-53 is relatively low. The necessity for protective force participation in other types of emergencies (fires, injuries, etc.) is much more likely. Drills in the area are, therefore, directed toward types of emergencies that would probably not involve the use of firearms. Drill scenarios, prepared by the M&H QA officer, rarely involve TA-53.

Protective force personnel receive only General Employee Training on ES&H-related subjects. The instruction program includes radiation worker, fire safety, first aid, and hazards communications training; it does not include site-specific training for TA-53 activities. M&H has submitted a proposal to LANL to organize the protective force into four dedicated sector groups. According to the proposed plan, each security inspector would be assigned to a single sector for 1 year. Adoption of this plan would enable site-specific training (including that for TA-53) as a practical measure and would enhance the value of ES&H training to protective force personnel assigned to a given area. The proposed plan is under review but has not yet been approved.

The 1991 LANL self-assessment report included a serious and well-organized treatment of the Security/Safety Interface at the Laboratory. However, neither of the two concerns presented in this report was identified. This section of the LANL self-assessment was structured in a way that facilitated the comparison of concerns cited in the Tiger Team Assessment and the LANL self-assessment reports.

4.5.3.10.2 Findings and Concern

SS.2 EMERGENCY ACCESS AND EGRESS

PERFORMANCE OBJECTIVE: Authorized facility and safety support personnel should not be denied access in an emergency. Egress during emergencies should be conducted according to approved preplanning.

FINDINGS:

- The two guard stations, TA-53 Bldgs. MPF-385 and MPF-676, controlling entry to the Accelerator Technology Division security zone are staffed during the regular day shift, 5 days per week. Accepted local practice, however, permits closing one guard station during the day shift for a period up to 15 minutes.

- The Station Orders do not clearly delineate the practices of staffing the guard station. For example, Station Order No. 457, dated October 4, 1991, stipulates that the Station 457 pedestrian gate must not be left unattended for longer than 15 minute intervals; whereas Station Order No 458, also dated October 4, 1991, does not acknowledge the practice of temporary closure of Station 458. Neither written order stipulates that both guard stations cannot be closed at the same time.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (SS.2-1) (H3/C2) **At the Los Alamos National Laboratory, the Station Orders for the guard stations controlling entry to the Accelerator Technology Division security zone in TA-53 do not accurately reflect current practices.**

FINDINGS:

- When the guard stations controlling entry to the Accelerator Technology Division security zones are closed, an emergency within the area could leave workers or visitors trapped within the security fence, in possible violation of NFPA 101, Life Safety Code.

- No crash gates are installed in the security fence encompassing the Accelerator Technology Division security zone. Automated Access Control Systems (AACS) are installed parallel to the portals of the guard stations, but are operational only for registered personnel. Administratively, the AACS is not considered to be an emergency egress device.

- With a loss of power, the AACS fails in the closed position. An emergency backup power battery, rated to last 8 hours, is installed for each AACS. However, during the appraisal, a test on loss-of-power at the AACS failed because the backup system would not allow egress, indicating that the system is not totally reliable.

- No safety analysis has been performed on the entire security zone to determine whether an emergency within the area could lead to a life threatening situation (in the absence of crash gates) and thereby violate NFPA 101.

CONCERN: **See Concern TSA-4, SS.2-1.**

FINDINGS:

- Existing practices within the Accelerator Technology Division security zone permit temporary closure of the pedestrian gate at a guard station for up to 15 minutes. These gates are also closed during the offshifts, at which time they can be opened only by summoning a roving security inspector by telephone. Employees often work interior to the buildings during the offshifts.

- Posted emergency evacuation routes from the principal buildings within the Accelerator Technology Division security zone direct evacuees through the pedestrian gates at the guard stations. No alternate evacuation routes are posted to cover those instances when one or both pedestrian gates are closed. (Accurate posting is required by 29 CFR 1910.34.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (SS.2-2) (H1/C1) **At the Los Alamos National Laboratory, emergency evacuation routes required for special conditions for the Accelerator Technology Division security zone in TA-53 have not been posted as required by 29 CFR 1910.34.**

SS.4 SAFETY OF SECURITY ACTIVITIES

PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous processes and materials should be identified and understood by all involved parties.

FINDINGS:

- Discussions with M&H management indicated that security inspectors receive General Employee Training, which includes radiation worker, fire safety, first aid, and hazards communication training. However, they receive no special site-specific training and, hence, no training on hazards specific to the Accelerator Technology Division security zone in TA-53, where they might be assigned.

- Currently, none of the LANL areas have specific protective force personnel dedicated to activities in that area. As a result, the entire force would have to be trained in the hazards peculiar to Accelerator Technology Division operations in TA-53.

CONCERN: **See Concern TSA-4, SS.4-2.**

4.5.3.11 Experimental Activities

4.5.3.11.1 Overview

This evaluation included all four performance objectives in the Experimental Activities technical area. Conclusions were based on (1) inspections of accelerator facilities; (2) interviews with personnel in accelerator operating organizations, ranging from division management to working-level positions; and (3) document reviews, including the LANL ES&H Manual, division ES&H manuals, and a variety of policies and procedures related to experimental activities. Eight of the major accelerator facilities were included in the evaluation.

LANL accelerator organizations have no overall policy or management system that prescribes safety requirements and procedural controls for experiments at their facilities. Independent review of the safety of accelerator experiments is not clearly required by LANL policy and is not often conducted at any of the appraised facilities. The formality with which individual organizations evaluate, select, conduct, and oversee such experiments varies greatly. At LAMPF Area A, LANSCE, IBML, IBF, and the Weapons Neutron Research Facility experimental activities are considered to involve only modest hazards. As such, they are conducted under standard operating procedures or special work permits, without invoking detailed procedures or close oversight. Thus, some experimental details escape review for safety. The respective responsibilities of experimenters and operations personnel for safety are not well defined. For example, add-on experiments may be conducted that have not been subjected to existing safety review processes, experimenters may not provide required documentation before initiating experiments, and housekeeping requirements may be ignored. Experiments with the LAMPF, IBML, and IBF accelerators per se (as opposed to user experiments at instrument stations) are not required to undergo more formal or extensive hazard analysis, even though the risks are likely to be higher. However, as attested to by a well-documented experiment at the Proton Storage Ring (TA-53), there are instances in which comprehensive safety reviews and detailed procedures are prepared. Limited independent reviews of program content and selected safety subjects have occasionally been held at LAMPF and LANSCE.

Information was presented indicating that more stringent policies and procedures for experimental activities have been or are being formulated for future implementation in LAMPF Area A, LANSCE, GTA, and the Weapons Neutron Research Facility. A hierarchical procedure system has been designed for GTA, and when implemented, the system will control all aspects of experimental activities. By contrast, personnel at the IBF and IBML indicated that more formal experimental controls will not be implemented until guidance is received from LANL management. Since experimental activities were not in progress at the time of the appraisal, observation and evaluation of improvements against past practices were not possible.

This appraisal of experimental activities identified deficiencies in the areas of formal policy and effective controls for the proposal, approval, execution, and oversight of experiments conducted at accelerator facilities. The LANL self-assessment also identified the need for substantial improvement in the conduct of accelerator experiments. It was recognized that no formal policy has been developed to evaluate proposals for experiments relative to safety concerns or for the conduct, oversight, and periodic appraisal of experimental

activities. It was further recognized that safety reviews and oversight are conducted with variable effectiveness. The LANL self-assessment identified in a broad way, without details specific to the accelerators, the four concerns developed in this appraisal.

4.5.3.11.2 Findings and Concerns

EA.1 INTERFACE WITH EXPERIMENTERS

PERFORMANCE OBJECTIVE: Persons planning or conducting experiments in or with the facility should have their relationship to the operating group clearly defined.

FINDINGS:

- Standard operating procedures and special work permits used at all accelerator facilities are often general, precautionary, and advisory in nature and do not provide specific details to experimenters. Numerous procedures need to be updated and revised.

- Other procedures (variously called operating procedures, routine operating procedures, test procedures, or maintenance procedures) are used by accelerator facilities but are not recognized in the LANL ES&H Manual. Operating organizations prescribe the usage, content, and approval of these procedures informally; appropriate usage is not defined and may not be understood by experimenters.

- At LANSCE, contrary to the policy of the facility, documents such as material safety data sheets or specific procedures requested by facility personnel are not always provided by experimenters before initiation of work.

- At LAMPF Area A, requirements for housekeeping and removal of experimental equipment are not always enforced by facility personnel.

- At IBML, experimenters are allowed to operate the accelerator as well as to conduct experiments, and until recently, a second person was not required to be present in the facility. Details concerning the implementation of the two-person safety rule are still being formulated.

- In all appraised accelerator facilities, operations personnel responsible for evaluating proposals and overseeing experiments are not fully independent because they may also collaborate on the experiments. Also, oversight personnel usually have other duties and insufficient time for the inspection and followup required to confirm adherence to existing procedures and safety requirements.

- See Concerns TSA-3, TC.4-1, and TSA-3, TS.2-2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (EA.1-1) (H2/C2) **Los Alamos National Laboratory has not implemented a management system for accelerator facilities that defines the relationship between operations personnel and experimenters and ensures safe operation of the facilities.**

EA.2 EXPERIMENT CATEGORIES

PERFORMANCE OBJECTIVE: All proposed experiments should be approved by an independent Safety Review Committee before they are performed.

FINDINGS:

- Of the accelerator facilities appraised, only LANSCE, the Weapons Neutron Research Facility, and GTA have been subjected to safety assessment or other similar evaluation to define the envelope of safe parameters for routine or repetitive experiments.

- The safety of proposed experiments is reviewed at all appraised accelerator facilities by formal or informal procedures, often by persons who are also responsible for the conduct of the work. None of the facilities have established independent systems to review experimental safety regularly as required by DOE 5482.1B.

- Experiments involving the LAMPF, IBF, and IBML accelerators per se, as opposed to user experiments at instrument stations, typically involve higher risks; however, there are no formal requirements for more stringent or independent safety review or higher level approval.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (EA.2-1) (H2/C1) **Los Alamos National Laboratory has no policy or procedures that define those accelerator experiments that are subject to the independent safety review required by DOE 5482.1B, and independent safety review systems have not been established.**

EA.3 EXPERIMENT PROPOSALS

PERFORMANCE OBJECTIVE: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

FINDINGS:

- Proposed LAMPF Area A experiments are submitted formally in accordance with the obsolete "Research Proposals" procedure, dated October 1984, set forth in the LAMPF Users Handbook; this procedure does not require that the proposal identify potential hazards.
- Proposals are made informally, even orally for experiments at the IBML.
- Proposals for experimental activities at accelerator facilities vary widely as to formality, content of information, and hazard identification.
- Proposals for experimental activities typically include technical details, general descriptions, and hazard checkoffs, but they do not include sufficiently detailed operating procedures to permit comprehensive safety evaluations.
- The system for approval of proposals, assessment of hazards, and authorization of experiments at LANSCE is applied more formally to experiments submitted through program advisory committees than to those conducted on "discretionary" beam time.
- Proposals for experiments with the LAMPF, IBF, and IBML accelerators per se are not required to be more formal or extensive in assessing risk than proposals for user experiments at instrument stations, even though risks are likely to be higher.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (EA.3-1) (H2/C2) **Los Alamos National Laboratory has no policy or procedures that use risk-based criteria to establish the formality and content of proposals for experimental activities at accelerators.**

EA.4 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments performed in any facility on the site should not present undue risk or significantly increase the risk previously evaluated for the facility or the site.

FINDINGS:

- Experimenters in LAMPF Area A, LANSCE, IBF, or IBML facilities who work within the limits of standard operating procedures or special work permits are not usually required to prepare detailed experimental procedures or seek approval for such procedures. As a result, the safety of some experimental steps is not being reviewed.
- The Health and Safety Division groups review but do not approve new or revised standard operating procedures. Such procedures may be put into use before Health and Safety Division review is completed (except for certain operations as specified in AR.1-3).
- Experimenters who have been authorized to conduct an approved set of experiments at LANSCE facilities are allowed to use "discretionary" beam time to conduct additional experiments that have not been formally evaluated for safety.
- Until recently, sample preparation activities in LANSCE chemical laboratories were not subject to oversight, and formal safety evaluations were not conducted prior to the initiation of such work.
- Although standard operating procedures and special work permits include general and precautionary limits, formal safety limits have not been established for experiments with the LAMPF, IBF, and IBML accelerators per se. Thus, limits for individual experiments are established by experimenters largely on the basis of their technical judgment.
- See Concern TSA-3, TS.2-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (EA.4-1) (H2/C2) **At the Los Alamos National laboratory, an effective control system is not in place to ensure that all experimental activities at accelerators are evaluated for safety concerns.**

4.5.3.12 Site/Facility Safety Review

4.5.3.12.1 Overview

This appraisal included all six of the performance objectives in the Site/Facility Safety Review technical area. Conclusions are based on (1) interviews with personnel from the Laboratory Assessment Office (LAO), as well as from all levels of the accelerator organizations; and (2) review of documents, including the site ES&H Manual, division ES&H manuals, and various general and specific policies and procedures. Eight of the major accelerator facilities were included in the evaluation.

LANL management has assigned the responsibility for conducting periodic, independent safety reviews of all LANL facilities to LAO. These reviews have been implemented for reactor and nuclear facilities, but no corresponding reviews have been conducted or scheduled for accelerator facilities as required by DOE 5482.1B. LAO attributed the absence of such reviews to inadequate funding. In addition to periodic LAO appraisals, the LANL internal review system requires comprehensive independent reviews at the organizational level (e.g., division level) of proposed facility modifications, proposed experiments, procedures, organization and staffing, operating limits, training programs, and operating experience. However, no policy or procedure documents clearly define this requirement, and no independent safety review systems have been implemented. Confusion about the requirement for such independent reviews is common, and no management system is in place to ensure implementation.

LAMPF, LANSCE, and GTA accomplish some aspects of the required organizational level reviews in an independent or semi-independent manner through ad hoc or standing committees. All organizations appraised use internal safety committees effectively. However, these activities are not sufficiently comprehensive or independent to meet the requirements set forth in the Order.

LANL policy states that the Director will authorize an independent appraisal of the LAO program on a triennial basis. However, these reviews of the site safety review system, as required by DOE 5482.1B, paragraph 9.d.(2)(d), have not been performed for any accelerator facilities and are not currently scheduled.

No formal system is currently used in any of the appraised accelerator facilities for collecting, evaluating, and disseminating information on safety-related operating events. Managers at LAMPF, LANSCE, the Weapons Neutron Research Facility, and GTA collect and circulate safety-related reports on an informal basis, but a program has not been established to share such information widely or to analyze it for trends, root causes, or corrective actions.

This appraisal developed concerns in five of the six review areas and indicates the need to establish and implement a more definitive and complete system for internal, independent safety reviews of accelerator facilities. The LANL self-assessment identified the need for substantial improvements in the safety review system. It was recognized that the present system does not provide for independent review of all facilities (e.g., accelerators), that no

guidance has been given to line management concerning the need for specific types of safety reviews, and that existing internal safety reviews vary in terms of content and effectiveness. Three of the concerns in this report were identified in the LANL self-assessment, one was partially identified, and one was not identified.

4.5.3.12.2 Findings and Concerns

FR.1 SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: A Safety Review Committee should be available to review safety questions and the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, DOE 5480.6, and/or DOE 5482.1B., Section 9.d.

FINDINGS:

- LANL Director's Policy (DP No. 111), "Assessments," dated September 1991, states that internal, independent assessments shall be conducted by the Laboratory Assessment Office (LAO). LAO management regards only the periodic review specified in performance objective FR.4 Annual Facility Safety Review as its responsibility, whereas the operating organizations themselves are responsible for internal, independent safety reviews of operational safety in a comprehensive manner on a more frequent basis.

- Discussions with personnel in each of the appraised accelerator facilities revealed that no internal, independent safety review committees have been chartered at the organizational level to provide the operational safety reviews that are required by DOE 5482.1B, paragraph 9.d.(2)(g). In addition, they have not established a system that would fulfill the requirements for safety reviews.

- Discussions with LAO management and with personnel in each of the appraised accelerator facilities confirmed that the current documentation (draft "Laboratory Assessment Program, Los Alamos National Laboratory," dated September 20, 1991) does not address the requirement for an internal, independent system functioning at the organizational level. Also, the need for such a system is not generally recognized by operations personnel.

- See Concerns TSA-3, TS.2-2; TSA-3, PT.1-2; and TSA-3, OA.5-1.

CONCERN: **See Concern TSA-4, FR.1-1.**

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

FINDINGS:

- The draft "Laboratory Assessment Program, Los Alamos National Laboratory," dated September 20, 1991, was prepared by LAO and enumerates topics to be included in the periodic LAO appraisals. However, not all topics listed in DOE 5482.1B, (paragraph 9.d.(2)(g), are included, and no guidance is provided on topics for internal reviews by organizational level committees.

- All of the appraised accelerator facilities conduct internal review of some aspects of operational safety, but none have implemented formal review systems that ensure inclusion of all topics cited in DOE 5482.1B, paragraph 9.d.(2)(g).

- Occasional independent reviews at LAMPF and LANSCE have focused on technical program content or specific safety issues, but these reviews did not include all of the safety topics set forth in the DOE Order.

CONCERN: **See Concern TSA-4, FR.1-2.**

FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management as specified in DOE 5480.5 and DOE 5480.6.

FINDINGS:

- No reports of periodic operating reviews of accelerator facilities, as required by DOE 5482.1B, paragraph 9.d.(2)(e), were available for evaluation.
- LANL Director's Policy (DP No. 111), "Assessments," dated September 1991, provides for comprehensive, independent ES&H assessments to be performed periodically by the Laboratory Assessment Office (LAO). The draft "Laboratory Assessment Program, Los Alamos National Laboratory," dated September 20, 1991, was prepared by LAO and stipulates that accelerator facilities will be reviewed once every 3 years; however, no such appraisals have been conducted to date.
- LAO has not included any safety reviews of accelerator facilities at LANL on the current schedule, which extends to February 1993.

CONCERN: **See Concern TSA-4, FR.4-2.**

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

FINDINGS:

- A triennial appraisal of the independent safety review system, as required by DOE 5482.1B, paragraph 9.d.(2)(d), has not been performed for any of the LANL accelerator facilities.
- LANL Director's Policy (DP No. 111), "Assessments," dated September 1991, states that the Director will authorize an independent appraisal of the Laboratory Assessment Office (LAO) program every 3 years. However, the system for triennial reviews has not been defined, and no such appraisals are scheduled.

CONCERN: **See Concern TSA-4, FR.5-1.**

FR.6 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experiences should be evaluated, and appropriate actions should be undertaken to improve safety and reliability.

FINDINGS:

- No system exists at any of the appraised accelerator facilities for reporting and reviewing incidents below the threshold defined by DOE 5000.3A. (See Concern TSA-3, OA.2-2.)
- Managers at LANSCE, LAMPF, the Weapons Neutron Research Facility, and GTA collect and circulate selected safety-related reports to members of their groups, but this is done on an informal basis without analysis and followup.
- The IBML has no lessons-learned program aside from followup on internal events.
- None of the appraised accelerator facilities have formal programs for systematic collection and analysis of onsite or offsite accelerator operating events that have safety implications, nor do the accelerator personnel regularly analyze for trends, root causes, generic implications, or corrective actions to prevent recurrences.
- None of the appraised accelerator facilities have formal programs for sharing safety-related accelerator operating experience with other LANL organizations, and facility personnel confirm that, in practice, little informal sharing occurs.
- See Concerns TSA-3, OP.2-3; TSA-3, MA.2-1; and TSA-3, OA.2-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (FR.6-1) (H2/C2) **Los Alamos National Laboratory accelerator organizations have not implemented a formal program to collect, evaluate, or disseminate safety-related operating experience to accelerator personnel.**

4.5.3.13 Radiological Protection

4.5.3.13.1 Overview

Radiological protection practices conducted at accelerator facilities, installations with x-ray generating devices and sealed gamma ray sources, and incidental x-ray radiation-producing devices at LANL were evaluated against all 12 performance objectives of the Radiological Protection technical area. LANL operations were reviewed against the requirements of DOE Orders, prescribed DOE policies and ANSI standards, documented and accepted best practices, and recommended standards.

The Radiological Protection appraisal for radiation-generating devices at LANL was conducted by a team of two health physicists. One health physicist primarily evaluated x-ray producing devices and some sealed sources. The other reviewed radiological protection programs for accelerators and participated in the review of x-ray devices. The appraisal was conducted by (1) interviewing LANL employees; (2) inspecting selected facilities; and (3) reviewing documents, procedures, and records associated with radiological protection programs. During the appraisal, 12 of 21 accelerators, 30 of 265 x-ray installations, and 4 sealed-source installations were inspected. These inspections represent a cross-section of the types of radiation-producing devices being operated at LANL.

Based on the these observations, the Radiological Protection appraisal concluded that LANL does not provide effective management oversight for implementation of a safety program for designing, operating, and surveying radiation-producing installations. Consequently, these devices do not comply with the requirements of regulatory standards.

All observed installations having radiation-producing devices (with the exceptions of LAMPF, LANSCE, and the Weapons Neutron Research Facility) fail to implement at least some of the requirements for interlocks, barriers, warning devices, interlock and personnel safety system testing, and postings. Some facilities do not meet any of these requirements. This is a Category II concern because of the scope of the problem and because LANL has not established any sitewide standards or mechanisms to facilitate compliance with the requirements. LAMPF, LANSCE, and the Weapons Neutron Research Facility have a formal and well-developed program to meet these requirements, and although it is not perfect, it meets the principal requirements of the standards.

LANL has not identified the need to develop a program to identify, control, and release potentially volume-contaminated material in accordance with the requirements of DOE 5400.5. Radiation protection technicians and radiation workers are not appropriately trained. Deficiencies have also been identified in the following areas: (1) procedures; (2) control of radiation exposure from depleted uranium; (3) selection, installation, and source checks of radiation instruments; (4) radiation monitoring and contamination control; and (5) ALARA programs.

Radiation protection for accelerators, x-ray devices, and source installations at LANL is implemented at the group level, with no single organization assigned the responsibility for sitewide standards and oversight. Radiation protection is a line responsibility, and the Health and Safety Division serves

primarily in a support role. Consequently, radiation protection programs are developed and implemented without uniformity between divisions or groups within the same division. Commensurate with this role, the Health and Safety Division does not have the authority or responsibility to develop radiation protection policies, establish standards, or provide oversight to assure that line organizations conform with regulatory standards.

Radiation protection programs at accelerator facilities are primarily implemented as cooperative efforts between the Health and Safety Division and the line organizations. However, the relationship and interface between line and Health and Safety Division groups and line radiation protection officers is not well defined. These cooperative efforts work well at TA-53 because an entire health physics section provides dedicated support to this area. This practice does not work well at other accelerator facilities because, in most cases, there is only a single radiation protection technician assigned to a facility or because it is covered by a roving radiation protection technician.

Accelerators used to produce x-rays are considered "special case" accelerators at LANL and are treated and controlled by the Health and Safety Division in the same manner as simple x-ray machines. These accelerators require much more complicated radiation protection controls and surveys than do conventional x-ray machines. A single individual is assigned responsibility to survey and inspect x-ray accelerators, along with concurrent sitewide responsibilities to control about 265 x-ray machines and 319 registered sealed sources. Effective oversight and control--in addition to compliance with regulatory requirements--is not achieved for these accelerators, x-ray devices, and sealed sources.

LANL has partially recognized these deficiencies and has initiated preliminary steps toward correcting them. Operational health physics functions have been assigned to a single group, and changes have been made in the ES&H Manual. More importantly, the Director has issued a series of policies assigning radiation protection responsibilities and clarifying the interrelationship between the Health and Safety Division and the line organizations.

The development of uniform standards and programs is essential in order to implement these new policies. The Health and Safety Division is developing standards and sitewide programs, but its progress is hampered by limited resources. Line organizations are having trouble implementing radiation protection requirements because of the absence of definitive standards, because they do not have the necessary expertise, and because the Health and Safety Division cannot provide the necessary technical support.

The LANL self-assessment identifies the oversight concerns regarding radiation-producing installations; however, it does not identify the more detailed concerns associated with the safe operation and interlocks of accelerators, x-ray and sealed source installations, and incidental x-ray devices. Twenty concerns have been identified by the Radiological Protection portion of this appraisal. Of these, approximately one-third have already been identified in the LANL self-assessment, one-third have been partially identified, and one-third have not been identified.

4.5.3.13.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities.

FINDINGS:

- The Health and Safety Division has oversight responsibility for radiation protection at accelerator facilities, but formal mechanisms are not in place to ensure that line management complies with radiological protection requirements.
- LANL does not provide management oversight for implementation of a safety program for design and operation of facilities with radiation-producing devices.
- Most accelerators do not have a designated radiation protection officer as required by ANSI N43.1. Accelerators with a designated radiation protection officer have not established position descriptions, minimum qualifications, and procedures for implementing the radiation protection officer responsibilities defined in ANSI N43.1.
- Qualified individuals are not assigned as radiation protection officers for x-ray devices as required by ANSI N43.2 and ANSI N543. The role of the x-ray safety officer relative to the x-ray machine radiation protection officer required by ANSI standards is not defined.
- The division of responsibilities and interaction between radiation protection officers and the Health and Safety Division are not defined.

CONCERN: **See Concern TSA-2, RP.1-2.**

FINDINGS:

- Some Dynamic Testing Division personnel who work with depleted uranium or in the proximity of accelerators and radiation-producing devices are not classified and trained as radiation workers. A review of 1990 Dynamic Testing Division dosimetry records indicates that some personnel received more than 100 millirem during 1990 but were not classified as radiation workers.
- Individuals who operate radiation-producing devices or who work with radioactive material are not always trained as radiation workers, even though they are defined as such by LANL AR 3-1, "Radiation Protection Program," dated August 30, 1991.
- A formal training program for radiation protection technicians at accelerator facilities is not in place for

radiation protection technicians in the Tritium/Other Sites Health Physics Section of the Health Physics Operations Group.

- LANL does not require that radiation protection technicians be trained before or during assignment to their duties.

- LANL policy allows individuals to perform work before they have received radiation worker or x-ray operator training.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.1-1) (H2/C1) **Training of radiation protection technicians and radiation workers at facilities with radiation-producing devices does not meet the requirements of DOE 5480.11 and Los Alamos National Laboratory AR 3-1.**

FINDINGS:

- Shielding initially installed over Line D at LAMPF was not designed to provide radiation protection for a maximum credible accident.

- Shielding at the LANSCE Target 1 Service Area is not designed to provide radiation protection for a maximum credible accident.

- See Concern TSA-3, OP.2-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.1-2) (H1/C1) **Qualified expert reviews of accelerator and shielding design, required by ANSI N43.1, did not correct shielding deficiencies in the design of some accelerator facilities at the Los Alamos National Laboratory.**

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

PERFORMANCE OBJECTIVE: The internal audit program for both routine operations and unusual radiological occurrences should provide adequate performance assessments.

FINDINGS:

- Internal appraisals of radiological protection have not been performed for any accelerator facilities.

CONCERN: **See Concern TSA-4, RP.1-1.**

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

FINDINGS:

- Interlock testing at TA-36 and TA-15 determines whether the failure of an interlock will prevent the machine from being operated. This type of test fails to evaluate whether the interlock system will shut down the machine during operation.
- The interlock test procedures at ITS/DARHT, Beam Accelerator for Novel Super High Energy Electrons (BANSHEE), and GTA confirm that the controller receives a scram signal but does not verify that the operation interrupt performs as designed.
- Many accelerator facilities do not perform and document full interlock testing every 6 months, and some do not perform any formal interlock checks at all.
- Access points to outdoor exclusion areas at PHERMEX and ITS/DARHT are not equipped with interlocks. Entry to these exclusion areas is not passively controlled to prevent activation of the accelerator while personnel are in the exclusion zone.
- Scram switches are not installed in all exclusion areas (indoor and outdoor) at accelerator facilities. Many interlocks are designed so that a local reset, followed by a reset at the console, is not required to resume operations. Interlock hardware, solid-state relays, programmable controllers, and associated wiring are not hardened and tamperproof. Some facilities do not maintain formal controlled copies of interlock schematics.
- Entrance points to all high radiation areas do not have warning lights. In general, there is no consistency in warning lights between different facilities, and an alarm does not sound when a warning light malfunctions.
- Software used to implement the interlock logic at IBF and PIXY is not developed, tested, and maintained using formal QA controls. Testing is not performed every time the program is loaded, and the interlock logic configuration at IBF is chosen from menu selections that are not independently verified by another operator.
- Evaluations have not been performed at all facilities with radiation producing devices to determine when duplicate or redundant interlocks must be installed as recommended by ANSI N43.1 and NCRP 88.

- See Concern TSA-3, TS.3-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.3-1) (H1/C1) CAT. II

The design, installation, maintenance, and testing of accelerator interlock and warning systems at the Los Alamos National Laboratory do not meet the requirements of ANSI N43.1.

FINDINGS:

- The accelerator and x-ray firing areas at TA-36 are not surrounded by a barrier, and the fences surrounding PHERMEX and ITS/DARHT do not provide reasonable access restraint.

- The key to the main door of the building housing ITS/DARHT is tightly controlled, but the access door in the rear of the building may be opened with a key that is commonly available to workers at the facility.

- Access to the upper level of the BANSHEE accelerator is blocked by a gate that does not provide reasonable access restraint.

- This following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.3-2) (H1/C1)

Contrary to the requirements of ANSI N43.1, not all accelerator facilities at the Los Alamos National Laboratory have been provided with barriers that restrain access to areas where dose limits could be exceeded.

FINDINGS

- There is no hierarchy of documentation that leads from the radiation protection standards set forth in the ES&H Manual to line management implementation procedures.

- The Health Physics Operations Group does not have a standard set of operational health physics procedures. A different set of procedures is used by each of the two Health Physics Operations Group sections having accelerator responsibilities, and the two sets are not consistent.

- Procedures are not issued and maintained under a controlled copy system, and all procedures do not have properly completed approval sheets.

- Most accelerator line divisions do not have standard operating procedures for all work related to radiological or safety systems.

CONCERN:

See Concern TSA-1, RP.3-2.

FINDINGS:

- Postings at access points and marked boundaries of accelerator facilities, except at TA-53, are incorrectly based on the radiation field at the access point rather than on the radiation field within the area. The fences around the ITS/DARHT and PHERMEX outdoor exclusion zones are not posted as radiation areas.

- The area outside the rollup doors at the Betatron in TA-8 is not posted as a radiation area, even though radiation levels in excess of 5 millirem per hour have been measured under operating conditions.

- Posted barricades have not been erected around any of the areas where accelerators or x-ray machines in TA-36 are used to perform radiography of explosive events. Very high radiation dose rates exist in these areas whenever the machines are in operation.

CONCERN: **See Concern TSA-4, RP.3-1.**

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

FINDINGS:

- The need for requirements to control dose to the skin, extremities, and lens of the eye during work performed with depleted uranium components has not been evaluated and documented.
- Accelerator personnel who work with depleted uranium components or with activated targets in the IBML have not been evaluated to determine whether they must wear extremity dosimeters.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-1) (H2/C1) **Work at the Ion Beam Materials Laboratory and with depleted uranium components at the Los Alamos National Laboratory has not been evaluated to ensure compliance with the external exposure control and dosimetry requirements of DOE 5480.11.**

FINDINGS:

- The staff of the Health and Safety Division is too small to conduct periodic surveys and to provide oversight for approximately 265 x-ray generating devices, 21 accelerators, and incidental x-ray generating installations.
- Periodic inspections are not always conducted to check interlocks and access controls.
- The Health and Safety Division staff is too small to provide oversight of radioactive sources sitewide, including 319 registered sealed sources, and to conduct the radioactive source inventory program, including registration and leak testing.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-2) (H1/C1) **The Health and Safety Division staff at the Los Alamos National Laboratory is too small to provide sitewide oversight and to conduct periodic surveys and inspections for radiation-producing devices and sources as required by DOE 5480.4, ANSI N543, and ANSI N43.1.**

FINDINGS:

- X-ray installations as defined by LANL AR 3-3, "X-Ray Generating Devices," dated July 19, 1991, do not conform to existing ANSI standards.
- LANL AR 3-3 does not include guidance and requirements to assist in the design, modification, and operation of x-ray installations.

- Personnel assigned to x-ray installations are not familiar with the ANSI standards that address the requirements for the design and operation of these installations.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-3) (H2/C1) **Definitions for x-ray generating devices in Los Alamos National Laboratory AR 3-3 do not conform with existing standards, and many x-ray installations do not fully comply with ANSI N543 and ANSI N43.2.**

FINDINGS:

- Some open-beam x-ray devices at LANL do not have ports equipped with beam shutter interlocks; some have shutters at unused ports that are not physically secured; some do not have guards or interlocks; and some have system barriers consisting of plexiglass shields that are not interlocked or otherwise passively controlled.

- Some enclosed beam SCINTAG access doors are not interlocked with the x-ray tube high-voltage supply or primary beam shutter. The shutters, which are not fail-safe, fail in the open position.

- Some x-ray generating devices do not have separate red warning lights located near all energizing switches to indicate "x ray on."

- Interlocks, indicator lights, and other safety functions are not adequately tested to ensure that they are fail-safe or that they perform their intended function. Nor are detailed procedures provided to describe how such tests are performed.

- Some installations do not have any interlocks at all, and others have only a single interlock. Some interlocks appear to be relatively small and of light-weight construction.

- Some open x-ray installations do not have conspicuously posted perimeters limiting the area in which exposure could exceed 100 millirem per hour. These perimeters are not posted with signs reading, "Danger High Radiation Area."

- Some open x-ray installations do not have conspicuously posted perimeters limiting the area in which exposure could exceed a 5 millirem per hour. These perimeters are not posted with signs reading, "Caution Radiation Area."

- Open x-ray installations do not have any positive means, such as locked enclosures, for preventing access during periods of unattended exposure. Use of these devices is

unattended because operators are located in a bunker with no visual access to the exposure area.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.4-4) (H1/C1) **Not all x-ray installations at the Los Alamos National Laboratory include access control and warning devices required by ANSI N43.2 and ANSI N543.**

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

- HEPA filters on vacuum cleaners and pumps used for contaminated areas at the Proton Storage Ring and Area A-East in TA-53 are not efficiency tested or replaced on a periodic basis.
- HEPA filters for vacuum cleaners and pumps are not checked by an approved DOE facility before being placed into service.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.6-1) (H2/C2)

The testing program for high-efficiency particulate air filters at the Los Alamos National Laboratory does not include periodic testing and replacement of filters on contaminated vacuum cleaners and pumps used at accelerator facilities, nor does it ensure that the filters are certified by an approved Department of Energy facility before installation.

RP.8 FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE OBJECTIVE: Personnel dosimetry and radiological protection instrumentation used to obtain measurements of radioactivity should be calibrated, used, and maintained so that results are accurately determined.

FINDINGS:

- Portable health physics survey instruments used by line personnel in some accelerator organizations are not always source-checked before and during routine operations.
- Reference readings are not obtained and recorded on each instrument by exposing them to a check source in a constant and reproducible manner at the time of, or promptly after, primary calibration.
- Source checks are not performed for each instrument scale or decade normally used. The allowed instrument response to a source check is greater than ±20 percent of the reference value.

CONCERN: **See Concern TSA-2, RP.8-5.**

FINDINGS:

- Most line personnel at accelerator facilities are not formally trained in the use of portable health physics survey instruments.
- Procedures establishing requirements for the control, source check, use, and return of portable survey instruments by line personnel are not in place at most accelerator facilities.
- Untrained personnel are not restricted from using portable health physics instruments to survey and release potentially contaminated material.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.8-1) (H2/C1) **Procedures and training to control the use of portable health physics survey instruments by line personnel are not in place at some Los Alamos National Laboratory accelerator facilities to ensure that the monitoring requirements of DOE 5480.11 and DOE 5400.5 are met.**

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

FINDINGS:

- Inappropriate contamination controls are implemented for personnel exiting from a contaminated area in the TA-53 Isotope Production Area.
- After exiting from contaminated areas at the Isotope Production Facility and Area A-East in TA-53, personnel perform contamination monitoring while wearing plastic booties and rubber gloves. Final monitoring is not performed after protective clothing is removed.
- Work was performed on a potentially contaminated piece of equipment in the Radioactive Storage Facility at TA-53 without using controls to minimize the spread of contamination.
- Loose debris and dirt were observed in one section of a contaminated area at Area A-East and in a contaminated material storage cage in LANSCE (TA-53 Bldg. MPF-30). Posting and control of the LANSCE storage area were incorrect.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.10-1) (H2/C1) **Personnel monitoring and contamination control at the Clinton P. Anderson Meson Physics Facility at the Los Alamos National Laboratory are not always conducted in accordance with the requirements of DOE 5480.11.**

FINDINGS:

- LANL has not developed or implemented a program to identify, control, and store potentially volume-contaminated material before it is released for unrestricted use.
- Significant amounts of material at LAMPF have been exposed to protons and neutrons and are potentially volume contaminated. The IBML also generates potentially volume-contaminated material.
- LANL does not have criteria or survey techniques approved by the office of the Assistant Secretary for Environment, Safety and Health to release volume-contaminated material.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory does not have a program to ensure that the unrestricted release of potentially volume-contaminated material from accelerator facilities is conducted in accordance with the requirements of DOE 5400.5.**
(TSA-3)
(RP.10-2)
(H2/C1)

FINDINGS:

- Standards, procedures, or requirements are not in place to perform prestartup surveys at accelerators that are used as x-ray machines.
- Surveys of the portable linear accelerator used at the Betatron in TA-8 do not consider the effects of a worst-case scenario involving scattered radiation from the object being radiographed.
- Operating restrictions based on the results of surveys are not established for all accelerators.
- The following concern was not identified in the LANL self-assessment.

CONCERN: **Prestartup and routine surveys at some Los Alamos National Laboratory accelerators are not performed in accordance with the requirements of ANSI 43.1.**
(TSA-3)
(RP.10-3)
(H2/C1)

RP.11 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, auditable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

FINDINGS:

- Accelerator organizations and organizations using radiation-producing devices do not always have ALARA programs.
- The ALARA program implemented by the Health and Safety Division does not establish any mechanisms for coordination of effort between different groups and line divisions at the same accelerator facilities or within the Health and Safety Division.
- The Health Physics Operation Group does not have an ALARA program; the accelerator section has an ALARA program, but another health physics section with accelerator responsibilities does not.
- Numerical goals and performance indicators are not used, and the ALARA process is not well documented--especially regarding work reviews, design reviews, ALARA actions used, radiation dose saved, post-job reviews, and documentation of lessons learned.
- The Health and Safety ALARA Coordinator does not have procedures and methods for implementing assigned responsibilities, is unaware of the status of the ALARA program for each line organization, and has not performed an audit of each existing ALARA program.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.11-1) (H2/C1)

As-Low-As-Reasonably-Achievable Programs at facilities with accelerators and radiation-producing devices are not implemented in accordance with the requirements of the Environment, Safety, and Health Manual and lack the formality and coordination of effort necessary to meet the requirements of the DOE 5480.11 Implementation Plan at Los Alamos National Laboratory.

RP.12 RECORDS

PERFORMANCE OBJECTIVE: Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

FINDINGS:

- LANL does not have any specific storage requirements for procedures and associated records concerning accelerator interlock and personal protection system tests.
- Records of these tests for accelerator facilities are not maintained under a formal document control system, stored in a suitable location, and archived for an appropriate time period.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (RP.12-1) (H3/C1) **Results of safety-related interlock and personal protection system tests for accelerators at Los Alamos National Laboratory are not maintained in accordance with the requirements of DOE 1324.2A, Attachment V-14.**

4.5.3.14 Personnel Protection

4.5.3.14.1 Overview

This portion of the appraisal was performed using each of the six performance objectives in the Personnel Protection technical area. Concerns related to accelerator facilities at LANL were identified in each of the six performance objectives. The appraisal was performed by means of (1) interviews with professional health and safety staff, (2) interviews with facility supervisors and managers, (3) reviews of program documentation, and (4) walkthroughs of representative accelerator facilities. The performance of both LANL and DOE was evaluated. Findings and concerns in the Worker Safety technical area were also considered in preparing this portion of the report.

Performance in the area of personnel protection varies greatly at LANL. In a few cases, such as with hoisting and rigging activities within the Dynamics Testing Division, no deficiencies were observed. Overall, however, programs related to personnel protection are substantially deficient. Health and safety leadership on the part of LANL managers and oversight from DOE have been ineffective.

Health and safety issues at the Laboratory have traditionally been addressed from the bottom of the organizational chart instead of from the top. Although a highly qualified professional health and safety staff is in place, none of these individuals have the authority to cause a change in the program.

ES&H programs related to personnel protection, as described in the LANL ES&H Manual, frequently do not reflect the requirements of long-standing mandatory DOE requirements. For example, the administrative requirement for eye protection does not state that the use of safety eyewear with side protectors is mandatory for shop operations such as grinding. Within this portion of the appraisal, programmatic-related deficiencies were identified--including those for confined spaces, safety eyewear, lasers, steady-state magnetic fields, and ventilation--that had not been established to meet mandatory requirements.

Historically, there has been no oversight to ensure that LANL activities related to nonnuclear facilities are in compliance with either the existing ES&H Manual or with mandatory DOE requirements. Each division, and in many cases each group within a division, has been free to comply with these requirements to whatever extent the organization deemed appropriate. A mechanism is not even in place to require that all operations involving hazardous materials or operations be reviewed and approved by cognizant health and safety professionals.

Oversight of LANL activities by DOE has not been effective in ensuring that LANL is in compliance with the requirements of applicable DOE Orders. The system of appraisal management is cumbersome and insensitive to the need to proceed in a timely manner. In some cases, hazards persist for months while appraisal-related documentation is processed.

The LANL self-assessment reflects a lack of experience in managing health and safety issues. The LANL self-assessment fully documented only a fraction of the deficiencies identified during the preparation of this portion of the appraisal report. It was noted, however, that the professional health and safety personnel were aware of virtually all the deficiencies identified but, in some cases, have been unable to convince management that these issues should be addressed in the LANL self-assessment report.

4.5.3.14.2 Findings and Concerns

PP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

FINDINGS:

- ES&H policy as documented in the LANL ES&H Manual does not state that LANL will comply with Occupational Safety and Health Act (OSHA) requirements or those of DOE 5483.1A.
- LANL has not implemented OSHA-mandated health and safety standards on a timely basis. For example, the OSHA deadline for preparation of a chemical hygiene plan was January 31, 1991. As of October 1991, LANL still had not issued the required laboratory safety program or chemical hygiene plan.
- Although LANL has identified nonconformances with OSHA-mandated standards, it has not--
  - Corrected the deficiency on timely basis,
  - Requested a permanent or temporary variance from DOE,
  - Advised employees of measures to be taken to ensure their protection until such time as compliance can be achieved, or
  - Documented a means of informing employees of OSHA noncompliance situations in their individual work areas.

CONCERN: **See Concern TSA-4, PP.1-1.**

FINDINGS:

- AL has not identified the failure of LANL to follow the administrative requirements of DOE 5483.1A as a deficiency.
- AL has not required LANL to submit temporary or permanent variances related to identified OSHA deficiencies as required by DOE 5483.1A.
- In the AL Industrial Safety Appraisal of October 16-20, 1989, DOE identified several OSHA deficiencies but did not require LANL to conform to the requirements of DOE 5483.1A in addressing these deficiencies.
- See Concern TSA-4, PP.1-1.
- The following concern was partially identified in the AL self-assessment.

CONCERN: (TSA-3) (PP.1-1) (H2/C1) **The Albuquerque Field Office is not fully implementing the requirements of DOE 5483.1A.**

FINDINGS:

- Standard operating procedures for laser activities at LANL have not received review and approval by the Laser Safety Officer as required by ANSI Z136.1-1986.
- Safety operating procedures for work in confined spaces did not receive review and approval from the Health and Safety Division as required by LANL AR 1-3, "Standard Operating Procedures and Special Work Permits," dated October 30, 1987.
- With a few exceptions, LANL policy as documented in the ES&H Manual does not require that approval be obtained from a cognizant professional in the Health and Safety Division before performing hazardous operations.
- Safe operating procedures and standard operating procedures at LANL accelerator facilities are not managed as controlled documents.
- Health and Safety Division review of safe operating procedures and standard operating procedures does not occur in a timely manner. For example, a safe operating procedures related to a confined space entry into the TA-2 Bldg. SM-16 Tandem Accelerator tank was submitted to the Health and Safety Division for review in March 1991, but the review had not been completed as of the end of September 1991.
- See Concern TSA-4, PP.3-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.1-2) (H2/C1) **Los Alamos National Laboratory does not have a system in place to ensure that standard operating procedures for accelerator facilities for operations involving potentially hazardous chemicals and physical agents are reviewed and approved by a health and safety professional as required by DOE 5480.10.**

PP.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the personnel protection program.

FINDINGS:

- The Confined Space Entry Program at LANL does not incorporate all requirements of ANSI Z117.1-1989. Omitted requirements include controls for physical or mechanical hazards, use of double block and bleed, and lockout/tagout requirements.
- No chemical hygiene plan has been published or implemented for LANL accelerator facilities as required by 29 CFR 1910.1450.
- Contrary to 29 CFR 1910, Subpart Z, LANL policy currently does not address the application of cosmetics in workplaces where materials are present.
- Procedures applicable to LANL accelerator facilities have not been developed to ensure proper response to low oxygen level alarms.
- No program or procedures applicable to LANL accelerator facilities have been developed to ensure that flammable liquids, gases, and vapors will be used only in laboratory hoods that meet the requirements of 29 CFR 1910.307.
- A program has not been established to ensure that exhaust hoods used for welding in LANL accelerator facilities comply with 29 CFR 1910.252.
- The LANL Laser Program and its standard operating procedures applicable to accelerator facilities do not address all requirements of ANSI Z136.1-1986. For example, standard operating procedures related to lasers do not require approval by the Laser Safety Officer.
- A nonionizing radiation program applicable to LANL accelerator facilities is not in place to address the requirements of ANSI C95.1-1982 for radio frequency hazards.
- Although several sources of static magnetic fields were identified in LANL accelerator facilities, a program has not been established to implement the requirements of the American Conference of Governmental Industrial Hygienists as set forth in, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," dated 1990-1991, with respect to static magnetic fields.

- No program, procedures, or practice is in place at LANL to prevent cross-connections between potable and nonpotable water systems in accelerator facilities as required by 29 CFR 1910.141.

- Forklifts at LANL accelerator facilities are not maintained and operated in accordance with 29 CFR 1910.178. Maintenance contracts do not require that forklifts be maintained in accordance with ANSI B56.1-1969. Deficiencies observed included bad tires and tires that had not been inspected or load tested.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.2-1) (H1/C1) **Occupational health and safety program documents and procedures applicable to accelerator facilities at Los Alamos National Laboratory do not incorporate requirements mandated by DOE 5480.4.**

PP.3 MANAGEMENT OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Chemical, physical, and other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

FINDINGS:

- Miscellaneous spare parts and supplies, including metal bar stock, were stored inside the patch-frame enclosure. Personnel were required to enter the enclosure to retrieve supplies that were stored near exposed electrical wiring and connections.
- A "patch frame" observed in TA-15 Bldg. R-185 contained exposed electrical wiring that presented an electrical shock hazard from 110-volt accelerator instrumentation and control wiring.
- Other components of the accelerator control system were observed near the PHERMEX chamber, which contained exposed electrical wiring.

CONCERN: See Concern TSA-4, WS.4-3.

PP.4 SURVEILLANCE OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

FINDINGS:

- Professional personnel within the Health and Safety Division provide technical consulting support to LANL line organizations and have no authority to enforce implementation of requirements documented in the ES&H Manual.
- A program has not been developed to require divisions or groups at LANL to establish uniform performance indicators in the areas of occupational safety and industrial hygiene.
- Past accidents and incidents have not always been investigated to determine root causes and ensure that changes were implemented to prevent recurrence.
- Safety performance data is not used to evaluate performance and identity trends, aside from mandatory OSHA injury and illness statistics.
- Professional employees responsible for investigation of accidents and incidents have frequently had no training in accident investigation.
- See Concern TSA-2, PP.4-1, and TSA-2, PP.1-1, and Section 4.5.2.14.2, PP.4.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.4-1) (H2/C1) **Los Alamos National Laboratory has not established or implemented a system to measure performance with respect to occupational safety or industrial hygiene that fulfills the requirements of SEN-29 and DOE 5482.1B.**

FINDINGS:

- Action on only seven of the 19 findings identified in an industrial safety appraisal conducted by AL in October 1989 has been completed by LANL.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.4-2) (H2/C1) **Los Alamos National Laboratory has not been responsive to findings identified during Albuquerque Field Office functional appraisals of accelerator areas conducted under DOE 5482.1B.**

FINDINGS:

- Three to 5 months, instead of 30 days as required by DOE 5482.1B and AL 5482.1A, elapsed before the reports were issued for the 10 Field Office appraisals of LANL conducted between April 1989 and April 1991.
- In some cases, AL has not notified LANL whether action plans submitted as a result of functional appraisals were approved or disapproved.
- The following concern was partially identified in the AL self-assessment.

CONCERN: **(TSA-3) (PP.4-3) (H3/C1)**

The Albuquerque Field Office has not managed functional appraisals for accelerator facilities in accordance with the requirements of DOE 5482.1B and AL 5482.1A.

PP.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Written programs, of sufficient quality to comply with all Department of Energy prescribed occupational safety and health standards, should be available.

FINDINGS:

- LANL does not have documents for a laboratory safety program or a chemical hygiene plan as required by 29 CFR 1910.1450.
- Laboratories observed in accelerator facilities were operating without laboratory-specific safe operating procedure as required by 29 CFR 1910.1450.
- An interview was conducted with a LANL employee whose job required that he periodically cut and weld stainless steel. This employee was unaware that the chromium and nickel compounds emitted during welding were potentially carcinogenic.
- Unlabeled process piping was observed in several LANL accelerator facilities.
- Accelerator facility personnel were unable to locate material safety data sheets for selected chemicals found in the workplace.
- LANL does not have a uniform policy regarding the labeling of secondary containers. LANL policy currently permits the use of several labeling systems.

CONCERN: **See Concern TSA-4, WS.3-1.**

PP.6 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS

PERFORMANCE OBJECTIVE: Site/Facility operations comply with DOE-prescribed standards for the evaluation and control of occupational health standards.

FINDINGS:

- The standard operating procedure related to entry into the Tandem Accelerator tank in TA-3 Bldg. SM-16 permits personnel to remove harnesses after being in the tank for 30 minutes.
- Emergency respiratory protection equipment for the Tandem Accelerator tank in TA-3 Bldg. SM-16 was not being inspected monthly or maintained in a sanitary condition as required by ANSI Z88.2-1980.
- LANL AR 8-1, "Limited Egress/Confined Spaces," dated August 1984, has not been revised to reflect the requirements of ANSI Z88.2-1980.
- Operating procedures for confined spaces (including AT-1-90-01, "Safe Operating Procedure for the Superconducting Structures Development Laboratory," dated May 15, 1991) do not fulfill the requirements mandated under ANSI Z117.1-1989. Omitted requirements include controls for physical or mechanical hazards, use of double block and bleed, and lockout/tagout requirements.
- Confined spaces in some LANL accelerator facilities are not labeled as Class A, B, or C as required by LANL AR 8-1.
- There are no procedures for calibration or use of either portable or fixed oxygen monitors in some LANL accelerator facilities.
- Existing inventories of confined spaces in accelerator facilities do not include all confined spaces.
- A non-permit confined space is one that does not require a special permit for entry as in the case of a frequently entered space that has procedures in place to be followed when entry is made.
- LANL AR 8-1 does not include a requirement for reevaluation of nonpermit confined spaces as required by ANSI Z117.1-1989.
- See Section 4.5.3.15.2, WS.3.

CONCERN: **See Concern TSA-4, PP.6-4.**

FINDINGS:

- Contrary to the requirements of ANSI Z136.1-1986, a Class 4 laser in TA-3 Bldg. SM-32 has been operated without interlocks, "scram" buttons, alignment procedures, or

safe operating procedure signed-off by the Laser Safety Officer.

- Contrary to the requirements of ANSI Z136.1-1986, a Class 4 laser observed in TA-53 Bldg. MPF-19 has been operated without panic buttons, alignment procedures, or safe operating procedure approved by the Laser Safety Officer.

- Contrary to the requirements of ANSI Z136.1-1986, the Class 4 drive laser for the Free Electron Laser has been operated without interlocks, documented alignment procedures, a determination of the nominal hazard zone, or a procedure approved by the Laser Safety Officer.

- LANL procedures do not require that laser operating procedures be approved by the Laser Safety Officer in accordance with ANSI Z136.1-1986.

CONCERN: **See Concern TSA-4, PP.6-3.**

FINDINGS:

- The practice of eating and drinking continues to occur in LANL work areas where hazardous materials are present.

- LANL policy currently does not address the application of cosmetics in workplaces where hazardous materials are present.

- A chemical hygiene plan has not been developed to address this requirement.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-1) (H2/C1) **Los Alamos National Laboratory has not effectively controlled the consumption of food and the application of cosmetics in the workplace as required by 29 CFR 1910, Subpart Z.**

FINDINGS:

- The Industrial Hygiene Group has not established procedures for an Industrial Hygiene response to low oxygen level alarms in areas where fixed oxygen monitors are present.

- Training video tapes used by the Accelerator Technology Division illustrated unsafe practices for response to low oxygen conditions.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-2) (H1/C2) **Los Alamos National Laboratory has not established written procedures ensuring proper response to low oxygen level alarms in accelerator facilities.**

FINDINGS:

- The LANL ventilation system data base does not include information related to whether ventilation systems are rated for the use of flammables.
- Exhaust systems in LANL accelerator facilities do not have signs or labels indicating whether they are approved for use with flammable liquids, vapors, and gases.
- A cleaning operation was observed in TA-53 Bldg. MPF-2 wherein open trays of flammable liquids (acetone and alcohol) were being used with an exhaust system that was not electrically rated for flammable vapors.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-3) (H1/C1)

Flammable liquids at Los Alamos National Laboratory are being used with ventilation systems that are not properly rated for flammable vapors as required by 29 CFR 1910.307.

FINDINGS:

- Welding, cutting, and brazing were conducted in LANL accelerator facilities using exhaust systems that have not been quantitatively tested.
- A ventilation program has not been developed to require that ventilation systems for welding exhaust to have a minimum of 100 feet per minute of linear flow, as required by 29 CFR 1910.252, or that welding be performed within that envelope.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-4) (H1/C1)

Los Alamos National Laboratory does not have a ventilation program that implements the requirements of 29 CFR 1910.252.

FINDINGS:

- LANL has not documented radio frequency emissions for the portable linear accelerator.
- LANL has not conducted radio frequency surveys of the PHERMEX facility.
- LANL has not conducted radio frequency surveys of the Rework Laboratory in TA-53 Bldg. MPF-19.
- LANL has not prepared an administrative requirement or otherwise established a program to implement the requirements of ANSI C95.1-1982.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-5) (H1/C1) **Los Alamos National Laboratory has not established an effective program to control radio frequency hazards in accelerator facilities in accordance with ANSI C95.1-1982.**

FINDINGS:

- Some areas where there are potentially high magnetic fields are not provided with posted signs carrying the required warnings.
- There are no requirements related to the control of personnel exposure to static magnetic fields in the LANL ES&H Manual.
- See Section 4.5.1.15.2, PP.6.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-6) (H1/C1) **Los Alamos National Laboratory does not have a program implementing the requirements of the American Conference of Governmental Industrial Hygienists as set forth in "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," dated 1990-1991, with respect to static magnetic fields in accelerator facilities.**

FINDINGS:

- Although all accelerator facilities visited were fitted with backflow prevention devices to protect water supply lines, no controls were present that would prevent or control cross-connections within individual buildings.
- LANL has not performed an audit of building plumbing systems to determine whether cross-connections exist.
- During the environmental portion of this appraisal, a situation was observed where a water fountain was connected to an industrial water line.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (PP.6-7) (H2/C1) **Los Alamos National Laboratory has not established a program to control cross-connections between potable and nonpotable water systems to ensure compliance with 29 CFR 1910.141.**

4.5.3.15 Worker Safety and Health (OSHA) Compliance

4.5.3.15.1 Overview

A comprehensive OSHA-type safety and health appraisal covering general industry and construction standards was conducted for accelerator facilities. The appraisal evaluated accelerators, maintenance shops, machine shops, experimental physics areas, laboratories, and chemical storage areas. The purpose of these inspections was to determine compliance with existing OSHA regulations as adopted by DOE. Evaluation criteria are based primarily on 29 CFR 1910, General Industry Standards, and 29 CFR 1926, Construction Standards. Noncompliances and hazards identified during the appraisal were documented and discussed with LANL management at the end of each day. Inspections of the accelerators were accomplished as complete inspections. Random inspections were accomplished in other workplaces within each of the Technical Areas. Noncompliances observed indicate generic problems that may be common to different areas, yet noted only once on OSHA Form 1B (see Appendix F). The Worker Safety and Health (OSHA) Compliance technical area for this appraisal included three of six performance objectives.

A total of 148 noncompliance issues were identified. Of these, 135 are considered "serious" and 13 are classified as "other than serious." Serious noncompliance issues were obvious, causing the appraisal team to expend most of the effort identifying serious issues. Table WS-3 provides a summary of the Technical Area inspections, the number of noncompliance issues noted, and the OSHA noncompliance classification of each.

Collectively, these findings indicate serious deficiencies in several areas; for example, noncompliances with hoisting and sling standards for cranes are common, as are noncompliances with electrical standards. Many cranes have been modified; additional attachments and work platforms have been placed on the cranes without proper engineering controls. Energy control programs (e.g., lockout/tagout) that are covered by procedures have not been fully and uniformly implemented in all areas, and machine guarding is deficient. Deficiencies related to emergency egress are also common.

Methods used to provide electricity to trailers and modular buildings were examined. Electrical service provided to trailers and modular buildings at the site do not meet the requirements of 29 CFR 1910, Subpart S, Electrical. The code applicable for permanent wiring should also apply to trailers, which are commonly used sitewide and remain in place for many years, even though they are treated as temporary buildings.

The hazard communication and the chemical hygiene programs have not been effectively implemented. These programs were mandated in order to assure that employees working with chemicals would be made aware of potential hazards. In addition, no effective program was identified for measuring fumehood performance. No analysis of the supply air systems nor cautions or concerns about manifolded exhaust air systems have been expressed.

Table WS-3

Technical Area Inspections and Noncompliance Information

Location	Number of Noncompliances			
	Serious	Other-Than-Serious	Willful	Imminent Danger
TA-11	0	2	0	0
TA-15	11	3	0	0
TA-16	5	0	0	0
TA-18	5	0	0	0
TA-3	47	1	0	0
TA-35	3	0	0	0
TA-36	3	0	0	0
TA-46	6	0	0	0
TA-53	53	7	0	0
TA-8	2	0	0	0
TOTAL	135	13	0	0
Percentage	91.22	8.78	0	0

Total Noncompliance 148

Compressed gas cylinder systems were found that have been locally constructed, have not been identified or inspected, or are missing pressure relief devices. There is no program in place to ensure that these systems, operating in a research environment, conform to industry standards and are appropriately certified. The confined space entry program is inconsistent. The monitoring program for entry does not contain enough checks to ensure that the spaces are safe to enter. Oxygen monitors in place are not calibrated on a regular basis or according to the manufacturer's recommendations. Personnel protective equipment is not readily available and is not always located in areas where routinely required. The requirements for such equipment are not uniformly defined or made mandatory in work areas where serious injuries could occur.

Training related to safety and health issues in the workplace has not been provided to all managers and personnel responsible for complying with these mandated regulations. When training has been provided, it has not been of sufficient depth or quality to ensure that DOE objectives for workers safety and health are achieved.

The LANL self-assessment found the Laboratory was not in compliance with eight complete subparts and four mandated programs of the OSHA standards. The findings in the LANL self-assessment are written so broadly that it will be very difficult to develop a plan of action to abate the deficiencies identified throughout these areas.

4.5.3.15.2 Findings and Concern

WS.3 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Site/facility operations should comply with Department of Energy prescribed standards for the evaluation and control of occupational health hazards.

Note: Noncompliance with this performance objective is documented utilizing the OSHA Form 1B format and compiled in Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- Chemical hygiene plans have not been developed and implemented in accelerator facilities laboratories, as indicated by the following examples:
  - Chemical hygiene officers have not been appointed for TA-3 Bldgs. 16 and 34 nor for TA-53.
  - Laboratories in TA-53 Bldg. 15 have supply air systems that re-entrain exhausted contaminants into the work area. The air system was not evaluated.
  - Refrigerators used to store flammable chemicals in TA-53 Bldg. 1 have been modified, violating the Underwriter Laboratories listing.
  - Recently installed fumehoods have no airflow-monitoring devices, as required by NFPA 45, to allow the operator to monitor the performance of hoods in TA-3 Bldg. 34.
  - Chemicals in TA-3 Bldg. 34 are stored in operational fumehoods, not in authorized storage cabinets.
  - There are no written procedures for the establishment of a "designated area."
  - Fumehoods in TA-53 Bldg.1, Chemical Wing D, and TA-3 Bldg. 34 are manifolded together with no plan in place to assure that researchers are not using incompatible chemicals.
  - Fumehoods have no use restrictions to prevent flammable vapors or gases from coming into contact with exposed nonrated motors and electrical fixtures.
- Chemicals and their associated hazards are not being properly labeled and identified at the following locations: TA-3 Bldg. 16, room 119; TA-18 Bldg. 127, High Bay; TA-18 Bldg. 28, room 4B; and TA-36.

- Employees interviewed at the Experimental Support Section in TA-53 did not understand the information on the material safety data sheets.

- See Section 4.5.3.14.2, PP.5.

CONCERN: **See Concern TSA-4, WS.3-1.**

FINDINGS:

- A confined space entry program has not been fully implemented for all accelerator facilities.

- Tunnel 198 in TA-15 has hazardous chemical and flammable gaslines with no monitoring for oxygen deficiencies or flammable atmospheres.

- Not all confined spaces in TA-53 have been identified and labeled in compliance with LANL AR 8-1, "Limited Egress/Confined Space," dated August 1984.

- In TA-3 Bldg. 16 and TA-53 Bldg. 2, the Experimental Test Laboratory, there is no program in place to maintain, inspect, and calibrate oxygen monitoring systems installed in confined spaces.

- See Section 4.5.3.5.2, TC.4.

CONCERN: **See Concern TSA-4, PP.6-4.**

FINDINGS:

- Emergency response operations for hazardous materials do not fully comply with 29 CFR 1910.120.

- Employees working in laboratories and industrial areas in TA-53 Bldg. 1 and the Experimental Support Section are required to clean up chemical spills, but they have not received training.

- Employees involved in cleanup operations of depleted uranium and beryllium from the firing tables located in TA-15 and TA-36 have not been trained in hazardous waste cleanup operations.

- See Concerns TSA-3, AX.1-3, and TSA-3, EP.3-1, and Sections 4.5.3.5.2, TC.4, and 4.5.3.15.2, WS.3.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (WS.3-1) (H1/C1) CAT. II

Individuals required to clean up chemical spills or hazardous waste sites at Los Alamos National Laboratory have not received the training required by 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.

FINDINGS:

- TA-53 employees in Chemical Wing D of MPF-23 and in the Experimental Support Section in Area A of MPF-3 demonstrated a lack of understanding of the limitations of their respirators.
- Respirators are not readily available for use in TA-53, Area A, Experimental Support Section, where they may be required for chemical cleanup activity.
- Respirators were not used or provided when employees are potentially exposed to airborne dust contaminated with depleted uranium and beryllium on the firing tables located in TA-15 and TA-36.

CONCERN: **See Concern TSA-1, WS.3-1.**

WS.4 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Workplaces should be free of uncontrolled physical hazards and should be in compliance with Department of Energy prescribed occupational safety standards.

NOTE: Noncompliance with this performance objective is documented utilizing the OSHA Form 1B format and compiled in Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- Caution signs are not posted near the cylinder storage area, the liquid nitrogen tanks, or the underground piping system to warn vehicle operators of hazards in TA-53 Bldg. 2, Experimental Test Laboratory and Bldg. 622.
- Some warning signs are not posted in TA-53 Bldg. 7, D-Tunnel.
- Contamination areas in TA-15, Bunker 185, are not posted with caution signs.
- There are no warning signs posted in TA-15 at PHERMEX, room 310, to alert personnel of potential discharges from the halon gas system.

CONCERN: **See Concern TSA-4, WS.4-1.**

FINDINGS:

- Work was performed on top of an accelerator in TA-3 Bldg. 16, room 62, approximately 12 feet above the floor. Guardrails or fall protection have not been provided.
- On the northeast side of TA-36 Bldg. 36, a 6-foot deep floor opening measuring approximately 12 feet by 10 feet has been left unguarded.
- At TA-15, PHERMEX Building, room 184, no guardrail has been installed on the top of a tank located approximately 30 feet above ground, and no fall protection has been provided.
- Required handrails have not been installed on stairs at the following locations: TA-33; TA-15 Bldg. 185, room 102; and TA-53.
- See Section 4.5.3.15.2, WS.4.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (WS.4-1) (H1/C1) CAT. II **Los Alamos National Laboratory does not always provide floor guarding, handrails, or fall protection as required by 29 CFR 1910, Subpart D, Walking Working Surfaces.**

FINDINGS:

- In TA-53 Bldg. 7, room 200, and TA-16 Bldg. 224, room 102, the rotating shafts of the motors and pumps are not fully enclosed.
- The guard for the gears is missing from the DO-ALL swing arm saw in TA-18 Bldg. 28.
- The pedestal mounted grinder available for use in TA-53 Bldg. 569 does not have a tongue guard.
- Air-compressor drive pulleys and belts are not fully enclosed with a guard in TA-53 Bldg. 368, P17.

CONCERN: **See Concern TSA-4, WS.4-2.**

FINDINGS:

- Means of egress are obstructed in the following locations: TA-15, Tunnel 201; TA-35 Bldgs. 2 and C-155; TA-3 Bldg. 16; and TA-18 Bldg. 127.
- Level means of egress are not maintained for TA-3 Bldg. 34, TA-53 Bldg. 2, and TA-53 Bldg. 17.
- Doors located in TA-33 Bldg. 173 and TA-60 Bldg. 17 swing out to areas with no landing platforms.
- Exit doors have padlock hasps installed on the outside in TA-15 Bldg. 203, room 1, and TA-3 Bldgs. 34 and 16, allowing the doors to be locked.
- Audible or visual fire alarms are not provided in congested trailers, or "temporary" buildings, at TA-46 and TA-53.

CONCERN: **See Concern TSA-4, FP.2-3.**

FINDINGS:

- Damaged and defective slings were used at the following locations: TA-3 Bldg. 16, TA-46 Bldg. 158, TA-53 Bldg. 2, and TA-60 Bldg. 17.
- Cranes at TA-3 Bldg. 16 and TA-35 Bldg. 27 have been modified. No manufacturer's approval or engineering notes have been provided.
- Frequent and periodic inspection records of hoisting and lifting equipment are not maintained for equipment located at the following locations: TA-3 Bldg. 16; TA-53 Bldg. 3; Bldg. 368, P17; and TA-18 Bldg. 227.
- LANL allowed the modification of forklifts through the addition of seat belts, even though rollover protective systems are not always provided. This modification greatly increases the hazard to employees in the event of an accident. LANL AR 12-2, "Personnel Protection Equipment," dated January 18, 1991, specifically states

that seat belts should not be worn when operating forklifts without rollover protective systems.

- See Section 4.5.3.14.2, PP.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (WS.4-2) (H1/C1) **Several accelerator facilities at Los Alamos National Laboratory operate equipment that does not comply with the requirements of 29 CFR 1910, Subpart N, Materials Handling and Storage.**

FINDINGS:

- No pressure relief valves are installed on piped-in gas systems at TA-3 Bldg. 16, room 67; TA-3 Bldg. 34, rooms B1B and 123; and TA-53 Bldg. 3, room 207.

- Liquid petroleum gas systems and tanks are not maintained, inspected, or protected at TA-53 and Bldg. 460, Area A.

- Oxygen cylinders are stored near fuel gases or oil and grease products at TA-33 Bldg. 39.

- The manifolded hydrogen system at TA-53 Bldg. 2 does not have the valve or piping system labeled to assure proper identity.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (WS.4-3) (H1/C1) **Several accelerator facilities at Los Alamos National Laboratory do not comply with the requirements of 29 CFR 1910, Subpart H, Hazardous Materials.**

FINDINGS:

- Electrical disconnect panels are not properly identified as to their purpose at TA-3 Bldgs. 16 and 34; TA-53 Bldg. 3; and TA-53, Area B, upper level.

- Exposed leads to an electrical system were observed in TA-3 Bldg. 16.

- The electrical systems in TA-53 are not properly grounded or bonded at the following locations: Area B; the cooling towers; Bldgs. 17, 18, and 365; and the transformer yard.

- Flexible cords, including those for trailer supply power at several locations, are used in place of permanent wiring.

- Electrical safety equipment is not certified for use at TA-46 Bldg. 158 and TA-53 Bldg. 365 and Maintenance Area.

- Nonrated electrical equipment and fixtures are used at TA-53 Bldg. 2, TA-53 Bldg. 3, and TA-3 Bldg. 34.
- Service drop wires are not grounded and installed at the proper height at TA-53 Bldg. 17 and TA-33 Bldg. 40.
- Handles on modified electrical cabinets violated the Underwriters Laboratories listing provided a means for access to energized electrical components by allowing employees to open the dead front of the cabinet at TA-53 Bldg. 3.
- Energized electrical parts of wiring are exposed at TA-3 Bldg. 16, TA-18 Bldg. 227, TA-53 transformer yard, and TA-11 Bldg. 30.
- See Section 4.5.3.14.2, PP.3.

CONCERN: **See Concern TSA-4, WS.4-3.**

FINDINGS:
- Yellow tape is being used to "lockout" a circuit in TA-3 Bldg. 16.
- Circuitbreaker panels do not have the capability of being locked out in TA-3, TA-15, and TA-53.
- See Sections 4.5.3.4.2, MA.2, and 4.5.3.5.2, TC.4.

CONCERN: **See Concern TSA-4, PP.2-2.**

FINDINGS:
- Welding leads for arc welders are not properly stored and maintained at the TA-53 Maintenance Area or in TA-60 Bldg. 19.
- Gas welding systems were not shut off when work was halted at TA-60 Bldg. 19.
- Welding screens are placed at floor level, causing a ventilation restriction at TA-53 Bldgs. 2 and 365.
- Compressed gas welding systems did not have their valves labeled in TA-60 Bldg. 19.
- See Section 4.5.2.15.2, WS.4.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (WS.4-4) (H1/C1) **Los Alamos National Laboratory does not fully comply with the requirements of 29 CFR 1910, Subpart Q, Welding, Cutting, and Brazing.**

4.5.3.16 Fire Protection

4.5.3.16.1 Overview

Six of the seven performance objectives in the Fire Protection technical area were reviewed in this appraisal. No appraisal was conducted for FP.6 Fire Department Operations. The appraisal consisted of interviews with LANL fire protection engineering staff, facility managers, and JCI personnel. In addition, 17 of the 21 identified accelerator facilities were observed and evaluated to determine their level of compliance with the performance objectives. Several accelerator support facilities, including offices, were also observed. Appraisals and assessments conducted by Factory Mutual Research Corporation, Inc.; AL; LAAO; and LANL were reviewed to determine which deficiencies had been previously identified. The appraisal also reviewed compliance with requirements and guidelines contained in DOE 5480.4, DOE 5480.7, and DOE 6430.1A; National Fire Protection Association (NFPA) codes and standards; and the "improved risk" concept.

The current LANL Fire Protection Program was established by a document titled "Fire Protection Program," dated April 1991. Responsibility for direction and administration of the program rests with the Fire Protection Officer, Fire Protection and Utility Group. Responsibility for implementation of various parts of the program rests with other groups, including the Health and Safety and the Environmental Divisions, JCI, the Los Alamos County Fire Department, and management at individual facilities. An established program has not been developed at accelerator facilities to assure compliance with NFPA 101, Life Safety Code, nor is conformance verified by periodic field inspections. Consequently, most observed facilities do not comply with the Life Safety Code and many have serious deficiencies.

The current fire protection program for the accelerator facilities does not effectively implement DOE 5480.7, DOE 6430.1A, and other requirements concerning construction materials, limitation of dollar value, and programmatic concerns at risk. The program also does not provide effective fire protection engineering oversight for the planning, design, and construction or modification of facilities.

Extremely flammable solvents, such as acetone, isopropanol, and ethanol, are often improperly stored and dispensed at accelerator facilities. A study has not been conducted to determine whether these solvents can be replaced by a nonflammable solvent.

A LANL self-assessment was completed in August 1991. Of the nine concerns presented in this report, one was fully identified in the LANL self-assessment, seven were partially identified, and one was not identified. However, the findings in the LANL self-assessment are written so poorly that it will be very difficult to develop a plan of action to abate identified deficiencies.

4.5.3.16.2 Findings and Concerns

FP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Fire protection organization and administration should ensure the effective implementation and control of the fire protection program.

FINDINGS:

- Review of a new structure, TA-53 Bldg. 622, revealed that the west stairwell does not have a 1-hour fire resistive enclosure as required by NFPA 101, nor are dead-end corridor distances within acceptable limits.
- The interior walls of TA-53 Bldg. 3, room 101, are covered with combustible pegboard.
- A 1-hour fire wall separates an industrial area from office areas at TA-53 Bldg. 365. Approved fire-rated windows and frames, fire dampers, and other penetration protective devices are not installed in the 1-hour fire wall.
- None of the exit stairs from the basement level (beam channel) of TA-53 Bldg. 3 are provided with fire-resistive enclosures. The Sector B stairwell does not terminate at the floor of the exit discharge. The exit stairs do not discharge to the exterior of the building.
- At TA-53 Bldg. 30, the installation of combustible shielding materials was not reviewed by the Fire Protection and Utilities Group.
- The installation of an experiment in the exit access corridor at TA-53 Bldg. 2 severely compromised the exit access arrangements.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.1-1) (H1/C1) CAT. II

All new facilities operated by the various accelerator organizations at Los Alamos National Laboratory have not been constructed in accordance with DOE 6430.1A and DOE 5480.4, nor are facility modifications and experimental setups subject to review and approval by the Fire Protection and Utilities Group.

FINDINGS:

- At TA-53 Bldg. 3, combustible storage that potentially threatens important areas or rooms in the facility was discovered in the following locations:
  - Combustible magnetic tapes are stored in the E-300 and G-300 corridors.
  - Wooden wire marker bins are located along the walls of F-300 corridor.

- Combustibles are stored in a wire cage in Sector G.

- A wooden platform has been constructed on top of a 30-ton crane in Sector M where it represents a combustible hazard and obstructs the operation of the fire sprinkler.

- The amount of combustible cables has not been reduced in all areas at TA-53 Bldg. 3, Sector M.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.1-2) (H1/C2) **Contrary to the requirements of DOE 5480.7, accelerator organizations at Los Alamos National Laboratory do not have a procedure designed to ensure that the use and storage of combustibles do not threaten important accelerator operations and experiments.**

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

FINDINGS:

- Documented life safety analyses have not been conducted for accelerator and accelerator support facilities, including offices.
- Life Safety Code deficiencies at various accelerator facilities include the following: (1) the use of hasps on exit doors, (2) excessive common path of travel and dead-end distances, (3) locations where the travel distance to an approved exit exceeds the allowable limit, (4) inadequate exit arrangements, (5) exit stairs that are not provided with a fire resistive enclosure, and (6) the lack of emergency lighting.
- Additional personnel protection measures as required by DOE 5480.7 (fire suppression systems, additional training, limitations on the numbers of personnel, combustible controls, etc.) have not been provided where strict compliance with the requirements of NFPA 101 is not feasible.
- The common path of exit access travel in the Line D Tunnel of TA-53 Bldg 7 is about 500 feet whenever the shield door is closed and secured. Similarly, the common path of exit access travel is 130 feet in the switchyard of TA-53 Bldg. 3 and 400 feet in a basement area of TA-53 Bldg. 3.
- See Section 4.5.3.15.2, WS.4.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.2-1) (H1/C1) CAT. II

Most accelerator facilities at Los Alamos National Laboratory are not in compliance with NFPA 101, Life Safety Code.

FP.3 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate protection to prevent any added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site or facility boundary.

FINDINGS:

- Fire protection reviews have not been performed for accelerator facilities to ensure that fires do not result in an unacceptable radiological release.
- The preliminary hazard analysis for TA-3 Bldg. 16 does not address the potential for fire, its control, or potential negative effects of fire on the public and the environment.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.3-1) (H1/C1) **Not all accelerator facilities at Los Alamos National Laboratory require that a fire protection review be performed as part of safety assessments, hazard analysis, experiment reviews, and similar safety evaluations to ensure that fires do not result in an unacceptable radiological or chemical release to the environment in accordance with by DOE 5480.7. and DOE 6430.1A, nor do they require that the Fire Protection and Utilities Group review and approve these documents.**

FP.4 IMPAIRMENT OF OPERATIONS

PERFORMANCE OBJECTIVE: The site should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

FINDINGS:

- Three Cockcroft-Walton injectors are located in TA-53 Bldg. 3, Section J:
  - Each injector is powered by electrical devices that contain combustible oil and that are located either within the Faraday cage or just below it on the basement level.
  - Automatic fire suppression systems or other suitable measures are not provided for protection of these injectors.
  - The injectors are not fire-separated from each other or from the remainder of the structure.
  - The interior walls of the P-Minus Dome are covered with expanded foam sound-proofing material. The potential for an additional fire loss due to the foam has not been evaluated.
  - All areas of Sector J are not protected by an automatic fire suppression system.
  - Modifications in rooms J05 and J09 have obstructed the existing automatic sprinkler system coverage.
- Automatic fire suppression is not provided for all areas where combustibles are present in TA-53 Bldg. 3, and fire separation is not provided between workshops and principal equipment areas.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.4-1) (H1/C1)

Contrary to the requirements of DOE 5480.7, all areas of TA-53 Bldg. 3 at Los Alamos National Laboratory are not provided with automatic fire suppression systems and passive systems designed to ensure that fires do not result in unacceptable programmatic losses.

FP.5 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A maximum credible fire, as defined in DOE 5480.7, Section 6.f., should not result in an unacceptable property loss.

FINDINGS:

- Automatic fire suppression systems are not provided in all areas of TA-53 Bldgs. 2, 3, 7, 16, and 29; and TA-36 Bldg. 86.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.5-1) (H1/C1)

Contrary to the requirement of DOE 5480.7, all accelerator facilities for which property loss due to fire may exceed $1,000,000 are not provided with automatic fire suppression systems, nor do accelerator organizations evaluate facilities for the installation of such systems in which the fire loss potential ranges from $250,000 to $1,000,000.

FINDINGS:

- The following deficiencies concerning portable and transportable structures at various accelerator areas were identified:
  - Combustible exterior and interior construction,
  - Improper fire separation distances from permanent structures and other portable structures,
  - Portable structures located within vital facilities without automatic sprinkler protection, and
  - Improperly installed automatic halon (FIREPAC 30) systems that do not meet the requirements of NFPA 12A.
- The Maintenance Group, Facilities Engineering Division, does not have a procedure that addresses the safe positioning of emergency generators adjacent to permanent structures.
- The potential impact of a fire in a portable structure on an adjacent permanent building has not always been considered.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.5-2) (H1/C1)

All portable or movable structures utilized by the accelerator organizations at Los Alamos National Laboratory are not constructed, located, or maintained as required by DOE/EV-0043, "Standard on Fire Protection for Portable Structures," dated August 1979.

FINDINGS:

- Electronic cables within the Proton Storage Ring have been run from the cross-tunnel through vertical shafts to

a service room located above the tunnel. The shafts are neither fire-stopped nor provided with fire barriers.

- Approved fire separation is not provided between the machine shop and office areas of TA-18 Bldg. 30 and between TA-3 Bldgs. SM-32 and SM-34.

- At TA-53 Bldg. 3, fire separation barriers between each major section are not being maintained.

- At TA-53 Bldg. 365, elevator fire/smoke partition enclosures that were installed during original construction were subsequently removed, and the four-story-high bay fire wall is violated by numerous unapproved penetrations.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.5-3) (H1/C1) **Fire protection features, such as fire-rated separation, are not provided in all accelerator and accelerator support facilities at Los Alamos National Laboratory, and existing fire barrier assemblies are not being inspected and maintained in accordance with DOE 5480.7.**

FP.7 PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE: A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection.

FINDINGS:

- Documented fire protection engineering surveys are not conducted for all accelerator facilities as required by DOE 5480.7.
- The following deficiencies exist at some control or electronic data collection areas: (1) fire separation is not provided; (2) an underfloor cable-routing tunnel does not have an automatic fire suppression system; (3) disaster recovery plans do not exist, and salvage supplies (tarps, sprinkler chocks, etc.) are not provided; (4) backup computer data is not stored in a separate fire area; and (5) automatic sprinkler protection is not provided in all required locations.
- Accelerator control rooms, data-processing rooms, and similar spaces are not being constructed or maintained in accordance with the requirements of DOE/EP-0108, "Standard for Fire Protection of AEC Electronic Data Processing Systems," January 1984.
- The accelerator organizations do not have a policy in place designed to ensure that satellite hazardous waste collection sites do not result in an increased fire threat to the facility and, ultimately, the environment.
- TA-53, which encompasses facilities with a high programmatic and property-loss potential, is not provided with a redundant water supply. A fire water supply is not provided for the high-value accelerator at TA-36 Bldg. 86 or for many areas of the PHERMEX site.
- A reliable fire water supply system, including the redundant supplies required for a major facility, is not provided at all accelerator sites in accordance with DOE 5480.7 and DOE 6430.1A.
- A secondary all-weather emergency access road is not provided for TA-53 in order to ensure emergency access in the event that the primary road is blocked or obstructed.
- Many accelerator divisions have not developed contingency plans for the control of fire in and around accelerators, in areas where high radiation fields are always present, or where radiation hazards are present only during operation.
- The manner in which flammable and combustible materials at accelerator facilities are stored, dispensed, and used does not comply with NFPA 30.

- A vegetation/brush control program is not in place at accelerator sites to prevent potential fire exposure to facilities and obstruction of fire department connections, hydrants, or post-indicator valves as required by DOE 5480.7.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-3) (FP.7-1) (H1/C1) **The accelerator organizations at Los Alamos National Laboratory are not in compliance with DOE 5480.4, DOE 5480.7, and DOE 6430.1A.**

4.5.4 Other Selected Facilities and Activities

4.5.4.1 Organization and Administration

4.5.4.1.1 Overview

This appraisal of Other Selected Facilities and Activities at Los Alamos National Laboratory (LANL) was conducted by the Safety and Health (S&H) Subteam No. 4 and encompassed all eight performance objectives in the Organization and Administration technical category. Information was obtained through interviews with management, from the Director, LANL, down through intermediate management levels to section leader level, encompassing four associate directorates and seven divisions. In addition, interviews were conducted with Johnson Controls World Services, Inc., (JCI) and Los Alamos Area Office (LAAO) management as well as a representative of the Office of the President, University of California. Management documents, including self-assessments pertaining to LANL and LAAO along with appropriate Department of Energy (DOE) Orders, were reviewed as part of the appraisal. Visits were made to division/group facilities located at TA-3, TA-9, TA-16, TA-21, TA-35, TA-46, TA-48, TA-59, and the Chemistry and Metallurgical Research Building in addition to those at JCI and LAAO.

Laboratory management has made a commitment to the new safety culture. The prevailing attitude across the Laboratory is positive toward making the required changes. Numerous deficiencies were cited by the S&H Subteams during the course of this appraisal that are significant management challenges. Many environment, safety, and health (ES&H)-related programs need further development and improvement and, then, integration into the line organizations. The Laboratory needs to complete the development of a fully integrated and prioritized implementation plan to ensure that a consistent approach toward implementing ES&H policies and programs will be achieved. Laboratory management needs to communicate its direction and expectations clearly to all levels of the organization. Organizational roles, responsibilities, and interfaces among the various ES&H groups, various offices, and the line organizations need to be clarified and strengthened. Management of Laboratory ES&H resources must receive attention. Decisions are needed on how these resources will be applied to support ES&H programs. Attention to the career development and salary needs of the ES&H personnel is needed to mitigate the possibility of loss due to job transfers and resignations. Overall, management must remain as diligent and committed as it has been prior to and during the Tiger Team Assessment if effective ES&H programs are to be institutionalized across the Laboratory.

LANL has initiated an ES&H action plan project aimed at providing management with a permanent mechanism to produce high-quality, efficient action plans. This project, now under development, is on target to produce an overall ES&H action plan for the Laboratory and is expected to be available for dealing with deficiencies identified by the Tiger Team Assessment. Management intervention in the form of decisions on such issues as organizational structure, funding, and program development will be required to implement the ES&H programs in a consistent manner.

Many of the key management decisions related to ES&H are made through the ES&H Council, composed of the Laboratory Director and Deputy Director, Associate Directors, and other key management staff, including the Health and Safety and

the Environmental Management Division Leaders. Minutes of the Council do not contain sufficient detail to track decisions. Assigned action items and their closeout are similarly not documented as part of Council minutes.

An examination of the JCI subcontract, managed by LANL, revealed a lack of clarity with respect to ES&H performance expectations as part of the Cost Plus Award Fee (CPAF) evaluation process. Furthermore, the CPAF provisions of the JCI subcontract do not appear consistent with the intent of the Secretary of Energy direction that ES&H criteria should be more than 50 percent of the overall CPAF process.

Evidence was not found for any systematic approach to conducting independent safety reviews at the group level. In some instances, the concept of independent safety review was not understood and was confused with activities associated with outside organizations conducting inspections, for example, Occupational Safety and Health Act (OSHA) type inspections. (Refer to Concern TSA-4, FR.1-1, for further information on the lack of a Laboratory-wide independent safety review system.)

LANL has initiated an occurrence reporting system which is described in the "Occurrence Reporting Handbook for DOE Order 5000.3A," September 1991. This program will need continued management attention. Training of all Facility Managers is approximately 80 percent complete, and training for workers on incident reporting has yet to be started. Closer working relationships with LAAO are needed to streamline the process whereby final reports are approved. Over the past several months approximately 100 final reports were backlogged at LAAO, although this backlog is now being reduced.

Of significance was the lack of a plan for managing, organizing, and using health and safety resources and for assuring the proper mix of disciplines are available to support the Laboratory. The organizational approach to managing these resources is not in place, although an ad-hoc committee was recently appointed to study this issue and make recommendations. LANL has neither addressed the classification, salary grade, and growth opportunities for its ES&H-related positions nor the consequences of staff transfer resulting from restructuring of nonexempt positions. This has significantly affected the availability of key support resources, particularly radiological protection technicians.

Sitewide ES&H objectives and strategies have been recently published by the Laboratory Director. These, by nature, are very broad because they set direction for the Laboratory. A formal process is not in place by which these objectives are both communicated through the various levels of the organization and uniquely adapted as measurable goals by each organizational unit.

The University of California, through the activities of the Health, Safety, and Environment Advisory Council (HSEAC), has monitored ES&H activities at LANL. HSEAC meets only three times each year, once at each of the three DOE laboratory sites operated by the University. HSEAC has tended to be narrowly focused on topics of interest to committee members rather than dealing with broad management issues related to ES&H and has not played an active role in affecting policies, programs, or procedures related to ES&H.

Although ES&H factors are now required to be incorporated into each employee performance appraisal, no plans are in place to review the degree to which this new requirement is being followed by Laboratory supervisors. Position descriptions have only been developed for the technical series of employees and do not contain any mandated ES&H elements.

Training has not been completed for all supervisory personnel in the identification and handling of employees suspected of substance abuse. There is no documented requirement for such training to assure that it will be performed on a continuing basis in the future.

Although mechanisms are in place at the Laboratory for updating administrative safety documents such as safety analysis report (SARs) and operational safety requirements (OSRs), of far greater concern is the number of unapproved documents. A significant contributing cause to this situation has been deficiencies within the DOE system whereby guidance is disseminated from DOE Program Offices, to the Field Office, and on to the contractor. Confusion exists on the interpretation of DOE requirements which, in turn, has led to delays in approval. The situation has been exacerbated at LANL in that LAAO has not established the necessary administrative controls to assure that clear and timely guidance is conveyed to the Laboratory regarding important safety-related documentation. Many other serious deficiencies with respect to the lack of LAAO oversight of LANL were observed in such areas as quality assurance (QA), emergency preparedness, packaging and transportation, and explosives safety.

The LANL self-assessment was comprehensive and candid with respect to the area of Organization and Administration. Findings were compiled to facilitate comparison of results from the Organization and Administration part of this Tiger Team Assessment with findings of the LANL self-assessment. The extent to which findings were identified indicated that the Laboratory has taken this initiative quite seriously and, thus, will provide an effective tool for implementing its new ES&H programs.

The LAAO self-assessment appeared to deal with many of the key issues, but it was difficult to find them due to the way large bodies of information were grouped under each discussion area. Corrective action responses to deficiencies were difficult to correlate.

4.5.4.1.2 Findings and Concerns

OA.1 SITE/FACILITY ORGANIZATION

PERFORMANCE OBJECTIVE: Management should organize and manage the site/facility's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

FINDINGS:

- LANL has initiated an ES&H action plan project aimed at providing a permanent mechanism to produce high-quality, efficient action plans. This project is cochaired by the Associate Director for Research and the Associate Director for Energy and Technology and is intended to provide an overall integrated action plan based on the Laboratory self-assessment and deficiencies identified during the Tiger Team Assessment. This overall action plan in combination with management decisions on organizational, programmatic, and funding approaches will serve as the implementing tool for the Laboratory ES&H programs. The overall system for producing this action plan is not fully in place but is on schedule to be available for use once the Tiger Team Assessment Report is made available to the Laboratory.

- During the course of this assessment, several observations were made that indicated the lack of an overall Laboratory implementation plan for its ES&H initiatives.

  - Interviews conducted in six groups, all of different divisions, indicated a wide variety of approaches to incorporating safety and health initiatives. For example, the Explosive Technology Group, with direction from the Division Office and the Operational Surety Office of the Associate Director, Nuclear Weapons Technology, had developed a well-documented ES&H program for the Group. The Isotopes and Structural Chemistry Group was less formal indicating that there was some confusion on what was expected for the group level ES&H program.

  - Interviews with the various group leaders indicated that they were not aware of the existence of an overall ES&H implementation plan for the Laboratory.

  - Management has not decided on how the ES&H resources of the Laboratory will be organized. Although this issue is now being studied by an ad-hoc committee, this action was not prompted by any overall implementation plan. (See Concern TSA-4, OA.2-1.)

  - It is not clear how policies are generated, reviewed, and implemented down through the organization. Further, lack of control on the

publication of policies creates confusion. A Laboratory ES&H policy published in the "Los Alamos Guide to ES&H Management Structure (GEMS)," August 1991, and a policy on ES&H published in the ES&H S^2-91-1435, "ES&H Policy Vision Goal Objectives Strategies," July 16, 1991, are identical, although they are called by different titles. At the same time, an overall policy on ES&H, presently contained in The Laboratory Manual, Chapter 1, "Environment, Safety, and Health" (ES&H Manual), February 1987, is different from that cited in the first two references. The Director's Policy on ES&H (DP No. 103, "Environment, Safety, and Health," September 1991) is different from all of the above references. Based on interviews, people are not sure which policy is applicable.

Several examples of programs not implemented or only partially implemented were observed by S&H Subteam 4 members during this appraisal. (See Concerns TSA-4, QV.1-1; TSA-4, MA.1-1; TSA-4, TC.1-1; TSA-4, PT.1-1; TSA-4, RP.5-2; TSA-4, RP.7-3; TSA-4, PP.4-2; TSA-4, PP.6-2; and TSA-4, FP.1-1.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.1-1) (H2/C1) **Los Alamos National Laboratory management has not prepared an integrated plan for implementing its environment, safety, and health programs.**

FINDINGS:

- The basis for evaluating JCI subcontract performance, as part of the Cost Plus Award Fee process, is contained in the "Evaluation Handbook Support Services Subcontract P-X86-Y7575-1 between Los National Laboratory and Pan Am World Services, Inc.," June 1990. For purposes of evaluation, the activities of JCI are divided into seven functional performance areas (FPAs).

- One of the FPAs is Health, Safety, and Environment, which is given an overall weight factor of only 15 percent in the evaluation process (FPA 6). Section II, Responsibilities, indicates that "the Laboratory's evaluation of ES&H responsibilities must pervade all activities to reinforce sound practices and responsible performance." However, aside from the Health, Safety, and Environment FPA, only three of the six remaining FPAs contain any evaluation criteria with reference to ES&H. In those instances, the criteria lack specificity. Thus, the degree to which JCI is evaluated overall against ES&H performance is difficult to assess.

- One of the 10-point initiatives announced by the Secretary of Energy in 1989 was that ES&H performance

would constitute 51 percent or greater of DOE contractor award fees. LANL Subcontract 9-X86-Y7575-1 with JCI provides for support services to the Laboratory, principally maintenance, custodial, and construction/modification work. By the nature of this subcontract, the parties are not bound to this percentage but are required to meet the intent of such initiatives. As stated above, ES&H performance as a separate FPA constitutes only a 15-percent weight factor of the award fee. The weight factors for the other six FPAs are as follows: (1) installation, alteration, construction, and work control (20%); (2) engineering, estimating, and planning (10%); (3) maintenance and custodial (17%); (4) utilities (15%); (5) Nevada Test Site support (13%); and (6) management (10%). However, review of the criteria for evaluation of these six FPAs indicated very little evidence of ES&H accountability in these areas.

- The results of the four most recent 4-month evaluation periods were reviewed. Serious safety concerns were noted in these evaluations. It was difficult to assess the degree of ES&H accountability used in the evaluation process due to the lack of specific evaluation criteria for ES&H performance.

- For the June 1 through September 30, 1990, evaluation, LANL reduced the award fee by $50,000 (about 7%) due to two significant ES&H problems during that period. Discussions with cognizant LANL personnel indicated that the provision for deductions from award fees, based on serious ES&H problems, meets the intent of the Secretarial initiative. However, based on the limited use of this provision, the lack of clearly stated ES&H performance criteria in FPAs other than the ES&H FPA 6, and the assignment of only 15 percent weight to the ES&H FPA, the S&H Subteam does not agree with this conclusion.

- See Concern TSA-4, TC.1-3.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.1-2) (H2/C1)

The basis for the Los Alamos National Laboratory evaluation of Johnson Controls World Services, Inc., environment, safety, and health performance is not clearly defined and does not meet the intent of the initiative established by the Secretary of Energy for measuring contractor environment, safety, and health performance.

FINDINGS:

- During the course of this appraisal, several examples of communications between LANL and LAAO were found that indicated deficiencies in the way formal correspondence with the Laboratory was handled by LAAO.

- A memorandum (Jerry L. Bellows to Allen Tiedman, June 28, 1991, Subject: Request for Comments on Draft DOE Order 5480.SAR) requested that a detailed and comprehensive review be conducted, including a cost impact study, with respect to compliance with draft DOE 5480.SAR. The Laboratory was allowed only 6 working days to respond to this very complex request.

- The response to the request cited above (letter Allen J. Tiedman to Jerry L. Bellows, July 18, 1991) acknowledged the "graded approach" cited in DOE 5480.SAR but further indicated the guidance in this area was "extremely vague," making it difficult to understand how it is to be applied. Further, the response noted that it was not clear how exemptions from the requirements of this draft Order are to be obtained. The lack of clarity with respect to guidance and interpretation affected the ability of the Laboratory to develop an accurate response.

- A memorandum (Jerry L. Bellows to Allen J. Tiedman, September 20, 1991, Subject: Safety Analysis Report and Technical Safety Requirements) requested that the Laboratory provide a revised schedule for facility SARs and technical safety requirements by September 19, 1991. The due date was one day before the request memorandum itself was issued.

- Revised OSRs (TA-55-PF-4) were forwarded to LAAO via letter (Joseph M. Graf to James A. Phoenix, February 1, 1989) in order to obtain DOE approval for the incorporated revisions. Subsequent to this submission, additional revisions to the TA-55 OSRs have been similarly transmitted to LAAO. Yet, to date no response has been received from LAAO on the status of the original revisions or any of the subsequent revisions.

- The Omega West Reactor (OWR) SAR was transmitted to LAAO via cover letter (Allen J. Tiedman to James Anderson, December 1, 1989). This SAR has not been approved to date. Recently, LAAO instructed OWR management to resubmit the SAR incorporating suggested changes. The status of the originally submitted SAR and reasons for delay of its approval were not clear to OWR management; yet, nearly 2 years have transpired, and communication on the status of the OWR SAR has not been received.

- Discussions with Health and Safety Division personnel indicated that correspondence directed to LAAO is difficult to track, and its status is hard to determine at any point.

- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (OA.1-3) (H3/C2) **The Los Alamos Area Office has not established the necessary administrative controls to assure that clear and timely guidance as well as communications to and from the Los Alamos National Laboratory are properly conveyed with respect to Department of Energy Orders and safety-related documentation. (Also see Concern TSA-4, OP.3-3.)**

FINDINGS:

- LANL administrative requirements (ARs) for low-level radioactive solid waste are given in AR 10-2, "Low-Level Radioactive Solid Waste," February 15, 1991, and are regulated under DOE 5820.2A. "Suspect radioactive waste" is defined in AR 10-2 as waste generated in an area where radioactive materials are present but cannot be verified as being radioactive or nonradioactive. Anything removed from a controlled area may be called "suspect radioactive waste" even when it is not contaminated.

- S&H Subteam 4 observed several instances in which equipment, instruments, computers and peripherals, files, office supplies, and equipment were classified as "suspect radioactive waste" because they had been moved from a radiologically controlled area. A radiation protection technician indicated that it was easier to classify equipment as "suspect radioactive waste" for disposal purposes than to take time to perform radiological surveys.

- S&H Subteam 4 also observed a dump truck loaded with electronic and mechanical equipment that had not been surveyed. Paperwork accompanying the equipment reflected an estimated value approaching $35,000. This equipment was disposed of as "suspect radioactive waste."

- No evidence could be found that the intrinsic value of this equipment had been considered in the disposal decision.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.1-4) (H3/C2) **Los Alamos National Laboratory has not enforced the use of administrative controls which has resulted in the disposal of valuable equipment as "suspect radioactive waste."**

FINDINGS:

- S&H Subteam 4 noted several serious deficiencies with respect to LAAO oversight of LANL activities. Specific concerns cited elsewhere in this report are identified below.

- See Concerns TSA-4, EP.1-4; TSA-4, PT.3-6; TSA-4, QV.1-4; TSA-4, ES.3-2; and TSA.4, AS.1-4.

- Numerous deficiencies were cited with respect to the lack of management direction for the fire department operations which are the responsibility of LAAO.

- See Concerns TSA-4, FP.6-1; TSA-4, FP.6-2; TSA-4, FP.6-3; TSA-4, FP.6-4; TSA-4, FP.6-5; TSA-4, FP.6-6; TSA-4, FP.6-7; TSA-4, FP.6-8; and TSA-4, FP.6-9.

- The following concern was identified in the LAAO self-assessment.

CONCERN: (TSA-4) (OA.1-5) (H1/C1) **The Los Alamos Area Office has not provided sufficient oversight and direction to the Los Alamos National Laboratory with respect to its safety- and quality-related activities.**

FINDINGS:

- S&H Subteam 4 cited several deficiencies with respect to the lack of well-defined roles, responsibilities, and interfaces among many of the Laboratory organizations. Specific concerns cited elsewhere in this report are identified below.

- See Concerns TSA.4, MA.1-1; TSA-4, TS.1-1; TSA-4, EA.2-1; TSA-4, PP.1-1; TSA-4, PP.2-4; TSA-4, PP.3-2; TSA-4, SS.3-2; and TSA-4, FP.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.1-6) (H1/C1) **Roles, responsibilities, and interfaces are not clearly defined for and among many of Los Alamos National Laboratory organizations.**

OA.2 ADMINISTRATION

PERFORMANCE OBJECTIVE: Administration programs and controls should be in place to ensure policies concerning health and safety are administered throughout the facility.

FINDINGS:

- During the appraisal, many instances were noted by the S&H Subteam where health and safety support for Laboratory line organizations and institutional programs was not sufficient. This was particularly evident with respect to the areas of industrial hygiene and radiological protection. For example, the S&H Subteam observed that radiological services and bioassay samples were backlogged as much as 6 weeks.

- The Health and Safety Division has not prepared a formal staffing plan, approved by management and constructed on workload and safety and health program requirements, to define actual health and safety personnel needs for the Laboratory. Contributing to this situation has been the lack of specific program guidance upon which such a plan must be based. Thus, staffing requirements for the Health and Safety Division have been based on needs perceived by Health and Safety Division management without reference to an overall sitewide program approach.

- A Laboratory approach for organizing and managing its health and safety resources has not been defined, i.e., whether these resources will be managed out of a central organization and, if so, what the reporting relationship of that organization will be relative to the Laboratory.

- There has been significant competition between the Health and Safety Division and the Laboratory line organizations and other support organizations for health and safety professional staff. This has resulted in the transfer of staff internally, competition for new hires externally, and the need for training of new staff as they fill vacated positions. (A memorandum, John E. Foley to Master Management, Subject: Advertising Restriction for ES&H Positions, October 7, 1991, has been issued to restrict the filling of ES&H-related positions by requiring the Health and Safety Division and the Environmental Management Division management to review the request and obtain approval by the cognizant Associate Director.) This situation has resulted from the lack of an overall Laboratory approach for managing and using its health and safety resources.

- See Concerns TSA-4, TS.1-1, and TSA-4, PP.1-2.

- The following concern was identified in the LANL self-assessment.

CONCERN: **The Los Alamos National Laboratory has not developed and implemented a plan for managing, organizing, and using its health and safety resources.**
(TSA-4)
(OA.2-1)
(H2/C2)

FINDINGS:

- S&H Subteam 4 cited numerous deficiencies related to work control practices. Specific concerns cited elsewhere in this report are identified below.
- See Concerns TSA-4, MA.2-1; TSA-4, MA.4-1; TSA-4, PP.2-2; TSA-4, PP.2-5; TSA-4, PP.3-1; TSA-4, PP.6-1; and TSA-4, PP.6-4.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **Safe work control practices are not consistently enforced across the Los Alamos National Laboratory.**
(TSA-4)
(OA.2-2)
(H1/C1)

OA.3 MANAGEMENT OBJECTIVES

PERFORMANCE OBJECTIVE: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

FINDINGS:

- The Laboratory Director has provided a broad set of ES&H goals, objectives, and strategies to Laboratory management by way of the document, ES&H S^2-91-1435, "ES&H Policy Vision Goal Objectives Strategies," July 16, 1991. This document provides the general direction and thrust for Laboratory ES&H initiatives but does not indicate specific goals and objectives for personnel at the division, group, or section level (applicable at that level) that support the Director's initiatives.

- Interviews with group level managers across several divisions indicated that they had received the Director's goal and objectives document and were aware of its content. For most of the groups reviewed, there was no set of goals and objectives prepared that were specifically tied to the Director's document. Furthermore, there was no expectation that such goals should be prepared. In one instance, there was confusion on what was intended by the Director's goals and objectives.

- No system is in place for formally communicating sitewide goals and objectives to each level of the organization. Also, no system is in place to ensure that each level establishes specific measurable goals and objectives tied to the Director's initiatives.

- The management of TA-55 has not applied the use of quantitative safety performance goals to the full range of safety objectives. (See Section 4.5.1.1.2, OA.3.)

- LANL has no requirement or policy regarding safety goals and the tritium facilities and reactors have very few measurable, challenging, achievable, and auditable safety goals. (See Section 4.5.2.1.2, OA.3.)

- As cited in the LANL or accelerator division strategy documents, the ES&H goals are not always measurable. (See Section 4.5.3.1.2, OA.3.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.3-1) (H3/C1)

The Los Alamos National Laboratory has no policy statement regarding safety and health goals, and no process is in place by which sitewide safety and health objectives are communicated through the various levels of the organization and uniquely adapted as measurable goals by each organizational unit as required by DOE 5480.19.

OA.4 CORPORATE SUPPORT

PERFORMANCE OBJECTIVE: Corporate interest and support for safe operation should be evident.

FINDINGS:

- The Health, Safety, and Environment Advisory Committee (HSEAC) has been in existence since 1980 and was formed to advise the President and Regents of the University of California on the operations of the University laboratories relative to ES&H matters. The HSEAC visits each of the three laboratories once each year. A review of the HSEAC agenda and presentations made during their visits indicated a focus on such topics as seismic phenomena or encouraging the laboratories "to concentrate their efforts on the toxicological hazards of the most common chemicals and not waste time on exotic chemicals."

- The HSEAC has been narrowly focused and has not looked at broad ES&H issues and their implications for LANL. A debrief by the HSEAC Chairman from the Committee's June 27-28, 1991, visit to LANL indicated that the Committee was asking how they could get more involved in helping the laboratories. This is a further indication of the lack of understanding by HSEAC of the important ES&H issues at LANL.

- At present the University of California has no structure in place to provide ES&H oversight of LANL and to review, understand, and apply DOE ES&H requirements across its laboratory sites. It is understood, as part of the University's new contract, now under negotiation with DOE, that an organization, at the University level, is being considered to provide a greater degree of oversight and involvement by the University in the ES&H activities of its laboratories.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.4-1) (H3/C2) **The University of California has not been actively involved in the review and oversight of environment, safety, and health activities at the Los Alamos National Laboratory.**

OA.6 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

FINDINGS:

- The memorandum (John E. Foley, Director of Human Resources, to All Employees, Subject: "Performance Appraisal," March 29, 1991) stipulates that ". . . all appraisals must address the employee's performance in environment, safety, and health (ES&H)." Based on interviews with various group personnel, it was evident that adherence to this requirement was not consistently met across the Laboratory. In two instances, group leaders indicated that ES&H factors, applicable to an individual's job, are not being applied in any consistent manner across the Laboratory.

- The Director of Human Resources indicated that no followup or "quality check" on completed performance appraisals has been made to determine the degree to which this requirement is being met.

- Position descriptions have only been developed for the technical series of employees (exempt and nonexempt) but do not exist for other positions at the Laboratory. For those position descriptions that do exist, there is no explicitly stated requirement that they contain an ES&H factor.

- The management of the Nuclear Materials Technology Division has not completed the preparation of all current position descriptions, including ES&H responsibilities, for all positions in the Division. (See Section 4.5.1.1.2, OA.1.)

- The management of LANL and the Nuclear Materials Technology Division have not completed implementation of a program to include ES&H factors in employee performance appraisals. (See Section 4.5.1.1.2, OA.6.)

- At the tritium facilities and reactors, line safety responsibilities are not specifically assigned in position descriptions and are not always definitely measured in personnel performance evaluations. (See Section 4.5.2.1.2, OA.6.)

- See Concern TSA.4, TS.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.6-1) (H2/C1) **The Los Alamos National Laboratory has not ensured that environment, safety, and health factors are properly incorporated into performance appraisals and position descriptions as required by SEN-6C-91, "Departmental, Organization and Management Arrangements."**

FINDINGS:

- A structured series of position levels are in effect at the Laboratory. At present health and environmental technicians, which includes radiological protection technicians, have been evaluated at grade levels 1 through 6. These grade levels are all nonexempt, providing no avenue of growth for advancement to professional positions (exempt) for this classification of technicians. This has been expressed as a frustration by radiological protection technicians who observed that Health Physics Analysis Laboratory technician positions, classified as chemical laboratory technicians, can go as high as a grade level 8.

- Some former exempt employees in the Health and Safety Division were "restructured" into nonexempt positions. This has resulted in frustration on the part of those employees who see no ultimate advancement opportunity to professional exempt positions. This, in turn, has contributed to Health and Safety Division personnel, particularly radiological technicians, seeking and moving to other positions at the Laboratory where a professional status advancement opportunity exists. This movement of staff has not been addressed by management.

- A memorandum (Lee McAtee to Ron Stafford, Subject: "Loss of Personnel," March 28, 1990) pointed to the cause of losing "HSE-10 technicians" as being the structured series of level reclassifications and the lack of opportunity for advancement and salary improvement.

- A letter (Donald T. Oakley to Siegfried Hecker, April 17, 1991) severely criticized the Laboratory pay structure and characterized the treatment of ES&H professionals as "uninformed and offensive." It further described the present job situation for ES&H professionals as "any qualified ES&H professional in the Lab can leave for more money and respect" and the "new pay structure is an unnecessary insult and only complicates the retention and recruitment of technically qualified staff."

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.6-2) (H3/C2) **Los Alamos National Laboratory has addressed neither the classification, salary grade, and growth opportunities for its environment, safety, and health positions nor the consequences of staff transfer resulting from restructuring of positions. (Also see Concern TSA-3, OA.6-1.)**

OA.7 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support site/facility operations.

FINDINGS:

- Mechanisms are in place at LANL, through the resources of the Safety and Risk Assessment Group, to provide for updating SARs, OSRs, and other administrative safety documents. However, a large number of administrative safety documents such as SARs and OSRs have not been approved. This is due, in part, to the DOE system which does not provide for a reasonable turnaround on questions or timely approval of such documents.

CONCERN: **See Concerns TSA-4, TS.2-1, and TSA-4, OP.3-1.**

FINDINGS:

- The DOE system for disseminating guidance on safety analyses documentation is not effective in that there is confusion on interpretation of Orders by the Albuquerque Field Office (AL), for example, SEN-6D-91. Furthermore, the Office of the Assistant Secretary for Defense Programs (DP) has not provided consistent guidance to AL regarding safety analyses documentation. This is further complicated by the lack of implementation of policy for preparing safety analyses documentation by DP. Overall, the system for disseminating and implementing guidance for safety-related administrative documents has affected the ability of the contractor to efficiently and correctly implement these important DOE requirements.

CONCERN: **See Concerns TSA-4, OP.3-3; TSA-4, OP.3-4; TSA-4, OA.1-3; and TSA-4, QV.3-1.**

FINDINGS:

- The Facility and Safety Analysis Section, Safety and Risk Assessment Group, provides support to Laboratory divisions for safety-related documentation such as SARs. In this role, group and section personnel interact extensively with line organizations in the generation of such documentation. Discussions with Facility and Safety Analysis Section personnel revealed that formal systems for the control of such documents varies considerably across the Laboratory and that no central document control system is in place sitewide.

- Visits to several groups/divisions as part of the S&H Subteam 4 appraisal confirmed the lack of any consistent approach to controlling important safety-related documentation. For example, the Laser Matter Interaction and Fusion Physics Group has no specific document control system but employs a "required reading" approach to assure important documents are read. The Isotopes and Structural Chemistry Group uses an informal undocumented approach to control such documents. In general, this was observed in most groups; however, some divisions and groups did have rather sophisticated control systems

(e.g., the Explosive Technology Group). The use of such a system at the division and group level is driven by the nature of the materials handled and the historical need for such a system. This approach, however, was observed to be the exception rather than the rule.

- LANL does not have an effective system to control important ES&H documents at TA-55. (See Section 4.5.1.1.2, OA.7.)

- LANL has not developed and provided guidance to the tritium facilities and reactors regarding controlled documents, and current methods do not provide positive assurance that uncontrolled or outdated versions of "controlled documents" do not become working documents. (See Section 4.5.2.1.2, OA.7.)

- Document control systems are not functional for all accelerator organizations. (See Section 4.5.3.1.2, OA.7.)

- See Concern TSA-4, QV.1-6.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OA.7-1) (H2/C1)

A consistently applied document control system is not in place at the Los Alamos National Laboratory for important safety-related documentation, and current methods do not provide positive assurance that uncontrolled or outdated versions of "controlled documents" do not become working documents as required by DOE 5700.6B, DOE 5700.6C, DOE 5480.19, and DOE 1324.2A.

OA.8 FITNESS FOR DUTY

PERFORMANCE OBJECTIVE: The Fitness for Duty Program should be capable of identifying persons who are unfit for their assigned duties as a result of drug or alcohol use or other physical or psychological conditions and should provide procedures to remove them from such duty and from access to vital areas of the site or facility pending rehabilitation or remedial actions.

FINDINGS:

- Although training of supervisors in the identification and handling of employees suspected of substance abuse is well under way, this effort is not complete. According to the Human Resources Directorate, an estimated 90 percent of site supervisors have received training as of September 1991.
- At present there are no formally documented requirements for such training for Laboratory supervisors and employees to ensure this effort will be performed on an on-going basis.

CONCERN: **See Concern TSA-2, OA.8-2.**

4.5.4.2 Quality Verification

4.5.4.2.1 Overview

All seven performance objectives in the Quality Verification technical area were addressed in this appraisal of LANL; its onsite subcontractor, JCI; LAAO; and AL. The appraisal assessed the effectiveness of the implementation of their QA programs and their compliance with DOE 5700.6B and DOE 5700.6C. The appraisal was conducted by means of personnel interviews, document reviews, and site and facility inspections. The personnel interviewed included managers, professionals, and technicians responsible for specific projects, programs, and activities located at the Laboratory. The documentation reviewed included policy and requirements manuals, implementing procedures, QA programs and plans, and QA records. The sites and facilities visited included office buildings, support facilities, warehouses, maintenance shops, and laboratories.

The status of DOE 5700.6 at the time of this assessment made for a unique situation regarding hazard/compliance categorization. Since DOE 5700.6B has been revoked and DOE 5700.6C will not be implemented until February 1992, C1 compliance ratings have been assigned only to those deficiencies that do not meet the requirements of either Order.

In March 1989, LANL issued its first sitewide QA program as the first step toward complying with DOE 5700.6B. The QA Program required each division, center, and facility to establish Quality Program Plans (QPPs) to implement its requirements. Some organizations prepared QPPs, which were implemented with varying degrees of success. Some organizations did not prepare QPPs. Still others had prepared QPPs in response to direction from external sponsoring organizations. As a result, S&H Subteam 4 noted a global concern that the QA program has been neither consistently nor comprehensively implemented throughout the Laboratory. The cause can be attributed to a combination of a lack of management commitment and followup to ensure successful implementation, a general lack of understanding and knowledge of how to implement the QA program requirements, and lack of resources.

Specific QA program elements generally found lacking at LANL include procurement and supplier controls, identification and control of materials, performance of independent inspections and verifications, and control of welding and nondestructive testing. These deficiencies were not identified as individual concerns, rather they reference the global concern. They should not be overlooked when preparing an action plan in response to this appraisal.

Other concerns noted by S&H Subteam 4, which are related to LANL, include a nonfunctioning QA audit program; lack of sitewide records management and document control programs; lack of a sitewide program for the identification, disposition, and prevention of suspect or counterfeit parts; lack of a sitewide calibration program; and failure of management to enforce compliance.

Partly because of the LANL self-assessment efforts and in recognition of the impending requirements of DOE 5700.6C, a significant effort to develop a new QA program was initiated in December 1990. A draft QA program was issued in August 1991 and is targeted for implementation starting in January 1992. Although the new QA program also requires each Laboratory organization to establish QPPs, it differs from the previous QA program by including detailed

implementation procedures that can be adopted by each organization or adapted to meet their individual needs. However, a documented implementation plan has not yet been developed to address the specific actions, responsibilities, resources, and schedules required to ensure successful implementation.

S&H Subteam 4 noted a concern that neither AL nor LAAO have had a QA oversight function which could have identified the LANL QA program implementation problems and provided the necessary leadership and pressure to correct them. The cause is attributed to a lack of personnel resources and a bias towards weapons QA oversight at other production sites. However, both AL and LAAO have identified this deficiency. The fact that AL has not transmitted to LANL the minimum requirements and guidance provided by the Assistant Secretary for Defense Programs for identifying and purging suspect or counterfeit parts and preventing their procurement is also of concern. Consequently, LANL efforts to date have not benefited from this information.

In May 1989, the JCI contract was modified to require JCI to establish and implement a QA program in accordance with DOE 5700.6B. JCI issued its QA Manual in June 1989 and initiated its implementation, which included the preparation of implementing procedures. However, S&H Subteam 4 noted a global concern that LANL has not ensured full implementation of the JCI QA program. The cause is attributed primarily to LANL's lack of a QA program and partly to a lack of consistent and clear direction from LANL on the integration of the LANL and JCI QA programs.

Specific QA elements not fully implemented at JCI include procurement and supplier controls, identification and control of materials, and performance of independent inspections and verifications. These deficiencies were not identified as individual concerns, but rather reference the global concern. They should not be overlooked when preparing an action plan in response to this appraisal.

Two notable aspects of the JCI QA program were identified by S&H Subteam 4: (1) the JCI welder test facility was recently certified by the American Welding Society; it is one of only 17 such facilities and the only one among DOE contractors, and (2) JCI has successfully implemented a Performance Enhancement Program to increase productivity and optimize the use of its resources.

The LANL and JCI self-assessments were found to be comprehensive in their scope of assessment criteria in that quality verification and assurance were specifically addressed. Most of the concerns noted by the S&H Subteam 4 were either fully or partially identified. The AL and LAAO self-assessments were not found to be comprehensive in their scope of assessment criteria in that quality verification or assurance were not specifically addressed. Nevertheless, most of the concerns noted by S&H Subteam 4 had been either fully or partially identified in these self-assessments. All of the self-assessments appeared thorough in their coverage of Laboratory organizations and were candid and honest in their judgments. There is evidence of in-depth analysis for root causes, and most of the root causes identified are consistent with those identified by S&H Subteam 4.

4.5.4.2.2 Findings and Concerns

QV.1 QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning quality are administered for each facility throughout the site.

FINDINGS:

- The first sitewide QA program was issued on March 29, 1989, and required each division, center, or facility to prepare a Quality Program Plan (QPP). Several QPPs were prepared but were for the most part a restatement of the sitewide QA Program requirements and did not include the "how to" necessary for effective implementation.
- Most Laboratory personnel have not been provided orientation or training on the QA program or on their responsibilities for its implementation.
- Procedures for implementing the QPPs were generally not prepared. In many cases where they were prepared, they are considered "guides" and are not required to be followed verbatim.
- Procedures and practices generally do not require records to be generated that would provide evidence of compliance with requirements.
- Guidance to line organizations for the preparation and implementation of their QPPs has been lacking.
- Many line organizations include quality assurance representatives on their staff. The authority and responsibility of these personnel are not well established:
  - They receive no formal QA training.
  - They are not selected on the basis of their qualifications (the selection is somewhat arbitrary).
  - They are not independent from the line organization.
  - Their QA responsibilities are often perceived as less important than other assigned responsibilities (such as ES&H officer, group leader, calibration coordinator, etc.).
- The few Laboratory organizations with mature QA programs developed them as a result of external pressures (programmatically driven) rather than institutional pressures. Consequently, these QA programs are varied and limited in scope. Some have been approved and

audited by external sponsors (such as Headquarters, DOE, organizations), and are generally well documented and supported by implementing procedures. However, these QA programs are the exceptions rather than the rule.

- The management of LANL and the Nuclear Materials Technology Division has not enforced implementation of QA programs for each program or project as required by LANL and Nuclear Materials Technology Division policy and by DOE 5700.6C and DOE 5700.6B. (See Section 4.5.1.2.2, QV.1.)

- Laboratory divisions and programs are operated autonomously and often do not collaborate on issues related to QA. Consequently, significant inconsistency exists in the interpretation and application of QA requirements.

- The Laboratory has drafted a new QA program which is based upon DOE 5700.6C and which is scheduled for implementation in January 1992. A documented implementation plan has not yet been developed that would address the specific actions (i.e., procedures, equipment, personnel resources, and training), responsibilities, resources, and schedules required to ensure satisfactory implementation.

- A LANL Director's Policy (DP No. 110) on quality was issued on September 16, 1991, which authorizes the Quality Operations Office (QOO) to establish, maintain, and verify the implementation of a sitewide QA program. It also assigns responsibility for the implementation of the QA program to line management.

- See Concerns TSA-4, PT.3-1; TSA-4, QV.4-1; and Sections 4.5.4.2.2, QV.2; 4.5.4.2.2, QV.3; 4.5.4.2.2, QV.5; 4.5.4.2.2, QV.6; and 4.5.4.2.2, QV.7.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (QV.1-1) (H2/C1) **The Los Alamos National Laboratory has not implemented a sitewide Quality Assurance Program as required by DOE 5700.6B and DOE 5700.6C.**

FINDINGS:

- Until recently, the Process Engineering Group included professional QA personnel who performed audits.

  - The Laboratory Quality Officer occasionally commissioned audits to be performed but had to pay for them out of a very limited budget.

- The Process Engineering Group performed audits only if requested by the audited organization, which also had to pay for them.

- The "pay for oversight" philosophy discouraged organizations from requesting QA audits.

- Audit reports were prepared and submitted to the audited organization as a final deliverable. Followup was not performed to ensure that appropriate corrective actions were established, that they were accomplished, or that they were effective.

- No closeout function existed for QA audits.

- Twelve QA audits were performed in 1989, two in 1990, and one in 1991, representing a decline in oversight.

- The Laboratory Assessment Office (LAO) has been doing Technical Safety Appraisal (TSA) style assessments since June 1989. However, the scope has excluded QA because it was discovered that QA programs had not been established or implemented throughout the Laboratory. The strategy was to allow these programs to be established and implemented before they were assessed. This strategy has resulted in no management visibility being provided for this continuing problem.

- Planned and periodic independent reviews or assessments of Nuclear Materials Technology Division activities are not conducted in a timely manner as required by DOE 5700.6B, DOE 5700.6C, ASME NQA-1-1989. (See Section 4.5.1.2, QV.1.)

- The Process Engineering Group QA audit functions have recently been transferred to the QOO.

  - No audit schedule exists for the future.

  - Procedures for the qualification of auditors and the performance of audits have been drafted but not implemented.

- The QOO reports to the Associate Director for Operations. As such, QA auditors will be responsible for performing audits of activities for which the Associate Director is responsible, constituting a potential conflict of interest and a lack of independence.

- Interviews with Laboratory management indicate that confusion exists regarding the independent audit and assessment responsibilities of the QOO, LAO, and the proposed Policy and Quality Oversight Office.

- LANL has not ensured the use or the effectiveness of QA plans as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989. (See Section 4.5.2.2.2, QV.1.)

- See Concern TSA-4, PT.3-2.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (QV.1-2) (H2/C1) **The Los Alamos National Laboratory has not implemented an independent quality assurance audit function as required by DOE 5700.6B and DOE 5700.6C.**

FINDINGS:

- AL has historically been primarily interested in the QA of programs related to weapons production. Nonweapons-related activities have had limited DOE QA oversight.

- AL 1120, Rev. 1, April 26, 1991, which defines LAAO organization, authorities, and functions, is not up-to-date regarding the assignment of QA oversight responsibilities.

- See Concern TSA-4, PT.3-5, and Section 4.5.3.2.2, QV.1.

- The following concern was partially identified in the AL self-assessment.

CONCERN: (TSA-4) (QV.1-3) (H2/C1) **The Albuquerque Field Office has not implemented programs for the oversight of quality assurance at the Los Alamos National Laboratory as required by DOE 5700.6B and DOE 5700.6C.**

FINDINGS:

- In March 1991, LAAO established a QA function in the Facility Operations Branch; however, the individual performing the function resides in the ES&H Branch. This individual is responsible for several other important programs and has had little time to devote to QA.

- LAAO has no surveillance program or schedule and has done only one surveillance since March 1991. Procedures, checklists, or written guidance do not exist to support the performance of surveillances.

- The tritium and reactor facilities QA plans have not been reviewed, approved, or independently assessed by LAAO to ensure implementation as required by DOE 5700.6B or DOE 5700.6C. (See Section 4.5.2.2.2, QV.1.)

- See Concerns TSA-4, PT.3-6; TSA-4, EP.1-4; and TSA-4, OA.1-5; and Section 4.5.3.2.2, QV.1.

- The following concern was partially identified in the LAAO self-assessment.

CONCERN: **The Los Alamos Area Office has not established programs for the oversight of quality assurance at the Los Alamos National Laboratory as required by DOE 5700.6B and DOE 5700.6C.**
(TSA-4)
(QV.1-4)
(H2/C1)

FINDINGS:

- LANL organizations other than the Communications and Records Management Division have not established records inventory and disposition schedules (RIDS) in accordance with DOE 1324.2A, which address records production, storage, processing, and disposition.
- Generally, records are not stored with appropriate consideration for their protection from damage, loss, or unauthorized access.
- Sitewide guidelines or instructions do not exist for the management of records.
- Most Laboratory personnel have not been provided orientation or training on records management principles and practices.
- A LANL Director's Policy (DP No. 115) on records management and document control was issued on September 16, 1991, which authorizes the Communications and Records Management Division to establish and maintain a sitewide records management program. However, an implementation plan for this program has not been established.
- See Concerns TSA-4, PT.10-1; TSA-4, TC.1-2; TSA-4, MA.7-1; and TSA-4, OP.6-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: **The Los Alamos National Laboratory has not established a sitewide records management program as required by DOE 1324.2A.**
(TSA-4)
(QV.1-5)
(H3/C1)

FINDINGS:

- Some Laboratory organizations have established document control processes and procedures while others have not.
- Most Laboratory personnel have not been provided training or indoctrination on document control principles and practices.
- Based on a sampling of various divisions across the Laboratory, S&H Subteam 4 found that existing document control practices are not consistent and are often deficient in one or more of the following ways:
  - Documents lack titles, publication dates, revision dates, page numbers, and/or signatures for review and approval.

- Distribution lists are not maintained, and there is no assurance that copyholders are notified of revisions or receive revised copies.

- Formats vary from document-to-document and revision-to-revision.

- Review and approval authorities are not defined.

- Governing policies and requirements are not referenced.

- A LANL Director's Policy (DP No. 115) on records management and document control was issued on September 16, 1991, which authorized the Communications and Records Management Division to establish and maintain a sitewide document control program. However, an implementation plan for this program has not been established.

- See Concerns TSA-4, OA.7-1; TSA-4, AX.1-5; TSA-4, OP.4-1; TSA-4, TS.2-2; and TSA-4, PT.1-2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (QV.1-6) (H2/C1) **The Los Alamos National Laboratory has not established a sitewide document control program as required by DOE 5700.6B and DOE 5700.6C.**

FINDINGS:

- In May 1989, the JCI contract was modified to require JCI to establish and implement a QA Program in accordance with DOE 5700.6B and, specifically, ASME NQA-1-1989. In June 1989, JCI issued its QA Manual and a plan for its implementation, which included the development of QA procedures and training sessions. Several elements of the QA Program, including the QA audit function, have not been fully implemented.

- After the JCI QA Manual was issued, the JCI Quality Assurance and Productivity Department performed 10 assessments throughout JCI to determine readiness to implement the QA requirements and to identify the actions necessary to ensure compliance. The assessments were closed out when action plans were established. Many of the actions have not been completed.

- See Sections 4.5.4.2.2, QV.2; 4.5.4.2.2, QV.3; 4.5.4.2.2, QV.5; and 4.5.4.2.2, QV.6.

- The following concern was identified in the LANL self-assessment through JCI organizational self-assessment.

CONCERN: (TSA-4) (QV.1-7) (H2/C1) **The Los Alamos National Laboratory has not ensured that Johnson Controls World Services, Inc., has fully implemented a Quality Assurance Program as required by DOE 5700.6B and DOE 5700.6C.**

FINDINGS:

- Senior Laboratory management has not strongly encouraged the application of QA and has not enforced compliance with QA requirements. No effective "marketing" of QA has been accomplished.
- There are no "penalties" for failure to comply with QA requirements.
- In the Facilities Engineering Division, three QA personnel have retired but only one vacancy has been authorized to be filled.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (QV.1-8) (H3/C1) **Senior management of the Los Alamos National Laboratory has not taken decisive actions to enforce compliance with DOE 5700.6B and DOE 5700.6C.**

FINDINGS:

- The lack of consistent and clear LANL direction and support to JCI has in some cases stymied their implementation efforts. For example, the application of JCI QA procedures to LANL Work Orders was delayed from November 30, 1990, to August 26, 1991, to provide the Facilities Engineering Division with an opportunity to evaluate these procedures. In the end, no substantive changes to the JCI QA procedures were required.
- In a memorandum (R. D. Stallings (LANL) to K. Fellers (JCI), April 26, 1991) it was stated that the compressor installation "shall be documented in accordance with the requirements of ANSI/ASME NQA-1-1989," but went on to clarify that "the project shall not be delayed for the development of QA procedures, QA training of personnel, or other QA related reasons."
- The following concern was identified in the LANL self-assessment through JCI organizational self-assessment.

CONCERN: (TSA-4) (QV.1-9) (H3/C2) **The Los Alamos National Laboratory has not coordinated and integrated the establishment of its Quality Assurance Program with that of Johnson Controls World Services, Inc.**

QV.2 PROCUREMENT AND SUPPLIER CONTROL

PERFORMANCE OBJECTIVE: Provisions should be established for the control of purchased material, equipment, and services; for selection and control of suppliers; and for assessing the adequacy of procurement activities.

FINDINGS:

- The LANL Quality Program Plan, March 29, 1989, required every division, center, and facility to establish plans and procedures that included QA controls for the procurement of items and services and for the selection and qualification of suppliers. With the exception of a few organizations, these controls are not established or implemented.
- No other sitewide policies or procedures exist that prescribe the application of QA to the procurement of items and services or to the selection and qualification of suppliers.
- Most Laboratory personnel have not been provided training or indoctrination on procurement principles and practices.
- Examples of procurement deficiencies noted by the S&H Subteam 4 include the following:
  - A controlled list of qualified suppliers is not maintained.
  - Suppliers of critical items or services are not required to have approved QA programs in place.
  - Criteria for determining when supplier evaluations and source inspections are not required.
  - Criteria for determining which QA controls (i.e., personnel certifications, inspections, nonconformance reporting, corrective action, calibration, certification of materials and processes, and records control) are not required for suppliers.
  - Independent QA personnel do not review and approve procurement documents to assure appropriate QA requirements and controls are specified.
- Determining the qualification (capability to satisfy technical and quality requirements) of suppliers has been the responsibility of the purchaser and has not included any independent review.

CONCERN: **See Concern TSA-4, QV.1-1.**

FINDINGS:

- Although the JCI QA Manual was issued on June 30, 1989, some elements of the QA program related to the procurement of items and services and to the control of suppliers have not yet been fully implemented. For example:

  - Audits and inspections of suppliers (both for determination of qualification and for supplier performance) are not being performed.

  - QA procedures for procurement control have not yet been issued, although they are scheduled for preparation.

  - Independent QA personnel do not review procurement documents to ensure that appropriate QA requirements and controls are specified.

  - A controlled list of qualified suppliers is not maintained.

CONCERN: **See Concern TSA-4, QV.1-7.**

QV.3 RECEIVING AND PREINSTALLATION INSPECTIONS

PERFORMANCE OBJECTIVE: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

FINDINGS:

- The LANL Quality Program Plan, March 29, 1989, required every division, center, and facility to establish plans and procedures that include QA controls for the performance of receiving and pre-installation inspections. With the exception of a few organizations, these controls are not established or implemented.
- Most Laboratory personnel have not been provided training or indoctrination on receiving inspection principles and practices.
- Examples of receiving inspection deficiencies noted by S&H Subteam 4 include:
  - There are no criteria for determining when inspections are required to be performed.
  - There are no criteria for determining when the validity of supplier material and process certifications is required to be verified.
  - There are no procedures for training and qualifying inspection personnel.
  - There are no procedures for selecting and documenting the attributes to be inspected, including their acceptance criteria.
  - There are no procedures for performing and documenting the results of inspections.
  - There are no procedures for dispositioning and documenting nonconforming conditions identified during inspection.
- With the exception of materials purchased for central stores by the Materials Management Division, receiving and pre-installation inspections are the responsibility of the purchasers. These inspections are not routinely performed or documented.

CONCERN: **See Concern TSA-4, QV.1-1.**

FINDINGS:

- Although the JCI QA Manual was issued on June 30, 1989, some elements of the QA program related to the performance of receiving and pre-installation inspections have not yet been fully implemented. For example:

- QA procedures for performing and documenting the results of receiving inspections have not yet been issued, although they are scheduled for preparation.

- Procedures for training, qualifying, and certifying inspection personnel were only recently issued October 21, 1991.

- Procedures are not in place for selecting and documenting the attributes to be inspected, including their acceptance criteria.

CONCERN: **See Concern TSA-4, QV.1-7.**

FINDINGS:

- On April 22, 1991, Richard A. Claytor, Assistant Secretary for Defense Programs (DP), issued a memorandum to the Manager, AL, et al. The memorandum provided the minimum requirements for identifying and purging suspect or counterfeit parts from DOE facilities and guidance for strengthening the procurement process to preclude the acceptance of counterfeit parts. In addition, the memorandum requested that an action plan for addressing the requirements be submitted to DP by June 1, 1991. However, the minimum requirements and guidance provided by DP were not transmitted to LANL.

- The AL response, dated June 12, 1991, included a status report from LANL on their actions which did not address the minimum requirements specified by DP. Consequently, the LANL actions did not include important provisions such as reporting the discovery of suspect or counterfeit parts as a reportable occurrence in accordance with DOE 5000.3A.

- AL has been preparing a plan that incorporates the minimum requirements and guidance provided by DP, which will be transmitted to LANL (via LAAO) in early January 1992.

- The following concern was not identified in the AL self-assessment.

CONCERN:
(TSA-4)
(QV.3-1)
(H2/C1)

The Albuquerque Field Office has not transmitted to the Los Alamos National Laboratory the minimum requirements and guidance provided by the Assistant Secretary for Defense Programs for identifying and purging suspect or counterfeit parts and preventing their procurement.

FINDINGS:

- On January 28, 1991, LAAO issued a memorandum (LESH:1AG-632) to LANL which transmitted a request from AL to immediately remove suspect bolts from LANL stocks and to initiate a program to ensure that additional suspect bolts are not accepted. A response was requested by February 22, 1991.

- The LANL effort to identify and remove suspect or counterfeit bolts from stores stock had started as early as October 1990 and was completed prior to receiving the LAAO memorandum. This effort did not include the identification of bolts that may have been purchased for purposes other than warehouse stock.

- The LANL response (ADO-91-163), dated February 27, 1991, reported that all suspect warehouse stock, including that at JCI, had been identified and removed and that efforts were under way to identify where previously withdrawn suspect stock might have been used in LANL facilities and equipment.

- On March 4, 1991, the Quality Operations Office (QOO) issued a memorandum (QOO/RDP-91-047) which:

  - Identified LANL organizations that had withdrawn suspect bolts from warehouse stock within the last 2 years,

  - Directed that any of these bolts held in storage or supply bins be removed and marked to prevent future use, and

  - Directed that critical installations be examined to determine whether suspect bolts had been installed.

- The Operations Surety Office issued an action notice on March 19, 1991, which established the Nuclear Weapons Technology Directorate plan to address these actions.

- No followup has been performed to determine to what extent these actions have been performed across the Laboratory.

- Interviews with Laboratory personnel indicate that, with the exception of the Weapons Group, these actions have generally not been initiated.

- A documented and approved sitewide plan does not exist to identify the required actions (e.g., training, inspections, purging, dispositioning, followup, and status reporting), assign responsibilities for these actions, and establish schedules for their completion.

- On August 14 and 15, 1991, two training and orientation sessions on suspect or counterfeit bolts were offered. Although invitations were sent to nearly 200 Laboratory personnel, including managers, attendance was reported as low by QOO.

- Over one-half of the applicable warehouse bolt stock has been identified as suspect. Based on the quantities of suspect materials issued from the warehouse, there is a

high probability that suspect bolts have been installed in some critical Laboratory facilities.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (QV.3-2) (H2/C2) **The Los Alamos National Laboratory has not established a documented sitewide plan for identifying, purging, and preventing the future procurement of suspect or counterfeit bolts in accordance with industry good practices.**

QV.4 CALIBRATION PROGRAM

PERFORMANCE OBJECTIVE: Provisions should be made to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

FINDINGS:

- The Laboratory policy on calibration, issued on March 13, 1986, as an attachment to Memorandum DDO/86-14, required all Laboratory organizations to establish calibration plans. Some organizations established plans, but many others did not.

- The LANL Quality Program Plan, March 29, 1989, required every division, center, and facility to establish plans and procedures that included QA controls for the calibration of measuring and test equipment (including facility and equipment instruments and controls). With the exception of a few organizations, these controls are not established or implemented.

- Most Laboratory personnel have not been provided training or indoctrination on calibration principles and practices.

- A "Calibration Handbook" was issued in July 1991 which provides guidance for the establishment and implementation of organizational calibration plans. The handbook suffers from the following deficiencies:

  - It does not reflect the endorsement of senior management of the Laboratory.

  - It does not address the calibration of facility and equipment instruments and controls used for operations.

  - Interviews with Laboratory personnel indicate that it has not been widely distributed.

- Calibration coordinators have been assigned in most Laboratory organizations. These personnel are assigned many other responsibilities (such as QA representative, ES&H officer, group leader, etc.) and are able to devote little or no time to calibration issues.

- Examples of calibration deficiencies noted by S&H Subteam 4 include the following:

  - Not all instruments requiring calibration have been identified.

  - Calibration procedures are used as guides and are not necessarily followed verbatim.

- The use of instruments that are subject to calibration is often not recorded to provide adequate traceability.

- Evaluations are not performed or documented to determine the validity of previous measurements when instruments are subsequently found to be out-of-tolerance.

- Until recently (May 23, 1991), the Standards and Calibration Group did not notify its customers when an instrument was received in an out-of-tolerance condition.

- Notices of out-of-tolerance conditions issued by the Standards and Calibration Group do not indicate the actual as-found conditions.

- The organizations responsible for accelerator operations have not developed, implemented, or assessed their calibration programs as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 12. (See Section 4.5.3.2.2, QV.4.)

- Technicians in the Standards and Calibration Group have not been certified in accordance with a documented qualification program. A procedure is currently in draft status.

- Some calibration standards at the Nuclear Materials Technology Division are not maintained within tolerance, controlled, and traceable to National Institute of Standards and Technology as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B. (See Section 4.5.1.2.2, QV.4.)

- The temperature and humidity monitoring equipment in the calibration laboratory operated by the Standards and Calibration Group (a) does not include alarms or lights to warn technicians performing calibrations that these conditions may be outside acceptable limits and (b) is not located so as to ensure it represents conditions throughout the laboratory.

- Measuring and test equipment within the tritium and reactor facilities is not always being calibrated or recalibrated as required by ASME NQA-1-1989, Section 12. (See Section 4.5.2.2.2, QV.4.)

- The high-voltage calibration and test facility operated by the Standards and Calibration Group has safety interlocks, but they are not periodically tested.

- Process instruments are not calibrated in tritium facilities. (See Section 4.5.2.11.2, EA.4.)

- See Concerns TSA-4, QV.1-1, and TSA-4, MA.2-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (QV.4-1) (H2/C1) **The Los Alamos National Laboratory has not implemented a sitewide calibration program that meets the requirements of DOE 5700.6B and DOE 5700.6C.**

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

PERFORMANCE OBJECTIVE: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

FINDINGS:

- The LANL Quality Program Plan, March 29, 1989, required every division, center, and facility to establish plans and procedures that included QA controls for the identification and control of hardware and materials. With the exception of a few organizations, these controls are not established or implemented.
- No other sitewide policies or procedures exist that prescribe uniform practices for the identification and control of hardware and materials.
- Most Laboratory personnel have not been provided training or indoctrination on material identification and control principles and practices.
- Examples of material identification and control deficiencies noted by S&H Subteam 4 include the following:
  - There are no criteria for determining which hardware and materials need identification.
  - There are no prescribed methods of identification, such as tags, labels, markings, etc.
  - There are no procedures that address transfer of identification when material lots or pieces are divided.
  - Materials stored in areas (other than in the Materials Management Division warehouse stores) are generally not traceable to procurement records which include material certifications.
  - There are no procedures for identifying, reporting, and dispositioning nonconforming items or conditions.
  - Trending of nonconforming items or conditions is not performed and/or documented.
- Most materials and hardware are not identified and controlled to ensure that only correct and acceptable items are used.

CONCERN: **See Concerns TSA-4, QV.1-1, and TSA-4, MA.3-2.**

FINDINGS:

- Although the JCI QA Manual was issued on June 30, 1989, some elements of the QA program related to the identification and control of hardware and materials have not yet been fully implemented. For example:

  - QA procedures for identifying and controlling hardware and materials have not yet been issued, although they are scheduled for preparation.

  - No criteria has been established to determine which hardware and materials need identification.

  - No prescribed methods of identification are in place, such as tags, labels, markings, etc.

  - No procedures have been developed to that address transfer of identification when material lots or pieces are divided.

- Most materials and hardware are not identified and controlled to ensure that only correct and acceptable items are used.

CONCERN: **See Concerns TSA-4, QV.1-7, and TSA-4, MA.3-2.**

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- The LANL Quality Program Plan, March 29, 1989, required every division, center, and facility to establish plans and procedures that include QA controls for the performance of in-process and post-installation inspections. With the exception of a few organizations, these controls are not established or implemented.
- No other sitewide policies or procedures exist that prescribe uniform practices for the performance of in-process and post-installation inspections.
- Most Laboratory personnel have not been provided training or indoctrination on inspection principles and practices.
- Examples of inspection deficiencies noted by the S&H Subteam 4 include:
  - There are no documented criteria for determining when inspections are required to be performed.
  - There are no procedures for training and qualifying inspection personnel.
  - There are no procedures for selecting and documenting the attributes to be inspected, including their acceptance criteria.
  - There are no procedures for performing and documenting the results of inspections.
  - There are no procedures for dispositioning and documenting nonconforming conditions identified during inspection.
- The Mechanical and Electronic Engineering Division performs design of Class B equipment as a purchased service to Laboratory programs. However, it is generally not involved in the evaluation of conditions that do not conform to the design drawings and specifications.
- Inspections of Class B equipment installation, modification, and maintenance are the responsibility of the cognizant researcher and are not routinely performed or documented.
- Inspections of Class A facility installations, modifications, and maintenance are the responsibility of the Facility Engineering Division.

- A nonconformance report form for inspections exists, but there are no procedures for its processing.

- Inspections are performed in an impromptu manner and often without the benefit of checklists and instructions.

CONCERN: **See Concern TSA-4, QV.1-1.**

FINDINGS:

- Although the JCI QA Manual was issued on June 30, 1989, some elements of the QA program related to the performance of in-process and post-installation inspections have not yet been fully implemented. For example:

  - QA procedures for performing and documenting the results of in-process and post-installation inspections have not yet been established, although their need has been identified.

  - Procedures for training, qualifying, and certifying inspection personnel were only recently issued on October 21, 1991.

  - No procedures are in place for selecting and documenting the attributes to be inspected, including their acceptance criteria.

- In-process and post-installation inspections are not generally being specified or performed.

CONCERN: **See Concern TSA-4, QV.1-7.**

QV.7 CONTROL OF SPECIAL PROCESSES

PERFORMANCE OBJECTIVE: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, non-destructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

FINDINGS:

- The LANL Quality Program Plan, March 29, 1989, required every division, center, and facility to establish plans and procedures that included QA controls for the performance of special processes (e.g., welding and nondestructive testing). With the exception of a few organizations, these controls are not established or implemented.
- No other sitewide policies or procedures exist that prescribe uniform practices for the performance of special processes, particularly welding and nondestructive testing (NDT).
- Most Laboratory personnel have not been provided training or indoctrination on the principles and practices regarding special processes.
- Examples of special process deficiencies noted by S&H Subteam 4 include:
  - Criteria are not in place for determining which processes require QA controls.
  - Applicable codes and standards for these processes are generally not specified or invoked.
  - Procedures have not been established for qualifying welding and NDT procedures, equipment, and personnel.
  - Welding and NDT is often performed without the benefit of qualified procedures or qualified personnel.
  - Records of the performance of welding and NDT operations are not prescribed or generated.
- A few LANL welders have been tested and qualified at the JCI welder test facility; the majority have not.
- Most Class A facility welding and NDT are subcontracted to JCI or other subcontractors who use qualified personnel and procedures.
- Most Class B welding and NDT are performed by LANL personnel who are not qualified.

CONCERN: **See Concern TSA-4, QV.1-1.**

4.5.4.3. Operations

4.5.4.3.1 Overview

Seven of the eight performance objectives were addressed during the S&H Subteam 4 appraisal of the Operations technical area. Performance objective OP.7 Shift Turnover could not be evaluated because activities observed by the S&H Subteam have been conducted only on day shift. Assessment activities assigned for S&H Subteam 4 review include general laboratory, lasers, explosives, Chemistry and Metallurgical Research Building, Mechanical Fabrication Division, Physics Division, hot dry rock geothermal, and other activities not covered by other S&H Subteams. This overview assignment resulted in visiting 28 separate facilities. Personnel interviewed included Headquarters, DOE, personnel; AL management personnel; LAAO personnel; LANL managers; field supervisors; principal investigators; and technicians. Documents reviewed included management plans, safety documentation, operations and maintenance manuals, standard operating procedures, and facility records. LANL activities are dispersed into many locations and frequently operate with crews of as few as two people.

The primary concern noted in facility operations is the lack of formalized operations. Safety documentation (including SARs, safety assessments, and preliminary hazards analyses) are in the developmental stage for almost all of the facilities observed. The lack of the safety documentation makes it difficult to assess if operational procedures adequately bound the hazards because hazards are not systematically identified in approved safety documentation. However, most operations reviewed by S&H Subteam 4 have been in existence for many years and have very good safety records. Clear guidelines for requirements are needed by LANL for preparation of nonnuclear safety documentation. Written instructions given recently by LAAO contained unclear and conflicting information. Policy guidance is needed from Headquarters, DOE (Office of the Assistant Secretary for Defense Programs), for preparation of nonnuclear safety documentation to ensure that documentation efforts will be consistent among all DOE facilities and will not have to be redone due to changing requirements. Headquarters, DOE, has provided draft requirements for nuclear documentation, but no guidance is available for nonnuclear safety documentation.

Lack of formality of operations was also indicated by the lack of an implemented sitewide lockout/tagout procedure, absence of a trending and lessons-learned program for unusual occurrence reports, infrequent use of narrative logbooks to record operational activities, incomplete training records, and the presence of uncontrolled safety-related documentation. Operational activities are conducted with evident personal pride and knowledge of the operations. Personnel recognize that safe operation is crucial to their own safety and operate the facilities in accordance with existing approved procedures. Supervisors and operators have an excellent attitude and are receptive to the new "culture" requirements of the DOE which requires more formalization of operations. They recognize the benefits of establishing more formal documentation records such as SARs, consistent lockout/tagout controls, narrative logbooks, and formal documentation control.

The operational aspects of these facilities are very different from large production-oriented facilities, operating with multishift operations. LANL operational activities have a low turnover rate for employees so that

personnel are experienced and knowledgeable and take pride in their work activities. Many of the traditional communication and work control problems found in production-oriented facilities are found to a lesser degree at LANL because of the small crew sizes, single shift operation, and the research and development nature of the operations.

The LANL self-assessment recognizes the lack of formality of operations in its policies, processes, and daily operations as a key finding. This finding agrees with the primary concern of this Subteam that basic required documentation is not in place to provide a formal basis for operating policies and procedures. The LANL self-assessment identified 75 percent of the concerns found by this appraisal Subteam. LANL management recognized the majority of the compliance shortcomings for operational activities in the self-assessment document.

4.5.4.3.2 Findings and Concerns

OP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Operations organization and administration should ensure effective implementation and control of operations activities.

FINDINGS:

- Many operational personnel interviewed stated that they have not received training on lockout/tagout procedure, LANL AR 8-6, "Lockout/Tagout Plan and Procedure," August 20, 1991, which implements the requirements of DOE 5480.19 and 29 CFR 1910.147.
- Currently, many divisions have their own lockout/tagout procedure with no consistency of requirements between organizations.
- Lockout/tagout controls for the general plant areas are not implemented consistently throughout the LANL complex. Numerous cases of lockout/tagout practices that do not comply with requirements of DOE 5480.19 were observed in the plant areas.

CONCERN: **See Concerns TSA-4, PP.2-2; TSA-4, MA.2-1; and TSA-1, OP.4-1.**

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

FINDINGS:

- SARs, safety assessments, and preliminary hazards analyses are not properly controlled by a formal document control system. This is evidenced by field copies of these documents found in offices that show no indication of formal approvals or document control.

CONCERN: **See Concerns TSA-4, QV.1-6 and TSA-4, OA.7-1.**

FINDINGS:

- Draft SARs for mixed waste and transuranic waste storage operations (in TA-54 Areas G and L) do not address criticality safety in adequate detail to support the conclusion that operational safety limits are not required for criticality control.

- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-4) (OP.2-1) (H1/C1)** **At the Los Alamos National Laboratory, safety analysis documentation for facility operations involving fissile material does not provide results of criticality safety calculations to demonstrate that the operation will be subcritical, as required in DOE 5480.5, paragraph 11.**

FINDINGS:

- No trending and lessons-learned program is in place for unusual occurrence reports at LANL, as required by DOE 5480.19, Chapter VI, and DOE 5000.3A, paragraph 8.c.(2).

- See Concerns TSA-4, TS.4-1, and TSA-4, EA.4-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-4) (OP.2-2) (H2/C1)** **No trending and lessons-learned program is in place for unusual occurrence reports at Los Alamos National Laboratory as required by DOE 5480.19 and DOE 5000.3A.**

FINDINGS:

- TA-8 Bldgs. 22 and 23 have high energy Van de Graaff and Betatron x-ray generators. Each generator creates an intense x-ray beam which penetrates the wall of the building behind the target area.

- The exact radiation field strength at contact with the exterior walls at TA8-23 where the beams emerge, could not be recalled by operating personnel. The building supervisor was not aware of the magnitude of the radiation field in the marked radiation area, nor did any available safety documentation quantify the hazard.

- Dose rates measured and calculated subsequent to the initial appraisal indicated the presence of a maximum radiation field of approximately 1.0 R per hour at the outside wall of the Betatron building.

- The area behind the target wall of each facility is administratively controlled by a wire fence with signs designating that it is a radiation area.

- Warning lights and an audible alarm are present and are activated for a short time before the Betatron generator activates. The horn discontinues when the Betatron generator activates, but the warning lights continue to operate as long as the Betatron generator is active.

- Two radiation areas on the outside of TA-8 Bldg. 23 are not appropriately designated or controlled. The area outside the rollup door at the front of the building has a measured radiation field of 8.0 mR per hour (as reported in the Annual X-ray Protection Survey, TA-8, January 17, 1991) and is not controlled as a radiation area. The high radiation area at the back wall of the facility is not marked as a high radiation area in accordance with LANL AR 3-7, "Radiation Exposure Control," January 11, 1991.

- See Concern TSA-4, PP.4-2.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (OP.2-3) (H2/C1) **Safety analysis documentation for TA-8 x-ray generator operations has not identified the location of all radiological areas present during operations as required in DOE 5480.11 and Los Alamos Natinal Laboratory AR 3-7.**

FINDINGS:

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (OP.2-4) (H2/C1) **Routine annual radiation monitoring of operational facilities has not been used to properly establish radiological control areas in accordance with DOE 5480.11 and Los Alamos National Laboratory AR 3-7.**

OP.3 OPERATING PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operations of each facility on a site.

FINDINGS:

- Approved SARs, safety assessments, or preliminary hazards analyses are not present for the majority of operating facilities reviewed by S&H Subteam 4 (which largely included nonnuclear and waste management activities). This is evidenced in draft document "Status of LANL Facilities Targeted for Priority Safety Documentation - Response To Finding 1 of DOE ES&H Management Appraisal," July 31, 1989, Rev. 0, September 26, 1991.

- The above facilities have procedures written and derived from many years of practical operating experience, but they are not based on an approved safety analysis document.

- LANL personnel are in the process of identifying the facilities that require SARs based on preliminary hazards analyses or safety assessments.

- See Section 4.5.4.8.2, TS.2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OP.3-1) (H2/C1)

Approved safety analysis documentation does not exist for many of the Los Alamos National Laboratory facilities to give formal basis for safety limits or operational safety requirements in operating procedures as required in DOE 5481.1B.

FINDINGS:

- Personnel of the Facility and Safety Analysis Section have established hazard classes for all LANL activities as stated in draft document "Status of LANL Facilities Targeted for Priority Safety Documentation - Response To Finding 1 of DOE ES&H Management Appraisal," July 31, 1989, Rev. 0, September 26, 1991.

- The hazard classes assigned by LANL to some of the facility operations are in conflict with direction given in AL 5481.1B, which states that a low hazard classification statement must include words to the effect that the project involves only hazards of a type and magnitude routinely encountered and accepted by the public, and no additional safety analysis is required. Many of the operations classified as low hazard activities clearly do not meet this definition, such as explosive pressing, casting, machining operations in the Design Engineering Division, and transuranic waste storage activities in the TA-54 Area G.

- LAAO and AL have not concurred with the hazard class assignments.

- LAAO letter, "LANL Safety Analysis and Review System Appraisal," August 2, 1991, identifies the following concern as an AL appraisal finding.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (OP.3-2) (H3/C1) **Los Alamos National Laboratory has assigned hazard classifications which conflict with AL 5481.1B guidance for hazard class assignment.**

FINDINGS:

- LANL personnel involved in the preparation of safety documentation have expressed the view that much uncertainty exists for requirements on preparation of safety documentation to meet requirements of DOE 5481.1B, despite written guidelines provided by LAAO and AL. This confusion is evidenced in a recent letter from the LANL Associate Director for Operations to the LAAO, "Safety Analysis Report and Technical Safety Requirements," October 11, 1991.

- LAAO letter, "Supplemental Guidance for Safety Analysis Program," September 24, 1991, gives instruction that all nonnuclear facilities should follow DOE 5481.1B for all SARs and OSRs. This instruction is unclear since OSRs are not addressed in DOE 5481.1B. This guidance is especially important since the proposed 10 CFR 830 (also see draft DOE 5480.SAR) does not contain guidance applicable to preparation of safety analysis documentation for nonnuclear facilities.

- LAAO letter, "Supplemental Guidance for Safety Analysis Program," September 24, 1991, is not consistent with AL letter, "Supplemental Guidance for Safety Analysis Program," September 10, 1991. The AL guidance letter states that the contractor should use both AL 5481.1B and DOE 5481.1B, contrary to the LAAO letter, which instructs to use only DOE 5481.1B.

- See Concerns TSA-4, TS.2-1, and TSA-4, OA.1-3.

- The following concern was not identified in the LAAO self-assessment.

CONCERN: (TSA-4) (OP.3-3) (H2/C2) **The Los Alamos Area Office is providing unclear guidance to Los Alamos National Laboratory for preparation of nonnuclear safety analysis reports and operational safety requirements.**

FINDINGS:

- SEN-6D-91 establishes a new policy whereby Program Secretarial Officers (PSOs) have a new reporting relationship as well as responsibilities to establish policies, program goals, and objectives for the administration and management of their programs. PSOs also provide technical direction to the Field Offices. This relationship does not give AL the authority to establish policy guidance for such things as content requirements of safety analysis documentation and safety requirements.

- Proposed guidance (draft DOE 5480.SAR) gives guidance for safety analysis documentation for nuclear facilities but does not apply to nonnuclear facilities.

- AL is instructing LANL to use DOE 5481.1B, which gives general and nonspecific direction for preparation of safety documentation. AL is also instructing LANL to use AL 5481.1B for guidance in the preparation of nonnuclear safety analysis and operating limits documentation (reference AL letter, "Supplemental Guidance for Safety Analysis Program," September 10, 1991.) Use of AL 5481.1B defeats the intent of SEN-6D-91, which is to have the lead PSO coordinate and resolve crosscutting issues. Since the preparation of nonnuclear safety analysis documentation is common to all DOE Field Offices, the requirements for preparation of safety documentation are a crosscutting issue.

- LANL is currently in the process of preparing safety documentation for almost all of their nonnuclear facilities. Confusion and disagreement with existing preparation instructions exists among LANL personnel as evidenced by a recent letter from the LANL Associate Director for Operations to the LAAO, "Safety Analysis Report and Technical Safety Requirements," October 11, 1991. Substantial rework costs could be incurred at a future date if conflicting documentation requirements are issued from the PSO.

- Standardized, definitive DOE criteria for establishing hazard classification of operations activities do not exist.

- See Concern TSA-4, TS.2-1.

- The following concern was not identified in any self-assessment. (No self-assessment was done for Headquarters, DOE, interfaces with LANL.)

CONCERN:
(TSA-4)
(OP.3-4)
(H2/C1)

Policy direction for preparation of safety analysis documentation and operational safety requirements for nonnuclear facilities has not been implemented by the Program Secretarial Officer (Defense Programs), as required in SEN-6D-91.

OP.4 FACILITY STATUS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control and should know the effect of non-operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operations.

FINDINGS:

- Narrative logbooks are not maintained and routinely reviewed by supervisors at many facilities as required in DOE 5480.19.
- Los Alamos Critical Experiments Facility logbooks are not kept in accordance with DOE 5480.19. (See Section 4.5.2.3.2, OP.2.)
- TA-33 Bldg. 86 operations records are not being kept in accordance with DOE 5480.19. (See Section 4.5.2.3.2, OP.3.)
- Logbooks at accelerators are not maintained as required by DOE 5480.19. (See Section 4.5.3.3.2, OP.3.)
- See Concern TSA-4, QV.1-6, and Section 4.5.4.6.2, AX.6.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OP.4-1) (H3/C1) **Narrative logbooks are not maintained by facility operators and routinely reviewed by supervisors at many Los Alamos National Laboratory operating facilities as required in DOE 5480.19.**

FINDINGS:

- A maintenance program is not established for the TA-40 gas-gun test equipment, including testing of safety relief valves and calibrating process gauges and instrumentation.

CONCERN: **See Concerns TSA-4, MA.2-1; TSA-4, QV.4-1; and TSA-1, OP.3-2.**

OP.6 OPERATOR KNOWLEDGE AND PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which they are responsible.

FINDINGS:

- A spot check of a machinist operator for a laser machining operation in the TA-3 Bldg. 39 shop revealed that operator training records were not adequate to document credentials for operation of specialized equipment.
- A spot check of training records for an operator of the gas-gun in TA-40 revealed that operator training records were not adequate to document credentials for operation of specialized equipment.
- See Concern TSA-4, QV.1-5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (OP.6-1) (H2/C1)

At the Los Alamos National Laboratory, records of qualification of operators for specialized equipment operation are not adequately documented as required in DOE 5480.19.

4.5.4.4 Maintenance

4.5.4.4.1 Overview

All eight performance objectives in the Maintenance technical area were addressed during this appraisal. The appraisal was conducted by onsite inspection of general laboratories, lasers, explosives areas, Chemistry and Metallurgical Research Building, Physics Division, Mechanical and Electronics Support shops, JCI, and other organizations and facilities at LANL. Maintenance activities were evaluated by interviewing senior program managers, maintenance managers, group leaders, building managers, area coordinators, engineers and maintenance personnel. Maintenance procedures, records, documents, operating manuals, and the LANL self-assessment were also reviewed.

Overall responsibility for real property maintenance at LANL is assigned to the Facilities Engineering Division, which has contracted the maintenance and support functions to JCI. The Facilities Engineering Division interface with JCI is accomplished through the Field Operations Groups, the Maintenance Group, and the Fire Protection and Utilities Group. The Field Operations Group is the support group for field operations. The Maintenance Group supports the maintenance of buildings and roads, and the Fire Protection and Utilities Group supports the maintenance of utilities and fire protection systems.

Equipment maintenance at LANL is separated into two categories, Class A and Class B. Class A equipment relates to the building and its installed equipment and is handled by the Maintenance Group. All utility systems and roads are considered Class A equipment. Class B is equipment purchased with programmatic funds and handled by the individual organization.

Class A equipment is maintained by JCI. JCI has developed a maintenance management plan with guidelines from the Field Operations Group, Maintenance Group, and the Fire Protection and Utilities Group which includes a structured work control and scheduling system that meets portions of the requirements of DOE 4330.4A.

A Category II concern was identified for not meeting the requirement of 29 CFR 1910.179 for the installation, modification, and maintenance program on overhead cranes. Modification of a crane was accomplished in TA-16 Bldg. 400 without planning and engineering support requiring rework on stops and bumpers. In addition, numerous cranes have been tagged out for not being in compliance with 29 CFR 1910.179.

A preventive maintenance program is well established for Class A equipment but does not totally comply with DOE 4330.4A.

Programmatic equipment (Class B) is the responsibility of the various program groups in the field; however, the Laboratory does not have a maintenance policy on Class B equipment. With no maintenance policy, a number of LANL organizations that are essentially autonomous operations are left to make their own determination of the level of maintenance performed. In most cases there is no maintenance program for Class B equipment.

Two working groups have implemented detailed maintenance programs for Class B equipment, the Engineering and Information Resources Group and the Facilities and Equipment Services Group. However, other groups within these same divisions and divisions within these same directorates have no programs.

Most of the maintenance activities are reactive rather than proactive; that is, much of the maintenance is for repair and is accomplished by small job tickets, standing work orders for maintenance of Class A equipment, or by LANL personnel within the working group. Sufficient oversight is not provided by Facilities Engineering Division or JCI in the areas of safety, quality, or root cause analysis for maintenance and support activities being accomplished on either Class A or Class B equipment.

LANL has initiated action to correct the deficiencies in their sitewide maintenance programs by establishing a Maintenance Management Office with responsibility for implementation of a maintenance policy for all equipment at LANL. The new policy is to provide for compliance with DOE 4330.4A. However, the Maintenance Management Office will be a staff function within the Facilities Engineering Division with no direct authority for implementation. This policy will require direction from the Director to enforce compliance sitewide.

The LANL self-assessment noted deficiencies in all eight performance objectives. In addition, one of the 17 key findings in the LANL self-assessment is that Laboratory management has not mandated a maintenance program consistent with DOE 4330.4A, "Maintenance Management Program." Of the 13 concerns identified in this assessment, 13 were at least partially addressed in the LANL self-assessment.

4.5.4.4.2 Findings and Concerns

MA.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

FINDINGS:

- The LANL organization does not define the responsibilities, organization interfaces, and administration activities needed to support a maintenance management program.
- Administrative controls and procedures are not employed for all maintenance activities related to safe and reliable operations. (See Section 4.5.3.4.2, MA.1.)
- LANL organizations are independently accomplishing maintenance with no direction.
- LANL has not established sitewide standards for the conduct of maintenance of Class B equipment. (See Section 4.5.1.4.2, MA.1.)
- See Concern TSA-4, OA.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.1-1) (H2/C1) **At the Los Alamos National Laboratory, lack of a sitewide maintenance management plan inhibits effective and efficient implementation and control of maintenance activities to meet the requirements of DOE 4330.4A.**

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

FINDINGS:

- Lockout and tagout procedures do not exist in all maintenance operations in accordance with 29 CFR 1910.147. The new LANL AR 8-6, "Lockout/Tagout Plan and Procedure," August 20, 1991, does not comply with 29 CFR 1910.147. (See Concern TSA-4 PP.2-1.)

- There is no program for calibration of relief valves and gauges throughout LANL. (See Concern TSA-4, QV.4-1.)

- Welding was performed on backup air compressor tanks in the Chemical and Metallurgical Research Building. These tanks cannot be certified in accordance with the American Society of Mechanical Engineers (ASME) Code, which is required by DOE 5480.4. Operational certification was given by the Maintenance Group.

- The stainless steel Acid Waste Line installed in Wing 3 of the Chemical and Metallurgical Research Building used carbon steel fasteners on several flanges, which is in violation of DOE 6430.1A. Drawings could not be located to review the specification.

- Battery backup for the paging system did not work during power outage in TA-48 Bldgs. RC1 and RC8 due to incomplete installation. The building manager said the job was signed off, but work was not complete.

- Maintenance is not consistently conducted at accelerator facilities in a manner that ensures protection of facility personnel or safe facility operation. (See Section 4.5.3.4.2, MA.2.)

- Maintenance of Class B equipment at the Los Alamos Critical Experiments Facility and the Tritium Salt Facility is not properly controlled. (See Section 4.5.2.4.2, MA.2.)

- Maintenance is not managed in plutonium facilities in a manner that ensures protection of facility personnel or safe facility operation. (See Section 4.5.1.4.2, MA.2.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.2-1) (H2/C1) **Maintenance work is not authorized, conducted, or controlled at the Los Alamos National Laboratory to ensure protection of facility personnel, safe facility operation, or compliance with DOE 4330.4A.**

MA.3 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- The emergency shower in TA-46 Bldg. 200 showed no evidence of being tested. (See Section 4.5.4.6.2, AX.1.)
- The emergency shower in TA-46 Bldg. 88 was last tested in 1989.
- No formal procedures exist to meet National Fire Protection Association (NFPA) maintenance requirements for fire protection systems within facilities. (See Concerns TSA-4, FP.3-3, and TSA-4, FP.7-5.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.3-1) (H2/C1) **Los Alamos National Laboratory does not have a program to ensure that appropriate safety devices are periodically inspected in compliance with ANSI Z358.1-1990.**

FINDINGS:

- Incoming inspection of relief valves and gauges relies on the certification by the manufacturer provided with the part.
- Storage of maintenance spare parts does not meet the requirements of DOE 4330.4A, Chapter I, paragraph 3.5.
- Policies and procedures for procurement, inspection, and storage of spare parts at the tritium facilities do not meet the requirement of DOE 4330.4A or ASME NQA-1-1989.
- No formal program exists at the accelerator facilities for receipt inspection of materials and components received by individual groups. (See Section 4.5.3.4.2, MA.3.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.3-2) (H2/C1) **At the Los Alamos National Laboratory, control and segregation of materials for maintenance work is not in accordance with DOE 4330.4A.**

FINDINGS:

- At TA-16 Bldg. 400, the 3-ton crane was installed without planning and engineering support requiring rework on stops and bumpers.
- Numerous cranes have been tagged out of service for not meeting requirement of 29 CFR 1910.179.

- Not all lifting, hoisting, and rigging equipment in the plutonium facilities is inspected and tested as required by DOE 4330.4A Chapter II, Section 13; 29 CFR 1910.179; and 29 CFR 1910.184. (See Section 4.5.1.4.2, MA.3.)

- See Concern TSA-3, WS.4-2.

- The following concern was partially identified in LANL self-assessment.

CONCERN: (TSA-4) (MA.3-3) (H1/C1) CAT. II

The Los Alamos National Laboratory installation, modification, and maintenance program on cranes is not in accordance with 29 CFR 1910.179.

MA.4 PLANNING, SCHEDULING, AND WORK CONTROL

PERFORMANCE OBJECTIVE: The planning, scheduling, and control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and effective manner.

FINDINGS:

- The Facilities Engineering Division provides JCI with information for planning, scheduling, and controlling maintenance work. Not all maintenance activities are included in this process.
- Planning and scheduling are often informal. Work coordination, safety reviews, and quality reviews are not always included in the work package.
- LANL has no formal program to effectively manage the backlog of Class B maintenance work.
- Building managers, area coordinators, and engineers are not always contacted or included in the planning or scheduling process.
- Maintenance planning, scheduling, and control at the plutonium facilities does not meet the requirements of DOE 4330.4A. (See Section 4.5.1.4.2, MA.4.)
- Maintenance planning, scheduling, and work control programs for the tritium facilities and reactors do not meet the requirements of DOE 4330.4A. (See Section 4.5.2.4.2, MA.4.)
- See Concern TSA-4, PP.2-5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.4-1) (H2/C1)

Management of the Los Alamos National Laboratory is not provided information to plan, schedule, and control maintenance that meets the requirements of DOE 4330.4A.

MA.5 CORRECTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

FINDINGS:

- Several mechanical and electrical systems and pieces of equipment in the basement area of TA-3 Bldg. 40 are out of service. These items have not been identified as being out of service or included in the decommissioning program.
- No facility inspection program is established for condition assessment.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.5-1) (H2/C1) **At the Los Alamos National Laboratory, the condition of equipment, identification of problems, and correction of deficiencies related to safety, material condition, and housekeeping are not in compliance with DOE 4330.2C or DOE 4330.4A.**

FINDINGS:

- The JCI work control system does not provide the Facilities Engineering Division or JCI with documentation of all equipment failures to assure effective corrective maintenance.
- Trend analysis and equipment failures are not documented for all equipment.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.5-2) (H3/C1) **Corrective maintenance is not fully documented at Los Alamos National Laboratory as required by DOE 4330.4A.**

MA.6 PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

FINDINGS:

- LANL has not established standards or guidance for preventive maintenance of Class B equipment.
- Techniques such as vibration and oil analysis are only being used to assess equipment performance on a small portion of LANL equipment.
- LANL has not established a preventive maintenance program for nuclear facilities that addresses the requirement of DOE 4330.4A. See Section 4.5.1.4.2, MA.6.)
- The preventive maintenance program for accelerators does not meet the standard identified in DOE 4330.4A, Chapter I, Section 3.6.1. (See Section 4.5.3.4.2, MA.6.)
- See Section 4.5.4.8.2, TS.4.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.6-1) (H2/C1) **The Los Alamos National Laboratory preventive maintenance program does not meet the requirements of DOE 4330.4A. (Also see Concern TSA-4, AX.6-2.)**

FINDINGS:

- There is no configuration control system for changes in the facilities. Configuration changes are made in facilities without being incorporated in the as-built drawings.
- The LANL Director's policy on configuration management, dated September 1991, has not been implemented.
- There is no program at the tritium or reactor facilities to implement the Director's policy on configuration management. (See Section 4.5.2.4.2, MA.6.)
- See Concerns TSA-4, AX.1-5, and TSA-4, TS.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.6-2) (H2/C1) **Los Alamos National Laboratory has not implemented a configuration control program as required by DOE 4330.4A.**

MA.7 PREDICTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and optimize equipment performance.

FINDINGS:

- Maintenance history records for most LANL equipment is limited. A new automated program is being established on some items, but it is incomplete.
- Age-related degradation of equipment is not documented in the maintenance history record.
- LANL has not established maintenance history or age-related degradation programs for the accelerators or plutonium facilities that meet the requirements of DOE 4330.4A. (See Sections 4.5.1.4.2, MA.7, and 4.5.3.4.2, MA.7.)
- See Concern TSA-4, QV.1-5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.7-1) (H3/C1) **At the Los Alamos National Laboratory, the maintenance history records do not meet the requirements of DOE 4330.4A.**

FINDINGS:

- Root cause analyses are not accomplished in any maintenance program at LANL.
- LANL has not established a root cause analysis program for the accelerators or plutonium facilities that meets the requirements of DOE 4330.4A. (See Sections 4.5.1.4.2, MA.7, and 4.5.3.4.2, MA.7.)
- There is no predictive maintenance program for Class B equipment at the Los Alamos Critical Experiments Facility or the Tritium Salt Facility. (See Section 4.5.2.4.2, MA.7.)
- See Section 4.5.4.8.2, TS.4.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.7-2) (H2/C1) **Los Alamos National Laboratory has not implemented a predictive maintenance program as required by DOE 4330.4A.**

MA.8 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Maintenance procedures and related documents should provide appropriate directions and guidance for work and should be used to ensure that maintenance is performed safely and effectively.

FINDINGS:

- The operator of the Scanning and Alarm Monitoring System at TA-3 Bldg. 223 does not have operating procedures for corrective actions on alarms for water systems.
- JCI procedures or work instructions for electrical equipment or breaker maintenance do not exist for all maintenance performed.
- No LANL standards are in place to define when maintenance procedures are required or how they are to be developed, reviewed, or approved. Each division and group makes its own determination.
- Procedures have not been established for preventive and corrective maintenance on circuit breakers and relays within the utility system.
- LANL has not implemented guidelines for the development, validation, approval, and use of maintenance procedures for the plutonium facilities as required by DOE 4330.4A. (See Section 4.5.1.4.2, MA.8.)
- Maintenance procedures for equipment at the tritium and reactor facilities have not been developed or used as required by DOE 4330.4A. (See Section 4.5.2.4.2, MA.8.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (MA.8-1) (H2/C1) **Los Alamos National Laboratory has not established policy or guidelines for the use of procedures and related documents required for performing maintenance in accordance with DOE 4330.4A.**

4.5.4.5 Training and Certification

4.5.4.5.1 Overview

This appraisal addressed 10 of 11 Training and Certification performance objectives. Performance objective TC.2 Reactors was covered by S&H Subteam 2. The appraisal was conducted through interviews with management staff with training responsibilities, group leaders, training professionals, supervisory and operations staff, and general employees throughout LANL. Training records from the Employee Development System (EDS) and division records as well as instructional materials, facilities, and employee performance in ES&H duties were appraised separately and in conjunction with other S&H Subteams reviewing other technical areas.

LANL is just beginning to implement a formalized health and safety training program. Personnel at LANL exhibit a recognition for the need to improve training both sitewide and within the divisions. However, the trend is to equate training with continuing education rather than mastery of assigned job tasks, measurement of job competencies, and auditability of training records. The lack of approved operating procedures, health and safety procedures, and instructional materials and evaluation measures made appraising division training records difficult. Both the LANL self-assessments and the S&H Subteam found numerous deficiencies related to health and safety (life safety issues, safety and operating procedures, and knowledge of regulatory codes). The findings demonstrate the importance of divisions, and the facilities they operate, developing site-specific training necessary to provide LANL workers with required safety and health knowledge and skills.

The EDS used to maintain the LANL training records recently became functional and the divisions have included a plethora of course titles taken by their employees. Courses taught by sitewide organizations have been entered, and the course materials are available for appraising. Most divisions are cooperating fully in entering the courses they have taught, although few have course materials and evaluation criteria on file. To date, no quality verification has been completed by the Laboratory Training Office (LTO), the submitting division, or the employee.

The current version of EDS cannot produce the job category-specific reports required by divisions. The second release of EDS is designed to incorporate required training with individual division training plans. Those groups who are subject to frequent audits are maintaining additional training recordkeeping systems.

Two groups, the Laboratory Training Office and the Safety and Risk Assessment Group, are coordinating safety and health training provided by LANL. The primary training position within the Employee and Organization Development Group was elevated to the Laboratory Training Director in August 1991. Since January 1991 a LANL Training and Coordination Committee has met to review training policies and procedures. The LTO has a training manual in the approval stage which outlines training policies. Training procedures to accompany the manual are in various stages of final draft. Many of the responsibilities assigned to the position will be performed for the first time during FY 92. Discussions with the LTO, LANL management, and training professionals indicate significant differences on the primary duties of the LTO.

The Safety and Risk Assessment Group has responsibility for providing sitewide health and safety training. Over the last year LANL has completed required introductory hazardous communication, general employee, radiation worker, and general electrical safety training. The Safety and Risk Assessment Group is assisting in coordinating the startup of EDS. Future training efforts of the Safety and Risk Assessment Group will be in response to LANL action plan priorities. Neither the Safety and Risk Assessment Group nor the LTO could define their responsibilities, if any, for auditing training to ensure that employees, workers, and guests assigned at LANL fulfilled job requirement training.

The positions of division training coordinators have not existed long enough to evaluate their effectiveness. Until recently the only divisions who had assigned full-time trainers were divisions that had high hazards or significant compliance requirements. The remainder were ES&H coordinators or administrative assistants with many collateral duties. None of the part-time coordinators interviewed believed they had divisional training audit responsibilities. Many had not regularly attended the scheduled LTO meetings for coordinators. Although the LTO and the Safety and Risk Assessment Group had provided the coordinators with tools for doing their jobs, no formal training has been given.

LANL oversight of JCI training is nearly nonexistent except when craftspersons require training to work in specific high-hazard facilities. The S&H Subteam did not identify a LANL organization which had training responsibility for the nearly 800 contract workers.

The issue of technical literacy across the LANL site is recognized by Laboratory management and training professionals. Many individuals interviewed by the S&H Subteam were reluctant to provide data or discuss possible solutions. Neither LANL or JCI management seem to recognize the liabilities for delaying the identification of technical literacy issues which negatively affect job performance. As LANL introduces formality of operations, such formality will require performance for many jobs to be based on written and documented standards and procedures. If remedial training is needed for existing employees, it should be initiated before they are individually found to be job deficient.

The facilities and training equipment necessary to fulfill the increased demand for health and safety and operations training are not available. Current training courses are almost all lecture and media presentations without laboratory experiments or field exercises. On-the-job training to ensure correct performance of critical activities is lacking, partially based on the lack of availability of facilities.

LANL plans for its new focus on supervisory training to be based on the participatory model used in the conduct of compliance training provided to managers during the summer of 1991. With few exceptions, no supervisory training has been provided to accompany any of the health and safety collateral duties given to group leaders, training coordinators, and many others.

Training professionals do not measure the competency of workers following training with the exception of staff assigned to high-hazard facilities. LANL is proud of the large number of staff with certified skill in cardiopulmonary

resuscitation. However, managers and training professionals have not begun to accept the necessity of measuring competency following training for critical job-related health and safety skills.

LANL can demonstrate efforts in developing and implementing the safety and health training required for general employees in DOE 5480.20 and for radiation workers and radiation protection technicians specified in DOE 5480.11. LANL should examine the lessons learned from having three distinct training efforts to train radiation protection technicians fully. The two groups who have not fulfilled the DOE 5480.11 requirements have addressed training needs but never established a date to complete a documented program. The DOE 5480.11 requirements which came out in December 1988 have not been met. The evaluators of training believe that, within the last 6 months, LANL management has committed to establishing a training structure to provide and evaluate health and safety training within the standards of acceptable industry practice. Sufficient progress has not yet been made, and evaluators conclude, just as the LANL self-assessment found, that current health and safety training is not acceptable.

"The training program is diffused and lacks validity" is the consensus statement in the Laboratory self-assessment. LANL identification of concerns in the self-assessment demonstrates an awareness of the training issues facing the Laboratory. The self-assessment and the other LANL supporting data bases have numerous additional entries where training is cited as part of a needed corrective action. Clearly, the issues to be addressed by training have been identified by LANL.

4.5.4.5.2 Findings and Concerns

TC.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administration should ensure effective implementation and control of training activities.

FINDINGS:

- The majority of the training policies, plans, and procedures examined from the divisions, the Laboratory Training Office (LTO), and the Safety and Risk Assessment Group were approved in September 1991 or still remain in draft.
- Training at LANL tends to be defined as continuing education. Very few of the approximately 50 individuals with training responsibilities who were interviewed discussed performance-based training as a partial solution to preparing the LANL workforce.
- LANL management, including the Laboratory Director, the Associate Director for Operations, and the Director of Human Resources Development, was not definitive on the roles and responsibilities of the newly created LTO.
- The incumbent Training Director of the LTO is currently in an acting position for 1 year as noted in memorandum DHR:106-F from John E. Foley, August 1, 1991.
- The training manual submitted for approval on September 16, 1991, contains only training policy; training procedures remain in draft. No procedure currently exists on integrating the manual with the Director's Policy on training (DP No. 113), also issued in September 1991.
- Twelve division training coordinators appointed by the Division Leaders were interviewed. Only five have training as their primary responsibility; with one exception, the other seven are ES&H coordinators or division office administrative staff who lack either the work experience required to oversee technical training or the time to perform adequately the coordinator duties outlined in the training manual.
- No sitewide definitions of training terms exist. For example, there is not common acceptance sitewide of such terms as "required training, on-the-job training, monitoring training, or visitor," to name a few.
- LANL has no policy or procedures for supervisors to use in documenting completion of on-the-job training programs.
- The last major DOE audit of LANL, the Safeguards and Security Inspection Notification Evaluation followup,

took place in July 1990. The 39 managers and group leaders sampled had completed their required security refresher training prior to the followup. Only one of the 39 has completed the same training for 1991.

- With two exceptions, removal from job position or other penalties were not identified for individuals or their supervisors when required training was not completed within established schedules.

- The Occurrence Reporting System identifies training as one potential root cause. The LTO is not on the distribution list for reports which cite training (example: ALO-LA-LANL-TA55-1991-1030).

- See Concerns TSA-4, ES.4-1; TSA-4, EP.1-3; TSA-4, SS.4-1; TSA-4, TS.1-1; and TSA-4, PT.2-1, and Section 4.5.4.11.2, EA.1.

- This concern was identified in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory has not implemented a comprehensive program for training as required in DOE 5480.20.**
(TSA-4)
(TC.1-1)
(H2/C1)

FINDINGS:

- Although the Employee Development System (EDS) training recordkeeping system has been under development for 4 years, it is not yet fully functional.

- The EDS can produce individual training records but currently cannot produce reports on job codes or work groups required by some line divisions.

- DOE 5480.11 and DOE 5480.20 require that LANL ensure that workers in particular job codes or work locations are trained.

- The line divisions within LANL do not have agreement on course titles, objectives, or technical content for similar instruction taught across divisions. Therefore, EDS or division records have limited usefulness in monitoring training.

- The LTO and the Safety and Risk Assessment Group do not formally monitor line division training courses.

- LANL management has not yet established procedures for the use of EDS as a tool for ensuring compliance with job-related training.

- LANL has not developed the comprehensive system for training records it requires. For example, LANL has not determined whether or not all non-employees working at

LANL will be trained by LANL or will be audited by LANL to ensure compliance with required ES&H training.

- No quality verification has been completed on the EDS training records by the group, the LTO, or the employee.
- See Concerns TSA-4, QV.1-5, and TSA-2, OA.5-2.
- Training record documentation is not maintained or trended in a unified or consistent manner for workers at the Tritium Systems Test Assembly and the Tritium Salt Facility. (See Section 4.5.2.5.2, TC.1.)
- At most Los Alamos National Laboratory accelerator facilities, participation and performace records related to training are not maintained in an auditable manner. (See Section 4.5.3.5.2, TC.1.)
- Training records for certified operators at the Tritium Systems Test Assembly and the Los Alamos Critical Experiments Facility are not required to be validated to ensure that all specified training is accomplished prior to certification. (See Section 4.5.2.5.2, TC.1.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.1-2) (H2/C2) **The Los Alamos National Laboratory does not have an effective and comprehensive training recordkeeping system to monitor whether employees and onsite workers have fulfilled environment, safety, and health training requirements necessary to comply with DOE 5480.11 and DOE 5480.20.**

TC.4 GENERAL EMPLOYEE/PERSONNEL PROTECTION TRAINING

PERFORMANCE OBJECTIVE: General employee and personnel protection training programs should ensure that site/facility personnel, subcontractors, and visitors have an understanding of their responsibilities and expected safe work practices and have the knowledge and practical abilities necessary to effectively implement personnel protection practices associated with their work.

FINDINGS:

- The sitewide General Employment Training (GET) course was initiated for new employees in August 1991. The course content and handouts fulfill the LANL sitewide requirements under DOE 5480.20 and reenforce the knowledge and performance objectives of other introductory training courses, including: Hazards Communications and Radiation Worker. However, except for new employees, few other LANL staff have taken the course.

- Site-specific training is inconsistently defined and delivered at LANL. For example, a single facility within the Physics Division may have several laboratories, each having distinct health and safety hazards. Site-specific training for the employee within that facility may need to be only for the employee's assigned laboratory. A facility with multiple group occupancy may require training by both the building manager and the group.

- The lack of sitewide emergency evacuation alarms and procedures, common hazardous signs, and hazardous communication requirements make it imperative that the divisions develop site-specific GET which is supplemental to the sitewide course.

- Twenty-three divisions reported, in response to a S&H Subteam 4 request, that they offered ES&H site-specific training. Sixty-five percent reported that they did not offer any training to meet the site-specific GET requirements of DOE 5480.20.

- Site-specific health and safety training taught by the divisions is not evaluated or even monitored by the Laboratory Training Officer (LTO) or the Safety and Risk Assessment Group to ensure that divisions meet DOE Order requirements.

- There is no assurance that TA-55 emergency response personnel have received appropriate radiation protection training related to specific TA-55 hazards, as required by DOE 5480.11, or other general employee training. (See Section 4.5.1.5.2, TC.4.)

- Not all personnel at the Ion Beam Facility are trained about the radiological hazards in the facility as required by DOE 5480.11. (See Section 4.5.2.5.2, TC.4.)

- See Concerns TSA-3, TC.4-1; TSA-2, RP.6-3; and TSA-1, WS.3-3.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.4-1) (H2/C1) **Los Alamos National Laboratory has not fulfilled all the requirements for General Employee Training as specified in DOE 5480.20 or radiation safety training as specified in DOE 5480.11.**

FINDINGS:

- A 12-member LANL task force was chartered in late 1990 to determine whether a workforce basic skills (information-processing skills needed by workers to meet the requirements of the job) program was required by LANL. The evidence presented by members of the task force was anecdotal but serious in implication for both LANL and JCI. For example, 1500 of 4000 LANL employees failed the test given during the hazardous communication training course. The Chair of the task force briefed many LANL managers following the issuance of the March 1991 report. Based on the findings, a pilot training program is scheduled in 1992.

- JCI reported, as an example of literacy risks, that one of its building custodians was cited in an occurrence report involving chemical contamination of a laboratory. The custodian entered the contaminated laboratory even though the door was marked with a sign that stated "Do Not Enter."

- JCI recognizes that technical literacy in its custodian workforce is a problem. JCI is not required to inform LANL when an assigned custodian or craftsworker might need special training to ensure safe performance.

- Five divisions, which were appraised, provided safety orientation and training on new safety and operating procedures solely by providing time for the employees to read the documents and sign their names. None of the five assigned training coordinators would confirm whether all their division employees had the literacy to understand the technical procedures.

- In 1984-1988 the former Plutonium Division assisted by Human Resource Development trained materials handlers who lacked the basic technical literacy to perform required job duties. Extensive training in mathematics and chemistry was provided on Laboratory time for over a year to make approximately 25 technicians job competent. Training professionals interviewed who were involved in the materials handler training believed that similar deficiencies in employee competence currently exist.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.4-2) (H2/C2) **The Los Alamos National Laboratory does not ensure that its employees or those of contractors or subcontractors have the technical, environmental, safety, and health literacy required to mitigate risk to themselves or other Laboratory workers.**

FINDINGS:

- The employee and visitor training and qualification programs at TA-55 are recognized as models by other DOE contractors. The Operational Security and Safeguards has a well-documented training program for materials custodians which requires LANL staff from many divisions to be certified. Most training coordinators interviewed had not examined these programs or materials for applicability to their needs.

- LANL is currently developing training to accompany the lockout/tagout procedure. JCI has implemented its own procedure. The Safety and Risk Assessment Group has not contacted JCI to determine lessons learned.

- Most of the training coordinators interviewed had not looked at training at other divisions to gain an insight into lessons for visitor control and site-specific training.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.4-3) (H2/C3) **The training expertise within Los Alamos National Laboratory is infrequently used for lessons learned or for assistance in solving other sitewide training issues.**

FINDINGS:

- The training manual issued by the LTO includes only training of employees and does not make explicit requirements for contract and subcontract employees.

- A review of Employee Development System training records of 221 contract workers assigned to LANL identified approximately 10 percent who had not received any health and safety training.

- The Quality Operations Office has a procedure to initiate the training requirements for contract personnel but lacks the authority to ensure that, once personnel are assigned within the divisions, the training requirements are met.

- The subcontract with Johnson Engineering, Subcontract No. 9-X-31-9276X-4, Sec IV, N and R (one of four companies currently providing 786 contract workers to LANL), contains clauses that it provide its employees with

required ES&H training. Johnson Engineering has not provided documented ES&H training. Further, LANL has not audited the health and safety plans of companies providing contract workers to ensure that they are qualified.

- In contracting with individual consultants, LANL does not specify ES&H training requirements to be met for the individual or does not audit to verify that LANL-required training has been accomplished.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.4-4) (H2/C2) **The Los Alamos National Laboratory does not ensure that contract or subcontract or employees working onsite have received required health and safety training.**

TC.5 MAINTENANCE PERSONNEL

PERFORMANCE OBJECTIVE: The maintenance personnel training qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- The LANL triennial review of the JCI, as part of the Cost Plus Award Fee process, has not contained "training" as an area for review for several years. The reason given for removing it as an evaluation criterion was that it was not perceived as a current problem.
- The JCI QA and training personnel who were interviewed knew of no instances where LANL management had addressed either training or the health and safety performance of JCI workers.
- LANL has not informed JCI what ES&H training is required for its craftspersons, except for radiation protection requirements and associated training at TA-55.
- No LANL staff with training responsibilities has ever requested that JCI report training costs or the methodology used to decide who should receive training.
- JCI has received no reply from the LTO to a January 1991 request for information on all site-specific training, including objectives and lesson plans.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.5-1) (H2/C2) **The Los Alamos National Laboratory subcontract evaluation process of Johnson Controls World Services, Inc., does not contain definite criteria and accountability for training. (Also see Concern TSA-4, OA.1-2.)**

FINDINGS:

- LANL and its subcontractor, JCI, are not in compliance with 29 CFR 1910, Subpart 5, Electrical. The code requires electrical training for both qualified and unqualified persons working in areas with significant electrical hazards. Training must include site-specific safety.
- See Concern TSA-4, WS.4-4.
- Although LANL has had several near-fatalities related to work involving electrical systems, including one 12 months ago, the first comprehensive Laboratory electrical safety awareness course was not begun until 1990. The Electrical Safety Awareness course curricula developed by a Laboratory committee has been taught to over 2000 LANL employees and contractors since November 1990. Currently, it is the only sitewide electrical safety course taught.

- LANL has many unique electrical systems which technicians and JCI craftsworkers learn on the job. Many of the systems no longer have as-built drawings. However, site-specific training does not meet the requirements of 29 CFR 1910, Subpart S, Electrical.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.5-2) (H1/C1) **Los Alamos National Laboratory has not developed and implemented training in electrical safety based on existing safety risks and 29 CFR 1910, Subpart S, Electrical.**

TC.6 CRITICALITY SAFETY

PERFORMANCE OBJECTIVE: Personnel should receive training in nuclear criticality safety consistent with their assigned tasks. (Reactors and Nuclear Facilities Only)

FINDINGS:

- There is no documented Laboratory criticality safety training plan, policy, or procedure.
- The Criticality Safety Group is responsible for criticality safety training of group leaders throughout the Laboratory.
- The Criticality Safety Group staff provides criticality safety training to group personnel only when requested by group leaders.
- The Laboratory Nuclear Criticality Safety Committee authorizes the Criticality Safety Group Group Leader to certify other Laboratory Group Leaders to administer the criticality safety program within their respective groups, including criticality safety training. However, there is no documented Laboratory policy or procedure which specifically charges group leaders with this responsibility.
- There is no requirement for managers or supervisors to use the expertise residing in the Criticality Safety Group to provide criticality safety training for their employees; they may provide it themselves or seek it elsewhere, at their discretion.
- The Criticality Safety Group has developed a 2-day course, a 3-day course, and a 5-day course in criticality safety. These courses are designed for specific groupings of audiences. None have been offered since 1989.
- According to the LANL ES&H training catalog, uranium workers are not required to have criticality safety training, and it is merely suggested that plutonium workers receive criticality safety training.
- Not all fissile material handlers are trained to the same standards at the Los Alamos Critical Experiments Facility. Training for some fissile materials handlers was not documented. (See Section 4.5.2.5.2, TC.6.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.6-1) (H1/C1) **There is no documented program which ensures that all people who handle fissionable material at the Los Alamos National Laboratory receive appropriate, job-specific criticality safety training as required by DOE 5480.5.**

TC.7 TRAINING FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: The training facilities, equipment, and materials should effectively support training activities.

FINDINGS:

- The lack of training classrooms was frequently identified by training coordinators and the Safety and Risk Assessment Group as one reason required classes were not offered.
- The two offsite training facilities managed by the Employee and Organizational Development Group are devoted primarily to human resource and personal computer training. One classroom is currently dedicated to extended General Employee Training classes. The Safety and Risk Assessment Group has only one dedicated classroom in its facility.
- The Safety and Risk Assessment Group has been unable to contract for space to provide classroom and hands-on training.
- LANL does not have dedicated training facilities or modules in such areas as glovebox, decontamination, spill control, laboratory safety, or electrical safety training, except for TA-55.
- The lack of training facilities, equipment, and materials where the trainees can demonstrate mastery of health and safety skills has prevented the Safety and Risk Assessment Group from developing on-the-job training and hands-on courses.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.7-1) (H2/C2) **At the Los Alamos National Laboratory, lack of dedicated training facilities and equipment inhibits the ability to conduct required environment, safety, and health training, including hands-on mastery of skills.**

TC.8 QUALITY CONTROL INSPECTOR AND NONDESTRUCTIVE EXAMINATION TECHNICIAN

PERFORMANCE OBJECTIVE: The quality control inspector and nondestructive examination technician training and qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Most Laboratory personnel have not been provided training or indoctrination on inspection principles and practices.
- S&H Subteam 4 noted that no procedures have been established for training and qualifying inspection personnel.
- See Concern TSA-4, QV.1-1, and Sections 4.5.3.2.2, QV.1, and 4.5.1.2.2, QV.6.
- Personnel who perform inspections and nondestructive testing at TA-55 are not all properly trained and certified in accordance with ASME NQA-1-1989 and the American Society of Nondestructive Testing Practice No. SNT-TC-1A. (See Section 4.5.1.5.2, TC.8.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.8-1) (H3/C2) **Los Alamos National Laboratory has not developed a training and qualification program for inspector and other quality control personnel.**

FINDINGS:

- The JCI procedure for training, qualifying, and certifying inspection personnel was only recently issued (October 21, 1991). Not all JCI staff have been trained on the procedure.
- The JCI procedure for training, qualifying, and certifying inspection personnel has not been reviewed by the Laboratory Training Office.
- See Concern TSA-4, QV.1-7, and TSA-4, QV.1-9.

CONCERN: **See Concern TSA-4, TC.5-1.**

TC.9 RADIOLOGICAL PROTECTION PERSONNEL

PERFORMANCE OBJECTIVE: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- Three operational health physics groups with responsibilities for radiation protection technicians required to fulfill DOE 5480.11 training were combined into the Health Physics Operations Group in July 1991. Each of the three groups have been developing and conducting radiation protection training which was partially coordinated across all groups.

- Two of the three groups have not specified the requirements that radiation protection technicians are required to complete to become certified. The Health Physics Operations Group has no approved training plan for radiation protection training.

- Staff within the Health Physics Operations Group could not agree in initial meetings with S&H Subteams 2 and 4 on which radiation protection technicians had fulfilled part or all of the required training for DOE 5480.11. In mid-October 1991 they wrote the internal procedure establishing the training requirements that each technician must complete.

- Not all site-specific procedures for operations performed by radiation protection technicians have been written. Therefore, site-specific on-the-job training using procedures has not been completed. (See Concern TSA-1, RP.3-2.)

- Untrained radiation protection technicians, as defined in DOE 5480.11, are technicians that are not certified to have been trained. LANL untrained technicians cannot be identified by sight. Some untrained radiation protection technicians are working alone but are encouraged to telephone their supervisors if they have questions.

- No documentation was provided indicating that lead technicians were informed of their supervisory responsibilities or their personal liabilities for untrained technicians.

- The Clinton P. Anderson Meson Physics Facility is operated using four, three-person shifts of trained and untrained health physics technicians who were responsible for 267 buildings with a variety of radiation concerns, making it essential that each crew include at least two trained technicians.

- Recertification of radiation protection technicians is in the planning stage for each former group, but lack of

documentation on when the original training was completed has hindered the efforts to identify the required date for recertification.

- The requirements for the Health Physics Operations Group Training Coordinator for radiation protection technicians cannot be fulfilled as a half-time position.

- The radiation protection techician training program is not audited periodically as required by ASME NQA-1-1989. (See Section 4.5.2.5.2, TC.9.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.9-1) (H1/C1) **At the Los Alamos National Laboratory, radiation protection technician training does not meet the requirements of DOE 5480.11.**

TC.10 TRAINING FOR SUPERVISORS, MANAGERS, AND TECHNICAL STAFF

PERFORMANCE OBJECTIVE: Training programs for supervisors, managers, and the technical staff should broaden overall knowledge of processes and equipment and develop supervisory and management skills.

FINDINGS:

- No sitewide assessment has been conducted to identify and prioritize the knowledge and skill requirements for supervisors and technical managers.
- No courses, other than the ES&H for Managers and Conduct of Operations courses, were identified which had been taught to a number of managers or supervisors.
- No Laboratory training course exists to assist group leaders in defining ES&H performace requirements for their staff.
- Division personnel assigned to be quality assurance representatives have not been trained by LANL. (See Concern TSA-4, QV.1-1.)
- No formalized curricula exists for the division training coordinators.
- See Concerns TSA-4, EP.2-2; TSA-4, TS.1-1; TSA-4, RP.2-2, TSA-4, PT.2-1; TSA-4, QV.1-5; TSA-4, PP.1-1; and Section 4.5.4.11.2, EA.1.
- Based on their records, some senior managers lack the required health and safety training to enable them to "walk the spaces" in many LANL facilities, except as escorted visitors. Managers cannot fulfill the requirements expected by conduct of operations if they must be escorted.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TC.10-1) (H2/C2)

Los Alamos National Laboratory does not ensure that its managers and supervisors receive the training necessary to fulfill safety and health responsibilities.

TC.11 SIMULATOR TRAINING/FACILITY EXERCISES

PERFORMANCE OBJECTIVE: Simulator training and/or facility exercises should be conducted utilizing methods and techniques that are effective in developing and maintaining team and individual knowledge and skills in responding to abnormal and emergency events and in integrated operations. (Reactors and Nuclear Facilities Only)

FINDINGS:

- The training coordinators interviewed did not have documented records of employees participating in continuing education exercises at the division level.
- When a new procedure is introduced, few groups within divisions have employee meetings to demonstrate how employees should follow the procedure.
- See Concerns TSA-1, TC.11-1, and TSA-2, TC.11-1.

CONCERN: **See Concern TSA-4, TC.1-1.**

4.5.4.6 Auxiliary Systems

4.5.4.6.1 Overview

This appraisal addressed four of nine performance objectives in the Auxiliary Systems technical area. The performance objectives that were not addressed were AX.3 Solid Waste, AX.4 Storage and Handling of Fissile Material, AX.7 Heat Removal Systems, AX.8 Engineered Safety Systems, and AX.9 Coolant Cleanup Systems. These categories were not applicable for this part of the assessment or were addressed by the other appraisal teams.

The appraisal consisted of onsite inspections of 32 buildings in 10 technical areas which were classified as general laboratory, laser and explosives areas. The inspections included reviews of reports, manuals, appraisals, procedures, facilities, basement plenums and discussions with LANL and JCI personnel responsible for auxiliary systems.

For all auxiliary systems reviewed, inconsistencies exist for the certification and maintenance of auxiliary equipment defined as Class A and Class B. The Class A auxiliary equipment is inventoried and is maintained by the Maintenance Group and JCI using a rather formal system. The new software system currently being implemented for Class A equipment is state-of-the-art. In contrast, the Class B auxiliary equipment maintenance program is very informal; inventory of the equipment is frequently not available at the site; and schedules for preventive maintenance, operating instructions and historical records are informal and frequently not available. LANL has not implemented a sitewide program to assure that Class B equipment associated with auxiliary systems is properly maintained.

Communication between building managers and their counterparts in the Facilities Engineering Division, who are responsible for maintenance of Class A auxiliary equipment, is deficient; e.g., building managers are not always aware of the operational status of equipment.

LANL has a generic deficiency regarding configuration control and formality of operating instructions, drawings, and schematics used for auxiliary equipment. Many documents used on auxiliary equipment do not have control numbers, date of issue, or identification of the author.

Several areas were found to have ventilation flow balancing problems as a result of aging facilities, building modifications, and lack of functioning control equipment. Some areas are operating in a reactive mode by changing high-efficiency particulate air filters (HEPA) when airflow becomes inadequate. The most severe ventilation problems encountered during the review were found at TA-3 Bldg. 39 (Shop 13), TA-59 Bldg. 1, and TA-48 Bldg. 1. LANL has not implemented a sitewide program for utilizing available data to predict when HEPA filters should be changed.

The assessment of the transuranic incinerator, TA-50, revealed that there is no real time measurement of exhaust stack effluent. Cuirrent sampling methods represents a weekly average which only provides "after the fact" data.

The human factors in the areas reviewed revealed a range from good equipment and line labeling practices to informal electrical panel board circuit identification and nonstandard practices for indicator lights; for example,

the use of red, green, and yellow for both "on" and "off" operating conditions, with one panel board containing a mixture of red and green for the "on" position. Many panel board lights on functioning equipment were found burned out.

On two occasions, battery rooms with high-voltage terminals contained three-ring notebooks with metal rings or metal binders which were used for recording service data. Inadvertent contact of the metal binder with the high-voltage terminals was possible.

Radioactive solutions are being stored in concrete underground tanks without secondary containment at the Waste Treatment Facility, TA-50. Data for these tanks from the monitoring wells have not indicated leakage; however, more sensitive testing will be done in Phase 2 of the test program.

LANL has not implemented a program to ensure that eyewash and shower stations are periodically tested; for example, there is no formal documentation for procedures; some stations have sign-off tags or logs, and some do not; frequency of checking is not consistent; and identifying the individual(s) responsible for performing the review is difficult. All facilities visited had deficiencies in the system used for periodic review of eyewash and shower stations.

A Category II finding identified by S&H Subteam 4 is associated with the 12 inch high-pressure natural gasline that runs through the city of Los Alamos. This line, which is approximately 3 miles long, runs between the East and West Metering Stations and is operated by the Gas Company of New Mexico under a lease agreement with the owner, the Department of Energy. An evaluation of this section of the gasline was performed by LANL which included the radiographic examination of nine randomly selected accessible welds, out of approximately 500 welds in the line. All nine welds failed the acceptance criteria on Department of Transportation code requirements. AL has not repaired, replaced, abandoned, or developed a plan to resolve this potentially serious problem.

The LANL self-assessment was reviewed and, in many cases, was more general than in the specific concerns of this assessment. The counterpart review of the computer data bank revealed well organized and useful self-assessment information for correlating with the concerns of this assessment.

4.5.4.6.2 Findings and Concerns

AX.1 SYSTEMS REQUIREMENTS

PERFORMANCE OBJECTIVE: Auxiliary systems should be considered under the same functional criteria for design, engineering, operations, maintenance, and modification as the structural, confinement, and primary process system of the facility.

FINDINGS:

- In the TA-3 Sigma Complex, Bldg. 66, waste solutions from the plating baths are being dispatched to the waste disposal area, TA-50, using aging equipment with marginal capacity.
- Incidents involving the waste drain system have included the rupture of a waste line used for acid bypass and acid storage tank leaks.
- One of the original concrete storage tanks (built in 1958), housed in the basement of Bldg. 66, was used for containing acid rinse water from the plating baths. It is not currently being used because of cracks in the walls that resulted in seepage to the surrounding area.
- The other concrete storage tank (built in 1958) used for containing cyanide rinse water from the plating operations is still in use.
- A temporary storage tank is being used to contain acid rinse water waste from the plating operations.
- The existing system cannot effectively accommodate the rinse water waste from the plating areas and other laboratories in the facility.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.1-1) (H2/C2) **At the Los Alamos National Laboratory, the drainage system in the TA-3 Sigma Complex, Building 66, presents a potential chemical hazard to occupants of the building.**

FINDINGS:

- The electroplating area in the TA-3 Sigma Complex, Bldg. 66, is on the first floor of the facility with a basement level below.
- The floor structure in the electroplating area will not survive a seismic event as identified in the LANL self-assessment, Deficiency No. 755-S-SH.
- The electroplating area has tanks which contain cyanide and acid; should these two chemicals combine, they would form hydrogen cyanide, a very toxic gas.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.1-2) (H2/C2) **In the TA-3 Sigma Complex, Building 66, a Los Alamos National Laboratory safety study revealed that a seismic event could cause the floor of the electroplating area to collapse, resulting in a cyanide-acid mixture that would cause a release of lethal hydrogen cyanide gas.**

FINDINGS:

- In the TA-43 Health Research Laboratory, Bldg. 1, Fan Room, a 55-gallon drum of glycerine did not have a hazard label attached.
- In the TA-3 Steam Plant, Bldg. 22, a soda-ash drum stored on a pallet near the water softener did not have a hazard label attached.
- In the TA-3 Steam Plant, Bldg. 24, cooling tower chlorination area, a 55-gallon drum of ammonium bisulfide did not have a hazard label attached.
- See Concerns TSA-4, PP.6-5, and TSA-4, WS.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.1-3) (H3/C1) **At the Los Alamos National Laboratory, hazard labeling of chemical containers associated with auxiliary equipment is not complete as required by 29 CFR 1910.1200(f)(5)(i).**

FINDINGS:

- In TA-15 Bldg. 185, Pulsed High Energy Radiographic Machine Emitting X Rays (PHERMEX), the basement contained a fenced area with exposed 110-volt AC terminals.
- There was no sign on the fence to communicate the hazards that were inside the area.

CONCERN: **See Concern TSA-4, WS.4-1.**

FINDINGS:

- LANL has not implemented a sitewide program to ensure that eyewash and shower stations are periodically tested; e.g., there is no formal documentation for procedures, some stations have sign-off tags or logs and some do not, frequency of checking is not consistent, and checking responsibility is vague in most instances.
- All of the facilities visited had deficiencies in the system used for periodic review of eyewash and shower stations.
- In TA-3 Bldg. 34, Cryogenics, there was only one eyewash and safety shower station in a large area of the basement that contained several chemical laboratories.

CONCERN: **See Concern TSA-4, MA.3-1.**

FINDINGS:

- In TA-43 Bldg. 1, Health Research Laboratory, illumination in the basement is poor because of equipment modifications and lighting removal. Tripping hazards and auxiliary equipment with rotating belts and pulleys exist in the area.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.1-4) (H2/C1) **At the Los Alamos National Laboratory, in TA-43 Building 1, Health Research Laboratory, illumination in the basement is poor because of equipment modifications and lighting removal, which violates 29 CFR 1910.22(b)(i); tripping hazards and auxiliary equipment with rotating belts and pulleys exist in the area.**

FINDINGS:

- LANL has a generic deficiency regarding configuration control of operating instructions, drawings, and schematics used for auxiliary equipment; e.g., documents do not have control numbers, date of issue, or identification of the author; observed instructions are written in indelible ink on duct tape which was attached to electric switch panels.
- Facilities in which these deficiencies were observed are TA-3 SM-132 and SM-1498, Computer Facility Buildings; TA-3 Bldg. 39, Machine Shop; TA-35 Bldg. 125, Antares Laser; TA-46 Bldg. 1, Advanced Engineering Building, room 11; TA-3 Bldg. 66, Sigma Complex, room 10B. This list is not all-inclusive.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.1-5) (H3/C1) **Los Alamos National Laboratory has a generic deficiency regarding configuration control of operating instructions for auxiliary equipment as required by DOE 5480.19.**

FINDINGS:

- In TA-35 Bldg. 85, Chemical Laser Sciences, Equipment Room 1, a lock on an electric Power Panel MCC-A was not an authorized lock, and there was no tag attached identifying the person responsible for placement.
- In TA-35 Bldg. 125, Antares Laser, electric Power Panels FE-6 and HVA-6 had duct tape labels with indelible ink printing.
- In TA-3 Bldg. 66, Sigma Complex, Penthouse I, there was a tag on an air duct that was dated September 29, 1969. In Penthouse II, a fire extinguisher was last checked in 1957.

- A generic pressure vessel certification deficiency exists throughout LANL; for example, some pressure vessels have certifications attached and some do not.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.1-6) (H3/C1) **Los Alamos National Laboratory, has not implemented a program to ensure that tags and labels are controlled, uniform, and current as required by DOE 5480.19.**

AX.2 EFFLUENT HOLDUP AND TREATMENT

PERFORMANCE OBJECTIVE: *Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or as effluent gaseous or liquid releases are less than Department of Energy and Environmental Protection Agency standards and are as low as reasonably achievable.*

FINDINGS:

- Secondary containment is not in place for concrete storage tanks that contain radioactive solutions at TA-50 Bldg. 1, Liquid Waste Treatment Facility.
- Monitoring wells for the underground concrete storage tanks, TA-50 Bldg. 1, Liquid Waste Treatment Facility, have not indicated any tank leakage; however, more sensitive testing will be done in Phase 2 of the program.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.2-1) (H2/C2) **At the Los Alamos National Laboratory, radioactive solutions are being stored in concrete underground tanks without secondary containment in TA-50 Bldg. 1, Liquid Waste Treatment Facility.**

FINDINGS:

- When the transuranic incinerator at TA-50 Bldg. 37 is operating, the exhaust stack effluent is measured on a weekly basis.
- Transuranic liquid waste disposal treatment equipment in TA-50 Bldg. 37 does not have real time monitoring on the exhaust stacks.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.2-2) (H2/C2) **At the Los Alamos National Laboratory, there is no real time monitoring equipment on the exhaust stacks for the transuranic incinerator in TA-50 Building 37 and the Liquid Waste Treatment Facility in TA-50 Building 1.**

AX.5 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is as low as reasonably achievable.

FINDINGS:

- In TA-48 Bldg. 1, Radio Chemistry, magnehelic gages in the exhaust system at the point of discharge are not routinely calibrated. (See Concern TSA-4, QV.4-1.)
- In TA-48 Bldg. 1, Radio Chemistry, the exhaust system recently had to be shut down to replace the HEPA filters when airflow became inadequate.
- In TA-48 Bldg. 1, Radio Chemistry, alpha hood ventilation is being controlled in a reactive mode by changing HEPA filters based on periodic airflow checks; the system has no real time equipment, with alarms, to notify occupants when ventilation is inadequate.
- LANL does not have a real time program for capturing change in pressure data over time in order to predict the appropriate time for filter changes.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.5-1) (H2/C1) **Los Alamos National Laboratory has not implemented a program for utilizing available data to alert when high-efficiency particulate air filters should be changed as required by DOE 5480.19.**

FINDINGS:

- TA-59 Bldg. 1, Occupational Health, is an aging facility with air-balancing problems in the ventilation system, which has had several modifications since the original design.
- Current air-balancing problems with the ventilation system surfaced about 2 years ago.
- Flue gases from the two forced-draft gas-fired boilers have back-flowed carbon monoxide into the basement of the facility on several occasions.
- The exhaust from the forced-draft gas-fired boilers, the ventilation exhaust, and the laboratory hoods discharge into the same exhaust stack in close proximity to each other.
- In TA-59 Bldg. 1, Occupational Health, the facility outside air dampers were held open by 2-inch by 4-inch wooden props, indicating control problems with aging equipment.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.5-2) (H2/C2) **At the Los Alamos National Laboratory, in TA-59 Building 1, Occupational Health, air-balancing problems for the supply and exhaust ventilation systems have resulted in flue gas from two gas-fired boilers back-flowing carbon monoxide into the basement area on several occasions.**

FINDINGS:

- In TA-3 Bldg. 66, Sigma Complex, the ventilation system cannot be balanced properly.
- In TA-43 Bldg. 1, Health Research Laboratory, a problem exists for adjusting the interlocks between the exhaust and supply ventilation system which could result in a positive pressure existing in areas that should have a negative pressure.
- In TA-43 Bldg. 1, Health Research Laboratory, Laser Room (basement), a converted storage area is not associated with the facility ventilation system. It has been converted to a work area and currently has a self-contained recirculating cooling system and a space heater for temperature control. The ventilation is provided by two small fans mounted in holes in the wall separating the room from the hallway through which supply and exhaust air circulate.
- TA-59 Bldg. 1, Occupational Health, is an aging facility with air-balancing problems in the ventilation system, which has had several modifications since the original design. (See Concern TSA-4, AX.5-2.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.5-3) (H2/C2) **Los Alamos National Laboratory has several operating facilities with air-balancing problems, creating the potential for uncontrolled migration of contaminants into occupied spaces.**

FINDINGS:

- In TA-3 Bldg. 55, which houses the natural gas supply line to the steam generators, has only a door and four windows for ventilation.
- The four windows in Bldg. 55 were open at the time of the review; however, they were not permanently fixed in that position.
- The vents for the gasline regulators open to the outside of Bldg. 55 near the open windows.
- There was a strong odor of natural gas within and immediately outside Bldg. 55, which houses the incoming gas regulators and controls for the gas at the Steam

Plant. A small leak was detected in a fitting and promptly repaired.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.5-4) (H2/C1) **At the Los Alamos National Laboratory, TA-3 Building 55, which houses the controls for the natural gas incoming pipeline for the steam generators, do not meet the 1991 Uniform Mechanical Code requirements for ventilation.**

AX.6 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

FINDINGS:

- In TA-3, the backup diesel generator at the Steam Plant has not been run or tested in approximately 10 months.
- Plant personnel at the Steam Plant did not have a clear understanding of whether the backup diesel generator was Class A or Class B equipment.
- The Maintenance Program for Class A equipment administered by the Maintenance Group did not have the backup diesel generator listed; however, it is listed under the JCI Utilities Department.
- In TA-57, the Earth and Environmental Sciences Division geothermal area, no certification records exist and personnel did not know the classification of a pressure vessel associated with a large air compressor.
- At TA-57, the Earth and Environmental Sciences Division geothermal area, and most other facilities visited, an inventory or defined preventive maintenance program for Class B equipment has not been established.
- There is not a clear delineation between Class A and Class B equipment that is understood by personnel throughout the Los Alamos National Laboratory.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.6-1) (H2/C2) **Los Alamos National Laboratory has not implemented a program to assure that Class B equipment associated with auxiliary systems is properly maintained.**

FINDINGS:

- In TA-3 Bldg. 1498, Computer Facility, the logbook for service records on the uninterruptible power supply (UPS) batteries consisted of a three-ring loose leaf notebook, with a metal binder, which was improperly stored on the metal rack directly under both leads to a 588-volt field-measured reading.
- In TA-15 Bldg. 310, Hydrodynamics, the logbook for service records on UPS batteries in the utility room, consisted of a three-ring loose leaf notebook, with a metal binder, which was improperly stored on the metal rack directly under the batteries of the 408-volt field-measured reading.

- The metal binders in the notebooks were approximately the same length as the distance between the terminals and could easily become an inadvertent shorting bar.

CONCERN: **See Concern TSA-4, WS.4-3.**

FINDINGS:

- In TA-3 Bldg. 1498, Computer Facility, the logbook for UPS batteries consisted of a three-ring loose-leaf notebook with pages that were not numbered or dated and that were not well organized.

- In TA-15 Bldg. 310, Hydrodynamics, Utility Room, the logbook for UPS batteries consisted of a three-ring loose-leaf notebook with pages that were not numbered or dated and that were not well organized. (See Concern TSA-4, QV.1-6.)

CONCERN: **See Concern TSA-4, OP.4-1.**

FINDINGS:

- LANL has a generic deficiency with color coding of electric power panel lights on auxiliary equipment throughout the site; e.g., red and green indicator lights are used inconsistently to indicate operational status, sometimes on the same panel board. This situation was observed in TA-3 Bldg. 66, Sigma Complex.

- In TA-3 Bldg. 66, Sigma Complex, red and green lights each indicated an "on" condition on the electric power panel board.

- Many electric power panel lights on functioning equipment were observed in the burned-out condition throughout the LANL site.

- In TA-35 Bldg. 125, Chemical and Laser Science, a panel board in the electric power supply room had a yellow light for "off" and a red light for "on."

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AX.6-2) (H2/C2) **Electric power panel indicator lights for auxiliary equipment throughout Los Alamos National Laboratory are not uniformly color coded as stated in Los Alamos National Laboratory Environment, Safety, and Health Manual.**

FINDINGS:

- A 12-inch, high pressure natural gasline runs through a residential neighborhood of Los Alamos, New Mexico.

- This line, approximately 3 miles long, runs between the East and West Metering Stations and is operated by the Gas Company of New Mexico (GCNM) under a lease agreement with the owner, the U. S. Department of Energy.

- An evaluation of this section of gasline was performed by LANL which included the radiographic examination of nine randomly selected accessible welds (out of approximately 500 welds). All nine welds failed the acceptance criteria of the current code, API 1104.

- Failure of these welds could cause a catastrophic pipe rupture that could result in significant property damage or injury to residents living adjacent to the gasline. In addition, the gasline goes through a neighborhood playground.

- AL, LAAO, GCNM, and LANL have been working together to determine the appropriate action to take. However, no documented action plan has been formulated that addresses (a) the short- and long-term actions and contingencies; (b) the responsibilities of AL, LAAO, LANL, and GCNM; (c) funding strategies; and (d) target schedules.

- The following concern was identified in the AL self-assessment.

CONCERN: (TSA-4) (AX.6-3) (H1/C2) CAT. II

The Albuquerque Field Office has not established a plan for the timely resolution of the potential problem associated with the Department of Energy owned 12-inch, high pressure natural gasline which does not meet the requirements of the current code, API 1104.

4.5.4.7 Emergency Preparedness

4.5.4.7.1 Overview

The appraisal addressed all seven performance objectives in the Emergency Preparedness technical area LANL. In addition, in this appraisal addresses the Emergency Public Information Program and Hazardous Materials Response Program. Findings and concerns related to emergency preparedness are also contained in Sections 4.5.1.7, 4.5.2.7, and 4.5.3.7.

The appraisal was accomplished through interviews with managers, supervisors, specialists; Emergency Management Office personnel, representatives of JCI; Mason and Hanger-Silas Mason, Inc. (M&H) management; and various members of the LANL emergency response organization. These interviews were used to ascertain how emergency response activities and the emergency preparedness programs were conducted, managed, and controlled. The S&H Subteam reviewed and examined records, emergency plans, implementing procedures, training programs, and supporting documents against DOE 5000.3A, DOE 5500 series of Orders, and the DOE 5480 series of Orders, American National Standards Institute (ANSI) standards, and industry good practices.

The Emergency Preparedness Program is in the early stages of development and documentation but has the limited capability to respond and report credible data on which assessments can be made for providing protection to onsite employees and offsite populations. LANL has an existing 2-year old, out-of-date emergency management plan and has recently drafted and distributed a revised edition for coordination and comments. This revised emergency management plan had not been developed using the criteria established in the new DOE 5500 series of Orders and lacks considerable information on which to base vital assumptions during emergency situations. When the new DOE 5500 series of Orders was distributed, the Emergency Management Office did not formally distribute these new Orders to divisions and groups their immediate actions and guidance in the revision of their facility emergency plans and procedures. These landlords and facility managers have not been given the appropriate training or directives to ensure that they develop suitable emergency plans or procedures and to affect a positive command and control during emergencies that may affect their individual facilities.

Recently, the Emergency Management Office was repositioned and now reports directly to the Associate Director of Operations, providing increased management support and higher visibility. At the present time, this organization has suitable resources to perform both its normal and emergency response duties. The Emergency Management Office leader should review and use this work force in a more detailed alignment to accomplish its assigned emergency preparedness mission.

LANL does not have a public address system that can be used to disseminate sitewide instructions during an emergency. Alarm signals are not audible in the various facilities and buildings, and their signals are not standardized for all facilities. Audio surveys have not been completed by LANL.

The On-scene Incident Commander position is staffed by personnel from within the emergency management organization. These individuals are emergency planners and do not have extensive knowledge of firefighting tactics, hazardous materials response actions, security operations, and explosive

safety problems. Based on these technical requirements and the associated management requirements and responsibilities, these emergency planners should be considered communicators or coordinators. They should provide information and data and maintain communications with Emergency Operations Center management and provide logistical support as needed during emergencies. LANL senior management should assume the command and control function as the LANL Incident Commander.

The existing emergency management team, its support staff, and technical support group have not achieved an effective working relationship as demonstrated during the appraisal emergency exercise. There is a need to provide more emergency response training to ensure LANL achieves the necessary high degree of professionalism required to support the emergency response program.

Emergency preparedness training is in the early stages of development and has been conducted on a limited basis. LANL is drafting an emergency preparedness training program description document which could be used to develop this program by addressing the requirements for a training matrix to identify emergency response organization training requirements, passing scores, approval of lesson plans, development of training modules, certification instructions, concept of operations training, and offsite training requirements, (i.e., hospital, state, and local emergency management agencies and tribal officials). During the appraisal emergency exercise, specialized teams and emergency response teams demonstrated that there is a need to provide additional team training to obtain the degree of professionalism needed to display a coordinated team response in the field.

Another area of concern is the lack of technical data that should be available from SARs. LANL needs to update these analyses so that this data can be incorporated into the emergency plan for use in making judgments, assumptions, and worst-case accident analysis.

There is no formal, documented emergency planning action item system that can be used to ensure that cited improvements or deficiencies are expedited to an acceptable resolution. Some cited deficiencies and improvements are still outstanding from 1989.

The appraisal emergency exercise scenario developed by the Emergency Management Office was a well-written document which contained a tasking and challenging scenario. There were sufficient cue-card messages to address the simulated emergency events, good timelines, and a well-thought-out set of exercise objectives. This exercise was evaluated as unsatisfactory based on the following cited deficiencies: (1) lack of appropriate training for emergency management; support staff, and field response teams; (2) lack of on-scene command and control; (3) slowness in development of protective action for both onsite and offsite populations; (4) use of uncontrolled emergency plan, implementing procedures and checklists; (5) poor use of communications systems; (6) and poor hazard assessment. The LANL post-exercise critique, both verbal and written, addressed all the observations identified by the S&H Subteam evaluators.

The Emergency Operations Center was refurbished prior to the arrival of the Tiger Team. It is a well-designed emergency facility that has a good communication system. Cathode-ray tubes are used instead of status boards,

and rear screen projection of transparencies is available. However, there are still problems, as demonstrated during the appraisal emergency exercise, with display of information and data to the Emergency Operations Center management team.

Many facility-specific or division-level emergency plans do not meet the requirements of the DOE 5500 series of Orders. The major contributor to this situation was the failure of LANL to provide sufficient emergency preparedness training to management at the division and facility level, to ensure that they have the capability to develop emergency plans and procedures to meet the requirements of the DOE 5500 series of Orders, and to ensure that emergency responses at the various facilities will protect the health and safety of Laboratory personnel, the general public, and the environment.

The LANL self-assessment identified all of the concerns and problem areas identified in the Emergency Preparedness area of this report. This self-assessment was a wide brush attempt to address Emergency Preparedness Program deficiencies using the guidance contained in the DOE 5500 series of Orders.

4.5.4.7.2 Findings and Concerns

EP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, site/facility emergency response.

FINDINGS:

- The LANL Emergency Preparedness Program has not been established in accordance with DOE 5500.1B, DOE 5500.3A (and its predecessor DOE 5500.3), DOE 5480.1B, and DOE 5480.10.
- Primary and alternate emergency management, support staff, and team leaders are not designated by normal duty position in the LANL Emergency Response Plan.
- Not all emergency responsibilities are detailed in the LANL Emergency Response Plan for members of the emergency response organizations and alternate positions.
- The Emergency Response Plan has not identified alternatives for each emergency position to provide 24-hour response capability.
- Technical support, operations, maintenance, and specialized field teams have not been identified by normal duty title.
- See Concerns TSA-1, EP.1-1; TSA-2, EP.1-1; and TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.1-1) (H1/C1) CAT. II

The Los Alamos National Laboratory Emergency Preparedness Program has not been developed in accordance with the requirements contained in DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

FINDINGS:

- LANL does not have an administrative procedure that provides instructions to document and address its emergency preparedness action item tracking system, thus ensuring prompt resolution of all cited deficiencies.
- Arrangements, mutual assistance agreements, and memoranda of understanding have not been formally addressed in writing and are not listed in the existing LANL emergency management plan.
- The LANL Emergency Response Plan does not have provisions for the management of the spectrum of operational emergencies that could result for the variety of site/facility activities, including emergencies having

both security and operational aspects and provisions for shifting from one type of emergency to another.

- See Concerns TSA-4, EP.1-1; TSA-4, SS.3-2; TSA-3, EP.1-1; and TSA-2, EP.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.1-2) (H1/C1) **The Los Alamos National Laboratory did not address all aspects of credible emergencies in detail as required by DOE 5500.1A and DOE 5500.3A (and its predecessor DOE 5500.3).**

FINDINGS:

- LANL emergency management and facility management did not retain effective command and control during the appraisal emergency exercise and during the assessment and mitigation phases of this exercise.

- LANL Hazardous Material Response Teams have not been integrated into the existing LANL emergency response organization, have not received sufficient emergency planning training, and at present do not have designated, trained, and qualified personnel to support operations depicted in the appraisal emergency exercise.

- See Concern TSA-4, EP.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.1-3) (H1/C1) **The Los Alamos National Laboratory Emergency Operations Center did not perform its command and control emergency functions in an efficient manner during the appraisal emergency exercise, and the emergency response field teams did not respond in a coordinated manner as required by DOE 5500.1B, DOE 5500.3A (and its predecessor DOE 5500.3), and DOE 5500.4A.**

FINDINGS:

- LAAO has not provided LANL with the oversight required in DOE 5500.1B.

- LAAO has not expedited written mutual assistance agreements for all offsite emergency agencies that provide emergency response to LANL.

- See Concerns TSA-4, QV.1-4, and TSA-4, EP.1-1.

- The following concern was identified in the LAAO self-assessment.

CONCERN: (TSA-4) (EP.1-4) (H1/C1)

The Los Alamos Area Office is not providing oversight of the Los Alamos National Laboratory Emergency Preparedness Program and has not developed and finalized mutual assistance agreements to cover all offsite emergency response agencies that could assist in response to emergencies at Los Alamos National Laboratory as directed by DOE 5500.1A and DOE 5500.3A.

EP.2 EMERGENCY PLAN AND IMPLEMENTING PROCEDURES

PERFORMANCE OBJECTIVE: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

FINDINGS:

- The existing LANL Emergency Response Plan was not developed using onsite-specific safety analysis of potential abnormal conditions and does not cover a wide range of credible emergencies.
- The existing plan does not contain emergency action levels and their relationship to appropriate emergency classifications.
- M&H has not been provided sufficient guidance and instructions by the Emergency Management Office to develop a facility emergency plan that is in compliance with the DOE 5500 series of Orders.
- JCI has not been provided sufficient guidance and instructions by the Emergency Management Office to develop a facility emergency plan that is in compliance with DOE 5500 series of Orders.
- Building and facility emergency plans do not have emergency action levels for facilities as required in DOE 5500.3A.
- The sample format provided to facility landlords for development of drafts of building or facility emergency plans by the Emergency Management Office is not in accordance with DOE 5500.3A.
- The Los Alamos National Laboratory Emergency Management Office has not provided JCI and M&H building managers, landlords, and facility emergency response teams with guidance, instructions, or emergency training to ensure that they have the capability to draft workable emergency plans or procedures and to provide command and control during a facility or building emergency situation.
- Emergency action levels provide the vital information that is used to make protective action recommendations to the onsite and offsite population and to develop emergency classifications.
- See Concerns TSA-1, EP.2-1; TSA-2, EP.2-1; TSA-3, EP.2-1; and TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: **(TSA-4) (EP.2-1) (H1/C1)**

The Los Alamos National Laboratory Emergency Response Plan has not been developed using the guidance contained in the DOE 5500 series of Orders; for example, it did not contain emergency action levels and all responsibilities were not identified for all members of the emergency response organization as required in DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

FINDINGS:

- LAAO has not transmitted the LANL Emergency Response Plan to the Program Secretarial Officers; AL; and state, county, and tribal emergency management agencies for review and coordination.
- During the appraisal emergency exercise, the emergency response organization, support staff, incident commander, and field team used uncontrolled checklists and documents.
- Emergency plan implementing procedures (EPIPs) had not been developed to support all provisions of the LANL Emergency Response Plan.
- Supporting procedures had not been developed to provide written instructions for activation and deployment of all emergency response teams.
- EPIPs had not been developed to provide detailed instructions for immediate actions, interim actions, and followup actions for each member of the LANL emergency management staff, support staff, and response teams.
- EPIPs have not been developed that provided sufficient guidance on required notifications and reporting criteria, on how to make emergency classifications decisions, on use of emergency action levels, on search and rescue operations, and on facility and site evacuations to include assembly and accountability.
- Emergency preparedness job task analysis studies, which could serve as an administrative tool in the revision of the EPIPs and Emergency Response Plan, had not been performed.
- ALL EPIPs developed do not include provisions for coordination and approval with space provided for approval signature, date of issue, and revision number.
- Emergency plan administrative procedures had not been developed to address the special instructions on conducting surveillances, testing, training program development, emergency action item tracking, and development of exercise and drill schedules to include scenario development, conduct, and post-exercise activities.

- LANL developed checklists for use in the Emergency Operations Center during emergencies; however, these checklists are not part of a controlled EPIP.
- The existing emergency plan is not developed in an user-friendly manner and contains numerous repetitions.
- Several facility and building emergency plans were reviewed and found to be unacceptable in that they did not follow the guidance provided in the DOE 5500 series of Orders.
- The provisions of the new DOE 5500 series of Orders had not been addressed in the existing Emergency Response Plan, especially DOE 5500.10.
- Cross-references to the DOE 5500 series of Orders, Emergency Response Plan, and implementing procedures have not been developed.
- See Concern TSA-4, EP.1-1.
- This concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.2-2) (H2/C1)

Guidance and training have not been provided to facility emergency management as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3) on preparation, development, and drafting specific facility and building emergency response plans and procedures.

FINDINGS:

- The Emergency Management Office has not developed a site evacuation plan for use during emergencies, nor has it conducted an exercise to test this plan. EPIPs for area or facility evacuation, assembly, and accountability have not been developed or reviewed.
- See Concern TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.2-3) (H1/C1)

The Los Alamos National Laboratory Emergency Management Office did not develop an emergency evacuation plan as required in DOE 5500.3A (or its predecessor DOE 5500.3).

EP.3 EMERGENCY RESPONSE TRAINING

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- The existing draft LANL emergency preparedness training document did not address General Employee Training, offsite news media orientations, training for state and local emergency management agencies, certification of instructors, passing grades for examinations, lesson-plan format, training matrixes for each emergency position (both primary and alternates), and annual and requalification training.
- Emergency preparedness lessons plans have not been reviewed and approved for training purposes by the Emergency Management Office, Training Department, and the Associate Director for Operations.
- Feedback from previously conducted drills and exercises, cited improvement areas, and past appraisals has not been used as a training tool during the development of emergency response training lesson plans.
- During the appraisal emergency exercise, training records of the responding members of the LANL emergency response organization training records were not reviewed to ensure participants had received the necessary emergency training to accomplish their assigned duties and functions.
- See Concerns TSA-1, EP.1-1; TSA-2, EP.3-1; TSA-3, EP.3-1; and TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.3-1) (H1/C1) **Los Alamos National Laboratory does not have an emergency preparedness training program document that addresses training requirements by emergency position, instructors qualification, and annual training requalification requirements established in DOE 5500.3A.**

EP.4 EMERGENCY PREPAREDNESS DRILLS AND EXERCISES

PERFORMANCE OBJECTIVE: Emergency preparedness programs should include provisions for simulated emergency drills and exercises to develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

FINDINGS:

- After facility drills, a written critique report is sent to the Emergency Management Office. Several of these reports were reviewed and found to contain repeated citations for deficiencies, and no appropriate corrective action has been taken to resolve these items by line management.
- Documentation for conducting a quarterly communication drill was not available for review.
- The Emergency Management Office has not resolved or close out some of the appraisal items that were cited in 1989 as a result of AL emergency appraisal.
- LANL had not developed a master exercise and drill schedule to include type of activity, selected location, and exercise objectives to be used in accordance with the requirements contained in DOE 5500.3A (and its predecessor DOE 5500.3).
- Exercise and drill evaluators and controllers are not trained annually as required in DOE 5500.3A (and its predecessor DOE 5500.3).
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.4-1) (H2/C1) **Los Alamos National Laboratory did not have an emergency drill and exercise program as directed in DOE 5500.3A.**

FINDINGS:

- The following findings were results of the appraisal emergency exercise:
  - Emergency management and support staff did not use controlled checklists.
  - Emergency management did not respond effectively to the emergency as outlined in the exercise scenario.
  - When important exercise information was not available, emergency operations center emergency management could not obtain this input.
  - Protective actions were not promptly and disseminated to onsite personnel and the public.

- LANL post-exercise critiques concluded that out of the 83 exercise objectives, 45 were rated unsatisfactory, 4 were marginal, 11 were not observed, and only 23 were evaluated as being satisfied.

- Crisis management decision-makers were unable to determine potential source terms in a timely manner.

- No default protective actions were available to crisis management decision-makers.

- Crisis management decision-makers were not proactive in the issuance of protective action recommendations, (i.e., the evacuation of all nonessential personnel from the site when it was apparent that the situation presented an imminent risk).

- The hazardous materials response teams, environmental response teams, medical treatment, field monitoring and sampling teams and radiation monitoring teams did not function as an organized emergency response functional organization.

- Crisis management decision-makers were unaware of information from the incident scene that was essential to their mission to protect the health and safety of site personnel, the general public, and the environment. This resulted from failure by an M&H security dispatcher to communicate complete emergency information to the Emergency Operations Center.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.4-2) (H1/C1) CAT. II

The appraisal emergency exercise was unsatisfactory in that it demonstrated poor command and control at the Emergency Operations Center and at the on-scene exercise control points, lack of professionalism for both the onsite and offsite field emergency response teams, and the inability of emergency personnel to perform their functions as required in DOE 5500.3 and DOE 5500.3A.

FINDINGS:

- Drills and exercises are not conducted and scheduled to ensure that all onsite facilities and offsite emergency response agencies are tested, nor has LANL developed a master exercise and drill schedule.

- Mini-drills have not been conducted to ensure that specialized and field emergency response teams (i.e., field monitoring and sampling teams, emergency maintenance, environmental teams, hazardous material teams, emergency public information, dose assessment,

etc.) receive experience and perfect procedures and communications between emergency functions.

- During the appraisal emergency exercise, it was evident that a retraining/remedial training program is required for most members of the LANL emergency response organization, including alternates, specialized field team members, incident commanders and LANL contractors.

- See Concern TSA-4, EP.1-1.

- This concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.4-3) (H2/C1) **Mini-drills for field emergency response teams have not been conducted to ensure that continuity of operations is achieved between management of the Emergency Operations Center and on-scene control points as required by DOE 5500.3A.**

EP.5 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support site/facility emergency operations.

FINDINGS:

- LANL does not have a public notification system that is capable of providing sitewide emergency instructions.
- See Concern TSA-4, OP.2-3.
- The following concern was identified in the LANL self-assessment.

CONCERN: (EP.5-1) (H1/C1) CAT. II

Los Alamos National Laboratory does not have an Emergency Notification System to provide sitewide coverage for issuing emergency instructions as required by DOE 5500.2A.

FINDINGS:

- Existing audio alarm signals have not been standardized sitewide.
- Surveys of audio alarm systems have not been conducted to ensure their reliability.
- See Concerns TSA-1, OP.4-1; TSA-1, FP.3-3; and TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.5-2) (H1/C1)

Emergency alarms have not been surveyed to ensure that audio signals can be heard throughout all buildings as required by DOE 5500.2B.

FINDINGS:

- All buildings or facility emergency plans and procedures are not available at the LANL Emergency Operations Center (EOC) or at the alternate EOC.
- The EOC is not equipped with as-built drawings for all facilities; lists of stored hazardous materials; radiological and nonradiological hazardous or toxic substances; and procedures for health physics, chemical, and maintenance emergency operations.
- See Concern TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.5-3) (H1/C1)

The Emergency Operations Center does not have all the documents described in DOE 5500.3A (and its predecessor DOE 5500.3) available for emergency management use.

EP.6 EMERGENCY ASSESSMENT AND NOTIFICATION

PERFORMANCE OBJECTIVE: Emergency assessment and notification procedures should enable the emergency response organization to correctly classify emergencies, assess the consequences, notify emergency response personnel, and recommend appropriate actions.

FINDINGS:

- LANL does not have acceptable emergency action levels (EALs) to address all hazardous conditions, including operational events, security events, natural phenomena, and medical or contamination injuries.
- LAAO has not submitted EALs to offsite agencies, (Headquarters, DOE; State; County; or Tribal) for review and approval.
- See Concern TSA-4, EP.1-1.
- The following concern was identified in the LAAO self-assessment.

CONCERN: (TSA-4) (EP.6-1) (H1/C1) **Los Alamos Area Office has not transmitted Los Alamos National Laboratory emergency action levels to offsite agencies as required by DOE 5500.1A or DOE 5500.1B.**

FINDINGS:

- Dissemination of emergency information to LANL personnel was not accomplished during the appraisal emergency exercise.
- Emergency plan implementing procedures have not been developed to address emergency notifications, reentry and recovery operations.
- Radiation protection personnel responding to LANL medical facilities during the appraisal emergency exercise did not have the knowledge or techniques to monitor injured or contaminated personnel.
- Field monitoring teams responding to the appraisal emergency exercise did not perform in an acceptable professional manner.
- EOC management and the support staff did not aggressively pursue the appraisal emergency exercise scenario and make appropriate and timely recommendations for protective actions for onsite and offsite populations.
- See Concern TSA-4, EP.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.6-2) (H2/C1) **Los Alamos National Laboratory Emergency Operations Center management does not have a coordinated and approved initial notification or followup notification report for distribution of emergency notifications to State, County, and Tribal emergency management agencies as required by DOE 5500.2B.**

EP.7 PERSONNEL PROTECTION

PERFORMANCE OBJECTIVE: Personnel protection procedures should control and minimize personnel exposure to any hazardous materials during abnormalities, ensure that exposures are accurately determined and recorded, and ensure proper medical support.

FINDINGS:

- LANL did not have a procedure to conform with DOE 5480.1B, Chapter XI, paragraph 4.9, and DOE 5480.10 for establishing (radiation and chemical) exposure limits for life saving, emergency repairs, and protection of vital equipment under emergency conditions and did not designate who was responsible for authorizing the use of emergency exposure limits as is required in DOE 5500.1B.
- An emergency plan implementing procedure for decontamination has not been developed which establishes emergency limits for decontamination of personnel, equipment, and facilities.
- All evacuation routes have not been clearly marked nor all assembly areas posted.
- A site evacuation plan or procedure has not been developed to provide for effective traffic control and egress during emergency conditions.
- The existing LANL hazardous material response team has not been totally integrated into the existing LANL emergency response organizational and operates as an essentially separate entity during emergency response functions.
- See Concern TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EP.7-1) (H1/C1)

Los Alamos National Laboratory emergency procedures on radiological and chemical exposure control, decontamination, and site evacuation have not been developed as required by DOE 5500.1B, DOE 5500.3A, DOE 5480.1B, and DOE 5480.10.

4.5.4.8 Technical Support

4.5.4.8.1 Overview

Four of the eight performance objectives were addressed in the Technical Support functional area. TS.6 Packaging and Transportation of Hazardous Materials; TS.7 Reactor Engineering; and TS.8 Criticality Safety were appraised as separate functional areas by other S&H Subteams, and Environmental Impact was reviewed by a separate Subteam.

The scope of this appraisal included interviews and discussions with operating and technical support personnel and extensive review of procedures and safety analysis documentation. Selected major LANL facilities were also visited.

Technical support for Laboratory programs is provided primarily by several divisions within the Operations Directorate. The divisions having responsibilities of primary interest with regard to this portion of the TSA include Health and Safety, Environmental Management, Facilities Engineering, and Mechanical and Electronics Support. Support is also provided by design and engineering groups within various divisions in other directorates and by subcontractors, primarily JCI. Support groups are funded by a combination of direct and indirect funding. Budgetary constraints have reduced the capability of some technical support groups to provide quality services.

LANL has assigned responsibility for ES&H performance to the line organizations. This concept has been widely accepted, and many line organizations have hired internal ES&H staff members. These staff members provide technical support to their individual line organizations in addition to that provided by the technical support groups. The effectiveness of such efforts has been limited by a lack of clearly defined relationships between support and line organizations and the roles, responsibilities, and authorities of technical support personnel. Additionally, no organization has been assigned responsibility or authority for the day-to-day oversight of ES&H performance by the line organizations.

Preparation and use of standard operating procedures as the primary mechanism used by LANL to address the ES&H aspects of routine laboratory activities. The guidance provided for the preparation of the procedures is not clear, and the review and approval process is not well controlled. In general, ES&H protection activities are not addressed in a set of detailed, accurate, comprehensive procedures.

The Health and Safety Division and the Environmental Management Division have not developed formal guidance documents or procedures to aid them in conducting technical support activities. These two divisions play key roles in the review of standard operating procedures, engineering designs, and proposed experimental activities and in providing ES&H advice and support to line organizations. The lack of formal guidance and procedures has led to inconsistency in the conduct of ES&H protection activities.

SARs, safety assessments and preliminary hazards analysis are the types of safety analysis documents in use at LANL. A concerted effort has resulted in identifying the specific safety analysis documents required for each facility, and an excellent system is in place to track their preparation, review, and approval. Much of the required documentation has not been approved. In

addition, some safety analysis documentation was found to be incomplete with respect to design criteria, conduct of operations, and definition of the overall safety envelope. It was also concluded that safety documentation is not adequately reviewed by independent experts.

Control of facilities modifications reflects a diversity of approaches. For larger jobs the design process is generally well managed. Design reviews are conducted with participation of ES&H and other technical support personnel, but field design changes are usually initiated and approved by only the field engineer. For smaller jobs, design is not well controlled, and modifications are frequently not incorporated in as-built drawings to maintain configuration control.

Modifications to facilities or experimental equipment can be made by facility users without involvement of facility engineers or review by ES&H personnel. On completion of a new facility or a modification, LANL does not have requirements or guidelines for conducting operational readiness reviews.

Outside of the high-hazard facilities, there has been little recognition of a need for formal performance testing of miscellaneous safety-related equipment. Consequently, there is no sitewide policy on such testing, and where it is done, it is generally being conducted on an informal basis with no specified frequency, no formal procedures, and little documentation.

The LANL self-assessment identified deficiencies in several areas pertaining to technical support performance. Included were inadequate administrative controls to ensure safe operations; lack of definition of responsibilities and authority resulting in unclear interfaces; absence of some required safety documentation; and problems with configuration control. To a large extent, the self-assessment recognized the broad issues associated with the concerns but failed to address all of the specific findings or to demonstrate a full recognition of the impact of some of the concerns. Of the nine concerns identified in the Technical Support functional area, three were identified, one was not addressed, and the remaining five were partially addressed in the self-assessment.

4.5.4.8.2 Findings and Concerns

TS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The technical support organization and administration should ensure effective implementation and control of technical support activities.

FINDINGS:

- Position descriptions and qualification requirements for ES&H officers have not been defined by LANL. Consequently, the responsibilities and authority associated with this position vary widely throughout LANL.
- The ES&H officers do not have a formal relationship with either the Health and Safety Division or the Environmental Management Division. Consequently, no mechanism is in place to ensure that line ES&H personnel are providing guidance to the line organizations consistent with the guidance of the Health and Safety and the Environmental Management Divisions.
- Competition between technical and support groups for ES&H professionals is causing staffing problems within the support groups and inefficiencies in performing technical support functions.
- LANL has not established formal position descriptions, qualification requirements, nor training requirements for safety officers, field industrial hygienists, waste coordinators, spill coordinators, or other technical support personnel.
- The Health and Safety and the Environmental Management Divisions do not have a formal role in the selection or guidance of individuals with ES&H responsibilities within the line organizations.
- The Health and Safety Division has established ES&H Support Teams in two directorates but has not developed formal guidelines for their functioning nor formal position descriptions for team members.
- The relationship between the ES&H support teams and the health and safety division is not clearly defined, and the teams are operating without clear direction from the Health and Safety Division or formal coordination.
- There are no formal professional development plans in the Health and Safety Division, the Environmental Management Division, or the line organizations, for technical support personnel.
- See Concerns TSA-4, PP.1-2; TSA-4, PP.2-4; and TSA-4, EA.1-4.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.1-1) (H3/C1) **The roles and qualification requirements for environment, safety, and health technical support personnel, and their relationships with line organizations are not clearly defined as required by DOE 5480.19.**

FINDINGS:

- There is no organization within LANL with the authority or responsibility to provide day-to-day oversight of ES&H performance by the line organizations.
- Personnel within the Health and Safety and the Environmental Management Divisions do not have a formal mechanism to report and resolve ES&H deficiencies identified within the line organizations.
- ES&H deficiencies identified by personnel from the Health and Safety and the Environmental Management Divisions are not always documented.
- See Concerns TSA-4, PP.1-3, and TSA-4, EA.2-2.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.1-2) (H2/C1) **Los Alamos National Laboratory does not have an organization with the authority or responsibility to maintain day-to-day oversight of the line organizations to ensure compliance with environment, safety, and health requirements.**

TS.2 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and be properly and effectively used to support safe operation of all facilities on the site.

FINDINGS:

- Required facility safety documentation has been identified, including 33 SARs, 35 safety assessments, and 115 preliminary hazards analyses. However, only 12 of the SARs have been approved by DOE, and less than half of the other documentation has received approval.

CONCERN: **See Concern TSA-4, OP.3-1.**

FINDINGS:

- Content of safety analysis documents is not uniformly complete with respect to determination of applicable design criteria, definition of the safety envelope, and conduct of operations.
- Safety documentation is not adequately reviewed by independent reviewers.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.2-1) (H2/C1) **At the Los Alamos National Laboratory, the process for preparing and reviewing safety analysis documentation does not meet the requirements of AL 5481.1B. (Also see Concerns TSA-4, OP.3-3, and TSA-4, OP.3-4.)**

FINDINGS:

- LANL has not defined a hierarchy of procedures.
- LANL has not developed requirements for the preparation and use of procedures, other than standard operating procedures and special work permits.
- AR 1-3, "Standard Operating Procedures and Special Work Permits," does not provide detailed guidance or a required format for the preparation of standard operating procedures, and most line organization have failed to provide any internal guidance.
- Standard operating procedures are not required to be prepared in a step-wise manner as required by DOE 5480.19, and no other procedures are required to address ES&H issues.
- Standard operating procedures addressing ES&H issues are maintained in a formal document control system.
- LANL does not have a formal system to provide independent verification, by the Health and Safety and the Environmental Management Divisions or any other organizational unit, that standard operating procedures

are accurate, and that they have been prepared for all activities requiring them.

- The Safety and Risk Assessment Group has not prepared formal guidance to aid personnel in determining review requirements for standard operating procedures.

- LANL does not have a formal requirement that clearly defines approval authorities for all standard operating procedures, rather, it is left to the discretion of the line organizations.

- The Health and Safety and the Environmental Management Divisions have responsibilities for the ES&H review of standard operating procedures but do not have authority to approve or disapprove procedures or authority to enforce procedure revisions needed to address ES&H issues.

- The standard operating procedure database is inaccurate, and status updates provided by line organizations are not consistently incorporated.

- LANL does not have a formal mechanism to ensure that Health and Safety Division or Environmental Management Division personnel are not assigned review responsibilities for standard operating procedures they helped prepare.

- Reviews of standard operating procedures by the Health and Safety Division have often required over 60 days, resulting in standard operating procedures being implemented without review of safety, health, or environmental issues by the Health and Safety and the Environmental Management Divisions.

- Practices regarding the use of unapproved procedures are not consistent throughout LANL.

- Procedure controls for technical support activities and accelerator facility operations are not maintained and managed in accordance with DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and LANL administrative requirements.

- See Concerns TSA-4, OP.3-1; TSA-4, EA.2-1; TSA-4, EA.2-3; TSA-4, EP.2-2; TSA-4, ES.7-1; TSA-4, QV.1-6; TSA-4, PP.2-1; TSA-4, PT.1-3; TSA-4, MA.8-1; TSA-1, RP.3-1; TSA-4, AX.1-7; and Sections 4.5.4.11.2, EA.1, and 4.5.3.8.2, TS.2.

- The following concern was partially addressed by the LANL self-assessment.

CONCERN: (TSA-4) (TS.2-2) (H2/C1)

Los Alamos National Laboratory does not have a comprehensive system for procedure preparation, review, approval, oversight, and control to ensure that procedures accurately address potential health, safety, or environment issues for all activities as required by DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and Los Alamos National Laboratory AR.1-3.

FINDINGS:

- The Health and Environmental Chemistry Laboratory has not implemented a formal policy regarding the use of unapproved procedures for the analysis of samples from ES&H activities.
- The Health and Environmental Chemistry Laboratory has not consistently completed analyses for radiological environmental surveillance analyses within 90 days of collection as stated in DOE/EH-0173T, "Environmental Regulatory Guidance for Radiological Effluent Monitoring and Environmental Surveillance," January 1991.
- LANL has not established a requirement for verification and validation of computer software supporting ES&H activities as required by DOE 5480.19.
- The Health and Safety Division has not prepared formal guidance for field safety representatives and field industrial hygienists to aid them in providing consistent regulatory advice and interpretation.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.2-3) (H2/C1)

At the Los Alamos National Laboratory, the Health and Safety and the Environmental Management Divisions have not developed formal procedures or guidance to ensure that technical support to the line organizations is timely, consistent, and accurate as required by DOE 5480.19.

TS.3 FACILITY MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that assure proper design, review, control, implementation, and documentation in a timely manner.

FINDINGS:

- LANL is preparing as-built drawings for the Chemistry and Metallurgical Research Building (TA-3 Bldg. 29) in support of the interim SAR. An aggressive, well-managed program is under way to define safety-related drawings, to get them into a data base, to walkdown the systems, and to make the required changes on drawings.
- For many of the older LANL buildings, existing drawings do not reflect the current configuration. This situation derives from undocumented facility and equipment changes and, until recently, the lack of an as-built drawings program.
- Twenty-two critical Laboratory facilities have been identified which require as-built drawings. Only two of them, the Target Fabrication Facility (TA-35 Bldg. 213) and the Laboratory Building (Ice House, TA-41 Bldg. 4), have complete as-built drawings. A plan for completing the remaining critical facilities was not provided, but completion is estimated to require 4 to 5 years.
- The JCI group preparing as-built drawings has limited resources to respond to the LANL as-built drawings program needs.
- See Sections 4.5.2.8.2, TS.3, and 4.5.3.8.2, TS.3.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.3-1) (H2/C2) **The as-built drawings program does not reflect the need to update drawings and equipment specifications for critical facilities at the Los Alamos National Laboratory in a timely manner.**

FINDINGS:

- Modifications to facilities or experimental equipment can be made without using controlled design procedures or without independent review by safety specialists or other technical support personnel.
- TA-55 facility modifications do not receive appropriate review as required by DOE 5480.5.
- No formal accelerator facility modification and configuration control program is in place for Class B structures, systems, and components as required by DOE 5700.6B, DOE 5700.6C, DOE 5480.4, DOE 6430.1A and DOE 5480.19.

- The tritium and reactor facilities do not have formal control programs for experiment modifications as required by DOE 5480.5.

- See Sections 4.5.1.8.2, TS.3; 4.5.2.8.2, TS.3; and 4.5.3.8.2, TS.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.3-2) (H2/C1) **Los Alamos National Laboratory does not have a requirement or procedure for control of modifications to facilities or experimental equipment as required by DOE 5480.19, DOE 5700.6B, DOE 5700.6C, DOE 5480.4, and DOE 6430.1A.**

FINDINGS:

- Operational readiness reviews are not conducted consistently for startup of new facilities and experiments or following significant facility modifications.

- No approved readiness review program is in place within the accelerator organizations that meets the requirements of DOE 5481.1B and DOE 5480.19.

- See Section 4.5.3.8.2, TS.3.

- This concern was not addressed in the LANL self-assessment.

CONCERN: (TSA-4) (TS.3-3) (H2/C1) **Los Alamos National Laboratory does not have a plan or procedure for conducting operational readiness reviews that meets the requirements of DOE 5481.1B and DOE 5480.19.**

TS.4 EQUIPMENT PERFORMANCE TESTING AND MONITORING

PERFORMANCE OBJECTIVE: Effective equipment performance testing and monitoring should be performed by technical support groups to ensure that equipment and system performance is within established safety parameters and limits.

FINDINGS:

- LANL does not have a policy or formal requirements regarding the performance testing of miscellaneous safety-related equipment such as interlocks, pressure or temperature limiters, automatic gas-flow shut-off valves, special purpose alarms, or warning devices.
- Generally, LANL personnel interviewed were unaware of the importance of routine performance testing of safety-related equipment.
- Inventories of safety-related equipment that require performance testing were not found in the line organizations.
- Where performance tests are being conducted on systems, they are generally informal; that is, no testing frequencies or procedures and little documentation are provided.
- Since records of performance testing are not maintained, there is no trending of performance failures, and no information is available to develop preventive or predictive maintenance programs.
- The tritium and reactor facilities do not have a policy that provides specific guidance for collection and analysis of surveillance test data as required by DOE 4330.4A.
- An equipment performance testing, monitoring, and trending program has not been developed and implemented at LANL accelerator facilities in accordance with DOE 4330.4A.
- See Sections 4.5.2.8.2, TS.4, and 4.5.3.8.2, TS.4.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (TS.4-1) (H2/C1) **Los Alamos National Laboratory has no formal procedures or requirements that ensure that safety-related systems are performing satisfactorily as required by DOE 5480.19 and DOE 4330.4A.**

FINDINGS:

- An extensive data base is in place containing maintenance records of machines and equipment in the main shops. The data base is not effectively used to determine maintenance needs and predict the useful life of equipment.

- The scope of preventive and predictive maintenance programs in the main shops has been reduced as a result of funding cuts and is now limited to routine lubrication of machines.

CONCERN: **See Concerns TSA-4, MA.6-1, and TSA-4, MA.7-2.**

4.5.4.9 Packaging and Transportation

4.5.4.9.1 Overview

The S&H Subteam 4 packaging and transportation appraisal covered those aspects of transportation at LANL not specifically covered by S&H Subteams 1, 2, and 3, plus the more global aspects of the LANL packaging and transportation organization, training, QA, operations, and regulatory compliance.

The S&H Subteam 4 packaging and transportation appraisal considered 11 of the 12 performance objectives under the Packaging and Transportation technical area; intra-building movements of materials were not appraised.

The appraisal consisted of observations of a variety of transportation-related activities (packaging, transfers, shipping, and storage of hazardous materials and wastes, and a road closure operation), interviews and discussions with LANL management and with packaging and transportation staff members, review of both general and specific safe operating procedures and checklists, review of QA documents and self-assessment reports, and review of information obtained during several presentations by LANL packaging and transportation staff members.

The present packaging and transportation program at LANL is decentralized and uncoordinated, although LANL has a major restructuring under way to establish a sitewide, single point of transportation management in the Materials Management Division. At present, five organizations at LANL have independent and overlapping responsibilities in packaging and transportation: Environmental Management Division (for wastes), Design Engineering Division (for explosives), Nuclear Materials Technology Division (with Operational Security and Safeguards Division) (for special nuclear material), Isotopes and Nuclear Chemistry Division (for isotopes), and Materials Management Division (for everything else). VWR Corporation also receives, distributes, and ships hazardous materials.

The Health and Safety Division is responsible for setting safety standards and providing safety oversight for those operations, although it is noted that the self-assessment report for the Safety and Risk Assessment Group disclaimed any such activity or responsibility.

There is a shortage of packaging and transportation experts at LANL. Much of that expertise is organizationally diffused and not fully used for packaging and transportation activities. The communication system between the various organizations involved in packaging and transportation is poor; this is due at least partly to the lack of a Transportation Safety Committee and/or a Transportation Operations Committee. Major deficiencies, which present unacceptable safety hazards, were found in several areas. This results in a fragmented and inconsistent packaging and transportation program that is not under positive control. Some 50 groups in 16 divisions are involved in packaging and transportation, many of them "doing their own thing." This uncoordinated program has produced inefficiencies, information gaps, regulatory violations, and significant safety deficiencies.

The high level of conscientiousness and loyalty of the employees involved in packaging and transportation has overcome much of the overall program weakness and has allowed LANL to perform its transportation-related activities

relatively free from highly visible incidents. However, this has been in spite of the fragmented system, not because of it.

Major deficiencies uncovered during this appraisal include (1) the lack or incompleteness of formal safe operating procedures; (2) the lack or inconsistent use of checklists, with some expression by LANL staff members that such formality is not needed; (3) the lack of packaging and transportation safety review of the formal procedures and checklists that do exist; (4) the lack of training standards or employees requirements and a qualification and certification program for packaging and transportation workers, which has resulted in unqualified persons playing vital roles in packaging and transportation safety; (5) the lack of an effective safety oversight and safety audit program for all packaging and transportation activities, with the result that LANL is incapable of detecting many of the safety-related problems and regulatory violations that have occurred; (6) gross failures in hazard communication, evidenced by the high number of errors in marking and labelling of hazardous materials packages (especially gas cylinders), both in transit and in in-transit storage; and (7) the failure of LANL to apply basic risk management principles to packaging and transportation activities, with the result that LANL does not know the level of risk involved in its present operations. These safety matters present a high level of risk of injury and property damage, as well as cause the high number of violations of Federal regulations and DOE Orders.

A total of 26 concerns of sitewide significance have been identified in this report, four of them considered to be Category II. Many of these same concerns were noted by S&H Subteams 1, 2, and 3 in their specific areas of appraisal.

In addition to the LANL self-assessment findings, several of the concerns noted in this appraisal were also identified in the 1988 and 1989 AL appraisals, with a LANL response stating that the concerns had been noted and, in some cases, corrected. The lack of action in the past is discouraging.

It was apparent that LANL management is serious about correcting these many deficiencies and establishing a packaging and transportation program that will meet the DOE goal of "excellence in safety." LANL management has stated its willingness to commitment the necessary resources to the program. LANL management has also stated its understanding of the need to identify and correct the root cause of the problems.

LANL has several examples of quality packaging and transportation operations that demonstrated a high level of awareness of safety requirements and compliance with the regulations. Such examples are found in the Nuclear and Radiochemistry Group, the Material Control and Accountability Group, the Nuclear Materials Technology Division, and the Materials Management Division Gas Plant.

The LANL self-assessment, backed up by the excellent self-assessment done by the Materials Management Division, detected many of these problems, and corrective action is already under way, including centralization of packaging and transportation management control. The changes under way complicated this appraisal in that the entire packaging and transportation program at LANL is in a state of rapid transition. This does instill some confidence; however, that the safety culture at LANL has changed for the better.

Most of the division level self-assessments did not really indicate an understanding of the self-assessment philosophy. Most reports either ignored packaging and transportation completely or contained only glowing accounts of how wonderful their programs were. The fallacy of that approach was signified by the many deficiencies noted in this appraisal report, and in the parallel reports of Subteams 1, 2, and 3.

The lack of frequent oversight of the LANL packaging and transportation programs by LAAO and AL safety personnel is another major management deficiency. The lack of concern (including lack of followup of previous AL appraisals) over the packaging and transportation problems at LANL is also shown in the lack of LAAO and AL support for correction of those problems.

The crosswalk courtesy shown pedestrians by drivers is commendable. Beyond that, however, traffic and pedestrian safety needs improvement, particularly with the large volume of jogger and bicycle traffic and the use of carpools.

The good working relationships between the Materials Management Division and the Health and Safety Division staffs and the working divisions is also commendable and provides a solid basis for program consolidation.

4.5.4.9.2 Findings and Concerns

PT.1 ADMINISTRATION AND ORGANIZATION

PERFORMANCE OBJECTIVE: Management should develop and implement a system of policies and directives that will provide for effective implementation of Department of Energy Orders, particularly DOE 5480.3, DOE 1540.2, Federal and State regulations, and good industrial practices, in operations involving packaging and transportation of hazardous materials.

FINDINGS:

- The decentralized LANL packaging and transportation functions have resulted in (1) inconsistent application of safety regulations, DOE policies and requirements, and LANL policies and procedures, and (2) a transportation safety program for hazardous materials (including wastes) that is not under positive control. (See Concerns TSA-3, PT.1-1; TSA-4, OA.1-1; and TSA-4, PP.1-1.)

  - Control of hazardous materials shipments is organizationally dispersed with inconsistency of operations and inability of LANL management to assure itself of regulatory compliance.

  - Five independent LANL packaging and transportation operations exist -- (1) hazardous waste, (2) special nuclear material (3) explosives, (4) isotopes and (5) all other materials. VWR Corporation also receives, distributes, and ships hazardous materials.

  - The relationships between and responsibilities of the various personnel and organizations involved in packaging and transportation are not clearly stated. A major restructuring is under way.

  - The Laboratory shipping and receiving program, described in Materials Management Division Procedure MMM-2-1 (untitled), October 1984, is no longer valid due to reorganizations and reassignments of responsibilities; a revision is in preparation.

  - Responsibility for packaging activities is decentralized among 16 operating divisions at 50 locations, with little coordination to ensure either consistency or regulatory compliance.

  - The Waste Management Group routinely arranges for and makes both onsite transfers and offsite shipments without first consulting with, or making post-shipment notification to the Property Management Group, the Supply and Distribution Group, or the Safety and Risk Assessment Group, contrary to Procedure MMM 2-2 (untitled), December 1986. This includes tariff and schedule negotiation with

commercial carriers, which is specifically prohibited by Procedure MMM 2-2.

- LANL does not require that offsite shipments of special nuclear material by via the DOE Safe Secure Trailer system be part of the overall LANL packaging and transportation program.

- Divisional Hazardous Materials Coordinators and Waste Management Coordinators are generally conscientious and well trained but are not routinely in good communication with the Property Management Group or the Safety and Risk Assessment Group; their packaging and transportation responsibilities are often not clearly identified or assigned.

- Signature authority for packaging and transportation operations (manifests, material transfer forms, checklist verifications) is not formalized and often not clearly assigned.

- ANSI standards for packaging and transportation of hazardous materials are largely ignored in LANL packaging and transportation operations.

- A centralized repository for shipment or packaging documentation does not exist. The total scope of LANL packaging and transport operations could not be determined in this appraisal.

- See Concerns TSA-4, TS.1-1; TSA-3, PT.1-1; and TSA-2, PT.1-1.

- LANL has not issued a basic transportation safety policy statement. The ES&H policy on hazardous materials transportation, stated in the ES&H Manual, is brief and general. (See Concerns TSA-4, OA.1-1, and TSA-4, OA.3-1.)

- AR 3-5, "Shipment of Radioactive Materials", January 1991, is not up-to-date regarding policies and practices for approvals of both onsite transfers and offsite shipments.

- LANL does not have a system for incorporating packaging and transportation needs in its future safety planning program.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.1-1) (H2/C2) **The Los Alamos National Laboratory packaging and transportation program is fragmented and inconsistent, is not operating as a uniform sitewide program, and does not meet the requirements contained in DOE 5480.3 and DOE 5480.19.**

FINDINGS:

- Many packaging and transportation operations are conducted without approved detailed safe operating procedures. (See Section 4.5.2.9.2, PT.1, and Concern TSA-4, ES.7-1.)
- Many safe operating procedures do not reflect the use of the latest version of the Hazardous Materials Transfer Form (HMTF). (See Section 4.5.4.9.2, PT.8.)
- Numerous instances were noted where procedures had been written but operating personnel had not been trained in the procedures (e.g., in the Waste Management Group). (See Section 4.5.2.9.2, PT.2.)
- There is no requirement for independent Health and Safety Division review of divisional packaging and transportation work procedures and safe operating procedures for consistency, adequacy, or regulatory compliance.
  - When the Health and Safety Division reviews divisional safe operating procedures, it sometimes fails to seek (or recognize a need for) a review of the sections related to packaging and transportation by its own packaging and transportation personnel (Safety and Risk Assessment Group).
  - Safety and Risk Assessment Group review of the packaging and transportation aspects of safe operating procedures is backlogged several months. The stated reason was lack of manpower.
- LANL lacks formality of operations in packaging and transportation activities, in that its work procedures, safe operating procedures, and checklists routinely do not require approval signatures.
- See Concerns TSA-4, TS.2-2; TSA-4, QV.1-6; TSA-1, PT.1-1; TSA-1, PT.1-2; and Section 4.5.3.9.2, PP.6.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.1-2) (H1/C1)

Los Alamos National Laboratory does not have an effective system for preparation, use, and safety review of packaging and transportation procedures as required by DOE 5480.3, DOE 5480.19, and ASME NQA-1-1989.

FINDINGS:

- There is no Transportation Safety (or Operations) Committee representing all major packaging and transportation organizations. No organization exists to resolve mutual transportation safety and operational problems and to provide consistent solutions and coordinated implementation of sitewide packaging and transportation policies and procedures.

- Communication channels exist between the various packaging and transportation activities, but they are not formalized or even well known or used by all LANL packaging and transportation personnel; multiple and inconsistent sources of information and standards compound this communications problem.

- The LANL Onsite Transportation Manual is neither current nor effective; there is no LANL offsite transportation manual. (See Sections 4.5.4.9.2, PT.8, and 4.5.4.9.2, PT.9.)

- The ES&H Council and the divisional ES&H officers do not play an active role in packaging and transportation activities or reviews. The packaging and transportation responsibilities of the ES&H officers are not documented.

- The following concern was identified in the Materials Management Division self-assessment.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.1-3) (H3/C2) **Los Alamos National Laboratory has not established an effective internal communication system for resolution of common packaging and transportation problems.**

FINDINGS:

- Resources for packaging and transportation activities at LANL is a long-standing problem.

  - The Packaging and Transportation Section of the Safety and Risk Assessment Group has seven staff members who are well trained and experienced in packaging and transportation; two of those staff members are on loan from operating divisions and are due to return to their parent divisions within a few weeks.

  - Many of the groups and divisions having packaging and transportation responsibilities are unable to fulfill their assigned safety responsibilities because their available resources are limited.

  - LANL plans for restructuring the packaging and transportation function and increasing its resource allowances are noted. However, there is no approved staffing plan for this restructuring.

- See Concerns TSA-4, OA.2-1; TSA-4, OA.4-1; TSA-4, PT.3-2; and TSA-4, PP.1-2.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **(TSA-4)** **(PT.1-4)** **(H2/C1)**	**Los Alamos National Laboratory does not have a plan for managing, organizing, and using its packaging and transportation resources to meet presently assigned functions and does not meet the requirements contained in DOE 5480.3, DOE 5480.19, and DOE 5480.20.**

PT.2 TRAINING

PERFORMANCE OBJECTIVE: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE 5480.3 and 49 CFR.

FINDINGS:

- There is no formalized, documented sitewide packaging and transportation training, qualification, or certification program; training is unstructured, unfocused, and inconsistent.
  - There is no centralized management or coordination of packaging and transportation training. Training is being done, but there is no sitewide system. Formal on-the-job training (with records) is not widely used at LANL. (See Concern TSA-1, PT.2-1.)
  - There is no effective, centralized sitewide system for maintenance of hazardous materials training records for all LANL employees. The Safety and Risk Assessment Group has attempted to do this but is swamped with data and is now a year or so in arrears in processing the information.
  - LANL is not monitoring training for JCI, M&H, and VWR employees.
  - There is no sitewide program for evaluation of adequacy of packaging and transportation training. Testing is often verbal and undocumented.
  - There was no evidence of a sitewide system for ensuring that all hazardous materials workers receive the recurrent training and biennial recertification required by the HAZPACT Quality Assurance Manual and by DOE 5480.3.
  - There was no evidence that LANL has undertaken the preparation of a Training Implementation Matrix for packaging and transportation training, required by DOE 5480.20 for submission to DOE prior to November 8, 1991.
  - See Section 4.5.1.9.2, PT.2.
- All packaging and transportation hazardous materials employees and drivers are not required by LANL to be qualified and certified as being appropriately trained and tested in accordance with the requirements contained in 49 CFR 173.1(b), 177.816, 391-393, and 396. (See Concern TSA-4, PT.4-2.)
- No effort is being made to check with the State of New Mexico to determine drivers' records of violations.

- There is no visible or documented program for incorporating "lessons learned" from accidents and incidents involving transportation of hazardous materials.

- Safety oversight of the various packaging and transportation training programs and criteria is not required by LANL management and is not consistently and independently performed. (See Concerns TSA-4, PT.4-1, and TSA-4, PT.3-3.)

- LANL has not established sitewide standards (functional job qualifications and training requirements) for packaging and transportation training programs for hazardous materials employees to ensure compliance with Department of Transportation regulations, DOE 5480.3, and DOE 5480.20, including standards, certifications and recertifications, records, and hazardous materials operating authority.

- Operating divisions determine their own training requirements, conduct or arrange for the training, and then evaluate the effectiveness of the training.

- LANL does not have a sitewide procedure specifying uniform training standards and certification qualifications for hazardous materials vehicle drivers, such as the requirements for commercial driver's license, New Mexico hazardous materials endorsement, specified hazardous materials-related training, management certification, and LANL identification.

  - The LANL action plan in response to a similar finding in the 1988 AL packaging and transportation appraisal at LANL stated this would be done by February 1989, but it still has not been done.

- See Concerns TSA-3, PT.2-1; TSA-4, TS.1-1; and TSA-2, PT.2-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.2-1) (H1/C1)

Los Alamos National Laboratory does not conduct and document packaging and transportation training and has not set sitewide training and qualification standards for packaging and transportation employees in accordance with DOE 5480.3, DOE 5480.20, DOE 5610.1, 49 CFR, 40 CFR, 29 CFR, and ASME NQA-1-1989.

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures the quality assurance requirements of the applicable Department of Energy Orders, especially DOE 5700.6B, and ASME NQA-1-1989 are met.

FINDINGS:

- The HAZPACT Quality Assurance Manual covers packaging and transportation of radioactive materials but does not cover other hazardous materials (e.g., acids, explosives, gas cylinders).
- See Concerns TSA-4, QV.1-1, and TSA-3, PT.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.3-1) (H3/C1) **The Los Alamos National Laboratory packaging and transportation quality assurance manual does not meet the requirements of DOE 5480.3, DOE 5700.6B, and DOE 5700.6C.**

FINDINGS:

- There is no documented sitewide internal QA audit and appraisal program for packaging and transportation. Few independent internal audits of LANL packaging and transportation activities have ever been performed.
- The Safety and Risk Assessment Group has the responsibility (stated in the HAZPACT QA Manual) to perform oversight appraisals on all LANL packaging and transportation operations. Such appraisals are performed only on request by an operating group.
- LANL has received several external appraisals related to packaging and transportation over the past few years (the AL appraisals in 1988 and 1989 and the Livermore appraisal early in 1991), but action on many of the findings is still pending.
- The LANL response to Finding QA-4 of the 1988 AL appraisal stated that this audit program would be initiated in 1989 and fully implemented by September 1990; this has not been done.
- The LANL system for tracking audit findings fails to provide an effective closed loop for timely corrective action; many instances were noted of no timely action, incomplete action, and errors in closure dates.
- Although LANL management has frequently stated its resolve to correct ES&H problems, it has not demonstrated the organizational ability to detect them; LANL staff was unaware of many of the problems identified in this appraisal.

- See Concerns TSA-4, QV.1-2; TSA-3, PT.3-1; TSA-2, PT.3-1; TSA-2, PT.11-1; and TSA-1, PT.3-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.3-2) (H3/C1) **The Los Alamos National Laboratory independent internal quality assurance audit program for packaging and transportation does not meet the requirements of DOE 5480.3, DOE 5480.19, DOE 5482.1B., DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.**

FINDINGS:

- There is no comprehensive independent safety oversight program for packaging and transportation in place at LANL.

  - The Safety and Risk Assessment Group does provide some limited oversight but is also involved with providing operational functions in packaging and transportation, so has conflict of interest in some areas.

  - The Health and Safety Division has the independent authority and the management directive to provide packaging and transportation program oversight appraisals of LANL operating divisions, as provided for in HAZPACT Quality Assurance Manual, QP-06, "Operating Group Appraisals," July 1989. However, scheduled appraisals are not being conducted. The Health and Safety Division, which is responsible for setting safety standards and providing safety oversight for those operations, stated in its self-assessment report for the Safety and Risk Assessment Group, that it disclaimed responsibility!

- The Health and Safety Division provides operational packaging and transportation assistance to operating divisions and, at the same time, oversight of their packaging and transportation operations, with resultant conflict of interest. There is no other independent system of checks and balances to ensure safety oversight of essential safety functions in packaging and transportation.

- There is no QA program for verifying integrity of new steel drums and other packaging received from offsite vendors. Vendor site visits have not been made.

- See Concerns TSA-4, TS.1-2; TSA-4, PT.1-4; TSA-1, PT.1-1; TSA-2, PT.3-1; TSA-3, PT.1-2; and TSA-3, PT.3-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.3-3) (H1/C1) CAT. II

Los Alamos National Laboratory does not have an internal transportation safety oversight program in place that will ensure and measure compliance with the applicable Department of Transportation and Environmental Protection Agency regulations and with DOE 5400.1, DOE 5480.3, DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.

FINDINGS:

- Checklists used for preparing packages of hazardous materials for onsite transfers or offsite shipments are often nonexistent or are general in nature. Sitewide standards for development, use, signature approval, or retention of checklists were not found.
- A 1989 AL appraisal noted that checklists were not being used, but that a LANL checklist system was being developed. The Safety and Risk Assessment Group response (undated) to that appraisal stated that the checklist system had been completed and was already in use. No system was found.
- No checklists or other procedures focus on meeting the Department of Transportation QA requirements in 49 CFR 173.475.
- Checklists are not consistently used in vehicle maintenance and inspections.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.3-4) (H1/C1) CAT. II

At Los Alamos National Laboratory, checklists for packaging and transportation operations do not meet the requirements contained in DOE 5480.3, DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, and their use is not consistent sitewide.

FINDINGS:

- LAAO and AL have provided only minimal safety oversight of LANL packaging and transportation programs; there has been little direct interest by or regular interaction between DOE and LANL personnel on packaging and transportation problems or proposed solutions.
- Neither AL nor LAAO perform frequent safety audits or appraisals of LANL packaging and transportation operations. AL conducted an appraisal of LANL packaging and transportation operations in 1988, finding that the overall operation is satisfactory. A limited appraisal was done in 1989. Another appraisal has been scheduled for 1992. Appraisals every few years do not constitute routine oversight. (See Concern TSA-1, PT.1-1.)
- Neither the AL nor the LAAO self-assessment reports contain information on packaging and transportation; this reflects their past interest in the packaging and transportation program at LANL.

- The AL audit tracking system is ineffective in following up on findings from previous AL appraisals. (See Section 4.5.2.9.2, PT.3.)

- See Concerns TSA-4, QV.1-3; TSA-4, QV.1-4; and TSA-2, PT.11-2.

- The following concern was not addressed in the AL self-assessment.

CONCERN: (TSA-4) (PT.3-5) (H3/C1) **The Albuquerque Field Office does not provide safety oversight of Los Alamos National Laboratory packaging and transportation operations, as required by DOE 5482.1B.**

FINDINGS:

- The following concern was not identified in the LAAO self-assessment.

CONCERN: (TSA-4) (PT.3-6) (H3/C1) **The Los Alamos Area Office does not provide safety oversight of Los Alamos National Laboratory packaging and transportation operations as required by DOE 5482.1B.**

PT.4 REGULATORY COMPLIANCE

PERFORMANCE OBJECTIVE: All packaging and transportation operations involving hazardous materials should be conducted in compliance with the applicable Federal and State regulations, including those of the Department of Transportation, the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and the Environmental Protection Agency.

FINDINGS:

- There is no sitewide system for ensuring and measuring compliance with applicable DOE Orders and Federal regulations.
- There is no system for ensuring that amendments to regulations and changes to Federal regulations and DOE Orders are disseminated and incorporated into written procedures and operations. (See Concern TSA-3, PT.4-1.)
- There is no formal system for providing the training required to meet new regulatory requirements. (See Section 4.5.4.9.2, PT.2.)
- See Concerns TSA-3, PT.4-1, and TSA-2, PT.4-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.4-1) (H2/C1) **Los Alamos National Laboratory does not have a reliable sitewide system for ensuring compliance with the requirements of DOE 5480.3 and Department of Transportation regulations.**

FINDINGS:

- There is no system or procedural requirement for prior approval of movements, transfers, and shipments of hazardous materials by local competent authority, including a requirement that such operations be conducted only by trained, qualified, and certified personnel.
- There is no formal system for authorizing individual operating divisions to certify and make shipments of hazardous materials.
- Shipping personnel in TA-41 Bldg. W4 do not ensure compliance with the approved conditions of the 89001 package approval certificate. (See Concern TSA-2, PT.4-2.)
- One placarding and labelling incident observed during the appraisal involved several violations of Department of Transportation (DOT) regulations, DOE 5480.3, DOE 1540.1, and the LANL Onsite Transportation Manual. Violations included improper vehicle placarding, improper labeling and tiedown of a compressed gas cylinder, and untrained handlers and vehicle operator.

- During the appraisal, the operator of a pickup truck parked his vehicle on a slight grade outside of TA-16 Bldg. 360 with the engine running but did not apply the manual brake. He then went inside the building. The unattended truck rolled backwards, off the paved parking area, into a ditch and some small trees. The operators had not received driver training.

- Hand-carrying of hazardous materials is not prohibited, and in fact has frequently occurred.

- See Concern TSA-4, PT.2-1.

- The following concern was identified in the Materials Management Division self-assessment.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.4-2) (HI/CI) CAT. II

Contrary to the requirements contained in 49 CFR, DOE 5480.3, and DOE 5480.20, Los Alamos National Laboratory procedures do not preclude loading or transport (including operation of vehicles) of hazardous materials by unqualified, untrained, and uncertified personnel.

FINDINGS:

- A drum containing beryllium and depleted uranium had been transported over public roadways by the Material Control and Accountability Group from the Weapon Subsystems Group (TA-41 Bldg. 4) to the Fabrication and Assembly Group (TA-16 Bldg. 410). The drum had no labels or markings to indicate the contents, other than a piece of paper taped to the drum lid.

- Hazardous waste materials stored at the Tritium Salt Facility and in TA-33 do not meet the storage and inspection requirements of 40 CFR. (See Concern TSA-2, PT.4-1.)

- In Wing 9, Chemical and Metallurgical Research Building, several drums had signs attached saying "Contaminated Lead" but with no indication of the nature or level of the contamination, no labels, no DOT name of contents, and no radiation symbols.

- Dumpsters used for carrying packages of suspect or low specific activity waste to TA-54 are not marked in accordance with the DOT regulations; inner boxes (designated as the primary "strong tight container") are not marked and identified in accordance with the DOT regulations. The waste is classified as "low specific activity (LSA)" material (which requires vehicle placards), but in fact, it has not been shown that the waste actually falls into that category. If the materials do not qualify for designation as LSA; their

transportation in placarded Dumpster vehicles is contrary to DOT regulations.

- "Contaminated" clothing shipments are made to an offsite laundry, the shipments are improperly classified as LSA (radioactive) material rather than "limited quantity." The laundry is shipped in metal bins marked "Radioactive" and on vehicles improperly placarded as containing LSA materials.

- An Isotopes and Nuclear Chemistry Division staff member stated that it was easier to arbitrarily classify waste as LSA or "suspect radioactive waste" for disposal purposes than to take the time to perform radiological surveys.

- Several instances of hazardous chemicals stored in unmarked and unlabelled drums were noted, in violation of OSHA regulations for hazard communication.

- A grease truck at the heavy equipment maintenance facility was observed to be improperly placarded.

- See Concerns TSA-4, PT.8-3; TSA-4, WS.6-1; and TSA-4, PP.6-5; and Section 4.5.1.9.2, PT.7.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.4-3) (H1/C1) **At the Los Alamos National Laboratory, marking and labelling of packages, and placarding of vehicles, do not conform to Federal regulations 49 CFR and 29 CFR.**

PT.5 ACCIDENTS AND INCIDENTS

PERFORMANCE OBJECTIVE: Accidents and incidents involving packaging and transportation of hazardous materials should be reported in a timely manner to Department of Energy.

FINDINGS:

- Sitewide procedures for reporting accidents or incidents are incomplete and inconsistent. LANL policy on whether an incident should be reported in a "Non-Conformance Report" or an off-normal "Occurrence Report" is not clear; no specific sitewide procedures exist.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.5-1) (H3/C1) **Los Alamos National Laboratory packaging and transportation accident and incident reporting procedures do not conform to DOE 5000.3A.**

PT.6 OPERATIONS

PERFORMANCE OBJECTIVE: Sitewide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted practices.

FINDINGS:

- There has been no sitewide safety assessment of the overall packaging and transportation operations and system.
- There is no documented sitewide system for incorporating the provisions of "as low as reasonably achievable" into procedures for packaging and transportation of hazardous materials.
- Shipping casks used to move highly radioactive target materials from the Clinton P. Anderson Meson Physics Facility to TA-48 (Isotopes and Nuclear Chemistry Division) and to move highly radioactive wastes from TA-48 to TA-54 (Environmental Waste Management Group) were constructed decades ago without apparent regard to transportation safety considerations. No safety and risk assessment has been made of the capability of those casks to withstand credible transport accidents or the consequences of such accidents. Their structural integrity is unknown, as is the QA of their welds.
- The LANL action plan in response to a 1988 AL appraisal indicated that the safety assessments for the existing noncompliant packaging would be completed by December 1993, 5 years after the appraisal. The effort has not yet started.
- See Sections 4.5.3.9.2, PT.6, and 4.5.2.9.2, PT.6.
- Many packaging and transportation operations are conducted without benefit of approved safety procedures. (See Concerns TSA-4, PT.1-3, and TSA-3, PT.8-1.)
- The existing packaging and transportation requirements in the HAZPACT-PP-01 QA program are not implemented by the Plutonium Metallurgy Group or the Nuclear Materials Management Group.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.6-1) (H2/C1) **Los Alamos National Laboratory does not require the consistent application of basic risk management principles to its transportation safety program and has not assessed the level of risk involved in its present operations as required by DOE 5480.19.**

FINDINGS:

- Shipping papers prepared by the Environmental Waste Management Group for waste shipments are not reviewed for accuracy and consistency by the LANL Traffic Manager (in the Materials Management Division). The same is true for special nuclear material shipments via the Safe-Secure Trailer system.
- Shipping manifests do not show specific identification of the container type or serial number as required. At a later date, it is difficult to track a specific package to its manifest.
- Many instances were noted where the LANL Hazardous Materials Transfer Forms (HMTFs) were not completely filled out. (See Concern TSA-4, PT.8-4.)
- See Sections 4.5.1.9.2, PT.6, and 4.5.2.9.2, PT.8.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.6-2) (H3/C1) **At the Los Alamos National Laboratory, manifests for offsite shipments and onsite transfers do not meet the requirements of DOE 5480.3 and Department of Transportation regulations.**

FINDINGS:

- There are several areas (e.g., Pajarito Road, TA-53 access from Jemez Road, upper Jemez Road) where carpool vehicles and buses load and unload passengers. These areas have high speed limits, poor shoulder areas, and no marked pedestrian crossings. At rush hours, a significant potential for injury to pedestrians and risk of vehicle collision exists in the areas due to the lack of traffic control.
- Numerous LANL "Deficiency Tickets" have been filed with the LANL Traffic Control Committee, but no action has been taken.
- Numerous statements were heard during the appraisal about the lack of speed limit enforcement by the Los Alamos Police Department. The LANL security force does not have authority to enforce traffic regulations.
- Pedestrians, joggers, and bicyclists are numerous at LANL, but the mix of slow and fast traffic is not well provided for. There is a pedestrian awareness program (focused on crosswalk protection), but no bicycle/jogger awareness program. There are few (if any) bicycle/pedestrian warning signs. Bicycle routes are not marked.
- Bikeway provisions on the Canyon Bridge do not meet Department of Transportation safety standards. Bridge

railing height is adequate (54"); bikeway width is not (only 5'6").

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.6-3) (H2/C2) **At Los Alamos National Laboratory, traffic safety control provisions for car pools, pedestrians, and bicyclists do not reflect current usage or needs.**

PT.8 ONSITE TRANSFERS

PERFORMANCE OBJECTIVE: Onsite transfers of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable standards and accepted safety practices.

FINDINGS:

- The LANL Onsite Transportation Manual, published in 1988, contains standards and procedures for intra-Laboratory (onsite) transfers. It is widely used but is not accurate, consistent, or current.
- The Onsite Transportation Manual has been informally withdrawn for revision, but not all users are aware of the withdrawal. The Onsite Transportation Manual is still being used by some divisions, for lack of other guidance.
- See Concern TSA-3, PT.8-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.8-1) (H2/C1) **Los Alamos National Laboratory does not have effective approved procedures covering onsite transfers of hazardous materials as required by DOE 5480.3.**

FINDINGS:

- There are written procedures but no documented safety standards for road closure for those intra-Laboratory (onsite) transfers of packages which do not otherwise meet Department of Transportation (DOT) regulations.
- See Concern TSA-3, PT.8-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.8-2) (H2/C2) **Los Alamos National Laboratory procedures for road closures have not been reviewed for safety effectiveness as provided for in DOE 5480.19.**

FINDINGS:

- LANL has numerous problems in onsite transfers of gas cylinders (unauthorized movements, wrong labelling, incompatible loading and storage, paperwork errors). The problems are resolved on a case-by-case basis, rather than a sitewide basis.
- Gas cylinders are transferred from various onsite locations to the Gas Plant with incorrectly described contents and incorrect labelling and placarding. Cylinders are described and marked "Residual" even though they are one-half or even three-quarters full. Such

marking is a violation of the DOT regulations 49 CFR 173.1 and 173.29 (b).

- Compressed gas cylinders which are empty or which contain residues of their former contents are stored in the open in TA-6 and TA-54; labels and other identification marks have deteriorated in the weather making it difficult to identify potentially hazardous contents.

- The lack of labels and contents marking of gas cylinders, both in storage (e.g., TA-8, TA-33, TA-54) and in transit, leaves emergency response personnel uninformed as to the hazardous nature of the contents and the degree of hazard presented.

- A review of sample shipping papers for gas cylinders show numerous errors in selecting the proper shipping name for compressed gases.

- See Concerns TSA-2, PT.4-3; TSA-4, PT.4-3; TSA-4, WS.3-1; and TSA-4, PP.6-5.

- The following concern was identified in the LANL self-assessment.

CONCERN: **At the Los Alamos National Laboratory, gas cylinders are stored and transported without proper labelling, marking, and vehicle placarding, contrary to the requirements contained in 49 CFR and DOE 5480.3.**
(TSA-4)
(PT.8-3)
(H1/C1)
CAT. II

FINDINGS:

- There is no sitewide procedure (requirements) or detailed instructions for use, approval, record maintenance, and implementation of the Hazardous Materials Transfer Form (HMTF).

- As detected by Safety and Risk Assessment Group in review of the HMTFs there has been an average of approximately 100 nonconforming documentation errors in the use of this form each month during the past 12 months.

- No sitewide training sessions have been held on the use of the HMTF.

- Several instances were noted during this appraisal of the use of an obsolete versions of the HMTF.

- See Concerns TSA-2, PT.10-1, and TSA-1, PT.6-1.

- The following concern was identified in the LANL self-assessment.

CONCERN:	**At Los Alamos National Laboratory, incorrect use of the**
(TSA-4)	**Hazardous Materials Transfer Form results in the shipping**
(PT.8-4)	**paper documentation requirements of DOE 5480.3 and the**
(H3/C1)	**Department of Transportation regulations not being met.**

PT.9 OFFSITE SHIPMENTS

PERFORMANCE OBJECTIVE: Offsite shipments of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures that ensure conformance with applicable regulations, standards, and accepted practices.

FINDINGS:

- There is no LANL offsite transportation manual setting forth standards, authorities, and procedures for consistency of operations and regulatatory compliance for offsite shipments of hazardous materials.
- Three separate organizations involving multiple shipping points have offsite shipping authority with no requirement for central review or coordination. A fourth organization packages, marks, labels, and releases offsite shipments direct to the carrier after MAT Transportation arranges for the transport service and completes the shipping papers. Also, a fifth organization prepares their own packages and shipping papers, which are then reviewed by MAT Transportation before offsite shipment. (See Concern TSA-4, PT.1-1.)
- There is no LANL requirement for each shipping organization or geographical area to assign a trained packaging and transportation representative to coordinate packaging and transportation activities.
- Contrary to the requirements contained in DOE 1540.1, there is no central office at LANL for review or filing of shipping papers.
- There are no sitewide procedures for vehicle loading and package tiedown as required by DOE 1540.1, Chapter II.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.9-1) (H2/C1) **Approved procedures for offsite shipments from Los Alamos National Laboratory are not established as required by DOE 5480.3. and DOE 1540.1.**

PT.10 RECORDS

PERFORMANCE OBJECTIVE: Records of hazardous materials movements, transfers, and shipments should be prepared and maintained to ensure compliance with Department of Energy and other regulatory requirements and to provide an auditable trail of actions.

FINDINGS:

- There are no sitewide standards or requirements for record storage, maintenance, and retention that apply to packaging and transportation activities that meet the requirements of DOE 5480.3.
- There is no effective mechanism for providing DOE record retention requirements to the operating divisions. Each division sets its own standards, which results in inconsistent procedures.
- There is no centralized storage or management of shipping records. (See Concerns TSA-4, QV.1-5, and TSA-2, PT.10-1.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.10-1) (H3/C1) **Maintenance of shipping records at the Los Alamos National Laboratory does not meet the requirements of DOE 5480.3, DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.**

PT.12 PACKAGING AND STORAGE PROCEDURES

PERFORMANCE OBJECTIVE: All packaging and storage procedures for hazardous material are in conformance with DOE 5480.3, 49 CFR, and 40 CFR.

FINDINGS:

- There is no central repository for packaging maintenance records. (See Concern TSA-4, QV.1-5.)
- There is no sitewide program for tracking scheduled packaging maintenance.
- There are no sitewide standards or procedures addressing when and how to do packaging maintenance and repairs; there is no clear definition of who is responsible for package maintenance. (See Section 4.5.4.9.2, PT.1.)
- There is no system for ensuring that the maintenance program for reusable packaging meets DOE 5480.3 and 49 CFR 173 (i.e., to ensure no loss of integrity due to storage conditions).
- There is no documented program to prevent others from doing repair work.
- LANL does not have an effective system for forecasting future packaging needs. The system for maintaining inventories of hazardous materials packages in HAZPACT-PP-01, HAZPACT Quality Assurance Manual, April 1989, has not been implemented.
- Decertified packagings have not been replaced with new packagings.
- Many reusable packagings, including gas cylinders, steel drums, and Type B radioactive materials containers, are stored outside, subject to the full range of weather conditions, resulting in deterioration of packaging integrity and safety assurance and loss of clear identity of container type.
- See Concerns TSA-4, PT.1-2; TSA-4, PT.6-1; TSA-2, PT.1-2; TSA-2, PT.6-1; and Section 4.5.1.9.2, PT.4.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.12-1) (H2/C1) **The Los Alamos National Laboratory program for the storage, maintenance, and inventory of packagings does not meet the requirements of DOE 5480.3.**

FINDINGS:

- Wooden boxes manufactured by the Property Management Group for shipping explosives do not meet the Department of Transportation Specification 15A requirements of 49 CFR 178.168, "Wooden Boxes, Nailed." The manufacturer's

(LANL) marked identification on the boxes does not meet 49 CFR 173.22(a)(3)(i) and 49 CFR 173.24(c)(1)(ii).

- Production-run tests have not been performed to demonstrate that the boxes, as manufactured, will perform as designed.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PT.12-2) (H3/C1)

Los Alamos National Laboratory ships explosives in boxes which do not meet the requirements of Department of Transportation regulations 49 CFR 173 and 178.

4.5.4.10 Security/Safety Interface

4.5.4.10.1 Overview

The appraisal addressed all four of the performances objectives in the Security/Safety Interface technical area. The appraisal included visits to TA-33; TA-41; TA-55; Bldg. AW-23 (Betatron); TA-3 Bldgs. SM-29, (Chemistry and Metallurgical Research Building), SM-43, and SM-164; and the Live Fire Range. Interviews were conducted with representatives of these facilities, the LANL Operational Security and Safeguards Division, the LANL Safety and Risk Assessment Group, and M&H management and security inspectors. Documents reviewed included safety analyses, General Security Orders and Station Orders, and emergency procedures.

The protective force personnel are generally competent in performing their assigned duties. The M&H General Security Orders and Station Orders have good scope and detail. LANL facility and Operational Security and Safeguards Division management are responsive in addressing security-related concerns brought to their attention. However, deficiencies were identified in the areas of emergency egress, emergency planning, protective force training, analysis of the safety impacts of security activities, and protective force injury experience.

Security and safeguards improvements and modifications are processed through the same review and approval system as modifications for other purposes. However, the S&H Subteams identified deficiencies in the overall review process.

The General Security Orders and Station Orders include provisions for emergency access and egress and satisfactorily address emergency vehicles. However, several deficiencies related to personnel emergency egress resulting from security barriers were observed. LANL staff took prompt actions to address the individual deficiencies brought to their attention. However, the number identified by the S&H Subteams and LANL employees indicates that LANL does not have a systematic, proactive process to identify and correct potentially serious security-related emergency egress interferences. No cases were identified in which loss of power to electrically operated barriers would preclude emergency access or egress. There are provisions for fire department emergency access, with or without protective force personnel presence.

Although the Security Orders address emergencies of various types, and some facility emergency plans briefly address security emergencies and duties of protective force personnel in other emergencies, interfacing responsibilities of facility and protective force personnel are not explicitly described. Analyses of the potential safety consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems and components and hazardous or radioactive materials have not been performed. Consequently, training of protective force personnel in this area has not been possible.

A program, called the Precincts Program, has been initiated for the purpose of identifying facility-specific hazards training needs for the protective force, fire department, and other emergency response personnel. This program is in the developmental stage, and training is not being provided at this time. Protective force personnel do receive the general employee safety training,

including radiation and hazardous materials training (although brief and undocumented (see Section 4.5.1.5.2, TC.4)). Protective force personnel are not provided with or trained in the use of special equipment for protection against radioactive or hazardous materials to which they might be exposed when responding to facility emergencies.

Injury rates for M&H protective force personnel are substantially higher than those for all DOE security contractors, and management has not taken actions to decrease the injury rates.

The LANL self-assessment identified five of the seven concerns expressed in the Security/Safety Interface technical area by S&H Subteam 4. One of the other two concerns was partially identified. The LANL self-assessment also identified a number of deficiencies not identified by S&H Subteam 4. The self-assessment demonstrates a familiarity with, and understanding of, the TSA performance objectives and criteria, which were used by LANL for the Security/Safety Interface technical area assessment. Taken as a whole, including the division and group self-assessments, the LANL self-assessment process is judged to have been thorough and effective in identifying security/safety interface deficiencies.

4.5.4.10.2 Findings and Concerns

SS.1 SAFETY OF IMPROVEMENTS

PERFORMANCE OBJECTIVE: Security/safeguards improvements and modifications should not create or increase hazards that would impede the safe, reliable operation or shutdown of any facility on the site in normal, abnormal, or emergency situations.

FINDINGS:

- Security/safeguards improvements and modifications at LANL are processed through the same review and approval process as modifications for other purposes. However, deficiencies in the general LANL review process were identified by the S&H Subteams.

  - Modifications to facilities or experimental equipment can be made without using controlled design procedures or without independent review by safety specialists or other technical support personnel. (See Sections 4.5.4.8.2, TS.3; 4.5.1.8.2, TS.3; and 4.5.2.12.2, FR.2.)

  - Operational readiness reviews are not conducted consistently for startup of new facilities and experiments or following significant facility modifications. (See Section 4.5.4.8.2, TS.3.)

CONCERN: **See Concern TSA-4, TS.3-2.**

SS.2 EMERGENCY ACCESS AND EGRESS

PERFORMANCE OBJECTIVE: Authorized facility and safety support personnel should not be denied access in an emergency. Egress during emergencies should be conducted according to approved preplanning.

FINDINGS:

- Several emergency egress impediments caused by security doors and gates at LANL plutonium and enriched uranium facilities were observed by S&H Subteam 1. (See Section 4.5.1.11.2, SS.2.) Similar impediments exist at TA-18 (See Concern TSA-2, SS.1-1.)
- The Chemistry and Metallurgical Research Building emergency plan specifies that the protected area be locked down during an emergency evacuation. No provisions are identified for relocation outside the protected area should the emergency render it unsafe.
- The Chemistry and Metallurgical Research Building emergency plan specifies, in the Appendix for Wing 4, that padlocks between two rooms be locked to protect special nuclear material if time permits during a building evacuation. There is no mention of first searching the area to ensure no one is being locked in.
- Emergency egress from the Accelerator Technology Division security zone in TA-53 is not ensured under all credible conditions, which could create a situation in violation of NFPA 101. (See Section 4.5.3.10.2, SS.2)
- Security enhancements at TA-18 have not been reviewed for safety implications. (See Section 4.5.2.12.2, FR.2.)
- LANL management has been responsive in addressing emergency egress problems brought to its attention by the S&H Subteams and by LANL employees. However, the number of such problems being identified indicates that LANL does not have a proactive program for their identification and correction.
- See Concern TSA-4, FP.2-1, and Sections 4.5.3.10.2, SS.2, and 4.5.1.11.2, SS.2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.2-1) (H1/C2) **The Los Alamos National Laboratory does not have a systematic process that identifies and corrects potentially serious security-related emergency egress interferences.**

SS.3 FACILITY PLANNING FOR SECURITY/SAFEGUARDS EMERGENCIES

PERFORMANCE OBJECTIVE: Safety authorities and responsibilities for all types of security/safeguards emergencies should be well defined and understood by all involved parties.

FINDINGS:

- LANL has not performed analyses, in accordance with DOE 5480.16, of the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems, safeguarded components, hazardous materials, and hazardous processes at its plutonium and enriched uranium facilities. (See Section 4.5.1.11.2, SS.3.)

- Representatives of the LANL Safety and Risk Assessment Group, M&H, and facility representatives, who were interviewed, were not aware of any such analyses for other types of facilities, except that prohibitions against using firearms or transmitters in explosives facilities were specified and the types of weapons to be used in the Ice House tunnel are restricted.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.3-1) (H2/C1) **The Los Alamos National laboratory has not performed analyses of the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components, and hazardous materials and processes as required by DOE 5480.16.**

FINDINGS:

- The emergency-related sections of the safety manual for TA-55 do not explicitly address interfacing responsibilities of facility and protective force personnel. (See Section 4.5.1.11.2, SS.3)

- The Chemistry and Metallurgical Research Building emergency plan briefly addresses protective force actions during an emergency (e.g., securing doors and gates). It does not address other interactions such as who is in charge during security emergencies as required by DOE 5500.3.

- See Concern TSA-4, EP.1-1.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.3-2) (H2/C1) **Responsibilities of facility operations personnel and protective force personnel during security emergencies are not defined in Los Alamos National Laboratory facility emergency plans in accordance with DOE 5500.1B and DOE 5500.3A.**

SS.4 SAFETY OF SECURITY ACTIVITIES

PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous processes and materials should be identified and understood by all involved parties.

FINDINGS:

- Protective force personnel have not received training in the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components and hazardous materials and processes at LANL plutonium and enriched uranium facilities. (See Section 4.5.1.11.2, SS.4.)
- Such training is not possible at this time because analyses of the potential consequences have not been performed. (See Concern TSA-4, SS.3-1.) A number of LANL facilities contain hazardous materials (e.g., fissile, radioactive, toxic, or explosive).
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.4-1) (H1/C2) **Protective force personnel have not received training in the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components, and hazardous materials and processes at Los Alamos National Laboratory facilities.**

FINDINGS:

- Security inspectors do not receive facility-specific training in chemical, radiological, and other hazards to which they might be exposed in LANL plutonium and enriched uranium facilities. (See Section 4.5.1.11.2, SS.4.)
- Hazard training specific to TA-53 is not provided to the protective force personnel who serve the area. (See Section 4.5.3.10.2, SS.4.)
- Chemical, radiological, and other hazards to which protective force personnel might be exposed during normal or emergency response entry have not been systematically identified for most other LANL facilities. Such information is necessary before effective facility-specific training on how to avoid the hazards can be performed.
- LANL has initiated a "Precinct Program" to group facilities, identify hazards for each group, and provide facility-specific training for protective force personnel and others. The program, however, is still in a formative stage.

- See Concerns TSA-1, WS. 3-1; TSA-1, TC.4-1; TSA-1, SS.4-2; TSA-4, FP.6-1; and TSA-4, FP.6-11; and Sections 4.5.1.5.2, TC.1; 4.5.1.11.2, SS.4; and 4.5.1.16.2, WS.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.4-2) (H1/C2) **Protective force personnel do not receive facility-specific training in the chemical, radiological, and other hazards to which they might be exposed in most Los Alamos National Laboratory facilities.**

FINDINGS:

- Protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to emergencies at LANL plutonium and enriched uranium facilities. (See Section 4.5.1.11.2, SS.4.)

- M&H personnel, including the Chief Training and Operations Officer, stated that protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to facility emergencies.

- See Section 4.5.1.16.2, WS.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.4-3) (H1/C2) **Protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to emergencies at Los Alamos National Laboratory facilities.**

FINDINGS:

- The M&H protective force organization at LANL has experienced a total of 39 Lost Workday Cases (LWCs) for CY 91 through September. These data yield an LWC Incidence Rate of approximately 10.4 (total personnel ~500).

- The M&H/Los Alamos average LWC Incidence Rate for the last 5 years (1986-1990) was 7.6. The comparable figure for all DOE security contractors was 2.8, and the average LWC Incidence Rate for total DOE and contractors for the same period was 1.3.

- Of the 39 LWCs recorded this year for M&H, 19 were attributable to physical training activities, and of these 12 occurred at facilities of the Los Alamos Wellness Center.

- Data on the number of Total (OSHA) Recordable injuries and on the total number of Lost Workdays follow the same trends as those for the LWCs.

- Discussions with LANL and M&H management personnel did not indicate that any initiatives were being pursued to address the abnormally high incidence of injuries to protective force personnel, although a review of several documented reports and safety meeting minutes revealed that the LANL Operational Security and Safeguards Division and M&H personnel were aware of the problem.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (SS.4-4) (H2/C2) **The safety performance statistics of the Mason and Hanger-Silas Mason Company, Inc. protective force organization reflect an abnormally high Lost Workday Case Incidence Rate, and the Los Alamos National Laboratory has not corrected the problem.**

4.5.4.11 Experimental Activities

4.5.4.11.1 Overview

The four performance objectives for the Experimental Activities technical area were addressed by (1) reviewing documentation relating to experimental activities (excluding reactors, accelerators, and special nuclear material facilities); (2) interviewing line management, laboratory experimenters and technicians, and group and division safety personnel; (3) touring laboratory facilities, and (4) interviewing Health and Safety Division personnel.

Documentation reviewed included standard operating procedures, special work permits, experimental and calibration logbooks, Laboratory administrative requirements, supporting technical bulletins, accident/incident reports, and self-assessment documentation.

The activities reviewed were primarily in the Chemical and Laser Sciences Division, the Materials Science and Technology Division, the Isotope and Nuclear Chemistry Division, the Chemistry and Metallurgical Research Building and Health Research Laboratory, and parts of the Physics Division and Shock Wave Physics Group. These facilities were located principally in TA-3, TA-21, TA-35, TA-39, TA-43, TA-46, TA-48, and two mobile LIDAR vans. Most of these experimental activities involve one or sometimes two groups conducting ongoing experiments or a group of closely related experiments. Although the experimental envelope, encompassed by a particular laboratory setup may be fixed, the experiments often vary on a daily basis within that envelope.

The performance objectives and criteria for TSAs apply to smaller research and development activities as well as they do to the conduct of experiments at reactors or process plants. The conduct of operations Order (DOE 5480.19, paragraph 5.b.) requires that a graded approach be used in the application of guidelines to assure the depth of detail and magnitude of resources used are commensurate with the importance of each facility and the potential safety or health impact. With appropriate grading of emphasis, the experimental activities performance objectives and criteria were applied to selected LANL experimental laboratories not covered by S&H Subteams 1, 2, and 3.

LANL uses an unusual number and variety of lasers in its research activities. Accordingly, attention was focused on these experimental facilities and laboratories, with emphasis on the two highest risk groups of lasers, Classes 3 and 4, as defined by ANSI Z136.1-1986, "American National Standard for the Safe Use of Lasers."

Compliance with ANSI Z136.1 is required by DOE 5480.4. LANL implements ANSI Z136.1 requirements with its AR 5-2 "Lasers," April 26, 1991. However, AR 5-2 was found to be significantly deficient. Many ANSI Z136.1 requirements are incompletely implemented in AR 5-2. Few researchers in smaller laboratories are familiar with ANSI Z136.1. As a result of omissions in AR 5-2, researchers often fail to comply with real safety requirements, while simultaneously finding the LANL guidance overly restrictive in other areas. Failure of the Laboratory to implement mandatory requirements in its administrative requirements is a deficiency.

The Laser Safety Officer (LSO) and deputy LSO were found to be highly qualified and duly appointed. The fact that the deputy LSO is a contractor

employee causes concern. The LSOs provide training and expert consultation; however, they fail to perform other prescribed functions, most notably preoperational approval of laser operations. There are no LANL requirements that they do so, nor are there any formal mechanisms by which they can.

These deficiencies result in oversight, safety, and compliance varying widely in the LANL laser safety organization. These variations reflect the cultural emphasis on individuality over institutional issues identified in the LANL self-assessment. There is no centralized guidance and oversight for the administration of laser safety, and this is a deficiency.

Laboratory record keeping was found to vary even more than laser safety. Similarly, although standard operating procedures were found in most laboratories, their quality varied widely. Many were broad documents which defined no operational limits, lacked meaningful safety hazard analyses, and had undergone a review process of dubious independence. In laser laboratories, standard operating procedures lack required alignment procedures for the protection of those not directly involved in the operations or experiments.

Most laboratory research personnel were found to have uniformly positive attitudes toward safety issues, although they often lacked adequate information on which to make informed judgments. Upper Laboratory management must find a way to provide the line management and experimenters with more accurate and timely guidance on ES&H requirements and to provide mandated independent reviews and approvals without destroying the culture of scientific and intellectual freedom and creativity. Finding a satisfactory compromise and fostering a culture in which good researchers welcome informed review of their laboratory practices will be a major challenge.

Although the LANL self-assessment identified deficiencies in compliance with ANSI Z136.1, it misplaced the cause, blaming noncompliance on AR 5-2. Similarly, many division and group self-assessments failed to identify true root causes, although some were quite perceptive.

4.5.4.11.2 Findings and Concerns

EA.1 INTERFACE WITH EXPERIMENTERS

PERFORMANCE OBJECTIVE: Persons planning or conducting experiments in or with the facility should have their relationship to the operating group clearly defined.

FINDINGS:

- Formal relationships were observed in some facilities (for example, Bright Source II and the Target Fabrication Facility). Other multi-group facilities lack formality in definition of intergroup relationships.
- Numerous (17) groups share space in TA-35 Bldg. 2, however, the relationships were not defined in a formal manner.
- There is no requirement that building managers be formally included in the preoperational experiment review and approval process.
- See Concern TSA-4, FR.2-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (EA.1-1) (H2/C1) **At the Los Alamos National Laboratory, small multiuser facilities and buildings often lack formality in defining experimental group interactions and information flow as required by DOE 5480.19.**

FINDINGS:

- Standard operating procedures are the only formal instrument defining the intergroup relationships. These vary widely in content and quality.
- Many standard operating procedures are newly written and do not have complete signoff. Very few have Health and Safety Division signoff.

CONCERN: **See Concern TSA-4, TS.2-2.**

FINDINGS:

- Training requirements for laser safety are implemented at the group level or the division level, without oversight by Health and Safety Division.
- Local Laser Safety Officers (LSOs) were not knowledgeable about LSO responsibilities and authority and lacked special training.
- There is no formal relationship between the LANL LSO and the local LSOs appointed within line divisions, groups, projects, and centers.

CONCERN: **See Concern TSA-4, PP.6-3.**

EA.2 EXPERIMENT CATEGORIES

PERFORMANCE OBJECTIVE: All proposed experiments should be approved by an independent Safety Review Committee before they are performed.

FINDINGS:

- Experimenters and group leaders usually determine the level of review to be performed for experiments. These decisions are subject to little oversight and are seldom documented.
- ANSI Z136.1 requires standard operating procedures be approved by the Laser Safety Officer prior to operation of lasers. LANL standard operating procedures become effective upon division-level approval, which normally precedes submission to the Health and Safety Division for review (not approval).
- Health and Safety Division reviews of laboratory standard operating procedures often take months. Since experiments begin before standard operating procedures are submitted to Health and Safety Division; their reviews of hazards occur after-the-fact.
- Often frustrated with Health and Safety Division review delays, groups establish their own review panels, which lack independence.
- Health and Safety Division laser safety walkthroughs are performed only when requested.
- See Concern TSA-4, FR.1-1.
- The following concern was partially identified by the LANL self-assessment:

CONCERN: (TSA-4) (EA.2-1) (H2/C1) **At the Los Alamos National Laboratory, the relationship between the Health and Safety Division and the line operating groups does not ensure preoperational independent reviews and does not comply with ANSI Z136.1 requirements.**

EA.3 EXPERIMENT PROPOSALS

PERFORMANCE OBJECTIVE: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

FINDINGS:

- Hazard analyses are not consistently performed to assure all real hazards are addressed.
- Standard operating procedures do not identify potential hazards that have been analyzed and found to present no risk.
- In multigroup facilities (example: TA-35 Bldg. 2) the flow of hazard analysis information from the experimenters to the building managers are often informal, especially during the planning and pre-operational phases. Conversely, the Target Fabrication Facility has an excellent process of reviewing experimental plans and modifications before changes are implemented. LANL does not have a formal process to ensure that cohabitants of buildings interact constructively on ES&H issues to assure the facility operations remain within acceptable envelopes.
- Standard operating procedures for most experiments are submitted to the Health and Safety Division for review (not approval) in parallel with (or after) startup of operations.
- The Health and Safety Division often does not provide comments in a sufficiently timely manner to affect experimental plans or operation.
- See Concern TSA-4, FR.1-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EA.3-1) (H2/C1) **At the Los Alamos National Laboratory, there is a lack of independent oversight and preoperational approval for experiments which may result in hazards being overlooked in standard operating procedures, contrary to the requirements of DOE 5480.19.**

EA.4 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments should not present undue risk or significantly increase the risk previously evaluated for the facility or site.

FINDINGS:

- The Laser Safety Officer is empowered to enforce the control of laser hazards as required by ANSI Z136.1, but does not have preoperational approval authority over Class 4 lasers.
- Door interlocks or optical baffles are not consistently in use in accordance with ANSI Z136.1 requirements.
- Panic shutdown switches are not consistently installed on Class 4 lasers as required by ANSI Z136.1, and they are not required by LANL AR 5-2.
- The concept of embedding higher class lasers to reduce their hazard classification under ANSI Z136.1 is not clearly understood and is being misapplied to avoid mandatory safety requirements for Class 3 and Class 4 lasers.
- Laser safety standards are not implemented as required by ANSI Z136.1.
- LANL AR 5-2 does not conform with ANSI Z136.1 as required by DOE 5480.4.

CONCERN: **See Concern TSA-4, PP.6-3.**

FINDINGS:

- LANL has had four medically confirmed retinal injuries in the past decade. The accident investigations focused on the deficiencies in the particular laboratory without looking at the institutional root causes, including inadequate training and lack of independent review by qualified Laser Safety Officers.
- The Chemical and Laser Sciences Division self-assessments identified many deficiencies, but failed to identify institutional deficiencies contributing to them. The root causes cited for the deficiencies often looked no further than the individual deficiency. Conversely, the Materials Science and Technology Division self-assessments pointed to some institutional deficiencies, both within the division and within the overall LANL structure, such as the lack of effective support from the Health and Safety Division.
- The LANL self-assessment failed to identify the deficiencies in AR 5-2. The self-assessment places the blame for noncompliance with ANSI Z136.1 on the line organizations, when in fact there are many other factors.
- See Concern TSA-4, MA.7-2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (EA.4-1) (H2/C1) **The Los Alamos National Laboratory's approach to rootcause analysis is flawed and fails to meet the requirements of DOE 5000.3A, DOE 5480.19, DOE 5484.1, and DOE 5481.1B.**

4.5.4.12 Site/Facility Safety Review

4.5.4.12.1 Overview

The appraisal addressed all six of the performance objectives in the Site/Facility Safety Review technical area. The appraisal included visits to TA-33; TA-41; TA-55; TA-3 Bldgs. SM-29 (Chemistry and Metallurgical Research Building), SM-43, and SM-164; and Bldg. 23 (Betatron). Interviews were conducted with representatives of these facilities, the Health and Safety Division (including the Safety and Risk Assessment Group), Emergency Management Office, Environment, Safety, and Health Council, Laboratory Assessment Office, and three of the LANL top-tier Safety Committees. Documents reviewed included committee and organization charters, safety analysis documents, meeting minutes, the draft laboratory assessment program document, safety manuals, and selected correspondence.

The LANL safety review system is complex, with a top-level ES&H Council, 12 upper-tier safety committees, and other committees reporting at division, group, and even section levels. In addition, LANL has a line safety support organization, the Health and Safety Division. This combination provides substantial safety support to the operating and research divisions. However, it does not meet the independent internal safety review requirements of DOE 5480.5 and 5482.1B, Section 9.d. Additional deficiencies were identified in quality of documentation, annual facility safety appraisals, triennial review of the safety review system, and Occurrence Report review and distribution.

The numerous LANL safety committees in many cases are staffed according to organizational representation rather than technical discipline. Many are special purpose, and do not interact to provide the kind of independent internal safety review system defined by DOE 5480.5 and DOE 5482.1B, Section 9.d. In addition, committees at a level high enough to be truly independent of the operation being reviewed do not necessarily review all of the safety matters specified by these Orders. The one exception is the Reactor Safety Committee, which is constituted to fulfill the independent internal safety review requirements of DOE 5480.6. There is no forcing function that ensures safety matters are brought to the attention of most of these committees.

The safety committees below the 12 top-tier ones that report to either the Laboratory Director or the Health and Safety Division Leader all serve the line operating/research divisions and groups, to assist the leaders of these organizations in meeting their safety responsibilities. This is a valuable function. However, LANL has not developed a policy or guidance to direct the line organizations in establishing fully effective committees.

Periodic safety appraisals are being performed by the Laboratory Assessment Office, the Reactor Safety Committee, and the Nuclear Criticality Safety Committee, all of which have sufficient independence from the functions being appraised. The current appraisal schedule is not meeting the schedule of annual appraisals for nuclear facilities, as required by DOE 5480.5, and the schedule for appraising nonnuclear operations on a 3-year cycle has not been fully evaluated to determine if it is commensurate with the safety issues. Triennial reviews of the independent internal safety review system have not been performed.

LANL has developed an occurrence reporting system that can be very effective in reporting events and evaluating and using the information derived from the reports. This system has not been fully implemented. At present, full responsibility and authority for issuance of Occurrence Reports is assigned to the facility managers. There are no requirements for involvement or review by the Health and Safety Division, or for standard distribution.

The LANL self-assessment identified four of the eight concerns expressed in the Site/Facility Safety Review area by S&H Subteam 4. Three more were partially addressed. The self-assessment also identified several other deficiencies, some of which have since been corrected. The self-assessment in this technical area is judged to have been fairly effective.

4.5.4.12.2 Findings and Concerns

FR.1 SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: A Safety Review Committee should be available to review safety questions and the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, DOE 5480.6, and/or DOE 5482.1B., Section 9.d.

FINDINGS:

- LANL has a multiplicity of safety committees reporting at levels from the group or section up to the Director's Office.
- The highest level committee, the Environment, Safety and Health Council, primarily has oversight and policy guidance roles. It does not provide technical safety reviews.
- There are 12 other upper-tier committees that provide technical safety guidance and/or review to LANL organizations. Of these, six report to the Director and six report to the Health and Safety Division Leader. Most of these 12 are special purpose committees with limited ranges of interest such as nuclear criticality, explosives, pressure vessels and piping, or electrical safety. Some of these committees serve primarily as technical support to the line organizations rather than independent review, and become involved only as requested by the organization management. There is no mechanism in place (such as requirements in the charters) that ensures issues are brought to the attention of these committees.
- The committees reporting to the Laboratory Director and Health and Safety Division Leader do not formally interact to discuss interfacing interests nor do they, taken in combination, provide the full range of technical disciplines relevant to LANL facility safety issues. Some of the technical areas not represented are chemistry, radiological sciences, and industrial hygiene. The one exception is the Reactor Safety Committee, which has the full range of technical disciplines pertinent to its area of responsibility.
- ES&H committees reporting to the operating division leaders and at the group level are, in a number of cases, staffed according to organizational representation rather than technical discipline. None of the representatives of these committees who were interviewed considered their role to be fulfilling the DOE 5480.5 and DOE 5482.1B requirements for an independent internal safety review system.
- Safety reviews are performed by several groups in the Health and Safety Division. However, these groups also

provide direct support and guidance to the line organizations, so the review is not truly independent. Further, there is no formal system for interaction among several groups of the Health and Safety Division on safety issues that may spread across interests of two or more groups.

- LANL management has not established an independent safety review committee for the tritium areas as required by DOE 5480.5 and 5482.1B. (See Section 4.5.2.12.2, FR.1.)

- LANL has not defined an independent safety review system for accelerator facilities as required by DOE 5482.1B, paragraph 9.d. (See Section 4.5.3.12.2, FR.1.)

- See Concern TSA-1, FR.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.1-1) (H2/C1) **The Los Alamos National Laboratory does not have a comprehensive independent internal safety review system for its nuclear and nonnuclear facilities that meets the requirements of DOE 5480.5 and DOE 5482.1B, Section 9.d.**

FINDINGS:

- The LANL ES&H committees serve a wide variety of functions. Some are walkthrough, safety inspection bodies, some address safety aspects of experiments and modifications, and still others serve a coordinating function among several organizations occupying a single facility.

- Some LANL ES&H committees are facility focused, while others serve individual divisions, groups, or sections.

- Some committees provide overview functions, while others see their primary roles as technical support.

- Committee functions are not consistent among LANL organizations and facilities.

- See Concern TSA-4, OA.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.1-2) (H2/C2) **The Los Alamos National Laboratory has not developed a policy or guidance that ensures all organizations have safety review systems that meet minimum requirements defined by the Laboratory.**

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

FINDINGS:

- The Chemistry and Metallurgical Research Building Management Committee, which also serves as the safety committee for the Chemistry and Metallurgical Research Building as a whole, is not chartered to address specific safety issues such as proposed experimental programs. Its role is to address building-wide safety issues for the common areas. Specific safety issues are to be addressed by the individual groups that occupy the building. However, the Chemistry and Metallurgical Research Building Management Committee is expected to play a significant role in reviewing the SAR now being prepared.

- The safety committees that report to the Laboratory Director and the Health and Safety Division Leader were placed on the distribution list for LANL occurrence reports in late October, 1991. However, committees reporting to the line divisions and groups receive Occurrence Reports only at the discretion of facility or division management.

- With the exception of the Reactor Safety Committee, none of the upper-tier committee charters specify review of all of the items specified by DOE 5482.1B section 9.d.

- See Concerns TSA-1, FR.2-1; TSA-1, FR.2-2; and TSA-4, FR.1-1; and Section 4.5.3.12.2, FR.2.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.2-1) (H2/C1)

Los Alamos National Laboratory oversight and line safety review organizations do not review all of the safety matters specified by DOE 5480.5 and DOE 5482.1B.

FR.3 OPERATION OF SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: Review of site/facility activities by the Safety Review Committee should ensure achievement of a high degree of safety.

FINDINGS:

- The charters of the top level LANL safety committees define reporting requirements, including meeting minutes. However, none of these detail the information to be provided in the minutes.
- For the Chemistry and Metallurgical Research Building Management Committee (which also serves as the Building Safety Committee), most of several recent meeting minutes reviewed did not identify who attended. They did provide a good summary of the discussions.
- The Los Alamos National Laboratory has not clearly defined what information is to be included in reports by its safety committees, thereby, not permitting management and DOE evaluation of the committee's effectiveness in considering safety issues.
- See Section 4.5.1.13.2, FR.3.

CONCERN: **See Concern TSA-4, FR.1-1.**

FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management as specified in DOE 5480.5 and DOE 5480.6.

FINDINGS:

- The Laboratory Assessment Office (LAO) has been chartered by the Laboratory Director to conduct independent internal ES&H organizational and functional appraisals. However, reactor safety appraisals and nuclear criticality safety appraisals have been assigned to the Reactor Safety Committee and the Nuclear Criticality Safety Committee, respectively.

- The draft laboratory assessment program document, dated September 20, 1991, which describes the current program, refers only to functional and organizational appraisals for nonnuclear operations. DOE 5482.1B requires periodic appraisals of each facility.

- The expressed intent of the LAO is to appraise nuclear facilities but, in the case of nonnuclear facilities, to appraise organizations rather than facilities.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.4-1) (H3/C1) **The Los Alamos National Laboratory independent safety appraisal program, does not require appraisals of facilities other than nuclear facilities as mandated by DOE 5482.1B, Section 9.d.**

FINDINGS:

- Appraisals of nuclear facilities have been conducted since June 1989. However, the facilities are not being appraised at an annual frequency. LAO staff stated that a combination of a large number of facilities and a limited appraisal staff has resulted in a cycle of about 18 months.

- Periodic, independent safety reviews of accelerator facility operations have not been performed as required by DOE 5482.1B, paragraph 9.d.(2)(e). (See Section 4.5.3.12.2, FR.4.)

- LANL has performed very few safety appraisals of nonnuclear operations. The focus, considering staff limitations, has been on the nuclear facilities.

- The LAO has concluded that nonnuclear operations need only be appraised on a 3-year cycle. This judgment is based upon LANL interpretation of Secretary of Energy guidance on ES&H self-assessment, dated July 31, 1990.

- DOE 5482.1B requires that the internal appraisal system review the overall operation of each facility with

sufficient frequency to "assure adequate ES&H coverage." The Secretary of Energy guidance states that many functional areas will require more frequent (e.g. annual) appraisals. LANL has not evaluated whether a 3-year cycle is consistent with the safety concerns at all of the non-nuclear facilities.

- See Concerns TSA-4, ES.3-1; TSA-4, AS.1-4; and TSA-2, FR.4-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.4-2) (H2/C1) **The Los Alamos National Laboratory is not performing nuclear and non-nuclear facility appraisals at the frequencies specified by DOE 5480.5 and DOE 5482.1B.**

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

FINDINGS:

- The draft laboratory assessment program does not address the triennial management review of the "adequacy of performance" of the internal appraisal system that is required by DOE 5480.5 and DOE 5482.1B, Section 9.d.
- The Laboratory Assessment Office, the sitewide Nuclear Criticality Safety Committee, and the Reactor Safety Committee provide annual briefings to the Environment, Safety, and Health Council. The Council's oversight is not proactive; it does not conduct criteria-based evaluations of the adequacy of performance of the safety review system.
- The Environment, Safety, and Health Council reviews do not cover all of the ES&H committees and line safety organizations that make up the LANL safety review systems.
- No triennial appraisal of the independent safety review system for accelerator facilities at the LANL has been performed as required by DOE 5482.1B, paragraph 9.d.(2)(d). (See Section 4.5.3.12.2, FR.5.)
- See Concern TSA-1, FR.5-1, and Section 4.5.2.12.2, FR.5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.5-1) (H3/C1) **Los Alamos National Laboratory has not performed triennial reviews of the operation of the internal safety review system in accordance with the requirements of DOE 5480.5, DOE 5480.6, and DOE 5482.1B, Section 9.d.**

FR.6 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experiences should be evaluated, and appropriate actions should be undertaken to improve safety and reliability.

FINDINGS:

- Preparation and distribution of event reports are the responsibility of the affected facility manager. LANL has no standard distribution lists.
- Involvement of safety support organizations or committees in the preparation or review of occurrence reports is at the discretion of the facility manager. There is no formal requirement in the LANL system for Health and Safety Division or safety committee review of safety-related occurrence reports.
- The Occurrence Reporting Section of the Emergency Management Office develops daily summary statement compilations for all LANL occurrences and for occurrence reports received from other DOE sites. Copies are distributed to a selected list of LANL managers, but not to the various upper tier safety committees.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.6-1) (H2/C2) **The Los Alamos National Laboratory does not ensure that appropriate safety functions review Occurrence Reports for technical accuracy or for information.**

FINDINGS:

- Currently, occurrence reports are being submitted within about 15 working days of categorization. This was stated to be a reduction from a 30-day period earlier; however, DOE 5000.3A specifies submittal within 10 working days.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FR.6-2) (H3/C1) **The Los Alamos National Laboratory is not submitting occurrence reports within 10 days as required by DOE 5000.3A, Section 7.d.**

4.5.4.13 Radiological Protection

4.5.4.13.1 Overview

Appraisal of the radiological protection programs and activities at LANL by S&H Subteam 4 addressed all 12 performance objectives in the Radiological Protection technical area; however, concerns were only identified under seven performance objectives. The appraisal was conducted by interviewing management and staff of the Health and Safety Division, interviewing other division managers and personnel, and by reviewing documents relevant to radiological protection activities at LANL. The appraisal also involved tours and inspections of various technical areas, facilities, buildings, equipment, and operations.

The primary technical areas and facilities visited by S&H Subteam 4 included the TA-3 Sigma Complex, Bldgs. SM-130, 39, 102, and the Chemistry and Metallurgical Research Building; the PHERMEX site in TA-15; the TA-21 laboratories and DP-West facilities; TA-35 Bldg. 2; the Health Research Laboratory and In Vivo Counting Facility in TA-43; TA-48 Bldg. 1 Radiochemistry; the TA-54 areas G and L low-level waste management sites; and the offsite laundry facility used by the Laboratory.

Laboratory operations, processes, weapons research and development, and associated experiments involve a wide variety of radiation sources and radioactive materials. Radioactive materials include tritium, enriched and depleted uranium, plutonium, americium, technetium, and a variety of other natural and manmade radionuclides. Nuclear reactors at the site generate both fission and activation products. High-dose-rate cobalt and cesium sources and linear accelerators are used in the study of radiation effects, while other radiation-generating devices are used for and in a variety of experiments (most of which were reviewed by S&H Subteams 1, 2, and 3).

The primary responsibility for radiological protection at LANL is assigned to line managers, who develop individual radiation protection programs for their own organization or facilities. Administrative requirements of ES&H Manual, Section 3, describes the scope of the radiological protection program at LANL.

Technical support for the various LANL divisions for radiological protection is provided by the Health and Safety Division. Technical groups in this division having radiation protection responsibilities include the Health Physics Operations Group, the Health Physics Measurements Group, the Nuclear Criticality Safety Group, and the Health Physics Policy and Programs Group. Field health physics activities such as radiation monitoring, surveying, and contamination control are performed by radiation protection technicians under the management of the Health Physics Operations Group. Radiological laboratory measurements, calibrations, and in vivo counting are functions of the Health Physics Measurements Group, and external and internal dose assessment are performed in the Health Physics Policy and Programs Group.

Several characteristics of the radiological protection program at LANL were evident from the appraisal. Radiological protection programs vary considerably from group-to-group and division-to-division within the Laboratory, even though the requirements and conditions are similar. There are many reasons for these inconsistencies, including (1) lack of adequate

review by Health and Safety Division professionals, (2) the lack of rigor and formality in the administrative requirements, (3) the reassignment of safety personnel and technicians away from the Health and Safety Division into the research and development divisions, and (4) the lack of oversight by Laboratory managers from all divisions.

The quality of the radiation protection programs at LANL also varies. Many of the elements of the good programs could easily be transferred to weaker programs. Examples include training and retraining programs (especially for radiological protection technicians), procedures, record keeping systems, routine survey programs, and others. It is not a question of not wanting to share information and ideas throughout the Laboratory, but rather, lack of effective promotion of excellence in ES&H program elements by line management.

There is evidence of need for better management of personnel resources within the Health and Safety Division. The distribution of work appears to be skewed, with the Health Physics Operation Groups having the larger share, particularly in day-to-day operations. The interactions required to maintain an excellent program will increase as the Laboratory program mix changes from a few large programs to many smaller research and development programs.

Line managers have not uniformly provided the information needed to determine which personnel should be included in the various radiation protection programs, including extremity dosimetry and radiobioassay. Many have not met their responsibility for the timely collection and processing of radiation dosimeters and bioassay samples.

The decommissioning and decontamination of aging plutonium and uranium facilities will require particular emphasis on quality radiation protection. At the same time, efforts to minimize the generation of radioactive waste, as required by DOE Orders, will necessitate a greater commitment from management and staff. This current commitment is not satisfactory, perhaps due to lack of incentive.

Comments were made to S&H Subteam members that responses to requests from research and development divisions for various radiological protection services have been less than satisfactory. Radiological protection services will deteriorate in the future unless current structures, staffing levels, authorities and responsibilities, and other priorities improve within the Health and Safety Division. The Division is hindered in conducting its programs and supplying technical support as a result of lack of facilities, equipment, and other resources. An example is the difficulty experienced by the Health Physics Measurements Group in obtaining a germanium detector array for lung measurements on personnel working with plutonium.

Most of the concerns were previously identified or were partially identified in the LANL self-assessment. However, the root causes for these concerns are not, in every case, similar. The S&H subteam identified several findings and concerns having a common root cause associated with the lack of oversight by Health and Safety Division line managers, review of standard operating procedures and special work permits, and review of radiation protection plans by Health and Safety Division personnel. Program deficiencies also resulted from the lack of "striving for excellence" in health and safety practices and operations by LANL line managers and staff.

4.5.4.13.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities.

FINDINGS:

- Health and safety audits are conducted by the Laboratory Assessment Office. They are not comprehensive throughout the Laboratory and do not have oversight by or participation from the Health and Safety Division.
- Neither a formalized audit nor an inspection program is conducted by Health and Safety Division specialists.
- Oversight of radiological protection activities is dependent on the priorities of the individual division or group manager, and consistency of oversight is not a general Laboratory requirement.
- Many open items remain on auditable inspections and reports performed by various organizations in the past.
- Appraisals of accelerator facilities have not been conducted as required by DOE 5482.1B and DOE 5480.11. (See Section 4.5.3.13.2, RP.2.)
- See Concerns TSA-4, PP.1-3, and TSA-4, PP.3-1.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.1.1) (H2/C1) **At the Los Alamos National Laboratory, scheduled inspections and audits are not conducted by health and safety specialists as required by DOE 5480.11 and DOE 5482.1B; the closure of open items from previous audits has not been completed.**

FINDINGS:

- There is a lack of review or approval by the Health and Safety Division of standard operating procedures, radiation work permits, and division ES&H plans and programs throughout the Laboratory.
- The review by Health and Safety Division of ES&H standard operating procedures, radiation work permits, and DOE 5480.11 implementation plans occurs only upon the request of the originators of those documents. There is no assurance that the required reviews are accomplished.
- See Concern TSA-4, OP.2-4.

CONCERN: **See Concern TSA-1, RP.3-1.**

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

PERFORMANCE OBJECTIVE: The internal audit program for both routine operations and unusual radiological occurrences should provide adequate performance assessments.

FINDINGS:

- There are no documented procedures or administrative requirements for evaluating personnel exposures from unusual internal exposures to radioactive materials as a consequence of an accident or incident.
- LANL ES&H policies and procedures do not describe the action to be taken by Health Physics Policy and Programs Group in conjunction with the Occupational Medicine Group following a major exposure to radiation. Policies and procedures do not include methods for work restrictions, decontamination, chelation therapy, and followup dose assessment.
- The following concern was identified by the LANL self-assessment.

CONCERN: (TSA-4) (RP.2-1) (H2/C2) **Los Alamos National Laboratory does not have documented procedures for evaluating and managing worker exposures to radioactive materials, as required by DOE 5480.4 and National Council on Radiation Protection and Measurements Report Number 65.**

FINDINGS:

- The Laboratory Assessment Office is responsible for analysis and trending of occurrence reports. There are no procedures and methods for performing this function.
- AR 1-1, "Accident/Incident Reporting," April 1988, incorrectly describes the current organization for occurrence reporting.
- AR 1-1 provides a description of events that require reporting, but its criteria for reportable radiation occurrences are not consistent with those required in DOE 5000.3A.
- Personnel have not been trained in use of the new reporting system.
- The management system developed by LANL to meet the reporting criteria in DOE 5000.3A does not lead to correct reporting decisions and followup actions. (See Section 4.5.2.13.2, RP.1.)
- See Concerns TSA-4, EA.4-2, and TSA-4, OP.2-2.
- AR 1-1 requires that the Health Physics Operations Group be notified of each radiation incident and that they document these incidents in a Radiation Occurrence Report. However, the Radiation Occurrence Report system is not defined in a formal program. The system does not

implement procedures for root cause and causal factors analyses and review of prior reports to identify trends and recurrent issues.

- At present, personnel are not assigned to review and closeout corrective actions associated with Radiation Occurrence Reports.

- The LANL Radiation Occurrence Report system is not compatible with the DOE 5000.3A system and does not include DOE 5000.3A radiological occurrence criteria.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.2-2) (H2/C1) **The Los Alamos National Laboratory Radiological Occurrence Reporting System is not defined or implemented with trend analysis and followup and is not consistent with DOE 5000.3A.**

FINDINGS:

- Director's Policy (DP No. 107) requires that the Health and Safety Division develop performance indicators for the radiological protection program. The Health and Safety Division has not established a sitewide radiological protection performance indicators program.

- AR 3-8, "ALARA Program," November 30, 1990, requires that the Health and Safety As-Low-As-Reasonably Achievable Coordinator perform sitewide trend analysis of radiological parameters and distribute the results to management. This requirement has not been implemented.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.2-3) (H2/C1) **Los Alamos National Laboratory has not implemented a formal sitewide radiological protection performance indicator program as required by DOE 5482.1B and SEN-29-91.**

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

FINDINGS:

- Radiation protection procedures developed at the division level for various buildings and operations are inconsistent throughout the Laboratory. Procedures used by different groups within the Health and Safety Division are also inconsistent.
- The Health and Safety Division does not, in many cases, participate in review of organization and site-specific radiation protection programs.
- Some LANL divisions are preparing separate DOE 5480.11 implementation plans that are inconsistent with the sitewide implementation plan approved by DOE.

CONCERN: See Concern TSA-1, RP.3-2.

FINDINGS:

- Criteria for defining, selecting, and identifying radiologically controlled areas are not consistent throughout the Laboratory.
- The posting of controlled areas is not uniform or consistent throughout the Laboratory and is not in compliance with DOE 5480.11.
- The technical bases for defining controlled areas is not documented.
- The posting policy is not uniform throughout LANL technical areas and facilities.
- Posted radiation survey information was found to be more than 1 year out-of-date in several facilities.
- Signs used to indicate controlled radiological areas are often not of acceptable quality or color and often do not contain information on the current radiological status of the area as required.
- Radiological hot-spots within controlled areas are not consistently posted according to DOE 5480.11, ANSI N2.1, and LANL AR 3-7. (See Section 4.5.1.14.2, RP.3.)
- Radiological area posting at access points and perimeters is not performed in accordance with the requirements of DOE 5480.11. (See Section 4.5.2.13.2, RP.3.)
- The following concern was identified in the LANL self-assessment.

CONCERN: **At the Los Alamos National Laboratory, specification of radiologically controlled areas and the posting of the radiological conditions of hot-spots, access points, and perimeters are not consistently in compliance with the requirements of DOE 5480.11.**
(TSA-4)
(RP.3-1)
(H2/C1)

FINDINGS:

- Contaminated items, such as wood scraps, wire rope and hooks, tools, pumps, and other equipment were improperly stored in the depleted uranium storage area of the TA-3 Bldg. 66.
- Packaged radioactive waste was stored in mislabeled areas within corridors of the Chemistry and Metallurgical Research Building.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **The practice of storing materials and radioactive wastes at Los Alamos National Laboratory does not comply with recommendations given in DOE 4330.4A, Chapter 2.**
(TSA-4)
(RP.3-2)
(H2/C2)

FINDINGS:

- Although line management is responsible for the approval of standard operating procedures and special work permits to identify potential hazards, Health and Safety Division personnel are not required to be involved in either the development process or the review process until the procedure has been approved by line management.
- There is no assurance that Health and Safety Division recommendations are incorporated into standard operating procedures and special work permits.
- See Concern TSA-4, TS.2-2.

CONCERN: **See Concern TSA-1, RP.3-1.**

FINDINGS:

- The large cobalt-60 (2500 Ci) sealed-source irradiator in the TA-43 Health Research Laboratory does not have (1) audible or visual warning devices to alert personnel within the installation that the startup procedure is being initiated; (2) a "crash" button within the installation that can be used by personnel remaining in the installation to interrupt the startup procedure or the active beam; or (3) required warning signs at the entrance to the installation. Operating personnel maintain that the video camera within the installation is sufficient for identifying personnel working in the enclosure. However, a brick wall constructed around the sealed source obstructs the view of the camera.
- The large cesium-137 irradiator in the TA-43 Health Research Laboratory has two sources (about 900 Ci, and 9 Ci, respectively). This irradiator has neither the required audible or visual warning devices, nor does it

have required warning signs at the entrance to the installation.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-3) (H1/C1) CAT. II

At the Los Alamos National Laboratory, the two gamma irradiators in the TA-43 Health Research Laboratory do not have positive controls for radiological protection as required by ANSI N543-1974.

FINDINGS:

- Line managers "must ensure" compliance with the requirements specified in AR 3-4 "Radioactive Source Control," July 19, 1991. However, only 76 of 209 groups at LANL have complied.
- Leak testing of encapsulated radioactive sources does not meet the requirements of AR 3-4 and, in many cases, has never been performed. Only one-third the required tests have been completed.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-4) (H2/C1)

There is no program at Los Alamos National Laboratory to identify deficiencies in radioactive source control and to assure the integrity of encapsulated sources, as required by Los Alamos National Laboratory AR 3-4.

FINDINGS:

- There is no audit program in place to identify discrepancies in the radioactive source control program.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.3-5) (H2/C1)

The source control and audit program (inventory, location, and custodian) does not comply with Los Alamos National Laboratory AR 3-4.

RP.5 EXTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The routine and accident personnel radiation dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- External radiation personnel dosimeters are exchanged monthly, sitewide, without regard to a worker's potential for exposure.
- The LANL external radiation personnel dosimeter is accredited by the Department of Energy Laboratory Accreditation Program (DOELAP) and was recently re-accredited; however, it was not accredited in all 13 categories.
- The existing LANL external dosimeter cannot be used for determining low-energy beta or positron doses, such as from thallium-204.
- LANL has determined that medium-energy beta emitters are infrequently handled at the Laboratory and has opted not to test in the low-energy beta categories. The dosimeter in use cannot meet the criteria for accreditation in those categories.
- LANL has not performed an assessment of their requirements for low-energy beta dosimetry, even though they currently process and handle radionuclides having low-energy beta radiations. These include bromine-77, technetium-99, and uranium. DOE 5480.11 requires the monitoring of all workers where the potential for exposure exceeds 100 millirem per year to the whole body and 5 rem to the skin and extremities.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP5-1) (H2/C1) **The Los Alamos National Laboratory personnel dosimeter can not accurately measure some radiations to which workers are exposed as required by DOE 5480.11.**

- There is one outstanding deficiency from the last accreditation site review: approximately 200 to 500 personnel dosimeters out of a total of 7500 are not returned at each exchange period for processing. An effective means is not in place to reduce the number of personnel dosimeters that are not returned on time.
- The personnel dosimeter has a lower limit of detection of 10 mrem, resulting in doses of 9 mrem or less being recorded as zero. This practice results in a potential missed dose of up to 108 mrem per year.

- See Section 4.5.1.14.2, RP.3.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-2) (H2/C1) **At the Los Alamos National Laboratory an effective personnel dosimeter exchange program is not in place, and this deficiency is an unresolved issue from a previous appraisal conducted under requirements of DOE 5480.15.**

FINDINGS:

- There is no program in place to assure that the personnel dosimeter is worn correctly by LANL personnel.
- The improper use of chains and necklaces, and the clipping of dosimeters to shirt collars may result in erroneous albedo measurement of neutron doses.
- See Section 4.5.1.14.2, RP.5.
- The following concern was not identified by the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-3) (H2/C1) **At the Los Alamos National Laboratory, the correct use and wearing of personnel dosimeters to assure the accuracy of the measurement of worker dose as required by DOE 5480.11 and Los Alamos National Laboratory are not enforced.**

FINDINGS:

- Line managers do not make appropriate changes in a staff member's dosimetry requirements using the Employee Health Physics Checklist (ES&H Form 3-1A), as required in the event of intra-group transfers or job content changes.
- See Concern TSA-4, RP.7-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-4) (H2/C1) **At the Los Alamos National Laboratory, there is no Health and Safety Division assurance that accurate monitoring of either external or internal exposures is accomplished using current procedures and policies or that DOE 5480.11 monitoring requirements are satisfied.**

FINDINGS:

- The current LANL extremity dosimetry system uses thick chips sensitive only to photon and high-energy beta particles. The system cannot meet all impending DOELAP performance objectives.
- Extremity exposures involving neutrons are corrected in the field using assumed neutron-to-gamma ratios, but these corrections are not entered in the dosimetry records for the individual.
- High extremity exposures involving beta radiation are investigated. Retrospective correction factors for

dosimeter under-response are derived for high exposures, but routine data are not corrected.

- To date, LANL has not reported extremity dosimetry results to DOE as required by DOE 5484.1.
- See Section 4.5.1.14.2, RP.5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.5-5) (H2/C1) **The Los Alamos National Laboratory extremity dosimetry system cannot meet the external radiation monitoring and accuracy requirements specified in DOE 5480.11.**

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- The LANL internal dosimetry program involves staff from three separate organizations. The program lacks clear organization, defined responsibilities, and authorities.

- The information needed by internal dosimetry specialists from the Employee Health Physics Checklist (HS Form 3-1A) is not being obtained by internal dosimetry specialists for various reasons. In many cases, the checklists are not filled out and returned to the Health Physics Policy and Programs Group; in other cases, the information submitted is incomplete, inconsistent with work assignments, or inaccurate. (See Concern TSA-4, RP.5-4.)

- Employee Health Physics Checklists are often not reviewed and resubmitted by line management and reevaluated by the Health Physics Policy and Programs Group when specific work assignments change. Reminder letters to line managers from the Health Physics Policy and Programs Group for return of checklists in many cases received no response. One example was observed where a response was not received after eight reminder letters were sent.

- Personnel of the Isotope and Structural Chemistry Group, the Ceramic Science and Technology Group, and the Materials Technology Metallurgy Group working with thorium-232 and its decay products during chemistry operations at TA-21 and TA-3 Bldg. SM-66 are not enrolled in the bioassay program for assessment of potential internal exposures. Line managers were not aware that thorium and its decay products were internal radiological hazards and that workers handling gram quantities of dispersable thorium oxide powders and other thorium compounds should be identified by the checklist system for participation in the bioassay program.

- There is no formalized authority to allow the Health and Safety Division personnel to stop work for noncompliance with the bioassay program checklist system.

- Radiation protection technicians are not reviewing operations involving radioactive materials to ensure that workers who should participate in the bioassay program do so. Low priority is given to enforcement of the requirement.

- The appendices to AR 3-6, "Personnel Radiation Dosimetry," August 30, 1991, provide criteria for worker participation in the bioassay program. These appendices are cumbersome, difficult to interpret, and difficult to implement and enforce.

- Not all workers at the plutonium and depleted uranium facilities are evaluated for participation in the bioassay program as required by DOE 5480.11. (See Section 4.5.1.14.2, RP.7.)

- The following concern was addressed in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-1) (H2/C1) **Los Alamos National Laboratory is not effectively identifying workers for whom bioassay is required under DOE 5480.11.**

FINDINGS:

- The time taken to collect, process, and analyze some bioassay samples is longer than appropriate for timely evaluation and follow-up to assure the accuracy of worker dose assessment.

- There is a deficiency in the bioassay program for short-term workers, visitors, and students that leads to the failure to obtain baseline and routine samples during and after work with radioactive materials.

- Not all managers have exercised their responsibility to conduct the chain-of-custody program for bioassay samples as required in AR 3-6, Appendix G. (See Section 4.5.2.13.2, RP.7-2.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-2) (H2/C1) **Procedures for collecting, processing, and analyzing some bioassay samples do not ensure the accuracy, timeliness, and quality of internal dose assessment as required by DOE 5480.11 and Los Alamos National Laboratory AR 3-6, Appendix G.**

FINDINGS:

- Internal dosimetry program personnel do not conduct an internal audit program to ensure quality radiochemistry measurements on bioassay samples.

- Nasal smears are counted for plutonium, uranium, and other radionuclides in the TA-55 Health Physics Analysis Laboratory liquid-scintillation counter system. Secondary alpha counting standards are made at LANL for system calibration and quality assurance/quality control, but traceability of these standards to the National Institute of Standards and Technology is not established.

- Chain-of-custody paperwork to track bioassay samples is not always completed, making it difficult to track the status of many samples or to assure that tampering with the samples did not occur. Bioassay sample collection kits are sometimes left in rest rooms and not picked up for analysis in a timely manner.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-3) (H2/C1) **The Los Alamos National Laboratory internal dosimetry program lacks the functional elements of an internal audit program to assure the quality and accuracy of bioassay measurements required by DOE 5480.11 and DOE 5480.1B.**

FINDINGS:

- Studies have not been performed at LANL work locations having major potential for worker internal exposure to airborne uranium and plutonium compounds to characterize the in vivo solubility characteristics of specific chemical forms.

- Sitewide studies have not been performed at LANL to determine aerosol particle-size distributions in locations where processed uranium or plutonium may be inhaled by workers.

- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-4) (H2/C2) **At the Los Alamos National Laboratory, characterization of airborne radioactive material is not performed to allow appropriate assessment of internal dose as suggested by DOE 5480.11.**

FINDINGS:

- Plutonium workers in some facilities (e.g., TA-3 Chemistry and Metallurgical Research Building) handle mixtures of plutonium, americium, uranium, and fission products. About 1600 workers are counted each year in the LANL In Vivo Measurements Laboratory for potential intakes of radioactive materials. The Laboratory uses two 5-inch phoswich detectors for measuring plutonium and americium in the lungs. However, phoswich detectors are not state-of-the-art and cannot accurately measure plutonium and americium in the presence of interfering gamma emitters (such as cesium-137).

- The In Vivo Measurements Laboratory cannot meet the requirements of draft standard ANSI N13.30.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.7-5) (H2/C1) **At the Los Alamos National Laboratory, the In Vivo Measurements Laboratory cannot provide monitoring appropriate to the workplace or adequate to demonstrate compliance with radiation protection standards as currently required by DOE 5480.11.**

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

FINDINGS:

- The use of open-front hoods in the TA-3 Chemistry and Metallurgical Research Building leads to an increased frequency of radioactive material contamination incidents.
- AR 3-7, "Radiation Exposure Control," January 11, 1991, refers to a workplace monitoring program. Responsibility for a current plan rests with each line manager, resulting in different radiation survey programs and program inconsistencies.
- Cracked glovebox gloves contaminated with plutonium were observed in TA-21 Bldg. 146.
- The storage of new HEPA filters was found to have signs of rodent infestation that could lead to rodent damage of the filters.
- TA-21 Bldg. 5, room 500A, has various vacuum systems and pumps connected with tygon tubing. The tubing has several low spots with most having oil accumulations.
- LANL does not have a formal program to ensure quality and timely radiation surveys as required by DOE 5480.11. (See Section 4.5.2.13.2, RP.10.)
- Floor surveys in TA-55 Bldg. PF-4 are not performed at a frequency or with the precision to ensure the minimization of the spread of contamination as required by DOE 5480.11. (See Section 4.5.1.14.2, RP.10.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-1) (H1/C1) **At the Los Alamos National Laboratory, the lack of thorough radiation protection practices could result in loss of contamination control required by DOE 5480.11 and the release of radioactive materials in excess of limits specified in DOE 5400.5.**

FINDINGS:

- The removable- and fixed-contamination limits for tritium and pure gamma emitters are specified in AR 3-7, Appendix C, as 100,000 disintegrations per minute per 100 centimeters square. This limit contradicts the surface contamination limit specified in DOE 5480.11, Attachment 2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-2) (H2/C1) **Surface contamination limits for tritium and pure gamma emitters in Los Alamos National Laboratory AR 3-7, Appendix C, do not comply with the limits specified in DOE 5480.11.**

FINDINGS:

- Engineered ventilation controls to prevent the intake of radioactive materials in some plutonium areas do not have backup power in the event of interruption of electrical power.
- Following the loss of and then restoration of electrical power in TA-21 DP-West laboratories, pre-entry surveys were not conducted by radiation protection technicians prior to re-entry of evacuated personnel. TA-21 does not have a re-entry plan.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-3) (H1/C1) **At the Los Alamos National Laboratory, engineered controls and radiological re-entry surveys are not performed following the loss of electrical power as required by DOE 5480.11; therefore, contamination control cannot be assured.**

FINDINGS:

- Personnel in the TA-48 Bldg. RC-1 operates under their own organizational radiation protection plan, dated September 1991, with no indication of review or approval by the Health and Safety Division.
- "Self-surveying" as observed throughout Laboratory facilities is ineffective in assuring contamination control.
- Anti-contamination protective clothing removal procedures were not posted at all controlled locations.
- The current use of "green tags" to identify surplus materials is an ineffective means of certifying materials and equipment for release or salvage.
- LANL does not have a procedure approved by the Office of the Assistant Secretary for Environment, Safety and Health for release of volume contaminated materials and equipment to the public.
- Radiation monitoring and contamination control procedures (and documentation) at the plutonium and depleted uranium areas do not ensure control of the spread of contamination as required by DOE 5480.11. (See Section 4.5.1.14.2, RP.10.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-4) (H1/C1)

The Los Alamos National Laboratory radiation protection plans and procedures do not preclude the spread of radioactive contamination to employees and the public as required by DOE 5480.11 and DOE 5400.5.

FINDINGS:

- Areas exist within certain firing test areas where radioactive uranium "hot spots" have not been identified. TA-15 is one example where there are readily identifiable pieces of depleted uranium on the ground.
- The need for extensive radiation protection procedures (respiratory protection, bioassay, etc.) was considered by LANL to be unnecessary following previous experience with health physics coverage of test-firing areas. However, there is no documentation of those findings.
- Cleanup procedures following test firings of depleted uranium do not comply with DOE 5400.5 and DOE 5480.11 for radiological controls.
- The following concerns were not identified in the LANL self-assessment.

CONCERN: (TSA-4) (RP.10-5) (H2/C1)

At the Los Alamos National Laboratory, the partial cleanup of sites following test-firing of depleted uranium does not prevent the further release of uranium to the environment or the spread of contamination by workers on the site; satisfactory cleanup is required by DOE 5400.5.

CONCERN: (TSA-4) (RP.10-6) (H2/C1)

At the Los Alamos National Laboratory, there are deficiencies in the procedures and documentation of health physics surveys, bioassay results, and studies on the spread of contamination by airborne transport or other means after test-firings using depleted uranium; these radiological protection procedures are required to document need, quality, and appropriateness as required by DOE 5480.11.

RP.11 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, auditable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

FINDINGS:

- There is minimal trending of personnel exposures; trending is limited to the major LANL facilities.
- As-Low-As-Reasonably-Achievable goals are not established at the Laboratory level, but are left to the individual line organizations (facilities, divisions, or groups).
- See Section 4.5.4.9, PT.6, and Concern TSA-4, OA.3-1.

CONCERN: **See Concern TSA-1, RP.11-1.**

4.5.4.14 Personnel Protection

4.5.4.14.1 Overview

Occupational safety and industrial hygiene aspects of this assessment were addressed in the Personnel Protection appraisal area. All personnel protection performance objectives were assessed. Findings were developed through discussions with representatives from the Health and Safety Division, operating directorates, divisions, and groups, and subcontractors including JCI and M&H. Representative facilities were visited which included laboratories, mechanical shops, fabrication shops, maintenance shops, explosives areas, production facilities, laser facilities, storage areas, geothermal research area, firing range, and administrative areas. During facility visits, policies, procedures, and records were reviewed and field observations were made to evaluate the effectiveness and adherence to the health and safety program and regulatory requirements. Personnel discussions were often conducted in concert with facility walkthroughs.

The line management safety program is in a state of development. New organizational initiatives have recently been initiated to add health and safety coordinators to the line management structure to support program implementation. Systems for line management self-inspections and safety awareness have been implemented. Initiatives undertaken have been only partially effective. Much attention has been paid to review of facility condition; however, evaluation of health and safety program compliance with fundamental LANL procedures, OSHA regulations, and DOE orders is lacking. As a result, substantial noncompliances with vital health and safety practices and programs are evident.

The Health and Safety Division, comprised of the Safety and Risk Assessment Group and the Industrial Hygiene Group, operates in a service and support role relative to line management. Oversight, assurance, and verification of program compliance is not a substantive Safety and Risk Assessment and Industrial Hygiene Group role. The effectiveness of these groups has been crippled by (a) extensive personnel exodus to line management and other organizations which has occurred without strategic planning by LANL; (b) lack of definition of roles, responsibilities, and authorities; (c) lack of guidance criteria to direct functions; and (d) lack of effective management of resources. As a result, these groups are not effectively providing support, are not functional in an oversight or programmatic review role, and have not identified and evaluated many credible hazards.

Coordination of organizations responsible for safety is not effective. Information transfer between line management, the Health and Safety Division, and Medical Services is not apparent. Groups within differing line organizations, which share common facilities, do not always coordinate their efforts. Again, lack of definition of roles and responsibilities as well as lack of systems to promote interaction contribute to this deficiency.

Many deficiencies exist in the application of a health and safety program, including program aspects of lockout/tagout, confined space entry, hazard analysis, exposure monitoring, asbestos abatement, carcinogen control, chemical handling and storage, hazard communication, ES&H training, and laser safety, among others. Deficiencies included four Category II concerns, as follows:

- Lockout/tagout procedures do not control hazardous energy sources and are not in compliance with 29 CFR 1910.147.

- The asbestos abatement program is not controlled or monitored and is not in compliance with 29 CFR 1926.58.

- Confined space entry is not controlled in compliance with ANSI Z117.1 1989 or DRAFT 29 CFR 1910.146.

- Laser programs are not controlled according to ANSI Z136.1-1986.

Many credible hazards at LANL have not been identified or evaluated. These include exposures to lead, benzene, formaldehyde, chromium, asbestos, and others.

All 18 concerns identified in this assessment, were at least partially addressed in the LANL self-assessment. It is apparent that initiatives are under way to address some of the findings reported, herein. However, for these initiatives to be successful, it is essential that roles, responsibilities, and authorities be clearly defined, that management direction and coordination be applied, and that oversight, surveillance, and enforcement of health and safety programs be conducted.

4.5.4.14.2 Findings and Concerns

PP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

FINDINGS:

- A line management safety program is applied at LANL and involves active participation by group leaders, building managers, facility landlords, and ES&H coordinators. The function of first line supervisors, however, is not clearly defined, and active participation in health and safety functions is not achieved in all cases as required by DOE 5480.1B.

- The roles and responsibilities of ES&H coordinators, who report to group or division organizations, are not clearly defined. Some are health and safety professionals, while others are not. Some actively participate in field oversight and support activities, while others serve mainly in a role of coordinator or administrator.

- The roles and responsibilities of the ES&H coordinators versus the Safety and Risk Assessment Group and the Industrial Hygiene Group staff are not clearly defined. One ES&H coordinator stated that risk or hazard assessment was the main role of the Health and Safety Division. Another ES&H coordinator relied on the Health and Safety Division to schedule and lead walkthrough inspections, while others conducted this function independently.

- Lacking role definition, one ES&H coordinator did not know who would schedule and initiate walkthroughs now that a Health and Safety Division staff member who formerly performed this function has been reassigned.

- Groups develop and adopt health and safety plans and procedures and safe operating procedures without prior review by the Health and Safety Division and, at times, without any review at all.

- Quarterly walkthrough inspections are conducted by most, but not all groups. However, these inspections are generally conducted to identify only facility or equipment deficiencies. Reviews regarding compliance with health and safety program elements, administrative requirements (i.e., mandatory health and safety practices and procedures), standard operating procedures, and safe work practices are not conducted. (See Concerns TSA-4, PP.4-1, and TSA-4, PP.4-2.)

- Numerous noncompliances with health and safety programs and procedures were identified in this appraisal. (See

Concerns TSA-4, PP.2-2; TSA-4, PP.6-1; TSA-4, PP.6-2; TSA-4, PP.6-3; TSA-4, PP.6-4; and TSA-4, PP.6-5.)

- In some cases, a facility is shared by multiple groups or divisions. Under this circumstance, coordination of the roles and responsibilities of the respective ES&H coordinators is unclear. In one case, this resulted in an unauthorized experiment being started without approval of the researcher's ES&H coordinator or the facility owner's ES&H coordinator. Hazards present included carcinogens (benzene) and storage of ethyl ether in a nonexplosion proof refrigerator with a sign stating no flammables allowed.

- The Nuclear Materials Technology Division does not effectively establish standards of protection, training, and support to assure the health and safety of its personnel as required by DOE 5480.4, DOE 5480.9, DOE 5480.10, DOE 5482,1B, and DOE 5483.1A. (See Section 4.5.1.15.2, PP.1.)

- LANL has not developed an occupational safety and health program that addresses the administrative requirements of DOE 5483.1A. (See Section 4.5.3.14.2, PP.1.)

- See Concern TSA-4, PP.2-4.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.1-1) (H2/C1) **The Los Alamos National Laboratory line management safety program is not applied in a coordinated fashion with clearly established roles and responsibilities and does not address safety and health programmatic issues as required by DOE 5483.1A, DOE 5480.1B and DOE 5480.10.**

FINDINGS:

- The Safety and Risk Assessment Group and the Industrial Hygiene Group roles, responsibilities, and criteria to initiate action are not clearly defined as required by DOE 5480.1B. For instance,

  - Personnel who perform asbestos abatement monitoring do not understand when monitoring is required. (See Concerns TSA-4, PP.2-6 and TSA-4, PP.6-1.)

  - The laser safety officer has either not exercised his authority to achieve compliance with ANSI Z136.1-1986 or has not had management support to do so. (See Concern TSA-4, PP.6-3.)

  - It is unclear who is to verify confined space entry requirements and who is to control entries. (See Concern TSA-4, PP.6-4.)

- The role relative to JCI oversight is not established, except for an award fee appraisal. (See Concern TSA-4, OA.1-2.)

- Interactions and roles relative to line management and ES&H coordinators are not established. (See Concern TSA-4, PP.1-1.)

- The Industrial Hygiene Group consists of approximately 75 personnel, 25 of which are industrial hygienists and technicians in the field services section. The Safety and Risk Assessment Group staff consists of about 90 personnel, 20 of which are in the operational safety group which provides field services and support. Staff stability in these groups has been very poor with substantial turnover in management and field services personnel over the past 2 years.

- The Safety and Risk Assessment and Industrial Hygiene Groups have lost many personnel to operational groups, divisions, and directorates. This personnel exodus has occurred without any strategic planning by LANL management. LANL management has allowed organizations to take personnel from the Health and Safety Division in an uncontrolled fashion.

- Strategic planning around program goals and objectives has neither been conducted within the Health and Safety Division nor at upper management levels. Distribution, management, and utilization of health and safety personnel resources has not occurred in concert with program planning.

- Disparity in the availability of resources is apparent. For instance, a former masters level industrial hygienist of the Industrial Hygiene Group was recently hired by the Materials Technology: Polymers and Coatings Group to support this group of only 60 employees. ES&H coordinators for other groups may or may not be safety and health professionals and support functional areas of various sizes and complexity. The Industrial Hygiene Group has ten professional field industrial hygienists to support the entire site of over 8000 personnel.

- The Safety and Risk Assessment and Industrial Hygiene Groups have many more personnel assigned to nonfield functions than they do for field functions.

- The Safety and Risk Assessment and Industrial Hygiene Groups do not establish program goals and objectives to determine how best to use resources. Guidance on priorities is not received from LANL management.

- See Concerns TSA-4, OA.2-1; TSA-4, OA.6-2; and TSA-4, TS.1-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.1-2) (H2/C1) **At the Los Alamos National Laboratory, health and safety personnel resources are not distributed and managed around a strategic plan with established programmatic goals, objectives and priorities, and with clearly defined roles and responsibilities as required by DOE 5480.1B and DOE 5480.10.**

FINDINGS:

- The Safety and Risk Assessment Group and the Industrial Hygiene Group have a support and service orientation to line management. Independent oversight, assurance, and verification are not provided by the Health and Safety Division. Programmatic reviews are not conducted.

- The Laboratory Assessment Office is responsible for independent ES&H appraisal program. However, independent appraisals of many nonnuclear facilities have not yet been conducted, and when implemented, this program will only provide a triennial appraisal. It will not provide continued assurance and verification of health and safety program implementation and enforcement.

- Numerous programmatic deficiencies and noncompliances were identified during this assessment, such as for laser safety, confined space entry and others. (See Concerns TSA-4, PP.2-2; TSA-4, PP.6-1; TSA-4, PP.6-2; TSA-4, PP.6-3; TSA-4, PP.6-4; and TSA-4, PP.6-5.)

- See Concerns TSA-4, PP.3-1; TSA-4, ES-3.1; TSA-4, FR.4-2; TSA-4, TS.1-2; and TSA-4, WS.5-2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.1-3) (H2/C1) **Los Alamos National Laboratory does not conduct a program to assure and verify the implementation and enforcement of health and safety program requirements as required by DOE 5482.1B, DOE 5480.10, and DOE 5480.9.**

PP.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the personnel protection program.

FINDINGS:

- The ES&H Manual contains administrative requirements which are mandatory procedures defining health and safety requirements. Many of these procedures are relatively new and have not yet been implemented by line management. Examples include lockout/tagout, beryllium, and ES&H training. (See Section 4.5.2.14.2, PP.2.)

- Some administrative requirements do not conform to DOE Orders, OSHA regulations, and good practice standards. Examples are as follows:

  - AR 8-1, "Limited Egress/Confined Spaces," does not comply with ANSI Z117.1-1989 and Draft 29 CFR 1910.146. (See Concern TSA-4, PP.6-4.)

  - AR 5-2, "Lasers," does not comply with ANSI Z136.1-1986. (See Concern TSA-4, PP.6-3, and Section 4.5.4.11.2, EA.4.)

  - AR 6-1, "Chemicals," does not address all of the requirements of OSHA. Examples include: current OSHA-Regulated and "immediate use" control of chemicals.

- Administrative requirements are not written to address certain credible hazards present at the site which include asbestos abatement, working with lead, working with benzene, and working with chemicals in laboratories, among others.

- Administrative requirements are often not implemented and enforced. Examples include the following:

  - AR 1-3 "Standard Operating Procedures and Special Work Permits," October 30, 1987, requires standard operating procedures for potentially hazardous activities and approval of Health and Safety Division specialist; however, prior approval or review by the Health and Safety Division is not always evident. Examples include, but are not limited to: Electroplating Procedures, Sigma Building; Gas Cylinder Storage Work Procedures; Use of Petrochloric Acid, CLS-1-SOP-6; Use of Chemicals CLS-1-SOP-5; Tagout/Lockout Procedure, MST-CMR-07, R0; and Beryllium Machining Operations in Shop 4, Bldg. SM-39, room 16.

  - AR 6-3, "Use of Chemical Carcinogens," has deficiencies including, but not limited to:

training or medical surveillance is not being conducted for all OSHA-regulated substances; the operating group is not always notifying the Industrial Hygiene Group prior to purchasing any carcinogen that has not already been evaluated for use at the Laboratory; periodic review of existing operations involving any carcinogen is not always being completed; names of employees who work with carcinogens are not always provided to the Occupational Medicine Group for medical surveillance; standard operating procedures are often not prepared.

- TA-55 health and safety programs do not include, apply, or enforce many important program elements (lockout/tagout, respiratory protection, confined space entry) relating to the review and implementation of safety and health procedures and guidance as required by DOE 5483.1A and DOE 5480.10. (See Sections 4.5.1.15.2, PP.2, and 4.5.2.14.2, PP.2.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.2-1) (H1/C1)

Administrative requirements in the Los Alamos National Laboratory <u>The Laboratory Manual</u>, Chapter 1, "Environment, Safety and Health" often are not implemented, are not enforced, do not address all credible hazards, and do not comply with various Occupational Safety and Health Administration regulations, DOE 5483.1A, and DOE 5480.10.

FINDINGS:

- LANL has not implemented a procedure for lockout/tagout of hazardous energy sources. Current procedures often violate 29 CFR 1910.147.

- LANL recently developed a Lockout/Tagout Plan and Procedure dated August 20, 1991, to be applied sitewide. This procedure was to be implemented by December 20, 1991; however, its status is uncertain. For example:

  - No implementation plan has been developed addressing key details such as phase-in training, acquisition of locks and tags, application to subcontractors, etc.

  - Concern exists that training cannot be provided by staff due to lack of qualifications of trainers.

  - Concern exists that the procedure is too complex to allow an understanding by workers.

  - Concern exists over combining into one procedure the basic lock/tag provisions of 29 CFR 1910.147 with the work control provisions of DOE 5480.19.

- A memorandum has been drafted, but not issued, to rescind the new procedure.

- The new procedure mixes the use of lockout/tagout for service and maintenance of equipment (i.e., 29 CFR 1910.147) with conduct of operations to control critical systems (i.e., DOE 5480.19). In practice, instead of rendering a piece of equipment inoperable, many red locks and tags were placed on equipment such as cranes for purposes of administrative control rather than service and maintenance where a safety hazard exists. This practice tends to reduce the concern and recognition that a red lock and tag is indeed an indication that an individual's welfare is at stake. This practice is in violation of both 29 CFR 1910.147 and DOE 5480.19.

- Multiple procedures are currently being used for lockout/tagout. Many violate 29 CFR 1910.147.

- Numerous deficiencies in the lockout/tagout of hazardous energy sources were observed. These deficiencies are in violation of LANL procedure and 29 CFR 1910.147 and include the following examples:

  - A confined space at the Mechanical and Electronic Support Division, TA-3 Bldg. SM-39, the utility tunnel, was locked out with a red lock but tagged with a yellow caution tag.

  - A slurry pump at the power plant was being repaired. The circuit breaker to the pump was not locked out or red tagged. It was tagged with a yellow caution tag, which indicates no personnel hazard.

  - A red lock was placed on a power switch for a crane at the Sigma Complex weld shop. No tag was present to indicate why the system was locked out or who placed the lock. No one knew who had placed the lock.

  - Numerous examples of nonstandard locks were observed. (See Section 4.5.4.6.2, AX.1.)

  - Persons working on systems do not always control the key.

- See Sections 4.5.2.15.2, WS-4; 4.5.3.15.2, WS.4; 4.5.4.3.2, OP.1; and 4.5.4.4.2, MA.2, and Concerns TSA-4, ES-3.3; TSA-1, OP.4-1; and TSA-1, WS.4-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.2-2) (H1/C1) CAT. II

At the Los Alamos National Laboratory hazardous energy sources are not being controlled through a lockout/tagout program which meets, as a minimum, the requirements of 29 CFR 1910.147 and DOE 5480.19.

FINDINGS:

- JCI has a Health and Safety Manual which has not been revised since it acquired the operation from Pan Am World Services, Inc. Many procedures in the manual are not in conformance with DOE Orders and OSHA regulations, examples of which include lockout/tagout and confined space entry.
- JCI monitoring practices and asbestos abatement practices are not in compliance with 29 CFR 1926.58 or its own Health and Safety Manual and Asbestos Management Program. (See Concern TSA-4, PP.6-1.)
- JCI procedure for working with lead, H&S No. 12-29-005, does not address the requirements of 29 CFR 1910.1025. Monitoring is not performed regularly as required by the procedure. Respiratory protection rather than engineering controls are relied upon for the lead casting operation conducted by JCI.
- JCI procedures for issuing work permits do not always address key hazards. (See Concern TSA-4, PP.2-5.)
- LANL conducts little oversight or review of JCI procedures or activities and does not assure that the JCI health and safety group conducts effective internal oversight and hazard analyses.
- See Concerns TSA-4, WS.5-1; TSA-4, WS.5-2; TSA-4, MA.8-1; TSA-4, TS.1-2; and TSA-1, PP.3-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.2-3) (H1/C1)

Los Alamos National Laboratory does not conduct effective health and safety review and oversight of Johnson Controls World Services, Inc., as required by DOE 5483.1A, DOE 5480.9 and DOE 5482.1B, which is demonstrated by the numerous noncompliances found in Johnson Controls World Services, Inc., procedures and operations.

FINDINGS:

- Many critical administrative requirements addressing high hazard operations do not clearly assign roles, responsibilities, and authorities to individuals and groups. Examples include the following:
  - AR 8-1, "Limited Egress/Confined Spaces," August 1984, does not identify where the "qualified person" resides (e.g., in Health and Safety Division or line management), does not identify who is to verify that permit conditions are in place, and does not specify

the role of the Health and Safety Division except to participate in permit approval (e.g., whether or not onsite presence is required). A Class C confined space could present a greater hazard than a Class A or Class B space, and the Health and Safety Division is assigned no role for this type of entry. (See Concern TSA-4, PP.6-4.)

- AR 5-2, "Lasers," April 26, 1991, does not assign the Laser Safety Officer (LSO) any of the roles and responsibilities designated in ANSI Z136.1-1986. It merely states that the LSO will monitor and enforce. The LSO is not functioning according to the ANSI standard as required by DOE 5480.4. (See Concern TSA-4, PP.6-3, and Section 4.5.4.11.2, EA.1.)

- AR 1-3, "Standard Operating Procedures and Special Work Permits," October 30, 1987, requires Health and Safety Division review only "as appropriate" and states that the Health and Safety Division is "encouraged" to conduct a review. A clear review and approval responsibility is not mandated.

- Many administrative requirements have no section to define responsibilities. Others, which have such a section, do not address all responsible parties, for example, the Health and Safety Division, in many cases.

- Lacking an asbestos administrative requirement and a management plan, oversight responsibility for asbestos abatement is lacking and virtually none is conducted. Interaction between the Field Operations Group, JCI, and the Industrial Hygiene Group is not defined. It is unclear where responsibility lies to ensure safe conduct of activities. In practice, JCI exhibits independent control. (See Concern TSA-4, PP.6-1.)

- The ES&H Manual, Section 4, gives the Health and Safety Division responsibility to "initiate and promote" the health and safety program. Without further definition in administrative requirements, the Health and Safety Division role is uncertain. Where an oversight role is implied for the Health and Safety Division (e.g., asbestos abatement, laser safety, construction safety) the effort is ineffective, lacking this clear definition.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.2-4) (H2/C1) **Roles, responsibilities, and authorities for individuals and groups with safety and health functions are not clearly defined in Los Alamos National Laboratory policy and procedure as required by DOE 5480.1B and DOE 5480.10.**

FINDINGS:

- LANL permit requirements for confined space entry do not conform to specifications of ANSI Z117.1-1989 and draft 29 CFR 1910.146.

- JCI permit requirements for confined space entry do not conform to specifications of ANSI Z117.1-1989 and draft 29 CFR 1910.146.

- JCI performed a drain line modification involving excavation of a sewer. The work authorization and permit process failed to identify the potential for the collapse of trench walls and the need for shoring to control this hazard. Details include the following:

  - The Maintenance Group filled out an ES&H Questionnaire for this job. The hazard of excavation and need for shoring was not identified.

  - The ES&H Questionnaire does not address industrial safety hazards. It only addresses chemical, biological, radiological, and environmental hazards.

  - The Safety and Risk Assessment Group approved the activity without recognizing the need for shoring.

  - The Maintenance Group issued a work order to JCI requiring preparation of an excavation permit.

  - JCI prepared an excavation permit and posted it at the site. The excavation permit was devoid of any safety information. Shoring was not mentioned. The requestor of the permit signed the permit himself as having complied without onsite verification of a safe condition.

  - The Maintenance Group signed the authorization without requiring shoring.

  - No one inspected the job site for proper shoring.

  - An inspection performed by the S&H Subteam resulted in LANL stopping the job due to improper shoring.

- Safety and Risk Assessment Group and Industrial Hygiene Group responsibility for permit review is not clear. (See Concern TSA-4, PP.2-4.)

- See Concern TSA-4, WS.5-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.2-5) (H1/C1) **The Los Alamos National Laboratory work authorization and permit process does not effectively identify and control safety and health hazards as specified by DOE 5480.19 and DOE 5480.10.**

FINDINGS:

- The Industrial Hygiene Group has not implemented quality control criteria for some important data collection activities. For example, phase contrast microscopy for fiber-in-air analyses (i.e., asbestos by National Institute for Occupational Safety and Health (NIOSH) method 7400) are not conducted according to all the quality control criteria of the method. Also, when outliers are obtained during NIOSH Proficiency Analytical Testing, no followup action to investigate and correct any problems is undertaken.

- The Industrial Hygiene Group has not established criteria to guide its action and response to hazards or activities. For example, the Group is notified of asbestos abatement, but personnel do not know what to do with the information (e.g., when to get involved and when not to).

- A revised protocol to perform health hazard analyses has been drafted, but has not yet been finalized and implemented. Industrial Hygiene Group personnel approaches to such analyses were inconsistent, as previously applied.

- See Section 4.5.2.14.2, PP.2.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.2-6) (H2/C1) **At the Los Alamos National Laboratory, the Industrial Hygiene Group, Health and Safety Division, has not established criteria to initiate and conduct many technical functions to assure the quality and adequacy of data collected as required by DOE 5480.10.**

PP.3 MANAGEMENT OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Chemical, physical, and other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

FINDINGS:

- A systematic program to identify and evaluate health and safety concerns has not been established as indicated below.
  - LANL has a program requiring management personnel to perform walkthroughs to indicate safety and health concerns. Programmatic reviews to determine compliance and safety and health status are not conducted by any organizational group including line management, Health and Safety Division, and the Laboratory Assessment Office. Many programs involving high-hazard operations are conducted in violation of DOE Orders and OSHA regulations and credible hazards exist. Such programs include laser safety, confined space entry, asbestos abatement, lockout/tagout, and others. (See Concerns TSA-4, PP.6-1; TSA-4, PP.6-2; TSA-4, PP.6-3; TSA-4, PP.6-4; TSA-4, PP.6-5; TSA-4, PP.2-2; and TSA-4, PP.4-1.)
  - Exposure monitoring for high-hazard operations is very limited in many cases, such as asbestos abatement, lead casting and machining, lead and chromium painting, use of carcinogens, and others. (See Concerns TSA-4, PP.6-1, and TSA-4, PP.4-2.)
  - Comprehensive industrial hygiene surveys and hazard analyses have not been performed for many operations with credible hazards such as foundry operations involving toxic metals, TA-3 SM-102 toxic metal machining operations, and many others. (See Concerns TSA-4, PP.3-2, and TSA-4, PP.4-2.)
  - Line management, the Health and Safety Division and subcontractors have not identified and evaluated the hazards associated with the widespread use of lead and zinc chromate paints. Workers have not been informed of their existence or hazard.
  - The source of carbon monoxide contamination in the Mechanical and Electronics Support Division utility tunnel has not been evaluated. (See Concern TSA-4, PP.6-4.)
- Oversight and evaluation of hazards associated with JCI operations is not conducted in any substantive manner (e.g., in area of asbestos abatement, construction, and maintenance). (See Concerns TSA-4, PP.4-1; TSA-4, PP.4-2; and TSA-4, PP.6-1.)

- Work permits are not prepared and verified to ensure control of hazards. (See Concerns TSA-4, PP.2-5, and TSA-4, PP.6-4.)

- Implementation plans are not prepared and issued under management directive to ensure timely compliance with and enforcement of health and safety programs. Examples include asbestos management, lockout/tagout, and laser safety. (See Concerns TSA-4, PP.2-2; TSA-4, PP.6-1; and TSA-4, PP.6-3.)

- Criteria have not been established to guide the Safety and Risk Assessment and Industrial Hygiene Groups in the identification and evaluation of hazards both in terms of technical approaches and responsibility. (See Concerns TSA-4, PP.2-4, and TSA-4, PP.2-6.)

- See Concerns TSA-3, PP.1-2, and TSA-4, TS.1-1, and Sections 4.5.2.14.2, PP.3, and 4.5.1.15.2, PP.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.3-1) (H1/C1) **Los Alamos National Laboratory has neither established the systems and processes, nor clearly assigned the responsibility, to identify, evaluate, and control health and safety hazards as required by DOE 5480.1B and DOE 5480.10.**

FINDINGS:

- At the Mechanical and Electronics Support Division, TA-3 Bldgs. SM-39 and SM-102, many high-hazard operations have been recently stopped by management prior to this assessment. Machining of beryllium, lead, and other toxic metals as well as industrial use of acids are involved. In the cases of SM-102 and the Beryllium Shop in SM-39, plans to modify facilities have been prepared; however, implementation of these plans is not certain. Plans for acid operations have not been developed.

- Comprehensive industrial hygiene surveys and hazard analysis as required by DOE 5480.10 have not been performed in concert with facility modification plans. Except for occasional monitoring of exposures, oversight of work practices is not performed.

- An effective interface and coordination between the Health and Safety Division, line management and Medical Services has not been established for these high-hazard operations. Medical Services is unaware of workers involved with lead, beryllium and other toxic metals.

- See Concern TSA-4, RP.2-1.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.3-2) (H2/C1)	At the Los Alamos National Laboratory, comprehensive and coordinated efforts between the Health and Safety Division, line management, and Medical Services are not established to ensure that occupational exposure to hazardous materials are evaluated and controlled as required by DOE 5480.10.

PP.4 SURVEILLANCE OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

FINDINGS:

- LANL does not conduct a formal program for health and safety surveillance of JCI.
- Internal appraisals are not clearly defined in writing, are not auditable, or do not provide an independent review of ES&H functions at the operating level.
- A formal mechanism for verifying implementation of administrative requirements through line management does not exist.
- Procedures to define safety and health oversight do not exist.
- The Laboratory Assessment Office (LAO) developed a draft assessment program for management of internal and external ES&H and quality assessments. The focus has been centered on assessments of nuclear facilities; therefore, sitewide appraisals are incomplete and do not include a formal audit to evaluate the effectiveness of Personnel Protection Program activities. The Health and Safety Division and line management also do not conduct program reviews.
- The LAO 1989 Appraisal Log included at least 48 entries. Twenty nine remain open as of October 1, 1991. The LAO 1990 Appraisal Log included at least 70 entries. As of October 1, 1991, 40 remain open. Of the 34 entries in the LAO 1991 Appraisal Log, all but two remain open.
- See Concerns TSA-4, ES.3-1; TSA-4, FR.4-1; and TSA-4, FR.4-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.4-1) (H2/C1) **A program to perform health and safety surveillance, oversight, and appraisals has not been implemented at Los Alamos National Laboratory as required by DOE 5480.10 and DOE 5482.1B.**

FINDINGS:

- The Industrial Hygiene Group has drafted a revised protocol for performing health hazard analyses; however, this protocol has not been implemented.
- Industrial hygiene surveys have not been conducted in any comprehensive manner as required by DOE 5480.10. Detailed safety analyses have also not been conducted for many operations.

- Hazard analyses which have been conducted are not consistent in their detail or approaches. Conduct of such analyses have often not incorporated exposure monitoring, evaluation of engineering or other controls, evaluation of personal protective equipment, or observation of work practices. (See Concern TSA-4, OP.2-3.)

- Industrial hygiene monitoring is actively performed, but many credible hazards have not been evaluated to any significant degree. Examples of these include exposures to lead and zinc chromate in paints, toxic metals including lead in the Sigma Complex foundry, benzene in laboratories, formaldehyde in laboratories, welding fumes including chromium.

- Asbestos abatement is conducted without oversight. (See Concern TSA-4, PP.6-1.)

- Laser operations are not monitored and ANSI Z136.1-1986 is not enforced by the Laser Safety Officer. (See Concern TSA-4, PP.6-3.)

- Compliance with many other health and safety programs is not reviewed (e.g., lockout/tagout and carcinogen control). (See Concerns TSA-4, PP.2-2; TSA-4, PP.6-5; and TSA-4, PP.6-2.)

- The exposure monitoring database and record keeping system does not provide easily accessible and retrievable data.

- Medical Services is not aware of employees with exposure to lead, beryllium, and other toxic materials. The Health and Safety Division submits data on monitoring to Medical Services, but a listing of employees with credible exposures is not provided to Medical Services by either the Health and Safety Division or line management. (See Concern TSA-4, PP.3-2.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.4-2) (H1/C1)

At the Los Alamos National Laboratory, effective programs are not in place to identify, evaluate, monitor, and control credible chemical, physical, and safety hazards as required by DOE 5480.10, DOE 5480.4 and Occupational Safety and Health Administrations regulations.

PP.5 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Written programs, of sufficient quality to comply with all Department of Energy prescribed occupational safety and health standards, should be available.

FINDINGS:

- The LANL Hazard Communication Program, AR 1-9, does not address all of the requirements in 29 CFR 1910.1200. Examples include but are not limited to:
  - The administrative requirement does not include the method the employer will use to inform employees of any precautionary measures needed to be taken to protect their employees when multi-organization employees occupy the worksite.
  - The administrative requirement does not address how employees are to be apprised of the target organ effects of hazardous chemicals when labeling systems do not convey this information.
  - The administrative requirement does not address nonroutine tasks.
- A materials safety data sheet (MSDS) prepared by LANL does not consider all available scientific evidence concerning the hazard of the chemical. For instance, Silicon Carbide Whiskers are referenced in the literature as a potential carcinogen. This information is not provided in the MSDS, a violation of 29 CFR 1910.1200.
- MSDSs are not available for all chemicals and products. (See Concerns TSA-4, PP.6-5, and TSA-4, WS.3-1.)
- Numerous labelling deficiencies were found sitewide. (See Concerns TSA-4, PP.6-5, and TSA-4, WS.3-1.)
- LANL does not have a Chemical Hygiene Plan, as required by 29 CFR 1910.1450, Occupational Exposure to Chemicals in Laboratories.
- Training as required by 29 CFR 1910.1450 is not being performed.
- Safe operating procedures required are not always available for laboratories.

CONCERN: **See Concern TSA-4, WS.3-1.**

FINDINGS:

- ES&H training on key occupational health and safety hazards and programs is not formalized. Examples include lockout/tagout, confined space entry, working with lead, working with benzene, laser safety, and others.

- Site-specific training is also not formalized based on the specific hazards present in the workplace. (See Concerns TSA-4, SS.4-2; TSA-4, FP.6-1; and TSA-4, FP.6-4.)

CONCERN: **See Concern TSA-4, TC.1.1.**

PP.6 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS

PERFORMANCE OBJECTIVE: Site/facility operations comply with DOE-prescribed standards for the evaluation and control of occupational health standards.

FINDINGS:

- The ES&H Manual contains no administrative requirements for asbestos abatement or management.
- Some draft LANL documents have been prepared for asbestos management; however, these plans have not been implemented and no plan or schedule is in place for implementation.
- JCI performs asbestos abatement at LANL. It also performs asbestos surveys on which LANL bases abatement decisions. This is a clear conflict-of-interest.
- JCI performs asbestos abatement with virtually no oversight performed by LANL. Thus, the asbestos abatement contractor is essentially free to conduct abatement in any manner it deems appropriate.
- The Industrial Hygiene Group is notified of asbestos abatement activities by JCI. However, the Group staff has no criteria to guide any decision as to whether monitoring or oversight should be performed. The Group does not provide oversight to any significant extent.
- Abatement monitoring by the Industrial Hygiene Group is very limited. Monitoring before and during abatement is rarely performed. Final clearance monitoring is performed only for abatements with enclosures; which is only a small percentage of jobs. No visual inspection is performed or documented. Inspections during abatement, if performed, are not documented.
- The Industrial Hygiene Group provided some level of oversight for abatement actions in 1990; however, no evidence of this oversight was found in 1991. It stopped after the responsible person was reassigned to the ES&H Coordination Center.
- JCI health and safety personnel have performed only a small amount of worker exposure monitoring for only a few of many projects performed in 1991, which violates 29 CFR 1926.58. Exposure results are erroneously compared to a guideline of 0.5 fibers per cubic centimeter of air (f/cc) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). The more stringent and mandatory OSHA standard of 0.2 f/cc, as required by 29 CFR 1926.58, is not used. The JCI industrial hygienist was unaware of the difference between ACGIH and OSHA standards.

- JCI performs numerous glovebag operations for asbestos removal as well as wrapping and dropping of pipes and ducts. No evidence of oversight and monitoring was found for these operations. Pre-abatement, during abatement, and final clearance samples are not taken during these operations. Visual inspection to ensure the area is free of asbestos debris is not performed as specified by Environmental Protection Agency "Guidance for Controlling Asbestos-Containing Materials in Buildings." In addition, worker exposure monitoring is not performed as required by 29 CFR 1926.58.

- Most abatements are performed without benefit of containment other than glovebag or wrapping. Abatements deemed to involve nonfriable material such as transite or floor tile are usually performed with no containment. The Industrial Hygiene Group is notified, but seldom visits the job site to judge the acceptability of JCI decisions. Since no monitoring is performed, it is unknown whether uncontrolled asbestos releases occur for these operations. This method of abatement, in the absence of monitoring, is a violation of 29 CFR 1926.58.

- JCI practice violates its own asbestos management plans and health and safety procedure regarding monitoring and construction of enclosures. Both are required by JCI procedures.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory exercises little, if any, management or technical oversight and control of asbestos abatement activities, and abatement actions are not conducted in compliance with 29 CFR 1926.58 and Environmental Protection Agency "Guidance for Controlling Asbestos Containing Materials in Buildings."**
(TSA-4)
(PP.6-1)
(H1/C1)
CAT. II

FINDINGS:

- LANL AR 6-3, "Use of Chemical Carcinogens," defines the requirements for chemical carcinogen purchasing and receiving, operations, medical surveillance, decontaminating and decommissioning, waste disposal, and record keeping. AR 6-3 does not conform to 29 CFR 1910.1200 nor DOE 5480.10 in all respects. Examples include but are not limited to the following:

  - AR 6-3 defines carcinogens as substances regulated as a carcinogen by OSHA or listed as confirmed or suspected human carcinogen by ACGIH, but does not include the National Toxicology Program and the International Agency for Research on Cancer Monographs as sources for providing information on carcinogens.

  - Appendices B and C of AR 6-3 are not current as far as ACGIH listings.

- Not all carcinogen controls specified in AR 6-3 have been implemented or are being enforced. Deficiencies include but are not limited to the following:

  - The carcinogen inventory does not include the Chemical Abstract Service number, brief description of the operation, and standard operating procedure number.

  - AR 1-3 requires a standard operating procedure for all cancer-causing agents, or extremely toxic materials. AR 6-3 specifies a standard operating procedure, for carcinogens, "if appropriate". Few standard operating procedures have been prepared.

  - Access to areas where carcinogens are used and stored are not always restricted by supervisors of the area.

  - Carcinogen warnings are not always posted as required by 29 CFR 1910, Subpart Z.

  - Names of employees who work with carcinogens are not always provided by the operating group to the Occupational Medicine Group for medical surveillance; therefore, medical surveillance is not always provided to employees exposed to carcinogens.

  - Containers of carcinogens such as benzene, chloroform, and asbestos were found in laboratories without any labeling other than the name of the chemical.

  - "Designated" and "controlled" areas for control of OSHA and ACGIH carcinogens have not been established in most cases.

  - Material Safety Data Sheets (MSDSs) are not available for all carcinogens.

  - The carcinogen inventory did not identify all carcinogens found in some laboratories.

  - Not all employees have received training to understand the significance of carcinogens found in the workplace.

  - LANL has prepared a MSDS for Silicon Carbide Whiskers. The MSDS does not identify these as a potential carcinogen.

- The following concern was addressed in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory has not developed and implemented an effective carcinogen program as required by DOE 5480.10 and 29 CFR 1910.1200 and does not consistently enforce its own procedure.**
(TSA-4)
(PP.6-2)
(H1/C1)

FINDINGS:

- LANL AR 5-2, "Lasers," defines LANL procedure for laser safety. This procedure does not address or conform to many aspects of ANSI Z136.1-1986 which is mandatory according to DOE 5480.4. Examples include the following:
  - The roles and responsibilities of the Laser Safety Officer (LSO) are not defined according to the standard. The procedure does not provide the LSO any system or mechanism to administer, monitor, or enforce the control of laser hazards. It does not define the LSOs interaction and responsibilities relative to laser operators.
  - Some procedures and steps of the standard are not mentioned such as the establishment of nominal hazard zones.
  - The procedure states that an interlocked enclosure of a Class 3 or 4 laser will "achieve Class 1 laser status" requiring few, if any, controls. This interpretation of the standard is in error. In addition, it creates potential for abuse in that laser operators can attempt to avoid compliance with the ANSI standard by inappropriately claiming a Class 1 status.
- Laser control measures specified in AR 5-2 and ANSI Z136.1-1986 have not been implemented in many cases. Deficiencies include the following:
  - Several Class 4 laser systems are operated with unenclosed beams at or near eye level.
  - Many Class 4 laser systems with unenclosed beams are operated without interlocks on doors to the room.
  - Improper warning signs are common, such as the use of yellow caution signs for Class 3b and 4 lasers and the lack of laser classifications.
  - Some rooms used for lasers do not afford access control. TA-21, Bldg. 5, rooms 530, 531, and 532, are particularly deficient in access control. Many other areas have door windows.
  - Access control light panels have not been installed for many laser areas.
  - Reflective surfaces are often used as barriers for stray beams.

- An LSO and Deputy LSO reside in the Safety and Risk Assessment Group. Consistent with ANSI Z136.1-1986, AR 5-2 states that these individuals have the authority to monitor and enforce the control of laser hazards. In practice, the LSO and Deputy LSO do not perform the responsibilities of the position as defined by ANSI Z136.1-1986. For example:

  - They do not enforce the requirements of the standard as demonstrated by the lack of interlocks and use of improper signs.

  - They do not establish nominal hazard zones.

  - They do not approve all standard operating procedures and ensure that they are in place.

  - They do not always recommend or approve protective equipment.

  - They do not review and approve operations prior to startup.

- Several operational groups claim to have internal LSOs. However, these personnel also do not perform the functions required by ANSI Z136.1-1986. Their role is not defined and their relationship to the LANL LSO is not defined.

- LANL management has not established an organizational system to implement and enforce ANSI Z136.1-1986. LSO responsibility has not been delineated. A directive to comply with the standard has not been issued to groups. Management has not made it clear to operational groups and the LSO what responsibility and authority belongs with the LSO.

- Laser installations in LANL accelerator facilities do not conform with ANSI Z136.1-1986. (See Section 4.5.3.14.2, PP.6.)

- See Concerns TSA-4, PP.1-1; TSA-4, PP.1-2; and TSA-4, EA.2-1; and Sections 4.5.1.15.2, PP.6, and 4.5.4.11.2, EA.4.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.6-3) (H1/C1) CAT. II

Laser operations are not in compliance with Los Alamos National Laboratory AR 5-2, ANSI Z136.1-1986, and DOE 5480.4.

FINDINGS:

- LANL AR 8-1, "Limited Egress/Confined Spaces," is the LANL procedure for confined space entry. This procedure provides little detail to define the process for entering a confined space. Examples of deficiencies relative to ANSI Z117.1-1989 and draft 29 CFR 1910.146 include the following:
  - The permit system used does not include all required information.
  - Rescue provisions are not defined.
  - Roles and responsibilities of key personnel, such as standby attendants and those authorizing entry, are lacking.
  - The process of permit issuance is not clearly provided.
  - The administrative requirement classification of confined spaces as A, B, or C has no basis in hazard ranking. Yet, some personnel feel that a Class A is not hazardous and a Class C presents little hazard, if any.
  - No requirement for standby personnel are included, nor are they identified in permits.
  - A qualified person is not required.
  - No reference is made to the standards cited above.
- Technical Bulletin 801, "Limited Egress/Confined Spaces," provides guidance for confined space entry; however, this bulletin is not required procedure.
- Many confined spaces are not labelled as A, B, or C or as confined spaces.
- Confined spaces have been misclassified as Class C, which is a space where "the only hazards are those caused by the work performed." An example is the utility tunnel in TA-39, the Mechanical and Electronics Support Division facility. This space, however, has potential for oxygen deficiency and has a carbon monoxide contaminant source.
- Confusion exists as to the entry process for Class A and B confined spaces. The Mechanical and Electronics Support Division utility tunnel at TA-3 Bldg. SM-39 was reclassified as a Class B confined space and a standard operating procedure was initiated by line management. However, the administrative requirement calls for Class B confined spaces to be entered under a special work permit. Class A spaces require standard operating procedures according to the administrative requirement.

- To deal with the carbon monoxide contamination in the utility tunnel, the Industrial Hygiene Group assembled monitoring equipment to be used continuously during entry, and assisted in writing a standard operating procedure. In essence, a decision was made to live with the condition. No attempt was initiated to identify, control, and eliminate the source.

- Permits are not mandatory for entries into Class A or C spaces, which violates 29 CFR 1910.146 and ANSI Z117.1-1989.

- Training is not conducted for all entrants and attendants.

- The authorizing person does not verify that all permit conditions have been met.

- Many standard operating procedures which have been prepared do not contain the information which is lacking in the administrative requirement and do not abide by Appendix A of the administrative requirement, "Guidelines for Preparing an SOP for Limited Egress/Confined Space Entries."

- The Marx Tank of the Multidiagnistic Hydrotest Facility, ECTOR, at TA-15 requires draining of oil from a capacitor bank and entry into the confined space. Oxygen is monitored; however, the hazard associated with vapors from the oil is judged only by sense of smell. The Health and Safety Division is not involved in this entry.

- No requirement for Health and Safety Division or other qualified person involvement in confined space entries is in place. No requirements for verification of permit conditions and oversight of high-hazard activities is in place.

- See Sections 4.5.3.14.2, PP.6; 4.5.3.15.2, WS.3; and 4.5.2.15.2, WS-3.

- The following concern was identified in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory confined space entry is not controlled by a qualified person and procedures do not conform to ANSI Z117.1-1989 which is mandated by DOE 5480.4 and Draft 29 CFR 1910.146.**
(TSA-4)
(PP.6-4)
(H1/C1)
CAT. II

FINDINGS:

- Proper eye and body protection is not being worn or is not available to reduce the potential for injury. This was evident for employees using acids. Other examples include:

- Emergency showers and eyewash stations were not always available or inspected. (See Concerns TSA-4, MA.3-1, and TSA-4, WS.3-2.)

- Face shields, a secondary protection, are used when primary (i.e., goggles) is required for eye protection.

- Latex gloves are used without employee understanding of the limitations (i.e., permeability to chemicals and need for periodic replacement).

- Only lab coats are worn when employees use various acids. Rubber aprons were not available in most laboratories.

- Prescription eyeglasses were observed as the only eye protection worn when an employee was using nitric acid.

- Known or suspect carcinogens are in use and are not identified, evaluated, or controlled. These include, but are not limited to: asbestos, silicon carbide whiskers, chloroform, benzene, lead chromate paints, zinc chromate paints, and methylene chloride.

- Deficiencies in storage and use of chemicals and gases were widespread. Examples include the following:

  - Flammables were stored in bottles at a height of 6 feet above the ground in TA-3 SM-31 on shelves without a sill of at least 2 inches.

  - Containers of Shellac (bulging cans) and lead based paint with expired shelf-life dates were stored in TA-3 SM-31.

  - A Catalyst II with a health warning of 3 was leaking in the Center for Materials Science, Bldg. 34, room 122.

  - Perchloric Acid was used and stored in a hood not designed for Perchloric Acid use; Chemical and Laser Sciences Division, Bldg. SM-29, room 7135.

  - Sulfuric and nitric acid were standing in water in the Space and Science Technology Division, Bldg. 502.

  - Solvents, acids, corrosives, and many other incompatible materials are stored haphazardly in the Space and Science Technology Division, Bldg. 502.

- Gas cylinders outside TA-21 Bldg. 3N are on an unstable footing (asphalt sloped) and leaning against their chains.

- Compressed gas cylinders are secured at their neck in many areas, and all caps are not in place.

- Chemicals were stored alphabetically without evaluation of compatibility in the Sigma Complex, TA-3 Bldg SM-66.

- Labeling deficiencies were found throughout LANL. Examples include:

  - Unlabeled containers were noted in TA-3 Bldg. 34, rooms 107, 108, and 122; the Space Science and Technology Division lower basement, main staging area; TA-3 Bldg. SM-40, room S116; the Mechanical and Electronics Support Division, room 115; Sigma Complex Basement G-3; and in TA-3, the Chemistry and Metallurgical Research Building and the Chemical and Laser Sciences Division.

  - Carcinogens were noted throughout the Laboratory without proper identification or hazard warning.

  - LANL labeling policy is not uniform throughout the Laboratory. Labeling for secondary containers varies from work area to work area.

- See Concerns TSA-4, WS.3-1; TSA-4, MA.3-1; TSA-4, AX.1-3; and TSA-3, PP.6-3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (PP.6-5) (H1/C1) **At the Los Alamos National Laboratory, chemical handling and storage does not comply with requirements of Occupational Safety and Health Administration regulations mandated by DOE 5480.4, such as 29 CFR 1910.1200 and 29 CFR 1910, subpart H.**

4.5.4.15 Worker Safety and Health (OSHA) Compliance

4.5.4.15.1 Overview

A comprehensive safety and health compliance appraisal based on the OSHA standards 29 CFR 1910 and 29 CFR 1926 was conducted at LANL from October 1991 to November 1991. The purpose of this appraisal was to determine compliance with existing OSHA regulations. Compliance issues are categorized in this report according to the specific objectives listed in DOE/EH-0135, "Performance Objectives and Criteria for Technical Safety Appraisals," June 1990. Compliance issues were documented and discussed with LANL management during daily debriefing meetings.

Multiple noncompliance issues in a particular work area were noted once on the OSHA Form 1B. (See Appendix F).

Both facilities and construction sites were inspected, using OSHA general industry and construction standards as evaluation criteria, 29 CFR 1910 and 29 CFR 1926, respectively. Due to time constraints, a representative sample of the facilities were appraised. Facilities were prioritized based on size, number of the employees, amount and usage of hazardous materials, and hazardous operations.

Priority facilities or sites included maintenance shops, hazardous materials storage areas, materials storage areas, hazardous waste disposal and decontamination areas, laboratories, and process facilities. A less comprehensive sample of office facilities and low hazard areas were inspected. A total of 574 noncompliance issues were identified. Of these, 573 were considered serious and one was classified as other than serious. Table WS-4 provides a summary of the Technical Area inspections, the number of noncompliance issues noted and the hazard classification of each issue.

Noncompliance issues indicate serious deficiencies or systemic problems in the following areas:

A Category I concern was generated due to noncompliance issues pertaining to excavation work being conducted in TA-3. Employees were working in the bottom of a 10-feet long by 10-feet wide by 8-feet deep excavation between Bldgs. SM-105 and SM-452 in order to install manhole access to a 8-inch sewer line. The excavation was not properly shored or otherwise protected from a cave-in and had not been inspected by a competent person. Additionally, the atmosphere in the excavation had not been tested and employees had not been trained as to the nature of the hazards involved with the excavation.

LANL does not exercise comprehensive safety oversight of subcontractors to assure that they comply with the requirements of 29 CFR 1926. This resulted in at Category II Concern. Problems noted at construction sites included the use of plywood in place of scaffold grade planking and the absence of standard guardrails and toeboards. Access to construction sites was not uniformly limited by barriers or flagging. Employees required to enter into confined or enclosed spaces were not always instructed as to the nature of the hazard involved, the necessary precautions to be taken, and in the use of protective and emergency equipment. Frequent and regular inspections of construction activities, materials and equipment are not conducted by a competent person designated by the employer.

Table WS-4

Technical Area Inspections and Noncompliance Information

Location	Number of Noncompliances			
	Serious	Other-Than-Serious	Willful	Imminent Danger
Sitewide	5	0	0	0
Labridge	3	0	0	0
JCI	3	0	0	0
TA-18	3	0	0	0
TA-3	412	0	0	0
TA-33	8	0	0	0
TA-35	39	1	0	0
TA-36	8	0	0	0
TA-43	3	0	0	0
TA-46	18	0	0	0
TA-48	1	0	0	0
TA-51	19	0	0	0
TA-55	1	0	0	0
TA-57	5	0	0	0
TA-59	1	0	0	0
TA-60	28	0	0	0
TA-61	10	0	0	0
TA-63	6	0	0	0
TOTAL	573	1	0	0
Percentage	99.83	0.17	0.00	0.00

Total Noncompliance 574

Confined space deficiencies were noted including improper identification or lack of identification, lack of atmosphere monitoring, and lack of entry procedures. Some confined spaces were improperly identified even though argon, natural gas, and carbon monoxide were present or potentially present due to ongoing work.

Eyewash stations which provide a 15-minute continuous flush were not readily available in several locations where acids, corrosive liquids, and other hazardous materials were being used or handled.

Application of the hazard communication program was inconsistent. Problems areas include TA-46 Bldg. 58, where 25 chemical containers were found in one storage cabinet without hazard warning labels. In addition, material safety data sheets were not consistently available for chemicals used in the facilities or were sometimes difficult to obtain.

Machine guarding problems are evident in numerous LANL and JCI facilities at the site. Inadequate guarding on drill presses, lathes, vertical mills, band saws, shafts, belts, pulleys, and other equipment is evident.

Electrical safety problems were noted sitewide in both permanent installations and portable power tools. For example in TA-3, SM-39, the inner panel on Power Panel No. 19 in the south utility tunnel and Panel No. 8 in the north utility tunnel had exposed energized parts. Systemic problems included breakers whose functions were not identified, extensive use of flexible power cords for permanent installations and frayed power cords. In addition, unqualified LANL and JCI employees who may come in close proximity to electrical work were not trained as required by the Electrical Safe Work Practices. Neither LANL nor JCI had written procedures as required under Electrical Safe Work Practices.

The issues of greatest concern have been summarized above. It should be noted that all of the concerns listed in this report were identified by LANL in their self-assessment report. Their self-assessment will be a valuable tool for assisting the facility in developing a viable action plan.

4.5.4.15.2 Findings and Concern

WS.3 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Site/facility operations should comply with Department of Energy prescribed standards for the evaluation and control of occupational health hazards.

NOTE: Noncompliance with this performance objective is documented on the OSHA Form 1B and compiled in Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- Monitoring for toxic and flammable gases, or oxygen deficient atmospheres was not conducted prior to entry into the north and south utility tunnels in TA-3 Bldg. 39.
- The pit and pit furnace area in the Heat Treatment Room of TA-3 Bldg. SM-102 is not posted as a confined space.
- Two ovens located in the JCI Electrical Maintenance Shop, TA-3 Bldg. SM-38, are not identified and controlled as confined spaces. Entries are routinely made into these areas.
- LANL has not comprehensively implemented the requirements of ANSI Z.1-1977, Confined Spaces, nor are they in compliance with the requirements of Section 5(a)(1) General Duty Clause of the Occupational Safety and Health Administration.

CONCERN: **See Concern TSA-4, PP.6-4.**

FINDINGS:

- The labeling of hazardous chemicals used at LANL is deficient. Many chemical containers do not have labels which identify the contents of the container or list the appropriate hazard information. For instance, there are no hazard warning labels on 25 chemical containers in a storage cabinet in TA-46 Bldg. 58. These chemicals included aluminum nitrate, Norahydrate, Methanol, fluorinated graphite, and Phenolphthalein. A material safety data sheet (MSDS) could not be provided for Dimethyl Hexynediol and nickel powder.
- A material safety data sheet was not available for a bottle of antimony located in room 100, TA-3 Bldg. 316. No MSDS was available for Stoddard Solvent used in room 101E, TA-3 Bldg. SM 37.
- See Sections 4.5.1.16.2, WS.3; 4.5.2.15.2, WS.3; 4.5.3.15.2, WS.3; 4.5.1.15.2, PP.5; 4.5.3.14.2, PP.5; and 4.5.4.14.2, PP.5.
- The following concern was identified in the LANL self-assessment.

CONCERN: **Los Alamos National Laboratory, does not fully comply with the requirements of 29 CFR 1910.1200, Hazard Communications and 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.**
(TSA-4)
(WS.3-1)
(H1/C1)

FINDINGS:

- Emergency eyewash facilities are not always provided.
- Although products injurious to the eyes are in use, eyewash facilities are not provided in areas of TA-3 Bldg. SM-39. For example, the oil storage and dispensing area outside room 30 uses drums of Cim Cool and DTE-24. The Electronic Discharge Machine area uses a Dielectric as a cooling agent. Each of these products are injurious to the eyes. Equipment in TA-3 Bldg. 102, room 110, uses Cim Cool as a coolant. In addition the annex to room 118A has a lithium hydroxide storage area. These areas are not provided with adequate eyewash facilities.
- In some cases eyewash stations with 15-minute flushing capability are not provided. In many cases, eyewash stations were blocked with equipment and are not readily available.
- See Concern TSA-4, MA.3-1, and Section 4.5.2.15.2, WS.3.
- The following concern was identified in the LANL self-assessment.

CONCERN: **At the Los Alamos National Laboratory, emergency eyewash and shower facilities are not always available or readily accessible as specified in 29 CFR 1910, Subpart K, Medical and First Aid.**
(TSA-4)
(WS.3-2)
(H1/C1)

WS.4 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Workplaces should be free of uncontrolled physical hazards and should be in compliance with Department of Energy prescribed occupational safety standards.

NOTE: Noncompliance with this performance objective is documented on the OSHA Form 1B. A compilation of these completed forms is included as Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- The furnace pit and furnace in the Heat Treatment Room of TA-3 Bldg. SM-102 are not posted as confined spaces.
- The emergency eyewash stations are not consistently marked or posted in TA-3 Bldg. 38, room 123; TA-46 Bldg. 24, room B22; and TA-46 Bldg. 31, room 170.
- A piece of white paper with the handwritten words "Loose Asbestos Fibers" is used to identify an asbestos controlled area.
- See Sections 4.5.2.15.2, WS.4; 4.5.2.13.2, RP.3; 4.5.2.4.2, MA.2; and 4.5.3.15.2, WS. 4; and Concern TSA-4, PP.6-4.
- The following concern has been identified in the LANL self-assessment.

CONCERN: (TSA-4) (WS.4-1) (H1/C1) **At the Los Alamos National Laboratory, danger, warning, and safety information signs are not consistently posted as required by 29 CFR 1910, and 29 CFR 1926.**

FINDINGS:

- Machine guarding problems were generic to LANL and JCI facilities at the site.
- For example, in TA-3 Bldg. SM-39, room 15, the Glass Shop, three Litton Lathes do not have chuck guards in place. In TA-3 Bldg. 38, the Machine Shop, the chuck guard on the Axelson Lathe does not provide adequate coverage of the chuck.
- In TA-3 Bldg. SM-39, Shop 5, no guarding was provided on the draw bar of the Kearney and Trecker Model H Lathe. Also in Shop 5, tongue guarding was not provided for the Baldor Pedestal Grinder. In TA-3 Bldg. SM-39, Shop 4, belts and pulleys on the Landis grinder are not properly guarded.
- The flywheels on the CA-1 and CA-2 air compressors located in room 5B, TA-36 Bldg. 1, are not properly guarded.

- The unused portion of the Delta Bandsaw blade located in room 4B1, the Carpenter Shop, TA-36 Bldg. 1, is not guarded.

- See Sections 4.5.1.16.2, WS.4; 4.5.2.15.2, WS.4; and 4.5.3.15.2, WS. 4.

- The following concern was identified in the LANL self-assessment.

CONCERN: **At the Los Alamos National Laboratory, machine guarding does not meet the requirements of 29 CFR 1910, Subpart O, Machinery and Machine Guarding.**

(TSA-4)
(WS.4-2)
(H1/C1)
CAT. II

FINDINGS:

- In many cases, exits and exit access are not marked with a readily visible exit sign.

- The exits are blocked in room 140, TA-3 Bldg. 216; room 110, TA-61 Bldg. 18; and TA-51 Bldg. 11.

- See Concern TSA-4, FP.2-3.

CONCERN: **See Concern TSA-4, FP.2-1.**

FINDINGS:

- Unused openings allowed employees access to energized electrical components in Panel Box No. LP-6, TA-60 Bldg. 60-1, located in the northwest corner of the machine shop. In addition there are unprotected openings in the No. LP-57 Electrical Panel, in Shop 5, TA-3 Bldg. SM-39, and the electrical panel adjacent to LP-57.

- The following noncompliances were noted in the TA-3 Bldg. SM-39 utility tunnels:

  South Tunnel

  - The junction box on top of Power Panel No. 27 is uncovered.
  - The inner panel on Power Panel No. 19 is not properly adjusted causing a potential exposure to live parts.
  - The panel schedule for Power Panel No. 25 does not identify the purpose of the breakers.

  North Tunnel

  - Breaker functions are not identified for all breakers in Power Panels Nos. pp-x, pp-p, pp-j and pp-d.
  - The inner panel is missing on Power Panel No. 8 causing a potential exposure to live parts.

- Numerous flexible cords are used as a substitute for permanent wiring. For example, flexible cord is run above the ceiling level from one office to another in room 15A, TA-3 Bldg. SM-39.

- Many examples of damaged electrical cords were found onsite. For example, the electrical cord is frayed on the Monarch Lathe, Shop 6, TA-3, Bldg. SM-39.

- The electrical cord is frayed on the quench tank stir motor in the Heat Treat Room, TA-3 Bldg. SM-102.

- The power cord insulation is damaged on the Screw Gun, in the Heavy Equipment Maintenance Shop, TA-60 Bldg. 60-1.

- There are breaks in the cord insulation for the electric motor in TA-35 Bldg. 25.

- LANL and JCI employees who may come in close proximity to electrical work are not trained as required by the Electrical Safe Work Practices. In addition, neither LANL nor JCI has a written procedure as required under Electrical Safe Work Practices.

- See Sections 4.5.1.16.2, WS.4; 4.5.2.15.2, WS.4; 4.5.3.15.2, WS.4.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (WS.4-3) (H1/C1) CAT. II

Los Alamos National Laboratories does not comply with 29 CFR 1910, Subpart S, Electrical, in that electrical hazards present shock or electrocution hazards.

WS.5 COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR CONSTRUCTION

PERFORMANCE OBJECTIVE: Construction activities should be free of uncontrolled physical and health hazards and should be in compliance with Department of Energy prescribed occupational safety and health standards relating to construction.

NOTE: Noncompliance with this performance objective is documented utilizing the OSHA 1B format. A compilation of these completed forms will be included as Appendix F to the Tiger Team Assessment Report.

FINDINGS:

- In TA-3, between Bldgs. SM 105 and SM 452, employees were allowed to work in the bottom of an excavation in order to install manhole access to a 8-inch sewer line. The excavation measured 10-feet long by 10-feet wide by 8-feet deep, was not properly shored or protected from a cave-in, and had not been inspected by a competent person. The atmosphere within the excavation was not tested for flammable gases or oxygen deficiency. Employees were not trained as to the nature of the hazards involved with the excavation.
- See Concern TSA-4, PP.2-5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (WS.5-1) (H1/C1) CAT. I

Excavation work at the Los Alamos National Laboratory is not conducted in accordance with 29 CFR 1926, Subpart P, Excavations, and Subpart C, General Safety and Health Provisions.

FINDINGS:

- LANL partially implemented a construction safety program in July 1991.
- Frequent and regular inspections of job sites, materials, and equipment are not conducted by a competent person designated by the employer.
- Construction contractor employers do not always instruct employees in the recognition and the avoidance of unsafe conditions and the regulations applicable to their work environment to control and eliminate job hazards.
- Employees required to enter into confined or enclosed spaces are not always instructed as to the nature of the hazard involved, the necessary precautions to be taken, and in the use of protective and emergency equipment. For example, employees performing a hot tap into an 8-inch sewer line in an excavation measuring 10-feet long by 10-feet wide by 8-feet deep were not protected by an effective confined space entry program.

- LANL construction contractors do not always require personal protective equipment such as eye protection, lifelines and safety belts, and hard-toed shoes to be used by employees of construction contractors as delineated in 29 CFR 1926, Subpart E and Subpart C.

- Scaffolding located outside of TA-3 Bldg. 510 is deficient in that plywood was used in place of scaffold-grade planking; standard guardrails and toeboards were missing.

- Access to construction sites is not always limited by barriers or flagging. For example, the trenching site at TA-46 is not barricaded to warn personnel of construction hazards.

- Where there was no assured equipment grounding program in effect, ground-fault circuit interrupter (GFCI) protection was not provided for electrical tools. For example, an electrically powered 1/2 inch portable drill does not have GFCI protection at the construction site between Bldgs. SM-105 and SM-142.

- See Section TSA-1, PP.3 and Concern TSA-4, PP.2.3.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (WS.5-2) (H1/C1) CAT. II

Los Alamos National Laboratory has not developed, implemented, and enforced a comprehensive safety oversight program to ensure that construction subcontractors comply with all applicable sections of 29 CFR 1926

4.5.4.16 Fire Protection

4.5.4.16.1 Overview

The seven performance objectives in the Fire Protection technical area were addressed in this appraisal. The appraisal was conducted by means of interviews with LANL fire protection engineering staff, facility managers, utilities management and staff, JCI staff, Los Alamos County Fire Department staff, and LAAO fire protection staff. Additionally, numerous facilities were visited and evaluated to determine the level of physical implementation of the performance objectives. Previous appraisals conducted by LANL, DOE, and Factory Mutual were reviewed to determine the type of previous findings and how LANL has acted in correcting previous deficiencies.

It must be noted, however, that all buildings at LANL were not visited during this appraisal due to time limitations. Thus, this report must be used as a tool in developing a self- assessment program that further investigates the buildings visited as well as investigates those buildings not covered at the time of this visit.

Based upon the findings of this appraisal the existing fire protection programs at LANL, LAAO, and AL are ineffective in assessing and correcting fire protection and life safety issues at LANL. Numerous noncompliances of the life safety code were found in over 90 percent of the buildings visited and fire protection problems were noted in a minimum of 40 to 50 percent of the buildings. The LANL program also directly involves LAAO, thus limiting the capability of DOE to act as a truly independent oversight entity.

The Fire Protection and Utilities Group has the responsibility for the fire protection program. This Group performs limited evaluation for property loss and life safety, design review, and fire protection maintenance activities. However, they are basing a major portion of their decisions on informal guidance from DOE, which is not in compliance with the DOE Orders and associated references. This has lead to the numerous findings and concerns developed during this appraisal.

The LANL Fire Protection Program does not identify or define who in the Laboratory community is the authority having jurisdiction for the purposes of making code interpretations or rulings. The specific qualifications of the personnel required to perform the various functions outlined in the program is not indicated nor does it cover all the areas outlined by AL as being necessary for a fire protection program. Implementation of the DOE Order requirements concerning construction materials, location of structures, limiting of dollar value and programmatic concerns at risk, etc. as outlined in DOE 5480.7, DOE 6430.1A, and the DOE/EV-0043, "Standard on Fire Protection for Portable Structures," is not covered in detail by the present LANL Fire Protection Program.

The concept of limiting losses through the use of automatic fire protection is not being aggressively implemented for values less than $1,000,000. Reasons for this are apparently informal rulings given over many years. This has lead to numerous loss potentials which are close to the $1,000,000 limit where automatic fire protection would automatically be required by DOE 5480.7.

The issue of a building being grandfathered from the current codes is not addressed in the LANL Fire Protection Program, yet the concept was presented many times to defend the current statutes. However correct this view may be in some situations, it is not correct categorically. Thus, every building and process needs to be evaluated against the new codes to determine, which are feasible to implement in existing situations without significant impact and which need implementing regardless of impact due to safety concerns.

In summary the Fire Protection Program at LANL needs major revisions to assure it clearly addresses all areas outlined in DOE 5480.7 with sufficient detail that other departments and groups can implement its requirements. Additionally, a strong independent oversight of the program must be developed to assure the program is being implemented.

4.5.4.16.2 Findings and Concerns

FP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Fire protection organization and administration should ensure the effective implementation and control of the fire protection program.

FINDINGS:

- LANL appraisals of facilities are not being conducted in accordance with DOE 5480.7.
- The LANL Fire Protection Program Manual calls for direct input from LAAO and has the County Fire Department Chief in an advisory capacity. Thus truly independent oversight can not occur from DOE.
- No authority has been identified as the "authority having jurisdiction" to facilitate code interpretations or rulings.
- The LANL Fire Protection Program Manual does not clearly address life safety.
- The LANL Fire Protection Program Manual is generic in nature, thus it does not clearly define the functions that are to take place.
- The Fire Protection Program Manual does not address how new or revised codes and standards are to be implemented at LANL.
- The fire protection organizational structure is fragmented, cumbersome, and does not clearly define the lines of authority. This is demonstrated by numerous different LANL organizations and separate contractors involved in the fire protection program.
- Resources are not available to assure all functions of the existing fire protection program can be fully addressed.
- Numerous unidentified life safety code issues and unidentified fire protection issues exist due to a lack of thorough building appraisals.
- There is no clear policy developed to assure the improved risk concept outlined in DOE 5480.7 is implemented.
- The responsibilities and authority for the fire protection engineering position is not defined in the program; however, this is defined for the County Fire Department Chief who is not a LANL authority and is not governed by LANL.

- Roles, responsibilities, and authorities, as presently defined, do not ensure the effective implementation and control of the fire protection program in TA-55 facilities in compliance with the LANL "Fire Protection Program" document, April 1991. (See Section 4.5.1.17.2, FP.1.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.1-1) (H2/C1) **The Los Alamos National Laboratory Fire Protection Program and organization is not well defined and does not achieve compliance with DOE 5480.7.**

FINDINGS:

- AL did not perform its annual appraisal of LANL in 1989 or 1990 and the 1991 appraisal has not been issued to LANL to date.

- See Concern TSA-4, FP-1.1

- The following concern was identified in the AL self-assessment.

CONCERN: (TSA-4) (FP.1-2) (H2/C1) **The Albuquerque Field Office is not performing fire protection appraisals of Los Alamos National Laboratory in a manner which will assure compliance with DOE 5480.7.**

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

FINDINGS:

- NFPA 101, Life Safety Code issues are not being properly identified or addressed by LANL as demonstrated by the following sample of items:
  - Corridors do not provide a protected path for exit due to doors being blocked open or having louvers, openings in walls, improper ventilation control, storage, and lack of smoke detection.
  - Stairwells were found during this appraisal with the following deficiencies: (1) Unoccupied spaces and elevators open into stairwells in several buildings. (2) The stairway landing is used as a radiological boundary in the Chemistry and Metallurgical Research Building. (3) Less than 50 percent of the stairwells discharge directly to the outside in several buildings.
  - Excessive travel distances and dead-ends exist in numerous buildings. An example of this is the spinal corridor of the Chemistry and Metallurgical Research Building.
  - Exit access illumination of one-half foot-candle has not been verified in the facilities visited during this appraisal.
- No formal program exists to assure places of assembly are in compliance with the Life Safety Code or that they are maintained in compliance.
- No enclosed protected exits exist from the upper or lower floors of the TA-3 Bldg. SM-22, boiler area, which does not meet NFPA 101 exiting requirements.
- The exit through the power dispatch center was found locked during this appraisal.
- During fire alarms, in TA-3 Bldg. SM-22, everybody evacuates the building except for the operators. However, the control room area is not designed in a manner that allows it to be considered an area of refuge during a fire situation.
- Audible and visual alarms are not provided in the TA-53 Bldg. 7 (Proton Storage Ring) cross-tunnel.
- Tritium facilities, reactors, and TA-18 buildings are not in compliance with NFPA 101, Life Safety Code, as required by DOE 5480.7. (See Section 4.5.2.16.2, FP.2.)

- See Concern TSA-4 WS.4-4; TSA-4, SS.2-1; TSA-1, FP.2-1; TSA-1 FP.2-2; TSA-1 FP.2-3; TSA-1, FP.2-4; and TSA-3, FP.2-1.

- The following concern was partially identified in the LANL self- assessment.

CONCERN: **Most NFPA 101, Life Safety Code issues, are not being identified or addressed in existing buildings at Los Alamos National Laboratory.**
(TSA-4)
(FP.2-1)
(H1/C1)
CAT. II

FINDINGS:

- Life Safety Code issues are not being addressed at LAAO similar to those identified for LANL.

- The following Concern was not identified in the LAAO self-assessment.

CONCERN: **NFPA 101, Life Safety Code issues, are not being identified or addressed at the Los Alamos Area Office building.**
(TSA-4)
(FP.2-2)
(H1/C1)

FINDINGS:

- TA-3 Bldg. 287 was modified and the occupancy was changed from special purpose industrial to business. However the corridors, stairwells, and heating and ventilation systems were not brought up to current codes and standards.

- TA-46 Bldg. 250 is a new building which has taken credit for the automatic sprinkler system to provide the 1-hour construction required for the exit corridor. However, no automatic sprinklers have been installed above the suspended ceiling in the concealed space nor are they called for in the design documents. Additionally the automatic sprinkler system is not designed in accordance with DOE 6430.1A.

- The Material Science Laboratory, currently under construction, has deficiencies in its design concerning code required equipment as follows:

  - Drawing C45802, 41 of 164, Detail 43 shows a stair, which exceeds the height limitations outlined in NFPA 101 and the Uniform Building Code.

  - Louvers are shown in the corridor walls, thus creating a potential for smoke migration.

  - Heating, ventilation, and air conditioning drawings do not indicate that fire dampers are to be installed in fire walls.

- Code-required duct smoke detection was deleted from the design based on design review comments from fire protection engineering organization.

- TA-3 Bldg. 30 has been converted from strictly warehousing to a combination of warehousing and office space. However, the offices are not separated from the warehouse operation by an occupancy separation wall as required by DOE 6430.1A, the Life Safety Code, or the Uniform Building Code. Additionally, protected corridors have not been provided for exiting.

- See Concern TSA-1, FP.7-1, and TSA-3, FP.1-1.

- The following concern was partially identified in the LANL self- assessment.

CONCERN: (TSA-4) (FP.2-3) (H1/C1) CAT. II

At the Los Alamos National Laboratory, review of new designs, major building modifications, and changes in experimental activities are not being thoroughly conducted for NFPA 101, Life Safety Code, concerns or compliance with DOE 6430.1A during design or prior to building occupancy.

FINDINGS:

- Building emergency plans require the use of voice communication systems. However, voice communication systems in LANL facilities have not been designed, installed, or maintained in accordance with NFPA 72, Standard for the Installation, Maintenance, and Use of Protective Signaling Systems.

- Personnel can not hear alarm notifications in several areas at LANL.

- See Section 4.5.4.7.2, EP-5.

- The following concern was partially identified in the LANL self- assessment.

CONCERN: (TSA-4) (FP.2-4) (H1/C1) CAT. II

The emergency voice notification systems at Los Alamos National Laboratory are not designed, installed, or maintained in accordance with NFPA 72.

FP.3 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate protection to prevent any added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site or facility boundary.

FINDINGS:

- No automatic fire suppression system exists to fight a fire in the hazardous material drum storage area at TA-54 Area L.
- The single fire hydrant for the TA-54 Area L is located too close to combustible trailers.
- Water supplies for fire fighting purposes are supplied by a single dead-end water supply main.
- Access to TA-54 is provided by a single all weather road, which could be impassible during numerous different situations, thus creating a potential for impaired fire department access.
- TA-54 Bldgs. 68, 69, and 70 have automatic dry chemical fire extinguishing systems installed, but they have never been activated since they were installed in late 1989 or early 1990.
- See Concern TSA-4, FP-6.1.
- The following concern was not identified in the LANL self- assessment.

CONCERN: (TSA-4) (FP.3-1) (H1/C2) **At the Los Alamos National Laboratory, automatic fire suppression systems and reliable fire department access for response to prevent an uncontrolled fire and associated hazardous material release are not in place at TA-54.**

FINDINGS:

- Automatic sprinklers installed in the final HEPA filter systems at the TA-3 Chemistry and Metallurgical Research Building are turned off.
- No SAR exists which evaluates the need for fire protection of the final HEPA filters at the TA-3 Chemistry and Metallurgical Research Building.
- No fire protection is provided in the fume hoods which exhaust through the final HEPA filter system at the TA-3 Chemistry and Metallurgical Research Building.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.3-2) (H1/C2) **Los Alamos National Laboratory has not evaluated the need for automatic fire suppression in the final high-efficiency particulate air filter system at the TA-3 Chemical and Metallurgical Research Building as required by DOE 6430.1A.**

FINDINGS:

- The sitewide fire alarm system uses equipment which is not listed or approved by a nationally recognized organization for use as a Central/Proprietary Alarm Station as defined by NFPA 72.
- Local businesses have fire alarms which report directly to the LANL fire alarm computer system instead of going to a private alarm company.
- 911 emergencies for both LANL and the county concerning medical and fires are monitored and announced by LANL.
- Three separate organizations are involved with maintenance and design of the fire alarm system. These organizations include two separate Laboratory groups and the local telephone company.
- Wiring for the sitewide fire alarm system is not in accordance with the NFPA 72.
- Certificates of compliance have not been completed for the fire alarm installations as required by NFPA 72.
- Testing and maintenance of all fire alarm detection systems is not in compliance with NFPA 72, nor has an exemption been received from DOE for this situation.
- See Section 4.5.4.7.2, EP-5.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.3-3) (H1/C1) **The Los Alamos National Laboratory fire alarm computer equipment and associated wiring has not been certified, installed, or maintained in strict compliance with national codes and standards, which include NFPA 72, for the monitoring of Los Alamos National Laboratory and public fire alarms and the dispatching of Los Alamos National Laboratory and County-wide 911 emergencies.**

FP.4 IMPAIRMENT OF OPERATIONS

PERFORMANCE OBJECTIVE: The site should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

FINDINGS:

- TA-57 has no automatic sprinkler fire protection systems, nor has fire protection water supplies been provided by automatic fire pumps.
- Los Alamos County Fire Department response to TA-57 is approximately 45 minutes in good weather.
- The data collection system and control room for TA-57 is located in a combustible trailer complex (Trailer 19).
- Estimated loss for TA-57 Trailer 19 would exceed $600,000 and 6 months would be required to restore all wiring, instrumentation, and control equipment.
- Forest areas expose the combustible construction at TA-57.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.4-1) (H1/C1) **Automatic fire suppression systems are not in place at TA-57 to prevent a loss in excess of the limits set by DOE 5480.7.**

FINDINGS:

- Thorough evaluations concerning the impact of a fire have not been conducted at all the individual facilities. Thus the loss potential in these facilities is not clearly identified. Facility conditions which exist and demonstrate a lack of evaluation are:
  - The control room for TA-54 Bldg. 38 is not separated from the process area by a 1-hour fire-rated separation.
  - Replacement of the control equipment in the control room of TA-54 Bldg. 38 is expected to be approximately 2 years due to its unique nature.
- Fire protection appraisals, as conducted by the Fire Protection and Utilities Group, do not ensure that the requirements of DOE 5480.7 are met. (See Section 4.5.1.17.2, FP.7.)
- See Concern TSA-4, FP.4-1, and TSA-3, FP.4-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.4-2) (H1/C1)	In depth evaluations, required by DOE 5480.7, to assess the vulnerability of Los Alamos National Laboratory to unacceptable program delays and shutdowns have not been completed in depth for all facilities.

FP.5 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A maximum credible fire, as defined in DOE 5480.7, Section 6.f., should not result in an unacceptable property loss.

FINDINGS:

- LANL has numerous combustible structures, without automatic fire protection.
- TA-3 Bldg. SM-1663 is constructed of wood and has had fire walls installed to separate the areas. However, the fire walls are not constructed in accordance with the Uniform Building Code, National Fire Code, or Factory Mutual Standards.
- LANL is located in an earthquake Zone IIB as defined by the Uniform Building Code. However, the automatic sprinkler systems located throughout LANL are not equipped with earthquake sway bracing and clearance through wall and floor penetrations as required by NFPA 13.
- A thorough fire loss evaluation has not been conducted for the majority of the buildings at LANL to assure compliance with the limits outlined in DOE 5480.7.
- TA-3 Bldg. SM-132 has an excessive amount of combustible material in the computer rooms.
- There is no evaluation based on the current values and current fire hazards in TA-55 that documents that the maximum fire loss limits established by DOE 5480.7 will not be exceeded. (See Section 4.5.1.17.2, FP.5.)
- See Concern TSA-1, FP.5-1, and TSA-3, FP.5-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.5-1) (H1/C1) **At the Los Alamos National Laboratory, facilities with a fire loss potential in excess of the limits specified by DOE 5480.7 have not been completely identified.**

FP.6 FIRE DEPARTMENT OPERATIONS

PERFORMANCE OBJECTIVE: The Fire Department should have the capacity to promptly terminate and mitigate the effects of a fire in a safe and effective manner.

FINDINGS:

- The fire department services are provided to LANL by the Los Alamos County Fire Department (Fire Department) under contracts directly with the LAAO.
- The Fire Department is trained to an OSHA awareness level for hazardous materials. This training level does not provide a level of training which would permit firefighters to safely intervene where hazardous materials or operations are present at LANL.
- The lack of training in the control of fires involving hazardous materials or operations may result in firefighters not undertaking an operation that they might safely mitigate if properly trained; or under take an operation which is too hazardous because thy do not fully realize the potential hazards.
- LANL does not have a formal training arrangement which is designed to provide the Fire Department with facility-specific hazards and suggested methods for safely terminating fire events within these structures.
- LANL, in an internal memorandum (J.R. Gourdoux to A. J. Tiedman, dated 5/20/91), expressed concern over who is responsible for fighting fires in hazardous materials where the Fire Department does not respond in accordance with prefire planning strategy.
- The following concern was identified in the Albuquerque Operations Office "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."
- See Concern TSA-4, SS.4-2.
- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-1) (H1/C2) **Los Alamos Area Office has not assured that the Los Alamos County Fire Department is provided with a level of training which permits the Department to safely mitigate fires involving hazardous materials or hazardous operations.**

FINDINGS:

- A mutual aid agreement for the control of wildland fires exits between the Bureau of Indian Affairs, the DOE, the Forest Service, the National Park Service, and the New Mexico Department of Natural Resources.
- A mutual aid agreement does not exist between LAAO and local community fire departments.

- During the appraisal emergency exercise which was conducted at TA-54 on October 28, 1991, the Fire Department activated its personnel call-back system of off-duty firefighters. Only four firefighters responded to the call-back.

- Neither the current contract or the proposed contract for fire department services with Los Alamos County, fire department directives, or DOE guidance requires that a minimum level of fire apparatus and personnel be held in reserve for response to LANL facilities in the event of a fire. Under the current arrangement, all on-duty firefighting forces could be committed to a major structural fire within the Town of Los Alamos. Located within the Town of Los Alamos are numerous large structures which would require considerable resources (manpower and equipment) in order to extinguish or confine the fire to the building of origin.

- The 1989 Factory Mutual Fire Protection Survey stated "In addition, due to the proposed change from a DOE department to a County department an SOP should be established that would require a minimum level of available equipment and personnel that the County must maintain in Stations FS-1 and FS-5 to assure protection to LANL buildings."

- No onsite facility for extensive live fire training exist. This issue was also addressed in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."

- The following concern was identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."

- The following concern was not identified in the LAAO self-assessment.

CONCERN: **Los Alamos Area Office has not ensured that trained fire department personnel and apparatus will be available to mitigate fire emergencies at nuclear, experimental, and other vital facilities at the Los Alamos National Laboratory under all conditions as required by DOE 5480.7.**

(TSA-4)
(FP.6-2)
(H1/C1)
CAT. II

FINDINGS:

- The Fire Department is provided with a single two-way radio frequency. The lack of a second channel for tactical does not allow for effective communication when multiple emergencies occur.

- The Fire Department is not provided with communications tools to reduce the impact during a major emergency of a single radio channel.

- Automatic fire alarm signals and telephone reports of fire are received in the security alarm center operated by M&H. In the event of a fire alarm, the alarm is announced to all fire stations.

- The Fire Department does not have a formal fire dispatch center for dispatching fire apparatus.

- The following concern was identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."

- The following concern was identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-3) (H1/C1) **Los Alamos Area Office has not ensured that the Los Alamos County Fire Department is not provided with a formal fire dispatch and communications capability to ensure prompt response and effective communications on the fire ground, while simultaneously responding to additional events and alarms as required by DOE 6430.1A.**

FINDINGS:

- The Fire Department does not have a written action plan designed to ensure compliance with NFPA 1500, Standard on Fire Department Occupational Safety and Health Program.

- Compliance with NFPA 1500 is not addressed by a Los Alamos County Fire Department Fire Chief's Directive.

- The Fire Department's Training Officer serves in the dual role of both Training Officer and Safety Officer.

- The Fire Department does not provide facility- and hazard- specific training at LANL.

- The Fire Department does not have a Fire Chief's Directive which addresses incident command.

- General fire department training activities were discontinued from January 1991 to September 1991.

- Equipment testing activities as required by NFPA 1500 are conducted but are not documented.

- The Fire Department does not have a physical fitness program which complies with NFPA 1500.

- The following concern was identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department".

- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-4) (H1/C1) **Los Alamos Area Office has not ensured the Los Alamos County Fire Department is in compliance with NFPA 1500, nor does it have a Department of Energy approved action plan for bringing the Fire Department into compliance.**

FINDINGS:

- The Fire Department responsibilities and authorities are not clearly defined.
- A needs assessment designed to establish the required level of fire department personnel, number and types of fire apparatus, apparatus manning, and fire station location has not been performed.
- Fire Department management has not provided the Operations Division the level of guidance and direction which is required to ensure compliance with DOE 5480.7. The number of firefighting directives are limited in number and scope. The request for firefighting personnel to participate in activities such as training, preplanning, and hydrant testing is not coordinated between the various requesting chief officers.
- The lack of clear guidance from Fire Department management on critical issues while simultaneously addressing minor details and issues has reduced the Department's emergency response effectiveness.
- The LAAO Technical Representative for this contract is not provided with a resources which is knowledgeable in Fire Department operations.
- In 1989 the Department of Energy purchased an elevating platform fire truck at a cost of $485,000. Although the truck may respond to alarms on special call, the truck is not manned or officially in service. Only a limited number of personnel have been trained in the trucks safe operation. The truck is not fully equipped. Fires within certain facilities at LANL could require use of the ladder truck.
- During a transformer fire at TA-35 Bldg. 213, some firefighters required up to 10 minutes to don their protective breathing apparatus. During a response to a smoke alarm at TA-3 Bldg. 132, firefighters entered the structure without protective breathing apparatus. Some of the firefighters were later treated at the Los Alamos Medical Center.
- Fifteen out of 106 members of the Fire Department do not have security clearances.
- The Fire Department proposes to add, under the latest staffing schedule, a new Battalion Chief position for the coordination of emergency medical activities. The Department already has a Deputy Chief that is responsible

for the Operations Division and a Battalion Chief is assigned to each shift.

- The retention of firefighters is a continuing problem. In a "Special Report on Issues Related to The Operation of the Los Alamos Fire Department," AL stated the following: "PS.2 - Personnel turnover is a problem among younger firefighters, upon obtaining a Q clearance, are tending to hire on with Mason & Hanger in Protective Services at substantial salary increases.

- The following concern was partially identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."

- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-5) (H1/C1) **Los Alamos Area Office has not ensured level of fire department services required by DOE 5480.7 is being maintained or will be maintained in the future.**

FINDINGS:

- In a "Special Report on Issues Related to The Operation of the Los Alamos Fire Department," AL addressed issues surrounding the development of prefire plans by the Fire Department.

- Prefire plans developed by the Fire Department do not include some important data such as available fire flow or the location of fire walls on drawings.

- Development of the prefire plans has become a burdensome process for the Fire Department. The Fire Department currently estimates that it will take 2 years to complete the development of prefire plans for all building. The Department also estimates that the collected data will fill 25 to 30 large three ring binders. It appears that the process has not been sufficiently coordinated between LAAO and the Fire Department.

- A review of a few preplans indicated a lack of quality control. The TA-3 Bldg. 22 preplan indicated that the structure did not contain a standpipe system while at the same time indicating that the standpipe was of the dry type. A number of the preplans reviewed take credit for the ladder truck, yet the truck is not manned nor is it fully equipped.

- The Fire Department does not have the resources which are required for the development of quality prefire plans in a timely manner.

- The Fire Department has been criticized for not responding promptly to the contract requirement which

requires the development of pre-fire plans. A review of Fire Department correspondence reveals that at least some of the responsibility for delayed delivery of preplans lies with LAAO. Clear guidance was not given on the development of plans, the initial listing of buildings to be preplanned was not current, documents were destroyed three times when proper guidance was not given on the selection and use of Unclassified Controlled Nuclear Information stamps, and LAAO has not always provided a timely review of the submitted documents.

- The following concern was identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."

- Increased administrative duties which have been assigned to the Fire Department's chief officers limits their ability to tour facilities and visit fire stations under their command.

- Fire Department officers within the Operations Division do not tour facilities on at least a quarterly basis.

- There is not a Fire Department Fire Chief's Directive which requires officers to tour facilities at LANL on any scheduled frequency.

- The following concern was not identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-6) (H1/C1)

Los Alamos Area Office has not ensured the Los Alamos County Fire Department has prepared preplans for all facilities at Los Alamos National Laboratory as required by the present contract; nor has LAAO ensured that Fire Department Officers in the Operations Division are sufficiently knowledgeable of Facilities at the Laboratory to ensure that they can safely direct the mitigation of fire events as required by DOE 5480.7.

FINDINGS:

- Fire apparatus manning levels are not in accordance with Headquarters, guidance, concerning NEPA 1500 which stipulates that interior firefighting operations should not be undertaken until a minimum of five qualified firefighters are on the scene.

- Under current Fire Department practices each pumper is manned by three persons. In order to reach the minimum on scene level of personnel which permits structural firefighting, additional engines must be dispatched. Station 5, due to its location and limited manning, must await the arrival of the second engine before it could under take interior firefighting actions in accordance with DOE directives. While ambulance crews could provide additional resources, these units are not automatically dispatched to fire alarms; however, fire engines are routinely dispatched to ambulance calls.

- During the drill of October 16, 1991, the limited manning on the first arriving engine company affected its ability to quickly stretch hose lines to the structure's third floor.
- The ladder truck is neither manned nor fully equipped.
- LANL in both internal and correspondence to LAAO has expressed concern about the limited number of firefighters which are assigned to each engine company.
- In a "Special Report on Issues Related to The Operation of the Los Alamos Fire Department" LANL addressed fire apparatus staffing levels.
- The following concern was partially identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."
- The following concern was identified in the LAAO self-assessment.

CONCERN: **(TSA-4) (FP.6-7) (H1/C1)** **Los Alamos Area Office has not ensured that apparatus manning and firefighting levels as mandated by Department of Energy in the implementation of NFPA 1500 are not being met.**

FINDINGS:

- In a memorandum (D.Visconti to E.Nunez, dated May 13, 1991) the Fire Chief expressed concern that firefighters were allowed to enter a structure (TA-21 Bldg. 21) that had been closed for approximately 1 month due to a hazardous materials spill.
- Fire alarm printouts do not contain up-to-date information on a facilities hazard status.
- Facilities at LANL may or may not be posted with adequate signs which portray the hazards within and which are beneficial to the Fire Department during routine as well as emergency operations.
- LANL in an internal memorandum (D.B.Davidson to K.L.Groves, dated 5/16/1991), stated "There are operational changes taking place daily in several LANL facilities and some of these may require temporary deviation from the regular Pre-Fire Plan. It would appear that LANL has a duty to warn of hazards under several DOE and EPA regulations and needs to develop some procedure to ensure this."
- See Concern TSA-2, SS.4-1.
- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-8) (H1/C2)

The Los Alamos Area Office has not ensured that Los Alamos National Laboratory has established a procedure whereby the Los Alamos County Fire Department is notified promptly of changes in facility status or conditions which might affect firefighter safety or their ability to safely mitigate a fire event during routine or emergency operations.

FINDINGS:

- Many smaller outlying technical areas within the LANL are not provided with fire water supplies or the available supplies are limited.
- A tanker is located at each fire station. The tankers are not capable of quick-dump water supply operations; but rather are only capable of nursing fire department pumpers, thus requiring more manpower and apparatus to sustain an equal amount of flow than do quick-dump and drop-tank operations.
- The Fire Department has procured portable drop-tanks, however the tanks have not been placed in service.
- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (FP.6-9) (H1/C2)

Los Alamos Area Office has not ensured the Los Alamos County Fire Department has developed an operational procedure and practice for the delivery of water to locations at the Los Alamos National Laboratory where water supply deficiencies exist.

FP.7 PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE: A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection.

FINDINGS:

- LANL management stated that the National Fire Codes, known as minimum standards by the fire protection community, have a safety factor of 200 to 300 percent built in. Thus it is not necessary to follow them exactly.
- A total-flooding halon system is slowly being installed in the computer room. Design and installation of the system has taken approximately 2 years, which is considered to be an excessive time span.
- AL has identified, in its August 1991 Draft Appraisal, that 33 recommendation from the 1977 Factory Mutual (FM) inspection report remain valid and have been incorporated into 28 new recommendations in the 1989 FM report. Additionally a total of 67 recommendations from the 1989 FM report are awaiting funding.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.7-1) (H1/C1) **Known deficiencies in the Los Alamos National Laboratory fire protection systems are not being corrected in a timely manner as required by DOE 5480.7.**

FINDINGS:

- TA-22 has dead-end water mains which limit water supplies available for firefighting.
- TA-54 has dead-end fire mains and lacks the number of fire hydrants required by DOE 6430.1A to assure fire protection water supplies are available.
- The 1989 Factory Mutual Report identifies 7 areas requiring fire protection water supply improvements, which have not been completed.
- A single break in the 10-inch water main on the east side of TA-3 Bldg. SM-30 will cause fire protection water supplies to be turned off to three buildings consisting of eight automatic sprinkler systems and seven fire hydrants.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: **At the Los Alamos National Laboratory, redundant water supplies and associated fire hydrant protection has not been provided for important facilities as required by DOE 6430.1A.**
(TSA-4)
(FP.7-2)
(H1/C1)

FINDINGS:

- A program does not exist for addressing wildfire potentials.
- Fire breaks which were established by a previous DOE operating contractor have not been maintained in current years.
- The TSA for the TA-2 Omega West Reactor identified a concern for a fire control plan for the forest area around the reactor.
- Wooded areas are directly adjacent to combustible structures in several Technical Areas.
- In a "Special Report on Issues Related to The Operation of the Los Alamos Fire Department," AL addressed the communities potential exposure to a wildland fire; however the same report did not address the Laboratories exposure to the same hazard.
- A mutual aid firefighting agreement that existed with other government agencies and DOE for the fighting of wildfire has been allowed to expire.
- The following concern was partially identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."
- The following concern was not identified in the LAAO self-assessment.

CONCERN: **The Los Alamos Area Office has not evaluated the potential impacts and means for mitigation of losses from a wildfire.**
(TSA-4)
(FP.7-3)
(H1/C2)

FINDINGS:

- TA-3 Bldg. SM-30 telephone equipment panels are directly exposed by combustible storage.
- In TA-3 Bldg. 40, no protection is provided for telephone equipment located in the corridors.
- Telephone equipment is used to transmit fire alarms to the central computer system.
- The following concern was not identified in the LANL self assessment.

CONCERN: (TSA-4) (FP.7-4) (H1/C1) **At the Los Alamos National Laboratory, telecommunication equipment is not protected as required in DOE 6430.1A to prevent the loss of fire alarm communications as well as building communications.**

FINDINGS:

- The curb box control valves on the automatic sprinkler system are visually inspected for tampering monthly and physically tested for the open position annually. This frequency does not meet the NFPA requirements or Factory Mutual standards for valve inspections.
- Oversight for the valve inspection program is delegated to the Fire Protection and Utilities Group. At present only an exception report is sent to the Group for review. The Group does not have a procedure for reviewing the actual inspection records to assure they are current.
- Testing and maintenance fire protection equipment is being done using generic draft procedures, which do not clearly define the number of devices expected, make or model of equipment involved, or what the expected results should be.
- Smoke detection and heat detection systems are not tested for sensitivity or calibration on a regular basis. These systems are tested primarily on a go/no go basis.
- Pneumatic detectors are not tested for leakage as required by NFPA 72E.
- Semi-annual inspections are not preformed on all detection devices as required by NFPA.
- Grinnell Aquamatic sprinkler heads, which are no longer approved by Factory Mutual, have not been removed from service at several LANL facilities. These include TA-53 Bldg. 3, Sector M and portions of Sector J.
- See Concerns TSA-1, FP.7-2, and TSA-4, MA.3-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (FP.7-5) (H1/C1) **At the Los Alamos National Laboratory, procedures and policies are not in place to ensure that fire protection equipment is maintained and tested in accordance with National Fire Protection Association codes and to ensure that equipment is removed from service when listing and/or approvals are discontinued.**

FINDINGS:

- The following concern was not identified in the self-assessment. (No self-assessment of Headquarters, DOE, was conducted.)

CONCERN: (TSA-4) (FP.7-6) (H1/C2)	The Department of Energy, Environmental and Health Office, does not have a mechanism in place to inform field elements of changes in fire protection equipment listings.

4.5.4.17 Aviation Safety

4.5.4.17.1 Overview

Ross Aviation, Inc.

This appraisal addressed all six of the Aviation Safety performance objectives, and is focused on Ross Aviation, Inc. (Ross). Interviews were conducted with all identified personnel with aviation oversight responsibilities in AL, the Kirtland Area Office (KAO), and Ross. Reviews and inspections were made of aviation policy manuals, procedures, facilities, and documentation pertaining to management, operations, training, and maintenance. Team members directly reviewed operational procedures on flights of the DC-9, Lear 35, DHC-6 and DHC-7 aircraft. Validation, to the extent possible, was made of adherence to DOE and AL Orders as well as Ross internal aviation policy, Federal Aviation Regulations (FARs) and all applicable Federal and State regulations.

The Ross hangar and maintenance facilities are housed at Kirtland Air Force Base in Albuquerque, New Mexico. DOE management of Ross is the responsibility of KAO. The Ross mission is to provide air transportation in support of the DOE nuclear weapons complex. Ross transports personnel and freight throughout the DOE and military network.

The current fleet consists of the following aircraft: three DC-9 Passenger/Cargo Jets, one DHC-7 Passenger/Cargo/Research Turbo-Prop (DASH 7), two DHC-6 Passenger/Cargo/Research Turbo-Prop (Twin Otter), one BE-200 Passenger/Cargo Turbo-Prop (King Air), and one Lear 35 Passenger/Cargo Jet.

The following represents performance data for the fiscal year 1990: 7714 flights, 62,721 passengers flown, 5,708,390 pounds of cargo flown, 1,405,022 miles flown, and 8096 flight hours.

In the last 19 years, Ross has accumulated over 150,000 flight hours without injury to any passenger or crewman. In conjunction with its governmental mission, Ross operates as an air carrier for the general public. The air carrier operations are scrutinized by the Federal Aviation Administration (FAA) in the same manner as any airline that serves the general public. Other Ross operations are primarily governed by DOE 5480.13 and AL 5480.13, "Aviation Safety," which mandates compliance, to the maximum extent possible, to 14 CFR 121 or 135. Ross operations are primarily regulated by 14 CFR 121 and 135 in the areas of flight operation, maintenance, training, and safety. Additionally, Ross maintains an FAA certificated repair station. All flight-line and intermediate level maintenance and inspections are performed at the Albuquerque location.

Ross is well organized, professional, and has a safety record comparable to any major airline. The Ross self-assessment was thorough and effective; Ross corrected all the deficiencies noted in their self-assessment prior to this appraisal. The concerns noted in this report are easily correctable and are not indicative of systemic deficiencies. Three concerns involve marking and documentation of emergency egress procedures and equipment, two are related to manual construction, two to training, and one each involves refueling equipment and post-flight procedures.

Los Alamos Airport

This appraisal addresses all six of the Aviation Safety performance objectives, and is focused on the Los Alamos Airport (LAM). Interviews were conducted with all identified personnel with aviation oversight responsibilities in AL, LAAO, LANL, and JCI. A meeting also was held with the LAM users group. Reviews and inspections were made of the aviation policy, manuals, procedures, facilities, and documentation pertaining to management, operations, training, and maintenance. Validation, to the extent possible, was made of adherence to DOE and AL aviation policy, FARs and all applicable Federal and State regulations.

The LAM is owned by DOE and provides a facility for aviation transportation for official and public purposes. LANL, a prime contractor to DOE, has contracted with JCI to manage, operate, and maintain the facility. The facility includes a terminal building, as well as a 5500-foot runway and the surrounding land. There are 31 privately-owned and maintained aircraft hangars, 31 spaces for aircraft tiedown parking, and a separately contracted fueling facility. A hangar lease also has been granted to an independent aircraft mechanic which permits him to operate an aircraft maintenance business in one of the hangars. Contractual agreements for use of parking and servicing facilities are administered by LAAO. During FY 91, the airport provided facility service for 2400 DOE-contract air carrier flights, 9000 general aviation flights, and 20,000 passengers using the contract air carrier service. In terms of takeoffs and landings, LAM is the second busiest airport in northern New Mexico. The airport has been certificated by the FAA under 14 CFR 139. The FAA performs annual inspections to maintain airport certification. An approved Airport Emergency Plan is included in the requirements of 14 CFR 139. The plan is reviewed and formally exercised regularly.

The largest aircraft currently allowed to operate from the facility is a Design Group III aircraft. Design Group III includes the Ross DeHavilland Dash 7 and is characterized by aircraft with wingspans of 79 to 118 feet.

The day-to-day management of the airport is carried out by JCI. The airport manager has 26 years of airport management experience and the airport supervisor has 16 years. Both of these individuals are knowledgeable and competent and run the airport in a safe and efficient manner. The majority of the concerns regarding the airport stem from a lack of management action and direction on the part of LAAO and LANL and the lack of a comprehensive plan to address deficiencies documented in this and previous appraisals. Aviation safety responsibilities for the Manager, LAAO; and the Prime Contractor, LANL, are delineated in the AL Aviation Safety Order, AL 5480.13; however, there was no evidence that these obligations were known or implemented or that anyone had been specifically trained to fulfill these responsibilities.

The deficiencies at the airport have been well documented; however, there is no comprehensive plan to address these concerns. FAA Advisory Circular 150/5070-6A outlines guidelines for modifications and modernization which will satisfy aviation demand in a safe and effective manner, and at the same time address concerns within the community. The need for a master plan was recommended in appraisals as far back as 1973. Currently, no plan of this type exists.

The LANL self-assessment was complete and addressed all six performance objectives in the Aviation Safety technical area; both concerns directed to LANL in this appraisal were fully covered in the LANL self-assessment. Some of the findings in the LANL self-assessment have been corrected but most remain unresolved.

The LAAO aviation safety self-assessment was two sentences long and indicated only that LAAO does not provide adequate direction to LANL and has not defined aviation oversight roles. The self-assessment is extremely brief relative to the large role LAAO is required to perform by the DOE orders. The LAAO self-assessment addressed two of the four concerns noted in this appraisal.

A total of 7 concerns are directed toward the Los Alamos Airport. Of these, one is addressed to the AL, four are directed to the LAAO, and two pertain to the LANL.

4.5.4.17.2 Findings and Concerns

AS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Organization, administration, and safety programs should ensure the provision of proper aircraft and facilities and the effective implementation and control of aviation and associated safety activities.

Los Alamos Airport

FINDINGS:

- AL has "oversight responsibility for aviation safety management" per AL 5480.13. AL has not assured that LAAO has adequate staff or policy to comply with their (LAAO's) aviation safety responsibilities (see Concerns TSA-4, AS.1-4, and TSA-4, AS.1-5). AL also has never required LANL to fulfill the aviation safety responsibilities of a prime contractor as set out in AL 5480.13. (See Concerns TSA-4, AS.1-2, and TSA-4, AS.1-3.)
- AL conducted an aviation safety appraisal of LANL/LAM and listed as one of four root causes the "lack of clear definition of authorities and responsibilities." AL forwarded the appraisal to LAAO on December 13, 1990, requesting an action plan within 30 days. LAAO forwarded the appraisal to LANL on January 14, 1991 requesting an action plan within 30 days. Neither LANL nor LAAO has resolved the issue and AL has not mandated a resolution.
- The following concern was not identified in the AL self-assessment.

CONCERN: (TSA-4) (AS.1-1) (H2/C1) **The Albuquerque Field Office has not ensured that the Los Alamos Airport receive the aviation safety oversight required by AL 5480.13 and AL 5482.1A.**

FINDINGS:

- LANL, a prime contractor to DOE, has contracted JCI to manage, operate, and maintain the airport. LANL has not acknowledged its responsibility for aviation safety oversight at the airport, primarily due to confusion regarding its aviation safety obligations.
- LANL personnel were not aware of the contractor aviation oversight and safety responsibilities set out in the AL Order.
- LANL has not provided policies to promote the effective resolution of aviation safety issues and establish a proactive accident prevention program at the airport.
- LANL has not generated clearly worded aviation policies which dictate acceptable and safe operating practices.

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AS.1-2) (H2/C1) **Los Alamos National Laboratory has failed to establish and document an aviation safety program as required in AL 5480.13, paragraph 7.g.(1).**

FINDINGS:

- LANL has not dedicated the staffing and funding resources to establish aviation oversight of LAM.
- LANL has not conducted periodic audits of its internal aviation safety program in accordance with AL 5482.1A.
- LANL has not formally identified or trained personnel to perform aviation safety oversight.
- See Concern TSA-4, FR.4-2.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (AS.1-3) (H2/C1) **Los Alamos National Laboratory has failed to provide the necessary staff, equipment, funding, and other support for the conduct of an aviation safety program as required by AL 5480.13, paragraph 7.g.(2).**

FINDINGS:

- LAAO, who has oversight responsibilities for LANL, has failed to require LANL to perform periodic audits of the LANL internal aviation safety program in accordance with AL 5482.1A.
- LAAO has failed to require LANL to "Establish and maintain suitable management review and audit systems and clear lines of responsibility for aviation safety within (LANL's) organizations," in accordance with AL 5480.13.
- The following concern was identified in the LAAO self-assessment.

CONCERN: (TSA-4) (AS.1-4) (H2/C1) **The Los Alamos Area Office has not assured that Los Alamos National Laboratory complies with the management review and audit requirements of AL 5480.13 and AL 5482.1A. (See Concern TSA-4, AS.1-2.)**

FINDINGS:

- Although a staff member has been nominally assigned to aviation safety, he has no aviation background, he has no aviation training, and he has no aviation program.
- LAAO has not developed policy, or formally delegated authority for aviation safety functions at LAM.
- The following concern was not identified in the LAAO self-assessment.

CONCERN: (TSA-4) (AS.1-5) (H2/C1) **Management of the Los Alamos Area Office has not recommended internal organization, policies, and authorities required to carry out the functions assigned to the Area Office by AL 1120, Chapter IV, Section 13, "Distribution of Functions within the Los Alamos Area Office."**

FINDINGS:

- As early as July 1973, consultants have recommended the creation of an airport master plan, but a plan has never been developed.
- Programmatic requirements for present and predicted future utilization of LAM have not been documented.
- Neither a safety analysis nor an equivalent risk-benefit study has been made of previously reported deficiencies to establish priorities for correction of these deficiencies.
- A number of problems have been noted in previous appraisals but have not been resolved in a comprehensive manner and incorporated into a master plan. These problems include:
  - Resolution of the Solid Waste Management Unit concerns to allow for the completion of a suitable "land short" and "overrun" area at the east end of the runway.
  - Provision for a suitable overrun at the west end of the runway.
  - Relocation of the fueling facility out of the obstacle-free-zone (OFZ).
  - Relocation of hangars at the northwest corner of the airport out of the OFZ.
  - A comprehensive study of all obstacles to flight and the marking and lighting of all new and existing obstacles.
  - A lease provision allowing unlimited access by airport management and operating personnel for safety and emergency purposes to all facilities located on airport property including all hangars and the fueling facility.
- The following concern was not identified in the LAAO self-assessment.

CONCERN: (TSA-4) (AS.1-6) (H1/C2) **The Los Alamos Area Office has not developed a master plan for the Los Alamos Airport as defined in Federal Aviation Administration Advisory Circular 150/5070-6A.**

FINDINGS:

- The Los Alamos Airport Certification Manual, Section G.4.i, and 14 CFR, 139.319(j)(3), require all rescue and firefighting personnel to participate in live fire training at least every 12 months. The Los Alamos County Fire Department is working toward this goal; however, it is currently not being met.
- The training facility referenced in the Airport Certification Manual has not been certified for use due to environmental considerations.
- The following concern was not identified in the LAAO self-assessment.

CONCERN: (TSA-4) (AS.1-7) (H2/C2)

The Los Alamos Area Office has not ensured that all airport fire and rescue personnel are trained as required by 14 CFR 139.319 and the Los Alamos Airport Certification Manual.

AS.2 OPERATION

PERFORMANCE OBJECTIVE: Operations should be provided the administrative support, publications, equipment, and training to maintain knowledge and skills to conduct the aviation mission safely in accordance with Department of Energy and Federal Aviation Administration standards.

Ross Aviation, Inc.

FINDINGS:

- Ross Aviation, Inc. (Ross), is required to comply with 14 CFR 121.571 which pertains to the briefing of passengers before takeoff. The passenger briefing card for the DC-9 Series 15 airplane is incorrect with respect to the description of the tail exit. On the card is the statement that "Some airplanes have doors . . . Others have hatches." The three airplanes which Ross operates and manages have doors, not hatches.
- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.2-1) (H2/C2) **Ross Aviation, Inc., is not in full compliance with the passenger briefing requirements of 14 CFR 121.571(b) and DOE 5480.13.**

FINDINGS:

- Ross is required to comply with 14 CFR 121.135 which specifies the contents of required manuals. Ross does not fully meet 14 CFR 121.135(a)(1) in that each required manual does not include instructions and information for personnel to perform their duties safely.
- The DC-9 Series 15 schematic in the DOE AL Aviation Operations Manual (page C-35) lacks captions to identify normal and emergency equipment locations and the location of the emergency exits.
- The DC-9 section of the DOE AL Aviation Operations Manual does not contain provisions for handicapped passengers and exit row seating similar to what is in the 14 CFR 135/121 Manuals for the DHC-6 and DHC-7 aircraft.
- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.2-2) (H3/C2) **Ross Aviation, Inc., is not in compliance with 14 CFR 121.135(a)(1) and DOE 5480.13 regarding normal and emergency exits.**

FINDINGS:

- 14 CFR 121.404, states that after January 2, 1991, all flight crew members are required to have windshear ground training. Ross documentation of windshear ground training and windshear flight training does not guarantee that the required training has been completed.

- The following concern was not identified in the Ross self-assessment.

CONCERN: **The Ross Aviation, Inc., documentation of windshear ground and flight training does not assure that the requirements of 14 CFR 121.409, 121.419, 121.424, and 121.427 have been achieved.**
(TSA-4)
(AS.2-3)
(H2/C2)

AS.3 MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should ensure safe operations and control of maintenance activities, and that these activities are conducted in a safe, accountable manner, following Department of Energy and Federal Aviation Administration standards, procedures, and accepted practices to support each facility condition and operation.

Ross Aviation, Inc.

FINDINGS:

- Ross Aviation, Inc. (Ross), has not assured that all General Maintenance Manuals contain the most recent revisions.
- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.3-1) (H2/C1) **Ross Aviation, Inc., has failed to ensure that all General Maintenance Manuals contain the latest revision in accordance with 14 CFR 121.133(a) and 135.21(a).**

FINDINGS:

- Ross does not always perform the "Post Flight" (daily) inspection of the Lear 35 and the BE-200 (King Air) when away from main base as required by the Ross General Maintenance Manual.
- The following concern was not addressed in the Ross self-assessment.

CONCERN: (TSA-4) (AS.3-2) (H3/C1) **Ross Aviation, Inc., "Post Flight" inspection on the Lear 35 and the King Air is not always performed, as required by the Ross General Maintenance Manual.**

FINDINGS:

- The Lear 35 does not have contrasting color markings around the exterior of all aircraft exists as required by 14 CFR 121.310.
- The means of opening each passenger emergency exit is not conspicuously marked on the exterior of the aircraft.
- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.3-3) (H1/C1) **Ross Aviation, Inc., is not in compliance with the emergency exit marking requirements of 14 CFR 121.310; the Department of Energy requires passenger carrying aircraft to comply with 14 CFR 121.**

FINDINGS:

- Procedural information required to be in the General Maintenance Manual is contained in the Ross "Standard Operating Procedures" Manual.

- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.3-4) (H3/C1)

The Ross Aviation Inc., General Maintenance Manual is not formatted in accordance with 14 CFR 121.133 and 135.23.

FINDINGS:

- Ross fueling trucks are not marked in accordance with NFPA 407, "Standard for Aircraft Fuel Servicing" and the Ross General Maintenance Manual.

- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.3-5) (H2/C2)

Ross Aviation, Inc., is not in compliance with NFPA 407 and the refueling vehicle markings requirements of the Ross General Maintenance Manual.

FINDINGS:

- Ross has not conducted training for its aircraft maintenance personnel regarding procedural changes contained in the Ross General Maintenance Manual issued October 1, 1991 as required by 14 CFR 121.375.

- The following concern was not identified in the Ross self-assessment.

CONCERN: (TSA-4) (AS.3-6) (H3/C2)

Ross Aviation, Inc., has not complied with aircraft maintenance personnel training requirements of 14 CFR 121.375.

4.5.4.18 Explosives Safety

4.5.4.18.1 Overview

During this appraisal, the seven Explosives Safety performance objectives were addressed; concerns have been identified in five. The explosives safety appraisal examined activities which store, perform operations on or with, and handle or transport explosives. The appraisal was concerned with the environment in which personnel either stored or handled explosives to ensure that the explosives were not exposed to harmful stimuli and that personnel had been afforded the required levels of protection. The activities visited included explosives operating and storage facilities in the Explosives Technology Group, the Hydrodynamics Group, the Shock Wave Physics Group, the Detonation Systems Group, and the Explosives Application Group in the Dynamics Testing Division; the Fabrication and Assembly Group, the Weapons Subsystems Group, the Analysis and Testing Group, and the Engineering and Information Resources Group in Design Engineering Division; and the Hazards Device Team in the Emergency Management Office.

The self-assessment efforts of LAAO, LANL, and those of the Design Engineering and the Dynamics Testing Divisions were addressed. Minimal explosives safety concerns were addressed in the self-assessment by the LAAO. The self-assessments by LANL and its Divisions addressed all seven Explosives Safety performance objectives and found many areas of concern.

The overall Explosives Safety Program at LANL is satisfactory; however, the appraisal identified several areas which need management attention. Explosives storage, assembly, testing, and handling operations are being accomplished by a workforce with years of experience in the specific types of activities being performed; however, there was no documented initial or continuing training program for explosives operations. Frequent independent oversights of explosive storage and operating facilities are not performed by qualified explosives safety personnel. Transient personnel are not alerted to exclusion areas adjacent to explosive operations to prevent their inadvertent entry and exposure to high overpressures and hazardous fragments.

4.5.4.18.2 Findings and Concerns

ES.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Management organization and administration should ensure the effective implementation and control of the explosives safety program.

FINDINGS:

- Roads adjacent to several buildings where operations are required to be performed remotely were not blocked at distances where the overpressures from an accidental explosion would be less than 2.3 psi positive incident pressure.
- Control procedures and/or barriers were not used to prevent personnel from entering the hazardous area. Hazardous areas are locations where fragments having greater than 11 ft-lb energy would impact from an accident involving operations which must be performed remotely.
- Buildings where operations must be performed remotely were not conspicuously identified by lights or similar warning devices which would alert personnel at road barricades or at perimeters of areas where hazardous fragments could impact in the event of an accidental explosion.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.1-1) (H1/C1) **At the Los Alamos National Laboratory, transient personnel near several remote operations involving explosives are not protected from possible exposure to overpressures and fragments in excess of those permitted by paragraph 4, Chapter VI, DOE/EV/06149, Explosives Safety Manual.**

ES.3 EXPLOSIVES SAFETY APPRAISAL PROGRAM

PERFORMANCE OBJECTIVE: Annual formal appraisals are conducted by safety personnel responsible for explosives operations.

FINDINGS:

- The Safety and Risk Assessment Group has only one Safety Engineer responsible for oversight of the explosives safety requirements in the Dynamic Testing and the Engineering Design Divisions. These Divisions have approximately 170 facilities spread over 20 square miles with over 290,000 square feet of space, seven burn/destruction sites, and 28 firing points where explosives transportation, storage, and operations occur. This Safety Engineer is also responsible for other aspects of industrial safety for these and other activities.

- Frequent oversight of explosive storage and operating activities are not performed by qualified explosives safety personnel. The number and types of findings noted substantiate this lack of comprehensive oversight.

- The Laboratory Assessment Office did not accomplish independent appraisals of explosives safety concerns. An appraisal has not been conducted for the Dynamic Testing Division. An appraisal of the Engineering Design Division had been completed in November 1989; however, explosives safety concerns were not addressed in that appraisal. (See Concerns TSA-4, PP.1-3; TSA-4, PP.4-1; TSA-4, FR.4-2; and TSA-4, OA.2-1.)

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.3-1) (H2/C1) **Los Alamos National Laboratory does not provide internal appraisals or frequent oversight of explosives activities by qualified explosives safety personnel as required by Chapter VII, DOE/EV/06194, Explosives Safety Manual, and DOE 5482.1B.**

FINDINGS:

- LAAO does not have a Safety Engineer qualified to provide oversight of explosives safety requirements during transportation, storage, or operations.

- The following concern was partially identified in the LAAO self-assessment.

CONCERN: (TSA-4) (ES.3-2) (H2/C2) **The Los Alamos Area Office safety personnel do not provide oversight of explosives safety concerns at the Los Alamos National Laboratory.**

FINDINGS:

- There is no positive interlock, to provide operator protection, for high explosives machining operations in Building TA-9 Bldg. 48. (See Concern TSA-4, PP.2-2.)

- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.3-3) (H1/C1)

At the Los Alamos National Laboratory, one explosives machining operation does not contain interlocks required by paragraph 12, Chapter II, DOE/EV/06194, Explosives Safety Manual.

ES.4 EXPLOSIVES SAFETY TRAINING

PERFORMANCE OBJECTIVE: Explosives safety training programs have been established and implemented to ensure compliance with Department of Energy prescribed standards.

FINDINGS:

- An explosives safety training program to meet the criteria of Chapter V, DOE/EV/06194, "Explosives Safety Manual," was not a documented requirement in either LANL AR 1-4, "Environment, Safety, and Health Training," July 19, 1991; or LANL AR 6-6, "Explosives," September 20, 1991.
- Job task analyses have not been performed to determine training requirements of personnel involved in explosives operations.
- Operating groups responsible for explosives operations do not have documented programs which provided initial, on-the-job, qualification, or explosives retraining.
- Periodic ES&H appraisals of explosives training, as required by LANL AR 6-6, "Explosives," September 20, 1991, have not been accomplished. (The same requirement existed in the previous edition of LANL AR 6-6.)
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.4-1) (H2/C1) **The explosives training and qualification program of the Los Alamos National Laboratory does not comply with the requirements and scope specified by Chapter V, DOE/EV/06149, Explosives Safety Manual. (Also see Concern TSA-4, TC.1-1.)**

ES.5 EXPLOSIVES OPERATIONS

PERFORMANCE OBJECTIVE: Explosives operational activities should be conducted in a manner that is both safe and reliable.

FINDINGS:

- Excess combustible material was located in several buildings in which explosives operations are performed.
- An operator in an explosives-operating building located within a reserve ammunition storage area was not provided protection from overpressures exceeding 1.2 psi positive incident pressure from an accidental explosion in adjacent magazines.
- Operating procedures permitted intermediate storage of explosives in an operating building; however, personnel in the building are not provided a DOE Class II level of protection from the intermediate storage of the explosives.
- A quantity of explosives in excess of the authorized explosives limit was located in Bay 7, TA-16 Bldg. 260.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.5-1) (H1/C1) **At the Los Alamos National Laboratory, operating personnel are not always provided the level of protection specified in Chapter VI, DOE/EV/06149, Explosives Safety Manual.**

FINDINGS:

- Electrical service lines were closer to several explosives operating buildings and the storage magazines in Magazine Area C (TA-37) than the length of the lines between the poles supporting the lines. There is no means provided to ensure that energized lines on breaking will not come into contact with the facility or its appurtenances.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.5-2) (H1/C2) **At the Los Alamos National Laboratory, several explosives operating and storage structures are not protected from electrical hazards resulting from breaks in nearby electrical service lines as recommended by paragraph 6-10, AMC-R 385-100, AMC Safety Manual.**

FINDINGS:

- The air terminals for the lightning protection system on TA-40 Bldg. 6 did not comply with paragraph 3-9, NFPA 78, Lightning Protection. Additionally, a metal air-supply pipe external to the structure was not bonded to the lightning protection system as required paragraph 3-15, NFPA 78.

- Air terminals as required by paragraph 3-9, NFPA 78, were not installed on a metal fence located on the roof of TA-36 Bldg. 10.

- External duct work for environmental conditioning at TA-26 Bldg. 82 was not bonded to the lightning protection system as required by paragraph 3-15, NFPA 78.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.5-3) (H2/C1)

At the Los Alamos National Laboratory, lightning protection for several structures containing explosives is not installed in accordance with Chapter II, DOE/EV/06149, Explosives Safety Manual.

ES.7 TRANSPORTATION, HANDLING, AND STORAGE OF EXPLOSIVES

PERFORMANCE OBJECTIVE: The transportation, handling, and storage of explosives should conform to all Department of Energy prescribed safety standards.

FINDINGS:

- Operational procedures for shipping explosives material do not include detailed instructions for packaging of explosives to meet Department of Transportation requirements for transportation. (See Concern TSA-4, PT.3-4.)
- Infrequent operations in the Transportation Building (TA-16 Bldg. 360) could involve explosives sensitive to sliding impact in a work area. Working surfaces in this area had not been designed for that type operation.
- Excess combustible material was located in the Transportation Building in a room where explosives may be stored.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.7-1) (H1/C1) **At the Los Alamos National Laboratory, transportation procedures and facilities do not comply with requirements in paragraphs 2, 14, and 16, Chapter II, DOE/EV/06149, Explosives Safety Manual.**

FINDINGS:

- The transfer of nitromethane between containers was permitted in a magazine containing other explosive material.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.7-2) (H1/C1) **At the Los Alamos National Laboratory, operations not permitted by paragraph 17, Chapter II, DOE/EV/06149, Explosives Safety Manual, are performed in a magazine containing explosives.**

FINDINGS:

- The inventories of Service Magazines are not reviewed every 3 months to identify explosives not required routinely (within 180 days) by the operations being supported.
- The following concern was not identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.7-3) (H2/C1) **At the Los Alamos National Laboratory, explosive items are stored in Service Magazines for longer periods than permitted by paragraph 17, Chapter II, DOE/EV/06149, Explosives Safety Manual.**

FINDINGS:

- LANL has quantities of bulk propellant located in storage and service magazines. There was no surveillance program to analyze the propellant for stabilizer depletion, and LANL had not obtained surveillance data from Department of Defense Components for those lots of propellant still in service.
- Storage review intervals based upon stability data are not established for bulk explosives and ammunition items in storage at LANL.
- The following concern was identified in the LANL self-assessment.

CONCERN: (TSA-4) (ES.7-4) (H1/C1) **A Los Alamos National Laboratory Storage Review Program, as required by paragraph 17.3, DOE/EV/06194, Explosives Safety Manual, has not been established.**

4.6 NOTEWORTHY PRACTICES

Noteworthy Practices are exceptional ways of accomplishing a Performance Objective or some aspect of it. Other DOE facilities are encouraged to adopt these practices when they are applicable to their operation.

4.6.1. Plutonium and Enriched Uranium

TC.7 TRAINING FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: The training facilities, equipment, and materials should effectively support training activities.

NOTEWORTHY PRACTICE: A comprehensive glovebox training laboratory was included in the initial design and construction of the TA-55 Training Center. This training laboratory simulates typical conditions and capabilities found in a typical laboratory within Bldg. PF-4. There is a change room associated with the training laboratory, and access to the laboratory is gained through an airlock, and a set of double swinging doors. The inside of the training laboratory is authentically finished and equipped, and it appears that it would be difficult for a trainee to imagine he or she is not actually within the operating facility from the moment of entering the change room. This duplication extends even as far as the color schemes, operational eyewash stations and safety showers, hand and foot monitors, ceiling height, door size, corridor width, etc.

The training laboratory and installed gloveboxes are equipped with wet vacuum, dry vacuum, compressed air, chilled water, industrial water, and domestic water. Also included in the design is glovebox negative pressure of one-half inch water, accurately mimicking Zone 1 pressure conditions within Bldg. PF-4 gloveboxes. There are three parallel lines of gloveboxes in the training laboratory. Two overhead transfer trolleys are included, situated at 90-degree angles to one another, with drop boxes at appropriate locations, so transfers can be made between the trolleys and between glovebox lines. Capability exists to install an inert-atmosphere glovebox, although this has not yet been accomplished.

Training which is routinely conducted in the training laboratory includes general glovebox operational safety (e.g., working with sharp objects, working with power tools, handling wet glassware, etc.), bag-out operations, trolley operations, glove change-out, window change-out for the various types of windows in use at TA-55, HEPA filter changeout. The five Bldg. PF-4 safety system alarms are all duplicated in the training laboratory and are used during routine training operations. These include ventilation failure, emergency evacuation, continuous air monitor, and the two fire alarms.

4.6.2 Reactor, Critical Assembly, and Tritium Facilities

OP.3 OPERATIONS

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

NOTEWORTHY PRACTICE: In the P-10 Group, an experimenter has generated the "Operating Instructions for the D2-DT-T2 Gas Handling System No. 1" with warnings or other highlights to the operator printed in colored ink. Green signifies a step that must be addressed in order to satisfy quality requisites, red indicates that the step is critical to safety, and blue denotes safe or final condition. Also the text in the operation instructions and the signs in the laboratory are printed the same color. The printing is not overly expensive; the printer costs under $1000 and is most likely available at most DOE sites. Different characters can be used in the color highlights that would stand out to those operators who have trouble differentiating among colors. To those of normal color discrimination, the color highlights truly provide a trigger to the operator that the step deserves some special attention which will increase potential for safe operations.

4.6.3 Accelerators

No noteworthy practices were identified by this team.

4.6.4 Other Selected Facilities and Activities

No noteworthy practices were identified by this team.

4.7 SYSTEM FOR CATEGORIZING CONCERNS

Each concern contained in this report has been characterized using the following three sets of criteria.

A. CATEGORY I: Addresses a situation for which a "clear and present" danger exists to workers or members of the public. A concern in this category is to be immediately conveyed to the managers of the facility for action. If a clear and present danger exists, the Assistant Secretary for Environment, Safety and Health, or his/her designee, is to be informed immediately so that consideration may be given to exercising the Secretary's facility shutdown authority or directing other immediate mitigation measures.

CATEGORY II: Addresses a significant risk or substantial noncompliance with DOE Orders but does not involve a situation for which a clear and present danger exists to workers or members of the public. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed until the preparation of a final report or the routine development of an action plan. Again, consideration should be given to whether compensatory measures, mitigation, or facility shutdown are warranted under the circumstances.

CATEGORY III: Addresses significant noncompliance with DOE Orders, or the need for improvement in the margin of safety, but is not of sufficient urgency to require immediate attention.

B. Hazard Level 1: Has the potential for causing a severe occupational injury, illness, or fatality, or the loss of the facility.

Hazard Level 2: Has the potential for causing minor occupational injury or illness or major property damage, or as the potential for resulting in, or contributing to, unnecessary exposure to radiation or toxic substances.

Hazard Level 3: Has little potential for threatening safety, health, or property.

C. Compliance Level 1: Does not comply with DOE Orders, prescribed policies or standards, or documented accepted practices. The latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements.

Compliance Level 2: Does not comply with DOE references, standards or guidance, or with good practice (as derived from industry experience, but not based on national consensus standards).

Compliance Level 3: Has little or no compliance considerations.

These concerns are based on professional judgment in pursuit of excellence in design or practice, i.e., these are improvements for their own sake and are not deficiency driven.

4.8 CATEGORIZATION AND TABULATION OF CONCERNS

4.8.1 Plutonium and Enriched Uranium

4.8.1.1 Categorization of Concerns

Concern Number	Potential Hazard Level	Compliance Level
OA.1-1**	1	1
OA.1-2**	1	1
OA.1-3	2	2
OA.2-1	2	1
OA.3-1	2	1
OA.5-1	2	2
OA.6-1	3	2
OA.7-1	2	1
OA.7-2	2	1
OA.7-3	2	1
OA.7-4	3	2
QV.1-1	2	1
QV.1-2	2	1
QV.1-3	2	2
QV.2-1	2	1
QV.3-1	2	1
QV.4-1	2	1
QV.5-1	2	1
QV.5-2	2	1
QV.6-1	2	1
QV.7-1	2	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
OP.1-1	2	1
OP.2-1**	1	1
OP.2-2	2	1
OP.3-1	2	1
OP.3-2	1	1
OP.4-1	1	1
OP.4-2	2	1
OP.5-1	2	1
OP.6-1	3	1
OP.6-2	2	1
MA.1-1	2	1
MA.1-2	2	1
MA.3-1	2	1
MA.5-1	2	2
TC.1-1	2	1
TC.3-1	2	1
TC.4-1	2	2
TC.4-2	2	2
TC.5-1	2	1
TC.11-1	2	2
AX.1-1	2	1
AX.1-2	2	2
AX.1-3	2	2
AX.1-4	2	2

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
AX.1-5	2	1
AX.2-1	2	1
AX.3-1	2	2
AX.4-1	2	2
AX.5-1	2	1
AX.5-2	2	2
AX.5-3	2	2
AX.6-1	2	2
AX.6-2	2	2
AX.6-3	2	1
EP.1-1**	1	1
EP.2-1	2	1
EP.2-2	2	1
EP.2-3	1	1
EP.3-1	2	1
TS.1-1	2	2
PT.1-1	2	1
PT.1-2	2	1
PT.2-1	2	1
PT.3-1	2	1
PT.6-1	2	1
CS.1-1	3	1
CS.1-2	3	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
CS.1-3	3	1
CS.1-4	3	1
CS.1-5	3	1
CS.1-6	3	2
CS.2-1	3	2
CS.3-1	3	1
CS.4-1	3	1
CS.4-2	2	1
CS.4-3	1	1
CS.4-4	3	1
CS.5-1	2	1
CS.5-2	2	1
EA.2-1	2	1
EA.2-2	2	2
FR.1-1	2	1
FR.2-1	2	1
FR.2-2	2	1
FR.5-1	3	1
RP.3-1	2	1
RP.3-2	2	1
RP.3-3	2	1
RP.4-1	2	1
RP.5-1	2	1
RP.6-1	3	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
RP.6-2	2	1
RP.8-1	2	1
RP.8-2	2	1
RP.9-1	2	2
RP.9-2	2	1
RP.11-1	3	1
RP.11-2	2	1
RP.11-3	2	2
RP.12-1	3	1
PP.2-1	2	1
PP.4-1	2	1
PP.5-1	1	1
WS.3-1**	1	1
WS.4-1**	1	1
FP.2-1**	1	1
FP.2-2**	1	1
FP.2-3**	1	1
FP.2-4**	1	1
FP.2-5	1	1
FP.3-1	1	1
FP.7-1	1	1
FP.7-2**	2	1
FP.7-3	2	1
FP.7-4	1	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
FP.7-5	1	2
FP.7-6	1	1
FP.7-7	2	1
FP.7-8	1	1
NP.1-1	1	2
NP.1-2	2	1
NP.2-1	2	2
NP.3-1	2	1
NP.3-2	2	1
NP.3-3	1	3
NP.4-1	2	2
NP.4-2	1	2
NP.5-1	1	2
NP.5-2	2	1
NP.6-1	2	2
NP.6-2	1	2
NP.6-3	1	2
NP.7-1	1	2

* Designates a Category I Concern
** Designates a Category II Concern

4.8.1.2 Tabulation of Concerns

4.5.1.1 Organization and Administration

CONCERN: (TSA-1) (OA.1-1) (H1/C1) CAT. II	The management of the Los Alamos National Laboratory and the Nuclear Materials Technology Division cannot demonstrate that TA-55 is operated and maintained within an evaluated and approved safety envelope as required by DOE 5480.5 and DOE 5480.19.
CONCERN: (TSA-1) (OA.1-2) (H1/C1) CAT. II	Department of Energy has not provided oversight and direction to Los Alamos National Laboratory and the Nuclear Materials Technology Division to ensure that TA-55 is operated and maintained within an evaluated and approved safety envelope as required by DOE 5480.5 and DOE 5480.19
CONCERN: (TSA-1) (OA.1-3) (H2/C2)	The management of the Los Alamos National Laboratory and Nuclear Materials Technology Division have not yet prepared an integrated action plan to evaluate and correct all environment, safety, and health deficiencies identified in the Los Alamos National Laboratory self-assessment.
CONCERN:	See Concern TSA-4, OA.6-1.
CONCERN: (TSA-1) (OA.2-1) (H2/C1)	At the Los Alamos National Laboratory, no system exists in the Nuclear Materials Technology Division to ensure that nongeneric safe operating procedures involving operations with significant risk receive independent safety reviews as required for compliance with DOE 5480.5.
CONCERN:	See Concern TSA-4, OA.3-1.
CONCERN: (TSA-1) (OA.3-1) (H2/C1)	The management of Los Alamos National Laboratory, the Nuclear Materials Technology Division, and Johnson Controls World Services, Inc. do not enforce and require that all work be accomplished in accordance with established and approved procedures or policy as required by DOE 5480.19.
CONCERN: (TSA-1) (OA.5-1) (H2/C2)	At the Los Alamos National Laboratory, the Nuclear Materials Technology Division managers and supervisors do not always critically assess facility safety-related activities to improve performance.
CONCERN:	See Concern TSA-3, OA.6-1.
CONCERN:	See Concern TSA-4, OA.6-1.
CONCERN: (TSA-1) (OA.6-1) (H3/C2)	At the Los Alamos National Laboratory, job qualification requirements are not established for some positions in TA-55.

CONCERN: (TSA-1) (OA.7-1) (H2/C1) At the Los Alamos National Laboratory, TA-55 and the Chemistry and Metallurgical Research Building are operating under safety analysis reports and operational safety requirements that are not current as required by DOE 5481.1B.

CONCERN: (TSA-1) (OA.7-2) (H2/C1) The Department of Energy has not provided timely approval of safety analysis documents as required by DOE 5480.5.

CONCERN: See Concern TSA-4, OA.7-1.

CONCERN: (TSA-1) (OA.7-3) (H2/C1) No Los Alamos National Laboratory or TA-55 policy or procedure exists to identify and store vital records as required by DOE 1324.2A.

CONCERN: (TSA-1) (OA.7-4) (H3/C2) At the Los Alamos National Laboratory, important personnel employment records are not protected against damage or loss.

CONCERN: See Concern TSA-2, OA.8-2.

4.5.1.2 Quality Verification

CONCERN: (TSA-1) (QV.1-1) (H2/C1) At the Los Alamos National Laboratory, no quality assurance program has been developed and implemented within the Nuclear Materials Technology Division for control and verification of computer codes as required by ASME NQA-1 1989, DOE 5700.6C, and DOE 5700.6B.

CONCERN: (TSA-1) (QV.1-2) (H2/C1) At the Los Alamos National Laboratory, procedures for some work processes in the Nuclear Materials Technology Division are not prepared, reviewed, approved, and controlled as required by DOE 5700.6C, and DOE 5480.19.

CONCERN: See Concern TSA-4, QV.1.

CONCERN: (TSA-1) (QV.1-3) (H2/C2) At the Los Alamos National Laboratory, Nuclear Materials Technology Division personnel responsible for coordination and development of quality assurance plans are not trained and qualified to ensure their performance capability as required by DOE 5700.6C.

CONCERN: See Concern TSA-1, OA.7-3.

CONCERN: See Concern TSA-4, QV.1-2.

CONCERN: (TSA-1) (QV.2-1) (H2/C1) Los Alamos National Laboratory has not implemented a program to qualify and review procurement activities and suppliers as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.

CONCERN: (TSA-1) (QV.3-1) (H2/C1)
At the Los Alamos National laboratory, a program to inspect, identify, and disposition items prior to use has not been implemented throughout the Nuclear Materials Technology Division in accordance with ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.

CONCERN: (TSA-1) (QV.4-1) (H2/C1)
Equipment used for process monitoring, data collection, inspections, and tests at the Los Alamos National Laboratory is not always properly calibrated and maintained at specified frequencies by qualified personnel using controlled and approved procedures as required by DOE 5700.6C, ASME NQA-1-1989, and DOE 5700.6B.

CONCERN:
See Concern TSA-4, QV.4-1.

CONCERN: (TSA-1) (QV.5-1) (H2/C1)
At the Los Alamos National Laboratory, items and processes that fail to meet established requirements are not identified, controlled, dispositioned, nor are causes of failure corrected as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.

CONCERN: (TSA-1) (QV.5-2) (H2/C1)
Items at Los Alamos National Laboratory are not identified and controlled to indicate status, maintain quality attributes, and prevent inappropriate use as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.

CONCERN: (TSA-1) (QV.6-1) (H2/C1)
A program for inspection and testing of items and processes at Los Alamos National Laboratory using established acceptance criteria has not been effectively implemented as required by ASME NQA-1-1989, DOE 5700.6C, and DOE 5700.6B.

CONCERN: (TSA-1) (QV.7-1) (H2/C1)
Not all special process procedures, equipment, and personnel at Los Alamos National Laboratory are qualified in accordance with applicable codes, standards, quality requirements, and specifications as required by ASME NQA-1-1989, DOE 5700.6C and DOE 5700.6B.

4.5.1.3 Operations

CONCERN: (TSA-1) (OP.1-1) (H2/C1)
At the Los Alamos National Laboratory, the Nuclear Materials Technology Division and the TA-55 Facilities Management Group organization and administration have not established policy guidelines, criteria, or standards for control of facility operations in compliance with DOE 5480.5 and DOE 5480.19.

CONCERN: TSA-1) (OP.2-1) (H1/C1) CAT. II
At the Los Alamos National Laboratory, a program to provide a qualified shift supervisor who exercises facility command and control in compliance with DOE 5480.19 during all TA-55 operations has not been implemented.

CONCERN: (TSA-1) (OP.2-2) (H2/C1)
At the Los Alamos National Laboratory, TA-55 Operations Center activities are conducted in an informal manner, which is not in compliance with DOE 5480.19.

CONCERN: (TSA-1) (OP.3-1) (H2/C1) At the Los Alamos National Laboratory, the currently approved TA-55 Operational Safety Requirements are not complete and not consistent with the Final Safety Analysis Report as required by DOE 5480.5 and DOE 5481.1B.

CONCERN: (TSA-1) (OP.3-2) (H1/C1) At the Los Alamos National Laboratory, procedures are not consistently prepared, reviewed, controlled, or implemented in compliance with DOE 5480.5 and DOE 5480.19.

CONCERN: See Concern TSA-2, OP.4-1.

CONCERN: (TSA-1) (OP.4-1) (H1/C1) At the Los Alamos National Laboratory, an effective program for control of equipment tagouts and lockouts that provides for personnel and equipment protection and configuration control has not been established or implemented in compliance with DOE 5480.19.

CONCERN: (TSA-1) (OP.4-2) (H2/C1) The Los Alamos Area Office facility representative to TA-55 at the Los Alamos National Laboratory, does not fulfill all responsibilities related to oversight of day-to-day operations in compliance with DOE 5480.19, such as review of facility modifications that may involve unreviewed safety questions.

CONCERN: (TSA-1) (OP.5-1) (H2/C1) At the Los Alamos National Laboratory, not all TA-55 material conditions effectively support facility operation as required by DOE 5480.19.

CONCERN: (TSA-1) (OP.6-1) (H3/C1) The Los Alamos Area Office facility representative has not been provided facility-specific training to promote effective oversight of the Los Alamos National Laboratory TA-55 operations in compliance with DOE 5480.19.

CONCERN: (TSA-1) (OP.6-2) (H2/C1) At the Los Alamos National Laboratory, TA-55 facility operations and technician personnel do not always demonstrate technical proficiency nor receive management supervision to ensure the safe and effective performance of their duties and responsibilities as required by DOE 5480.19 and DOE 5480.20.

CONCERN: See Concern TSA-2, OP.8-1.

4.5.1.4 Maintenance

CONCERN: See Concern TSA-4, MA.1-1.

CONCERN: (TSA-1) (MA.1-1) (H2/C1) The Los Alamos National Laboratory, has not established goals and objectives or performance indicators for maintenance as required by DOE 4330.4A.

CONCERN: (TSA-1) (MA.1-2) (H2/C1) The Los Alamos National Laboratory draft maintenance policy does not provide a commitment to maintenance of nuclear facilities that meets the requirements of DOE 4330.4A.

CONCERN: See Concern TSA-4, MA.2-1.

CONCERN: (TSA-1) (MA.3-1) (H2/C1) At the Los Alamos National Laboratory, not all measurement and test equipment related to plutonium facilities with suspected or actual deficiencies has been segregated or marked as required by DOE 4330.4A, Chapter II, Section 12.

CONCERN: See Concern TSA-4, MA.3-3.

CONCERN: See Concern TSA-1, QV.5-2.

CONCERN: See Concern TSA-4, MA.4-1.

CONCERN: (TSA-1) (MA.5-1) (H2/C2) There is no program to ensure that Class B equipment, structures, and systems that are inactive, but are not in the decontamination and decommissioning program, are maintained in such a way that they will not pose a hazard to Los Alamos National Laboratory personnel or a threat to public health and safety.

CONCERN: See Concern TSA-4, MA.6-1.

CONCERN: See Concerns TSA-4, MA.7-1, and TSA-4, MA.7-2.

CONCERN: See Concern TSA-4, MA.8-1.

4.5.1.5 Training and Certification

CONCERN: (TSA-1) (TC.1-1) (H2/C1) At the Los Alamos National Laboratory, oversight and control functions of training activities in the Nuclear Materials Technology Division fail to meet the requirements of DOE 5480.5, such as recordkeeping, auditability, verification of training, and so forth.

CONCERN: (TSA-1) (TC.3-1) (H2/C1) At the Los Alamos National Laboratory, job-specific training within the Nuclear Materials Technology Division does not ensure that all assigned workers have received training as required by DOE 5480.5; for example, there is insufficient documentation of job-specific examinations, insufficient implementation of a formally documented training program, and so forth.

CONCERN: See Concern TSA-4, TC.4-1.

CONCERN: (TSA-1) (TC.4-1) (H2/C2) At the Los Alamos National Laboratory, the Nuclear Material Technology Division training program accreditation status is in jeopardy if it must conform with the undeveloped sitewide training program.

CONCERN: (TSA-1) (TC.4-2) (H2/C2) At the Los Alamos National Laboratory, written examinations used during TA-55 training do not ensure that training material has been mastered.

CONCERN: (TSA-1) (TC.5-1) (H2/C1) At the Los Alamos National Laboratory, oversight and control of training for maintenance personnel at TA-55 does not ensure that they possess adequate knowledge and skills to safely and correctly complete assigned tasks as required by DOE 4330.4A and DOE 5480.5.

CONCERN: See Concern TSA-4, TC.8-1.

CONCERN: (TSA-1) (TC.11-1) (H2/C2) At the Los Alamos National Laboratory, exercises to develop and maintain skills in responding to process and procedure abnormal and emergency events are not conducted at TA-55.

4.5.1.6 Auxiliary Systems

CONCERN: See Concerns TSA-1, TS.2-1; TSA-1, OA.7-1; and TSA-1, OP.3-1.

CONCERN: (TSA-1) (AX.1-1) (H2/C1) At the Los Alamos National Laboratory, responsibility for safety function and/or safety related systems is divided between organizations in violation of DOE 5480.5.

CONCERN: See Concern TSA-1, AX.1-1.

CONCERN: (TSA-1) (AX.1-2) (H2/C2) At the Los Alamos National Laboratory, the need for significantly larger uninterruptable power system at TA-55 Building PF-4 has not been evaluated.

CONCERN: (TSA-1) (AX.1-3) (H2/C2) At the Los Alamos National Laboratory, there is no implemented program at the TA-55 to document and evaluate incidents below the level of DOE 5000.3A.

CONCERN: (TSA-1) (AX.1-4) (H2/C2) At the Los Alamos National Laboratory, no long-term surveillance program is in effect to detect degradation of systems.

CONCERN: (TSA-1) (AX.1-5) (H2/C1) At the Los Alamos National Laboratory, safe operating procedures for TA-55 and the Chemistry and Metallurgical Research Building do not meet requirements of DOE 5480.5 and DOE 5480.19.

CONCERN: (TSA-1) (AX.2-1) (H2/C1) At the Los Alamos National Laboratory, liquid waste monitoring at TA-55 Building PF-4 and the Chemistry and Metallurgical Research Building is deficient and gaseous waste discharges are not monitored in compliance with the National Emissions Standards for Hazardous Air Pollutants and ANSI N13.1-1969.

CONCERN: (TSA-1) (AX.3-1) (H2/C2) At the Los Alamos National Laboratory, much low-level radioactive waste in wooden boxes and cemented barrels has accumulated at TA-55 and restriction on the material brought into the controlled area is deficient.

CONCERN: (TSA-1) (AX.4-1) (H2/C2) At the Los Alamos National Laboratory, the reason that the plutonium, which has been found on the interior walls of the TA-55 Zone 1 exhaust ducts, was not stopped by the glovebox filters has not been determined.

CONCERN: (TSA-1) (AX.5-1) (H2/C1) At the Los Alamos National Laboratory, configuration control rules required by DOE 5480.5 are not fully implemented.

CONCERN: (TSA-1) (AX.5-2) (H2/C2) At the Los Alamos National Laboratory, the safety reviews at TA-55 have been informal and cannot be audited as required by DOE 5480.5.

CONCERN: See Concern TSA-1, AX.1-1.

CONCERN: See Concern TSA-1, AX.1-3.

CONCERN: (TSA-1) (AX.5-3) (H2/C2) At the Los Alamos National Laboratory, no automatic audible alarm is given if Zone 2 ventilation fails in TA-55 Building PF-4.

CONCERN: (TSA-1) (AX.6-1) (H2/C2) At the Los Alamos National Laboratory, identified deficiencies in vital supply systems are not being remedied in a timely manner.

CONCERN: (TSA-1) (AX.6-2) (H2/C2) At the Los Alamos National Laboratory, no uninterruptable power is provided for stack monitors at the Chemistry and Metallurgical Research Building.

CONCERN: (TSA-1) (AX.6-3) (H2/C1) At the Los Alamos National Laboratory, important modifications related to safety and reliability at TA-55 are not being addressed promptly as required by DOE 5480.5.

CONCERN: See Concern TSA-1, AX.1-2.

4.5.1.7 Emergency Preparedness

CONCERN: (TSA-1) (EP.1-1) (H1/C1) CAT. II At the Los Alamos National Laboratory, the management of TA-55 have not developed an effective management and response organization that can detect, react to, coordinate, and mitigate emergency situations as required by DOE 5500.3A (and its predecessor DOE 5500.3) and DOE 5500.1B.

CONCERN: (TSA-1) (EP.2-1) (H2/C1) The TA-55 emergency controls plan does not address notifications and reporting and protective action recommendations for Los Alamos National Laboratory personnel as required by DOE 5500.1B, DOE 5500.3A (and its predecessor DOE 5500.3), and DOE 5480.10.

CONCERN: (TSA-1) (EP.2-2) (H2/C1) At the Los Alamos National Laboratory, the TA-55 emergency plan implementing procedures have not been developed as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-1) (EP.2-3) (H1/C1) At the Los Alamos National Laboratory, the TA-55 emergency plan does not consider site-specific emergency action levels as required by DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-1) (EP.3-1) (H2/C1) At the Los Alamos National Laboratory, the TA-55 training program and implementation of training activities do not meet the requirements of DOE 5500.3A (and its predecessor DOE 5500.3); furthermore, the management and support personnel have not been trained in emergency management requirements and responsibilities outlined in DOE 5500 series of Orders.

4.5.1.8 Technical Support

CONCERN: (TSA-1) (TS.1-1) (H2/C2) TA-55 technical support activities with safety significance are not always controlled or reviewed in a way that ensures protection of facility personnel or public health and safety.

CONCERN: See Concern TSA-1, OP.4-1.

CONCERN: See Concern TSA-4, TS.3-2.

CONCERN: See Concern TSA-1, AX.2-1.

4.5.1.9 Packaging and Transportation

CONCERN: (TSA-1) (PT.1-1) (H2/C1) Oversight of packaging and transportation activities for plutonium and enriched uranium is not provided by Los Alamos National Laboratory or the Nuclear Materials Technology Division in compliance with DOE 5480.3.

CONCERN: (TSA-1) (PT.1-2) (H2/C1) Packaging activities for plutonium, enriched uranium, and hazardous chemicals are not always performed using safe operating procedures, as required by DOE 5480.3 and Los Alamos National Laboratory AR 1-3, that are based on current transportation safety and quality assurance manuals.

CONCERN: (TSA-1) (PT.2-1) (H2/C1) At the Los Alamos National Laboratory, the training program for preparation of packages of plutonium and enriched uranium products by the Nuclear Materials Management Group does not meet the requirements for quality assurance in the use of packagings per DOE 5480.3.

CONCERN: (TSA-1) (PT.3-1) (H2/C1)
At the Los Alamos National Laboratory, packaging and transportation activities for preparation of packages of plutonium and enriched uranium product for shipment by the Plutonium, Metallurgy Group and Nuclear Materials Management Group are not verified by a comprehensive quality assurance program as required by DOE 5480.3 and DOE 5700.6C.

CONCERN:
See Concern TSA-1, PT.1-1.

CONCERN: (TSA-1) (PT.6-1) (H2/C1)
At the Los Alamos National Laboratory, use of the Hazardous Materials Transfer Form does not comply with the shipping documentation requirements of DOE 5480.3 and 49 CFR 172.

CONCERN:
See Concern TSA-1, QV.5-2.

4.5.1.10 Nuclear Criticality Safety

CONCERN: (TSA-1) (CS.1-1) (H3/C1)
The Los Alamos National Laboratory Nuclear Criticality Safety Committee fails to satisfy some requirements of DOE 5482.1B, such as having a charter that provides complete committee specifications, in fulfilling its role in the contractor independent review and appraisal system.

CONCERN: (TSA-1) (CS.1-2) (H3/C1)
At the Los Alamos National Laboratory, the TA-55 Facility Safety Committee and the TA-55 Criticality Safety Committee fail to satisfy some requirements of DOE 5480.5 and DOE 5482.1B, such as suitable consideration of nuclear criticality safety issues, in their role in the contractor independent review and appraisal system.

CONCERN: (TSA-1) (CS.1-3) (H3/C1)
Los Alamos National Laboratory policy does not fully address requirements of DOE 5480.5, Section 9 and DOE 5482.1B, Section 9 concerning the contractor independent review and appraisal system, such as providing for an effective triennial appraisal of the Nuclear Criticality Safety Program.

CONCERN: (TSA-1) (CS.1-4) (H3/C1)
The Los Alamos National Laboratory training program for personnel concerned with nuclear criticality safety does not satisfy all requirements of DOE 5480.5, Section 10.

CONCERN: (TSA-1) (CS.1-5) (H3/C1)
The Albuquerque Field Office is failing to discharge some duties, such as administration of periodic appraisals, related to nuclear criticality safety required by DOE 5480.5, Section 7 and AL 5480.5.

CONCERN: (TSA-1) (CS.1-6) (H3/C2)
At the Los Alamos National Laboratory, the TA-55 Final Safety Analysis Report contains omissions in the analysis of criticality accidents.

CONCERN: (TSA-1) (CS.2-1) (H3/C2) At the Los Alamos National Laboratory, validation of computer code calculations to support nuclear criticality safety analyses is not fully in compliance with ANSI/ANS-8.1-1983, Section 4.3.6.

CONCERN: (TSA-1) (CS.3-1) (H3/C1) At the Los Alamos National Laboratory, Health and Safety Division requirements for documentation and review of nuclear criticality safety analyses as required by ANSI/ANS-8.1-1983, Section 4.3.4, have not been completely implemented.

CONCERN: (TSA-1) (CS.4-1) (H3/C1) Policies to govern review and approval of safe operating procedures are not consistently enforced at Los Alamos National Laboratory as required by ANSI/ANS-8.1-1983, Section 4.1.6.

CONCERN: (TSA-1) (CS.4-2) (H2/C1) At the Los Alamos National Laboratory, Criticality Safety Limit Approvals are unclear and fail to satisfy DOE 5480.5, Section 11.c.

CONCERN: (TSA-1) (CS.4-3) (H1/C1) At the Los Alamos National Laboratory, some limit postings for materials in storage at TA-55 are incorrect or incomplete and do not fully satisfy the requirements of DOE 5480.5, Section 13.b.

CONCERN: (TSA-1) (CS.4-4) (H3/C1) At the Los Alamos National Laboratory, notification, investigation, and reporting of criticality limit violations at TA-55 do not satisfy the requirements of DOE 5480.5, Section 8.g.

CONCERN: (TSA-1) (CS.5-1) (H2/C1) The criticality alarm system support operations including calibration, maintenance, and analysis at Los Alamos National Laboratory do not satisfy DOE 5480.5, Section 11.c.(3).(g) and Section 11.c.(3).(h).

CONCERN: (TSA-1) (CS.5-2) (H2/C1) At the Los Alamos National Laboratory, emergency preparations for criticality evacuations at TA-55 fail to satisfy DOE 5480.5, Section 8.k.

4.5.1.11 Security/Safety Interface

CONCERN: See Concern TSA-4, TS.3-2.

CONCERN: See Concern TSA-1, FP.2-1.

CONCERN: See Concern TSA-1, FP.2-1.

CONCERN: See Concern TSA-4, SS.3-1.

CONCERN: See Concern TSA-4, SS.3-2.

CONCERN: See Concern TSA-4, SS.4-1.

CONCERN: See Concern TSA-4, SS.4-2.

CONCERN: See Concern TSA-4, SS.4-3.

4.5.1.12 Experimental Activities

CONCERN: (TSA-1) (EA.2-1) (H2/C1) At the Los Alamos National Laboratory guidance for preparing experimental plans for review by the appropriate TA-55 safety review committee does not ensure that all appropriate safety-related items will be identified and addressed.

CONCERN: (TSA-1) (EA.2-2) (H2/C2) At TA-55, Los Alamos National Laboratory, there is no formalized method to ensure that the safety aspects of all experiments sponsored by outside organizations are appropriate and meet the criteria established for TA-55 activities; a similar concern exists when the Nuclear Materials Technology Division performs experiments at facilities other than TA-55.

CONCERN: See Concerns TSA-1, EA.2-1; TSA-1, FR.1-1; and, TSA-1, FR.3-1.

CONCERN: See Concern TSA-1, EA.2-2.

4.5.1.13 Site/Facility Safety Review

CONCERN: (TSA-1) (FR.1-1) (H2/C1) At the Los Alamos National Laboratory, the Nuclear Materials Technology Division safety committee system is not in compliance with the full requirements of the DOE 5480.5, DOE 5482.1B, and DOE 5481.1B, which govern the operation of a contractor independent review and appraisal system.

CONCERN: (TSA-1) (FR.2-1) (H2/C1) The lack of facility-specific criteria may mean that the Environment, Safety and Health Questionnaire independent safety review required by Los Alamos National Laboratory policy is not being applied to all appropriate experimental activities at TA-55.

CONCERN: (TSA-1) (FR.2-2) (H2/C1) At the Los Alamos National Laboratory, guidance and direction to the TA-55 safety review committee system for conducting inspections of operations or operational readiness reviews is not in compliance with DOE 5480.5.

CONCERN: See Concern TSA-1, FR.1-1.

CONCERN: (TSA-1) (FR.5-1) (H3/C1) A triennial appraisal of the entire Los Alamos National Laboratory nuclear site/facility safety review system in compliance with DOE 5480.5 and DOE 5482.1B, has not been implemented or proposed.

CONCERN: See Concern TSA-1, FR.1-1.

4.5.1.14 Radiological Protection

CONCERN: (TSA-1) (RP.3-1) (H2/C1) — At the Los Alamos National Laboratory, the implementation of procedures involving radiological work without line management approval is not in compliance with DOE 5480.19 and without the review and approval of the Health Physics Operations Group does not provide the control and worker safety required for compliance with DOE 5480.11.

CONCERN: — See Concern TSA-4, RP.5-2.

CONCERN: (TSA-1) (RP.3-2) (H2/C1) — At the Los Alamos National Laboratory, procedures approved by site/facility management to implement the radiological protection program are not updated as necessary for compliance with DOE 5480.11.

CONCERN: — See Concern TSA-4, RP.3-1.

CONCERN: (TSA-1) (RP.3-3) (H2/C1) — All groups are not implementing the radiation source leak test program as required by Los Alamos National Laboratory AR 3-4.

CONCERN: (TSA-1) (RP.4-1) (H2/C1) — At Los Alamos National Laboratory, positive control is not exercised by TA-21 line management as necessary to ensure compliance with radiation dose limitations of DOE 5480.11 concerning minors.

CONCERN: (TSA-1) (RP.5-1) (H2/C1) — The issuance of dosimeters to all Los Alamos National Laboratory personnel is not technically based on the radiation dose criteria specified in DOE 5480.11.

CONCERN: — See Concern TSA-4, RP.5-5.

CONCERN: (TSA-1) (RP.6-1) (H3/C1) — At the Los Alamos National Laboratory, internal radiation exposure controls do not preclude eating, drinking, and using tobacco products in commingling areas and do not minimize internal exposures as required to comply with DOE 5480.11.

CONCERN: (TSA-1) (RP.6-2) (H2/C1) — At the Los Alamos National Laboratory, radiation surveys are not performed so as to comply with Health and Safety Division procedures.

CONCERN: — See Concern TSA-4, RP.7-1.

CONCERN: (TSA-1) (RP.8-1) (H2/C1) — Fixed and portable radiation survey instruments are not calibrated annually or source checked in compliance with Los Alamos National Laboratory procedures and ANSI N323-1978, and instruments past calibration are not removed from service in compliance with Los Alamos National Laboratory AR 3-1.

CONCERN: — See Concern TSA-2, RP.8-5.

CONCERN: (TSA-1) (RP.8-2) (H2/C1) At the Los Alamos National Laboratory, process control monitors, for which calibration is required by DOE 5700.6C, are not under the oversight of Health and Safety Division even though they have the potential to be effective health and safety instruments.

CONCERN: (TSA-1) (RP.9-1) (H2/C2) At the Los Alamos National Laboratory, airflow, particle size, and solubility studies have not been documented at all plutonium and depleted uranium facilities, such as TA-50, TA-3 (Sigma Complex), and the firing sites, to verify the proper positioning of the continuous air monitors for monitoring airborne activity.

CONCERN: (TSA-1) (RP.9-2) (H2/C1) At the Los Alamos National Laboratory, the tritium stack monitor at Building PF-4 are not calibrated as required by ANSI N13.10-1974, and the range of response of the instrument does not ensure accurate determination of released quantities of tritium during accident situations.

CONCERN: See Concern TSA-4, RP.10-1.

CONCERN: See Concern TSA-4, RP.10-4.

CONCERN: (TSA-1) (RP.11-1) (H3/C1) Los Alamos National Laboratory does not comply with DOE 5480.11 requirements for an As-low-As-Reasonably-Achievable Program as detailed in PNL-6577.

CONCERN: (TSA-1) (RP.11-2) (H2/C1) At the Los Alamos National Laboratory, the Nuclear Materials Technology Division does not comply with DOE 5480.11 requirements to maintain radiation doses as low as reasonably achievable in the vault area.

CONCERN: (TSA-1) (RP.11-3) (H2/C2) The lack of a firm counseling requirement for pregnant women in the Los Alamos National Laboratory AR 3-1 does not ensure that fetal exposures are as low as reasonably achievable.

CONCERN: (TSA-1) (RP.12-1) (H3/C1) At the Los Alamos National Laboratory, comprehensive records related to occupational radiation exposure are not readily available as required by ANSI 13.6 and DOE 5480.11.

4.5.1.15 Personnel Protection

CONCERN: See Concern TSA-4, PP.1-1

CONCERN: See Concerns TSA-4, PP.2-1, and TSA-4, PP.2-2.

CONCERN: (TSA-1) (PP.2-1) (H2/C1) At the Los Alamos National Laboratory, workplace exposure monitoring and personnel medical records are not controlled, structured, or coordinated to ensure compliance with the exposure assessment requirements of 29 CFR 1910, Subpart C.

CONCERN: See Concern TSA-4, PP.3-1.

CONCERN: See Concerns TSA-4, WS.5-1, and TSA-4, WS.5-2.

CONCERN: (TSA-1) (PP.4-1) (H2/C1) Los Alamos National Laboratory and Nuclear Materials Technology Division do not have in place a program to effectively identify, investigate, and abate hazards and their root causes and to systematically apply lessons learned as required by DOE 5480.19 and DOE 5480.4.

CONCERN: See Concern TSA-4, WS.3-1.

CONCERN: (TSA-1) (PP.5-1) (H1/C1) The basic concepts of the Los Alamos National Laboratory industrial safety and industrial hygiene program are not fully implemented and trended as required by DOE 5480.10 and DOE 5482.1B.

CONCERN: See Concern TSA-1, WS.3-1.

CONCERN: See Concern TSA-3, PP.6-6.

CONCERN: See Concern TSA-4, PP.6-3.

4.5.1.16 Worker Safety

CONCERN: See Concern TSA-4, WS.3-1.

CONCERN: (TSA-1) (WS.3-1) (H1/C1) CAT. II Los Alamos National Laboratory is not in complete compliance with the requirements of 29 CFR 1910.134, Respiratory Protection, for equipment storage, maintenance, tracking/accountability, inspection, and comprehensiveness of the respiratory protection program.

CONCERN: See Concern TSA-3, WS.3-1.

CONCERN: See Concern TSA-4, WS.4-3.

CONCERN: (TSA-1) (WS.4-1) (H1/C1) CAT. II TA-55 at the Los Alamos National Laboratory is not in complete compliance with the requirements of 29 CFR Part 1910.147, Control of Hazardous Energy, relative to employee training, standardization of lockout devices, singularity of lockout/tagout devices, and means to enforce compliance with energy control procedures and programs.

CONCERN: See Concern TSA-4, WS.4-2.

CONCERN: See Concern TSA-1, FP.2-1.

4.5.1.17 Fire Protection

CONCERN: See Concern TSA-4, FP.1-1.

CONCERN: (TSA-1) (FP.2-1) (H1/C1) CAT. II	At Los Alamos National Laboratory, TA-55 is in substantial noncompliance with various requirements of NFPA 101, Life Safety Code, and 29 CFR 1910, Subpart E, Means of Egress, in subject areas such as the arrangement of means of egress, marking of exits, provision and maintenance of fire barriers, separation of means of egress, operation and arrangement of doors and latching devices, provision of smoke detection in ventilation systems, and type and arrangement of stairs.
CONCERN: (TSA-1) (FP.2-2) (H1/C1) CAT. II	The Department of Energy Technical Safety Appraisal system as implemented by the Nuclear Materials Technology Division and Los Alamos National Laboratory does not assure complete corrective action prior to closeout of significant (Category II) Concerns.
CONCERN: (TSA-1) (FP.2-3) (H1/C1) CAT. II	The Technical Safety Appraisal system as implemented by Headquarters, Department of Energy, does not assure complete corrective action prior to closeout of significant (Category II) Concerns.
CONCERN: (TSA-1) (FP.2-4) (H1/C1) CAT. II	Contrary to the requirements of the Life Safety Code for prompt evacuation, the evacuation procedures for Building PF-4 at Los Alamos National Laboratory cause occupants to be detained in the building for up to 10 minutes in the event of a fire alarm signal, even though safe havens are not provided.
CONCERN: (TSA-1) (FP.2-5) (H1/C1)	Emergency evacuation plans at TA-55, as required by 29 CFR 1910.38, do not properly address security interfaces and worker protection and also do not agree, in all cases, with the means of egress requirements of NFPA 101, Life Safety Code.
CONCERN: (TSA-1) (FP.3-1) (H1/C1)	At the Los Alamos National Laboratory, the configuration of TA-55 with respect to fire protection features and fire hazards within the facility are not controlled to remain within the parameters of the Final Safety Analysis Report as required by DOE 5480.5.
CONCERN:	See Concern TSA-4, FP.5-1.
CONCERN: (TSA-1) (FP.7-1) (H1/C1)	At Los Alamos National Laboratory, fire protection engineering review and approval is not evident in the planning and design of projects, modifications, and renovations as required by DOE 5480.7.
CONCERN: (TSA-1) (FP.7-2) (H2/C1) CAT. II	At the Los Alamos National Laboratory, the numerous deficiencies in the fire protection inspection, testing, and maintenance program at TA-55 reflects lack of oversight provided by the Fire Protection and Utilities Group and is not in compliance with National Fire Protection Association requirements to ensure the reliability of fire protection systems, some of which are defined as safety-class systems.

CONCERN: See Concern TSA-1, OA.3-2.

CONCERN: See Concern TSA-4, FP.4-2.

CONCERN: (TSA-1) (FP.7-3) (H2/C1) At Los Alamos National Laboratory, exemptions from mandatory fire protection requirements have not been obtained in accordance with DOE 5480.4.

CONCERN: (TSA-1) (FP.7-4) (H1/C1) The Los Alamos National Laboratory Fire Protection Program, as implemented, does not effectively discover significant fire protection deficiencies for correction.

CONCERN: (TSA-1) (FP.7-5) (H1/C2) At the Los Alamos National Laboratory, there is insufficient documentation or knowledge of fire protection systems by operations personnel onsite at TA-55 to make effective use of the fire protection systems in the event of a fire emergency.

CONCERN: (TSA-1) (FP.7-6) (H1/C1) Fire doors in Building PF-4 at Los Alamos National Laboratory do not meet the requirements of NFPA 80, and there is insufficient documentation to ascertain that the doors, as installed, provide fire separation equivalent to that required by the fire codes.

CONCERN: (TSA-1) (FP.7-7) (H2/C1) Fire detectors in the gloveboxes in Building PF-4 at Los Alamos National Laboratory do not provide assurance of an acceptable level of warning in accordance with the NFPA 72E.

CONCERN: (TSA-1) (FP.7-8) (H1/C1) The safety-class fire protection systems in Building PF-4 at Los Alamos National Laboratory do not comply with DOE 6430.1A.

4.5.1.18 Natural Phenomena Hazards

CONCERN: (TSA-1) (NP.1-1) (H1/C2) Personnel training, documented plans, and defined procedures necessary for response to a design basis earthquake are not in place at TA-55 Building PF-4; TA-55 Building PF-3, rooms 116 and 117; and TA-3, Building SM-66 at Los Alamos National Laboratory.

CONCERN: (TSA-1) (NP.1-2) (H2/C1) The current list of facilities classified as "high hazard" at Los Alamos National Laboratory does not include all facilities meeting the definition of high hazard, such as the Chemistry and Metallurgical Research Building, and the classification methodology does not comply with DOE 5481.1B.

CONCERN: (TSA-1) (NP.2-1) (H2/C2) A comprehensive seismic safety program to design new facilities and review existing ones does not exist at Los Alamos National Laboratory.

CONCERN: (TSA-1) (NP.3-1) (H2/C1)	At Los Alamos National Laboratory, safety system component anchorages do not comply with the seismic Class I operability requirements contained in the Building PF-4 Final Safety Analysis Report.
CONCERN: (TSA-1) (NP.3-2) (H2/C1)	At Los Alamos National Laboratory, miscellaneous pieces of nonsafety class equipment are not anchored in accordance with seismic Class II and III Uniform Building Code requirements as required in the Building PF-4 Final Safety Analysis Report.
CONCERN: (TSA-1) (NP.3-3) (H1/C3)	Building PF-3 at Los Alamos National Laboratory has pressurized tanks containing hazardous gases that could release their contents to the environment during a design basis earthquake.
CONCERN: (TSA-1) (NP.4-1) (H2/C2)	At Los Alamos National Laboratory, seismic Class 1 operative systems (such as the Building PF-8 compressed air supply system and the Building PF-8 auxiliary diesel air-start system) do not comply with safety factors specified in UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990, and are not consistent with standard industry seismic design practices.
CONCERN: (TSA-1) (NP.4-2) (H1/C2)	Building SM-66, a high-hazard facility at Los Alamos National Laboratory, does not meet structural design guidelines for seismic loading as recommended in UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.
CONCERN: (TSA-1) (NP.5-1) (H1/C2)	At Los Alamos National Laboratory containment of cyanide gas is not assured by appropriate safety factors for design at the recommended review-level earthquake for high-hazard facilities, or earthquakes of lesser magnitude as recommended by UCRL 15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.
CONCERN: (TSA-1) (NP.5-2) (H2/C1)	Components of uninterruptible power supply system for Building PF-4 at Los Alamos National Laboratory do not comply with the seismic Class I operability requirements specified in the Building PF-4 Final Safety Analysis Report.
CONCERN: (TSA-1) (NP.6-1) (H2/C2)	At Los Alamos National Laboratory, seismic interaction effects were not evaluated for all seismic Class I systems (as defined in the Building PF-4 Final Safety Analysis Report), including the Operations Center, the ventilation system, and the compressed air system.
CONCERN: (TSA-1) (NP.6-2) (H1/C2)	The potential for seismic-induced fire was not evaluated for Los Alamos National Laboratory Bldg. SM-66.

CONCERN: (TSA-1) (NP.6-3) (H1/C2)	Fire protection piping system and components for TA-55 at Los Alamos National Laboratory do not comply with safety factors for seismic loading in UCRL-15910 "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.
CONCERN: (TSA-1) (NP.7-1) (H1/C2)	At Los Alamos National Laboratory, TA-41 and TA-2 slope stabilities, drainage, and rock catchers do not have safety factors required by the natural phenomena hazard evaluation guidance of UCRL-15910, "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards," June 1990.

4.8 CATEGORIZATION AND TABULATION OF CONCERNS

4.8.2 Reactor, Critical Assembly and Tritium Facilities

4.8.2.1 Categorization of Concerns

Concern Number	Potential Hazard Level	Compliance Level
OA.1-1	2	1
OA.1-2	2	1
OA.2-1	2	1
OA.2-2	2	1
OA.2-3	1	1
OA.3-1	1	1
OA.5-1	3	1
OA.6-1	2	2
OA.8-1	2	2
OA.8-2	2	2
QV.1-1	3	1
QV.1-2	3	1
QV.2-1	3	1
QV.3-1	3	1
QV.5-1	3	1
QV.6-1	3	1
QV.7-1	3	1
OP.2-1**	1	1
OP.2-2	2	1
OP.2-3**	1	1
OP.3-1	2	1
OP.3-2	2	1
OP.4-1	1	1
OP.4-2**	1	1
OP.5-1	1	1
OP.5-2	2	2

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
OP.5-3	2	1
OP.5-4	2	2
OP.5-5	1	1
OP.6-1	2	2
OP.8-1	2	2
MA.1-1	2	2
MA.2-1	2	1
MA.2-2	2	1
MA.5-1	2	2
MA.6-1	2	2
TC.1-1	2	1
TC.1-2	2	1
TC.2-1	2	1
TC.2-2	3	2
TC.2-3	2	1
TC.2-4	3	2
TC.3-1	2	1
TC.3-2	3	1
TC.3-3	3	2
TC.5-1	3	1
TC.10-1	3	1
TC.11-1	2	1
AX.1-1	2	1
AX.1-2	2	2
AX.2-1	2	1
AX.5-1	2	1
AX.5-2	1	2
AX.6-1	2	1
AX.6-2	2	2
AX.8-1	2	2

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
EP.1-1	2	1
EP.2-1	2	1
EP.2-2	2	1
EP.3-1	1	1
TS.1-1	3	2
TS.1-2	3	2
TS.2-1	2	1
TS.2-2	2	1
TS.8-1	2	1
PT.1-1	2	1
PT.1-2	3	1
PT.2-1	2	1
PT.3-1	2	1
PT.4-1	2	1
PT.4-2	2	1
PT.4-3	2	1
PT.6-1	2	1
PT.10-1	2	1
PT.11-1	3	1
PT.11-2	3	1
SS.1-1	2	1
SS.4-1	2	2
EA.2-1	2	1
EA.2-2	2	1
EA.4-1	1	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
FR.2-1	2	2
FR.2-2	1	1
FR.3-1	3	1
FR.3-2	3	1
FR.4-1	2	1
FR.6-1	2	1
FR.6-2	2	2
RP.1-1	2	1
RP.1-2	2	1
RP.1-3	2	2
RP.2-1	3	2
RP.3-1	2	1
RP.4-1	1	1
RP.5-1	3	2
RP.5-2	2	2
RP.6-1	2	2
RP.6-2	2	1
RP.6-3**	1	1
RP-7-1	2	1
RP.8-1**	1	1
RP.8-2	1	1
RP.8-3	2	1
RP.8-4	2	1
RP.8-5	2	1
RP.9-1	2	1
RP.10-1	2	1
PP.1-1	2	2
PP.4-1	3	1
WS.4-5	1	1
WS.4-6	2	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
FP.3-1	2	1
FP.4-1	2	1
FP.5-1	2	1
FP.7-1	1	1
FP.7-2	2	1
FP.7-3	1	1
MS.1-1	1	1
MS.1-2	2	1
MS.1-3	1	1
MS.2-1	2	1
MS.2-2	3	2
MS.2-3	2	1
MS.3-1	2	1
MS.3-2	2	1
MS.3-3	1	1
MS.3-4	2	1
MS.3-5	2	1
MS.3-6	1	1
MS.4-1	2	1
MS.4-2	3	1
MS.4-3	2	2
MS.5-1	3	1

* Designates a Category I Concern
** Designates a Category II Concern

4.8.2.2 Tabulation of Concerns

4.5.2.1 Organization and Administration

CONCERN: (TSA-2) (OA.1-1) (H2/C1)	No requirement or policy has been established at Los Alamos National Laboratory regarding the holding of regularly scheduled safety meetings, and the frequency of safety meetings is not dependent on the potential hazards associated with the operation of the tritium and reactor facilities as required by DOE 5480.19.
CONCERN: (TSA-2) (OA.1-2) (H2/C1)	At the Los Alamos National Laboratory, safety meetings are not being used as a means of learning from past experiences or experiences of others nor as a means of instilling a unified effort to attain a higher level of safety excellence at the tritium and reactor facilities as required by DOE 5480.19.
CONCERN: (TSA-2) (OA.2-1) (H2/C1)	At the tritium and reactor facilities, the line safety programs as required by SEN-6C-91, "Departmental Organization and Management Arrangements," are not well defined and the Los Alamos National Laboratory has not provided guidance regarding what is expected.
CONCERN: (TSA-2) (OA.2-2) (H2/C1)	At the Los Alamos National Laboratory tritium and reactor facilities, a program has not been institutionalized so that self-assessments will be an ongoing, continuing effort as required by the Secretary of Energy Notices and letters.
CONCERN: (TSA-2) (OA.2-3) (H1/C1)	The Los Alamos National Laboratory does not have a hierarchy of documentation to provide the policies, programs, plans, procedures, and guidance needed at the tritium and reactor facilities to ensure consistent safety programs that meet the various Department of Energy Orders and requirements.
CONCERN:	See Concern TSA-4, OA.3-1.
CONCERN: (TSA-2) (OA.3-1) (H1/C1)	Los Alamos National Laboratory management has not pursued safety excellence at the tritium and reactor facilities, which far exceeds mere compliance, as required by Secretary of Energy Notices and letters.
CONCERN:	See Concern TSA-3, OA.2-2.
CONCERN: (TSA-2) (OA.5-1) (H3/C1)	At Los Alamos National Laboratory, operational data which reflects facility performance is not analyzed and trended as a means of improving the safety and performance of the tritium and reactor facilities as required by DOE 5480.19.
CONCERN:	See Concern TSA-4, OA.6-1.

CONCERN: (TSA-2) (OA.6-1) (H2/C2) At Los Alamos National Laboratory, it is not always clear who is responsible for an area in the tritium and reactor facilities, and responsible individuals do not always understand the extent of their safety authorities and responsibilities pertaining to building or area management.

CONCERN: See Concern TSA-4, OA.7-1.

CONCERN: (TSA-2) (OA.8-1) (H2/C2) The random drug-testing program at Los Alamos National Laboratory does not include all those employees who are in a position where they could significantly endanger life or significantly affect the environment or public health and safety, including the management and staff at the Omega West Reactor.

CONCERN: (TSA-2) (OA.8-2) (H2/C2) Not all management personnel and staff at Los Alamos National Laboratory have received training on the drug-free workplace and Employee Assistance Program, and there is no documented requirement that such training will continue to ensure periodic refresher training.

4.5.2.2 Quality Verification

CONCERN: See Concern TSA-4, QV.1-4.

CONCERN: See Concerns TSA-4, QV.1-1, and TSA-4, QV.1-2.

CONCERN: (TSA-2) (QV.1-1) (H3/C1) Quality assurance plans for tritium and reactor facilities at Los Alamos National Laboratory do not identify a mechanism to implement the plans or to assign implementing responsibility as required by ASME NQA-1-1989, Section 2.

CONCERN: (TSA-2) (QV.1-2) (H3/C1) Identification and control procedures for nonconformance items and processes are not in place at the Los Alamos National Laboratory tritium and reactor facilities as required by ASME NQA-1-1989, Section 16.

CONCERN: (TSA-2) (QV.2-1) (H3/C1) The tritium and reactor facilities groups have not demonstrated procurement control over vendors which supply material, equipment, and services to Los Alamos National Laboratory as required by ASME NQA-1-1989, Section 4.2.

CONCERN: (TSA-2) (QV.3-1) (H3/C1) The tritium and reactor facilities organizations at Los Alamos National Laboratory do not have documented evidence of conformance to technical requirements available before items are installed or used as required by ASME NQA-1-1989, Section 10.

CONCERN: See Concern TSA-4, QV.4-1.

CONCERN: (TSA-2) (QV.5-1) (H3/C1)
Items are not identified and controlled within the tritium and reactor facilities at Los Alamos National Laboratory to preclude the use of an item when its shelf life or operating life has expired or to preclude the use of an incorrect item as required by ASME NQA-1-1989, Section 14.

CONCERN: (TSA-2) (QV.6-1) (H3/C1)
Inspections are not being performed by qualified or certified personnel at the Los Alamos National Laboratory tritium and reactor facilities as required by ASME NQA-1-1989, Section 2.

CONCERN: (TSA-2) (QV.7-1) (H3/C1)
Welding or brazing at the Los Alamos National Laboratory tritium and reactor facilities is not being performed by qualified or certified personnel or with qualified procedures and equipment as required by ASME NQA-1-1989, Section 9.

4.5.2.3 Operations

CONCERN:
See Concerns TSA-4, OA.3-1, and TSA-2, OA.5-1.

CONCERN: (TSA-2) (OP.2-1) (H1/C1) CAT. II
Technical specification compliance for Los Alamos Critical Experiments Facility at Los Alamos National Laboratory cannot be demonstrated.

CONCERN:
See Concern TSA-4, OP.4-1.

CONCERN: (TSA-2) (OP.2-2) (H2/C1)
Occurrence and incident reporting is not implemented for Los Alamos Critical Experiments Facility at Los Alamos National Laboratory as required by DOE 5000.3A.

CONCERN: (TSA-2) (OP.2-3) (H1/C1) CAT. II
Operations have been performed at Technical Area-33 Building 86 after its shutdown.

CONCERN:
See Concern TSA-1, OP.3-2.

CONCERN: (TSA-2) (OP.3-1) (H2/C1)
At Los Alamos National Laboratory, there is no formal procedure for an independent verification that the fence gate at a Kiva associated with the Los Alamos Critical Experiments Facility is left unlocked during experiments as required by DOE 5840.19.

CONCERN:
See Concern TSA-1, OP.3-2.

CONCERN: (TSA-2) (OP.3-2) (H2/C1)
TA-33 Building 86 operations records at Los Alamos National Laboratory are not being kept in accordance with DOE 5480.19.

CONCERN: (TSA-2) (OP.4-1) (H1/C1)
At the Los Alamos National Laboratory, configuration control is not being maintained as required by DOE 5480.19 and ASME NQA-1-1989.

CONCERN: (TSA-2) (OP.4-2) (H1/C1) CAT. II
At Los Alamos National Laboratory, the operation of Godiva IV with a cracked fuel ring has not been formally evaluated and approved as required by DOE 5480.6.

CONCERN:
See Concerns TSA-1, OP.4-1, and TSA-4, PP.2-2.

CONCERN:
See Concerns TSA-1, OP.4-1, and TSA-4, PP.2-2.

CONCERN:
See Concern TSA-2, OP.4-1.

CONCERN: (TSA-2) (OP.5-1) (H1/C1)
At Los Alamos National Laboratory, Omega West Reactor operators working on the unguarded basin ledges are in danger of falling.

CONCERN: (TSA-2) (OP.5-2) (H2/C2)
At Los Alamos National Laboratory, a certified cask is not available to ship spent fuel from the Omega West Reactor.

CONCERN: (TSA-2) (OP.5-3) (H2/C1)
Contrary to DOE 5480.19, poor housekeeping is evident in many tritium areas at Los Alamos National Laboratory.

CONCERN: (TSA-2) (OP.5-4) (H2/C2)
Some Los Alamos National Laboratory tritium operations personnel do not identify and correct inherent equipment weaknesses which could (and do) result in releases of radioactive material.

CONCERN: (TSA-2) (OP.5-5) (H1/C1)
At Los Alamos National Laboratory, TA-33 Building 86 has not always been afforded management attention commensurate with the hazards present.

CONCERN: (TSA-2) (OP.6-1) (H2/C2)
Tritium operating or safety information from similar facilities (both onsite and offsite) such as lessons learned, unusual occurrence reports, and so forth, is not being disseminated to all workers at Los Alamos National Laboratory.

CONCERN:
See Concern TSA-2, OP.8-1.

CONCERN: (TSA-2) (OP.8-1) (H2/C2)
Human factors considerations, including uniformity of controls, alarms, and indicators, have not been generally applied to tritium facilities at Los Alamos National Laboratory.

4.5.2.4 Maintenance

CONCERN: (TSA-2) (MA.1-1) (H2/C2) Management supervision of worker performance and review of administrative practices at reactor facilities and of Los Alamos National Laboratory subcontractor Johnson Controls World Services, Inc., do not ensure effective implementation and control of maintenance activities.

CONCERN: (TSA-2) (MA.2-1) (H2/C1) At Los Alamos National Laboratory, the maintenance training programs and training records for operators working on program (Class B) equipment at tritium and reactor facilities do not meet the requirements of DOE 4330.4A.

CONCERN: See Concern TSA-4, MA.2-1.

CONCERN: See Concern TSA-2, QV.7-1.

CONCERN: See Concerns TSA-4, PP.2-2, and TSA-1, OP.4-1.

CONCERN: (TSA-2) (MA.2-2) (H2/C1) Los Alamos National Laboratory procedures designed to achieve as-low-as-reasonably-achievable radiation exposures for maintenance workers are not being followed as required by DOE 4330.4A.

CONCERN: See Concern TSA-4, MA.3-2.

CONCERN: See Concern TSA-4, MA.4-1.

CONCERN: (TSA-2) (MA.5-1) (H2/C2) Corrective maintenance at Los Alamos National Laboratory is not performed for tritium and reactor facilities in an effective and timely manner.

CONCERN: See Concern TSA-4, MA.6-2.

CONCERN: (TSA-2) (MA.6-1) (H2/C2) The Facilities Engineering Division schedules for the electrical equipment and lubrication preventive maintenance programs at Los Alamos National Laboratory are not being followed by Johnson Controls World Services, Inc.

CONCERN: See Concern TSA-4, MA.7-1.

CONCERN: See Concern TSA-4, MA.8-1.

4.5.2.5 Training and Certification

CONCERN: (TSA-2) (TC.1-1) (H2/C1) At Los Alamos National Laboratory, the Tritium Salt Facility and the Weapons Engineering Tritium (Test) Facility have not provided training plans to ensure that each employee is properly trained to perform his or her assigned tasks safely as required by DOE 5480.5 and DOE 5480.20.

CONCERN: See Concern TSA-4, TC.1-2.

CONCERN: (TSA-2) (TC.1-2) (H2/C1) Weapon Subsystems Group personnel at Los Alamos National Laboratory are not being trained in accordance with the Design Engineering Division training plan, DOE 5480.5, and DOE 5480.20.

CONCERN: See Concern TSA-4, TC.1-2.

CONCERN: (TSA-2) (TC.2-1) (H2/C1) Contrary to the requirements of DOE 5480.19, general training classes conducted in the control room of Los Alamos National Laboratory Omega West Reactor during reactor operation distract the operator from his or her primary function of "at the controls" operation of the reactor.

CONCERN: (TSA-2) (TC.2-2) (H3/C2) At Los Alamos National Laboratory, examinations to certify operators for Los Alamos Critical Experiments Facility do not ensure a consistent minimum level of expertise from one examination to the next, and the content of oral examinations is not documented.

CONCERN: (TSA-2) (TC.2-3) (H2/C1) At Los Alamos National Laboratory, not all certified operators are trained as required by DOE 5480.20 and the Los Alamos Critical Experiments Facilities training plan.

CONCERN: (TSA-2) (TC.2-4) (H3/C2) Formal lesson plans or class outlines that detail specific learning objectives do not exist at Los Alamos Critical Experiments Facility for some training classes.

CONCERN: (TSA-2) (TC.3-1) (H2/C1) Tritium Systems Test Assembly test directors at Los Alamos National Laboratory are not certified as required by DOE 5480.5 and DOE 5480.20.

CONCERN: (TSA-2) (TC.3-2) (H3/C1) The Tritium System Test Assembly staff at Los Alamos National Laboratory does not administer or control examinations in a formal manner as required by DOE 5480.20.

CONCERN: (TSA-2) (TC.3-3) (H3/C2) Not all subjects have been presented which are required in the training of certified operators at Tritium Systems Test Assembly by the new facility training plan; no schedule has been formulated to implement this training at Los Alamos National Laboratory.

CONCERN: See Concern TSA-4, TC.4-1.

CONCERN: (TSA-2) (TC.5-1) (H3/C1) At Los Alamos National Laboratory, the Los Alamos Critical Experiments Facility does not document program (Class B) equipment maintenance training as required by DOE 5480.6 and DOE 5480.20.

CONCERN: See Concern TSA-4, TC.6-1.

CONCERN: See Concern TSA-4, TC.9-1.

CONCERN: (TSA-2) (TC.10-1) (H3/C1) At Los Alamos National Laboratory, Tritium facilities and Los Alamos Critical Experiments Facility managers, supervisors, and technical staff personnel do not receive the training necessary to broaden their overall knowledge and develop management proficiency as required by DOE 5480.20.

CONCERN: (TSA-2) (TC.11-1) (H2/C1) Tritium and reactor operators are not periodically evaluated at Los Alamos National Laboratory to ensure proper operating team response to abnormal and emergency alarms as required by DOE 5480.20.

4.5.2.6 Auxiliary Systems

CONCERN: (TSA-2) (AX.1-1) (H2/C1) The safety analysis reports for the some tritium-handling facilities at Los Alamos National Laboratory do not have approved, detailed limiting conditions for operations and surveillance requirements as required by DOE 5481.1B.

CONCERN: (TSA-2) (AX.1-2) (H2/C2) The status of various auxiliary systems cannot be accurately determined for the High Pressure Tritium Laboratory, Tritium Salt Facility, and Ice House at Los Alamos National Laboratory.

CONCERN: (TSA-2) (AX.2-1) (H2/C1) Assurance has not been provided that tritium effluent releases at Los Alamos National Laboratory tritium facilities are measured and quantified accurately in accordance with ANSI N13.1.

CONCERN: See Concern TSA-3, AX.3-1.

CONCERN: (TSA-2) (AX.5-1) (H2/C1) Personnel qualifications and methodologies for testing high-efficiency particulate air filters are not formally established at the Los Alamos National Laboratory as required by ANSI N-510.

CONCERN: (TSA-2) (AX.5-2) (H1/C2) The potential for tritium contamination exists in the Tritium Salt Facility at Los Alamos National Laboratory after a loss of normal ventilation.

CONCERN: (TSA-2) (AX.6-1) (H2/C1) Emergency and standby emergency power systems at the Los Alamos Critical Experiments Facility (TA-18) and the Ice House (TA-41) are not tested in accordance with the requirements of NFPA 110.

CONCERN: (TSA-2) (AX.6-2) (H2/C2) The fuel supply for emergency diesel generators at Los Alamos National Laboratory is not verified to be of an acceptable quality prior to filling the tanks.

CONCERN: (TSA-2) (AX.8-1) (H2/C2) The Los Alamos National Laboratory practice of monitoring plant and process parameters to determine whether problems exist at nonoccupied facilities is not uniformly applied to all tritium and reactor facilities.

4.5.2.7 Emergency Preparedness

CONCERN: (TSA-2) (EP.1-1) (H2/C1) The Design Engineering Division at Los Alamos National Laboratory does not have an emergency preparedness program that provides the necessary protective actions during emergencies for both onsite and offsite populations and that provides the necessary documentation and training required by DOE 5500.1B, DOE 5500.2A, and DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: See Concern TSA-4, EP.2-2

CONCERN: (TSA-2) (EP.2-1) (H2/C1) At Los Alamos National Laboratory, the emergency plans of the Design Engineering Division and Omega West Reactor do not consider site-specific emergency action levels as required by DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-2) (EP.2-2) (H2/C1) Emergency plan implementing procedures At Los Alamos National Laboratory TA-41 tritium facility and Design Engineering Division have not been developed as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-2) (EP.3-1) (H1/C1) The Design Engineering Division at Los Alamos National Laboratory has not provided sufficient emergency response team training for all members of the Division emergency response organization as required by DOE 5500.3A (and its predecessor DOE 5500.3).

4.5.2.8 Technical Support

CONCERN: (TSA-2) (TS.1-1) (H3/C2) Los Alamos National Laboratory does not have a program in place to provide a mechanism for promoting good practices or policies for sitewide use.

CONCERN: (TSA-2) (TS.1-2) (H3/C2) At Los Alamos National Laboratory, detailed written job descriptions are not provided for professional positions in the reactor and tritium facilities.

CONCERN: (TSA-2) (TS.2-1) (H2/C1) The tritium and reactor facilities at Los Alamos National Laboratory have not maintained current safety analysis reports and technical specifications or operational safety requirements as required by DOE 5480.5, DOE 5480.6, and DOE 5481.1B.

CONCERN: (TSA-2) (TS.2-2) (H2/C1) Safety analysis reports for facilities at Los Alamos National Laboratory are not receiving timely review by Department of Energy organizations to ensure that the requirements of DOE 5480.5, DOE 5480.6, and DOE 5481.1B are met.

CONCERN: See Concern TSA-4, TS.3-1.

CONCERN: See Concern TSA-4, TS.4-1.

CONCERN: (TSA-2) (TS.8-1) (H2/C1)
Contrary to the requirements of DOE 5480.5 and DOE 5480.6, fissile and combustible materials are stored in the Omega West Reactor vault at Los Alamos National Laboratory.

4.5.2.9 Packaging and Transportation

CONCERN: (TSA-2) (PT.1-1) (H2/C1)
Packaging and transportation activities at Los Alamos National Laboratory are fragmented and do not ensure consistency or compliance with DOE 5480.3.

CONCERN: (TSA-2) (PT.1-2) (H3/C1)
At Los Alamos National Laboratory, annual inventories of reusable shipping containers are not being performed by the tritium facilities, TA-18, or Omega West Reactor to anticipate present and future container needs as required by the HAZPACT Quality Assurance Manual.

CONCERN: (TSA-2) (PT.2-1) (H2/C1)
The Los Alamos National Laboratory has not established a packaging and transportation training program to meet DOE 5480.3, 49 CFR, or ASME NQA-1-1989.

CONCERN: (TSA-2) (PT.3-1) (H2/C1)
At Los Alamos National Laboratory, no independent quality assurance oversight of packaging and transportation activities is performed as required by DOE 5700.6B and ASME NQA-1-1989.

CONCERN: (TSA-2) (PT.4-1) H2/C1)
At Los Alamos National Laboratory hazardous waste material stored at the Tritium Salt Facility and TA-33 do not meet the storage and inspection requirements of 40 CFR.

CONCERN: (TSA-2) (PT.4-2) (H2/C1)
At Los Alamos National Laboratory, TA-41 Building W-4 does not have facility-specific procedures or a quality assurance program for use of the 89001 container as required by the Offsite Transportation Certificate issued by the Department of Energy.

CONCERN: (TSA-2) (PT.4-3) (H2/C1)
At Los Alamos National Laboratory, compressed gas cylinders stored at the Tritium Handling Facility in TA-33, do not meet storage and identification requirements of 40 CFR and DOE 5480.3.

CONCERN:
See Concern TSA-4, PT.6-1.

CONCERN: (TSA-2) (PT.6-1) (H2/C1)
A maintenance program has not been established at Los Alamos National Laboratory for reusable shipping containers as required by DOE 5480.3 and 49 CFR.

CONCERN: (TSA-2) (PT.10-1) (H2/C1)
Hazardous material shipment records at Los Alamos National Laboratory do not comply with 49 CFR and DOE 5480.3.

CONCERN: (TSA-2) (PT.11-1) H3/C1) No independent safety audits or appraisals of packaging and transportation are conducted at Los Alamos National Laboratory as required by DOE 5480.3, DOE 5482.1B, and DOE 5700.6B.

CONCERN: (TSA-2) (PT.11-2) (H3/C1) Los Alamos Area Office oversight of Los Alamos National Laboratory packaging and transportation activities does not meet the requirements of DOE 5482.1B and DOE 5700.6B for followup verification of corrective actions.

4.5.2.10 Security/Safety Interface

CONCERN: (TSA-2) (SS.1-1) (H2/C1) Protective force personnel at the tritium and reactor facilities at Los Alamos National Laboratory do not always follow post order requirements, which puts facility personnel at risk.

CONCERN: (TSA-2) (SS.4-1) (H2/C2) At the Los Alamos National Laboratory Tritium Systems Test Assembly and the Tritium Salt Facility, no formal system has been established to keep security post orders current with potential hazards nor has a feedback system been developed to inform facility management when security post orders are changed.

4.5.2.11 Experimental Activities

CONCERN: (TSA-2) (EA.2-1) (H2/C1) Contrary to the requirements of DOE 5480.6, the Reactor Safety Committee at Los Alamos National Laboratory does not always have an opportunity to review and recommend approval of experiments before they are run.

CONCERN: (TSA-2) (EA.2-2) (H2/C1) Los Alamos National Laboratory does not have an independent safety committee to review tritium experiments and operating procedures as required by DOE 5480.5.

CONCERN: (TSA-2) (EA.4-1) (H1/C1) At Los Alamos National Laboratory, Tritium experiments which use liquid nitrogen were conducted without risk analyses as required by DOE 5481.1B.

CONCERN: See Concern TSA-4, QV.4-1.

CONCERN: See Concern TSA-1, NP.2-1.

4.5.2.12 Site/Facility Safety Review

CONCERN: See Concern TSA-4, FR.1-1.

CONCERN: See Concern TSA-4, SS.2-1.

CONCERN: (TSA-2) (FR.2-1) (H2/C2) At the Los Alamos National Laboratory the effects of uneven floor settling on the safe operation of the critical assemblies in Kiva II of the Los Alamos Critical Experiments Facility has not been evaluated.

CONCERN: (TSA-2) (FR.2-2) (H1/C1) Los Alamos National Laboratory is not performing comprehensive safety evaluations of the operation of the Ion Beam Facility to ensure that good operating and as-low-as-reasonably-achievable practices are being applied as required by DOE 5481.1B.

CONCERN: (TSA-2) (FR.3-1) (H3/C1) The Los Alamos National Laboratory Reactor Safety Committee does not always comply with the requirements of its charter and DOE 5480.6.

CONCERN: (TSA-2) (FR.3-2) (H3/C1) The Environment, Safety, and Health Council is not approving or disapproving the recommendations of the Los Alamos National Laboratory Reactor Safety Committee.

CONCERN: (TSA-2) (FR.4-1) (H2/C1) Annual operating reviews of the tritium facilities at Los Alamos National Laboratory are not conducted using independent individuals with indepth technical competence as required by DOE 5480.5 and DOE 5482.1B.

CONCERN: See Concern TSA-4, FR.5-1.

CONCERN: (TSA-2) (FR.6-1) (H2/C1) Los Alamos National Laboratory has not established a program for the collection, evaluation, and dissemination of operating experiences to the tritium and reactor and facility staff.

CONCERN: (TSA-2) (FR.6-2) (H2/C2) Los Alamos National Laboratory has not established a comprehensive program to track and review age-related phenomena and degradation for the tritium and reactor facilities.

CONCERN: See Concern TSA-1, RP.11-1.

4.5.2.13 Radiological Protection

CONCERN: (TSA-2) (RP.1-1) (H2/C1) Los Alamos National Laboratory radiation protection technicians have not been trained to meet minimum requirements specified in DOE 5480.11.

CONCERN: (TSA-2) (RP.1-2) (H2/C1) Management at Los Alamos National Laboratory has not implemented a high-quality radiation protection program as required by SEN-6D-91 and DOE 5480.1B.

CONCERN: (TSA-2) (RP.1-3) (H2/C2) Los Alamos National Laboratory has not defined the responsibilities and authorities of safety and radiation protection officers and their relationship with the Health and Safety Division.

CONCERN: See Concern TSA-4, RP.2-2.

CONCERN: (TSA-2) (RP.2-1) (H3/C2)
The internal audit system at Los Alamos National Laboratory does not include all elements of the Radiation Protection Program to ensure prompt action.

CONCERN:
See Concern TSA-4, RP.3-1.

CONCERN: (TSA-2) (RP.3-1) (H2/C1)
The contamination control policy at Los Alamos National Laboratory tritium facilities does not cover all required elements, does not meet the requirements of DOE 5480.11 for control, does not provide positive control of personnel in contaminated areas, and is not rigorously enforced.

CONCERN: (TSA-2) (RP.4-1) (H1/C1)
The Los Alamos National Laboratory x-ray safety program does not provide the level of protection required by DOE 5480.11 for potentially high levels of radiation.

CONCERN: (TSA-2) (RP.5-1) (H3/C2)
A documented basis has not been provided for choosing the processing frequency of or need for external dosimetry for personnel in the tritium facilities at Los Alamos National Laboratory.

CONCERN: (TSA-2) (RP.5-2) (H2/C2)
A method to use Personnel Nuclear Accident Dosimeters for quickly identifying personnel who are exposed has not been developed at the Los Alamos National Laboratory.

CONCERN: (TSA-2) (RP.6-1) (H2/C2)
Los Alamos National Laboratory cannot demonstrate that engineering controls in tritium facilities will minimize internal tritium exposure.

CONCERN: (TSA-2) (RP.6-2) (H2/C1)
The internal contamination control program at Los Alamos National Laboratory relies primarily on administrative controls to maintain tritium exposures as low as reasonably achievable instead of obtaining quantitative data from airborne, surface, and bioassay samples results.

CONCERN: (TSA-2) (RP.6-3) (H1/C1) CAT. II
At Los Alamos National Laboratory, the contamination control program at the Ion Beam Facility does not provide necessary protection for radiation workers against internal tritium exposure as required by DOE 5480.11.

CONCERN: (TSA-2) (RP-7-1) (H2/C1)
DOE 5480.11 requirements for tritium internal dosimetry are not uniformly applied throughout all buildings at Los Alamos National Laboratory and are not defined by internal dosimetrists in all cases.

CONCERN:
See Concern TSA-4, RP.7-2.

CONCERN:
See Concern TSA-2, RP.6-2.

CONCERN: (TSA-2) (RP.8-1) (H1/C1) CAT. II — Los Alamos National Laboratory does not have the capability to calibrate and test the Eberline RMS-II to determine whether instrument performance meets the requirements for a high-range instrument used for emergency warning and evacuation by workers.

CONCERN: (TSA-2) (RP.8-2) (H1/C1) — Los Alamos National Laboratory does not use available resources to calibrate and test portable high dose equivalent rate instruments to determine proper instrument performance as required by ANSI N323.

CONCERN: (TSA-2) (RP.8-3) (H2/C1) — Radiation protection instruments at Los Alamos National Laboratory are not being returned for calibration and maintenance as required by ANSI N323 and Health Physics Measurements Group procedures.

CONCERN: (TSA-2) (RP.8-4) (H2/C1) — Operations management purchases radiation protection instruments without review, approval, testing, and calibration by the Health Physics Measurements Group as required by Los Alamos National Laboratory AR 3-1.

CONCERN: (TSA-2) (RP.8-5) (H2/C1) — Calibration, maintenance, and periodic source checks of fixed and portable radiation protection instruments at Los Alamos National Laboratory do not meet ANSI N323 requirements.

CONCERN: (TSA-2) (RP.9-1) (H2/C1) — The Los Alamos National Laboratory air-sampling and monitoring program does not meet the requirements contained in DOE 5480.11, ANSI N13.1, and ANSI N323.

CONCERN: — See Concern TSA-4, RP.10-1.

CONCERN: (TSA-2) (RP.10-1) (H2/C1) — Alarm signals from critical building radiation monitoring instrumentation at Los Alamos National Laboratory are not routed to a continuously staffed central location as required in DOE 6430.1A.

CONCERN: — See Concern TSA-1, RP.12-1.

4.5.2.14 Personnel Protection

CONCERN: (TSA-2) (PP.1-1) (H2/C2) — Los Alamos National Laboratory does not establish, implement, and enforce safety performance goals.

CONCERN: — See Concerns TSA-4, PP.2-1, and TSA-4, PP.2-6.

CONCERN: — See Concern TSA-4, PP.3-1.

CONCERN: (TSA-2) (PP.4-1) (H3/C1) — Los Alamos National Laboratory is not recording injuries and illnesses as required by 29 CFR 1904.

CONCERN: See Concern TSA-1, PP.4-1.

CONCERN: See Concerns TSA-4, WS.5-1, and TSA-4, WS.5-2.

CONCERN: See Concern TSA-4, WS.3-1.

4.5.2.15 Worker Safety and Health (OSHA) Compliance

CONCERN: See Concern TSA-4, PP.6-4.

CONCERN: See Concern TSA-4, WS.3-1.

CONCERN: See Concern TSA-4, WS.3-2.

CONCERN: See Concern TSA-4, WS.4-1.

CONCERN: See Concern TSA-3, WS.4-1.

CONCERN: See Concern TSA-4, WS.4-2.

CONCERN: See Concern TSA-4, FP.2-3.

CONCERN (TSA-2) (WS.4-5) (H1/C1): Tritium and reactor facilities at Los Alamos National Laboratories are not in compliance with 29 CFR 1910, Subpart N, Material Handling and Storage, for appropriately identifying load ratings and inspections of hoist and rigging equipment.

CONCERN (TSA-2) (WS.4-6) (H2/C1): Tritium and reactor facilities at Los Alamos National Laboratory do not comply with 29 CFR 1910, Subpart H, Hazardous Materials, for storage, labeling, and securing of compressed gas cylinders.

CONCERN: See Concern TSA-4, WS.4-3.

CONCERN: See Concern TSA-4, PP.2-2.

CONCERN: See Concern TSA-3, WS.4-4.

4.5.2.16 Fire Protection

CONCERN: See Concern TSA-4, FP.2.1.

CONCERN (TSA-2) (FP.3-1) (H2/C1): Fire hazard analyses for the tritium and reactor facilities and TA-18 buildings at Los Alamos National Laboratory are not performed in accordance with DOE 6430.1A.

CONCERN (TSA-2) (FP.4-1) (H2/C1): Contrary to DOE 5480.7, some tritium and reactor facilities support facilities at Los Alamos National Laboratory have no fire suppression systems, early warning smoke detection systems, fire hydrants, or fire-rated barriers to prevent curtailment of operations for periods of 3 months or more.

CONCERN: (TSA-2) (FP.5-1) (H2/C1) Some tritium and reactor facilities have no fire suppression systems, early warning smoke detection systems, early warning smoke detection systems, and fire-rated barriers to prevent a critical fire loss of $1,000,000 or more as required by DOE 5480.7.

CONCERN: (TSA-2) (FP.7-1) (H1/C1) Some fire protection suppression systems have not been provided in the tritium facilities and reactor support facilities in TA-18 at Los Alamos National Laboratory; others systems already installed do not meet the requirements of DOE 5480.7.

CONCERN: (TSA-2) (FP.7-2) (H2/C1) Los Alamos National Laboratory has not requested fire protection exemptions from the Albuquerque Field Office in accordance with DOE 5480.4.

CONCERN: (TSA-2) (FP.7-3) (H1/C1) Combustibles at Los Alamos National Laboratory are not being stored in accordance with DOE 5480.7.

4.5.2.17 Medical Services

CONCERN: (TSA-2) (MS.1-1) (H1/C1) Los Alamos National Laboratory management has not implemented an occupational medical program or its support systems of sufficient depth and scope to comply with DOE 5480.8.

CONCERN: (TSA-2) (MS.1-2) (H2/C1) At the Los Alamos National Laboratory, appropriate arrangements and agreements with offsite providers of medical support are not complete as required in DOE 5500.3A.

CONCERN: (TSA-2) (MS.1-3) (H1/C1) Medical personnel at Los Alamos National Laboratory are not fully trained, and the training program is not documented in accordance with 29 CFR 1910.120.

CONCERN: (TSA-2) (MS.2-1) (H2/C1) Procedures to ensure the uniformity and adequacy of medical services at Los Alamos National Laboratory are not accurate or complete as required by DOE 5500.7.

CONCERN: (TSA-2) (MS.2-2) (H3/C2) Systems are not in place at Los Alamos National Laboratory to ensure compliance with procedures and effective preventive actions.

CONCERN: (TSA-2) (MS.2-3) (H2/C1) Narcotics at Los Alamos National Laboratory are not protected as required by 21 CFR 1301.71 and 21 CFR 1301.75.

CONCERN: (TSA-2) (MS.3-1) (H2/C1)	At Los Alamos National Laboratory, the medical services needed for support facility and site operations are not formally identified.
CONCERN: (TSA-2) (MS.3-2) (H2/C1)	At Los Alamos National Laboratory, the full compliment of medical staff needed to support the site and facility is not available as required by DOE 5480.8.
CONCERN: (TSA-2) (MS.3-3) (H1/C1)	The medical facility at Los Alamos National Laboratory cannot support patient care and does not meet the requirements of DOE 5480.8.
CONCERN: (TSA-2) (MS.3-4) (H2/C1)	At Los Alamos National Laboratory, the medical screening and testing to ensure that the health of new and continuing employees is adequately monitored does not extend to all employees and is not in accordance with DOE 5480.8 and DOE 5500.3A.
CONCERN: (TSA-2) (MS.3-5) (H2/C1)	At Los Alamos National Laboratory, existing systems do not ensure that all required special medical assessments are performed for medical hazards associated with work in accordance with 29 CFR 1910.
CONCERN: (TSA-2) (MS.3-6) (H1/C1)	Los Alamos National Laboratory has not ensured quality medical advice and care in the event of an emergency as required by DOE 5500.3A.
CONCERN: (TSA-2) (MS.4-1) (H2/C1)	The Los Alamos Area Office do not have oversight mechanisms in place for the adequate control of occupational medicine at Los Alamos National Laboratory.
CONCERN: (TSA-2) (MS.4-2) (H3/C1)	A system is not in place at Los Alamos National Laboratory to ensure that medical policies are reviewed when there are changes in site hazards as required by DOE 5480.8.
CONCERN: (TSA-2) (MS.4-3) (H2/C1)	Medical personnel activities at Los Alamos National Laboratory are not adequately audited or documented as required by DOE 5500.3A.
CONCERN: (TSA-2) (MS.5-1) (H3/C1)	Employees are not informed of their right to access and copy medical records and records of exposure as required by the Privacy Act of 1974 and 29 CFR 1910.20.

4.8 CATEGORIZATION AND TABULATION OF CONCERNS

4.8.3 Accelerators

4.8.3.1 Categorization of Concerns

Concern Number	Potential Hazard Level	Compliance Level
OA.1-1	2	1
OA.1-2	2	1
OA.2-1	2	1
OA.2-2	2	1
OA.2-3	2	1
OA.5-1	2	2
OA.6-1	3	2
QV.1-1	2	1
QV.1-2	3	2
QV.2-1	2	1
QV.3-1	2	1
QV.5-1	2	1
QV.5-2	2	1
QV.5-3	2	2
QV.6-1	2	1
QV.7-1	2	1
OP.1-1	2	2
OP.1-2	2	1
OP.2-1	1	1
OP.2-2	2	1
OP.2-3	2	1
OP.4-1	1	1
MA.2-1	3	2
MA.2-2	2	2
MA.3-1	2	2

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
MA.3-2	2	2
MA.5-1	2	2
MA.8-1	3	1
TC.1-1	2	2
TC.1-2	2	2
TC.4-1**	1	1
TC.4-2	2	2
TC.10-1	3	2
AX.1-1	2	1
AX.1-2	2	2
AX.1-3	2	2
AX.1-4	2	2
AX.1-5	2	2
AX.2-1	1	1
AX.2-2	2	2
AX.3-1	2	1
AX.5-1	2	2
AX.5-2	1	2
AX.6-1	2	2
AX.7-1	3	2
EP.1-1	2	1
EP.2-1	2	1
EP.3-1	2	1
TS.1-1	3	2
TS.1-2	2	2
TS.2-1	2	1
TS.2-2	1	1
TS.3-1	2	1
TS.5-1	2	1
TS.5-2	2	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
PT.1-1	2	1
PT.1-2	2	1
PT.2-1	2	1
PT.3-1	2	1
PT.4-1	2	1
PT.6-1	2	2
PT.8-1	2	2
PT.11-1	3	1
SS.2-1	3	2
SS.2-2	1	1
EA.1-1	2	2
EA.2-1	2	1
EA.3-1	2	2
EA.4-1	2	2
FR.6-1	2	2
RP.1-1	2	1
RP.1-2	1	1
RP.3-1**	1	1
RP.3-2	1	1
RP.4-1	2	1
RP.4-2	1	1
RP.4-3	2	1
RP.4-4	1	1
RP.6-1	2	2
RP.8-1	2	1
RP.10-1	2	1
RP.10-2	2	1
RP.10-3	2	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
RP.11-1	2	1
RP.12-1	3	1
PP.1-1	2	1
PP.1-2	2	1
PP.2-1	1	1
PP.4-1	2	1
PP.4-2	2	1
PP.4-3	3	1
PP.6-1	2	1
PP.6-2	1	2
PP.6-3	1	1
PP.6-4	1	1
PP.6-5	1	1
PP.6-6	1	1
PP.6-7	2	1
WS.3-1**	1	1
WS.4-1**	1	1
WS.4-2	1	1
WS.4-3	1	1
WS.4-4	1	1
FP.1-1**	1	1
FP.1-2	1	2
FP.2-1**	1	1
FP.3-1	1	1
FP.4-1	1	1
FP.5-1	1	1
FP.5-2	1	1
FP.5-3	1	1
FP.7-1	1	1

* Designates a Category I Concern
** Designates a Category II Concern

4.8.3.2 Tabulation of Concerns

4.5.3.1 Organization and Administration

CONCERN: (TSA-3) (OA.1-1) (H2/C1) The Los Alamos National Laboratory top management has not provided all necessary guidance and oversight to the accelerator organizations for many activities mandated by the Department of Energy.

CONCERN: (TSA-3) (OA.1-2) (H2/C1) The Albuquerque Field Office has not provided all necessary guidance or oversight to the Los Alamos Area Office and the Los Alamos National Laboratory accelerator organizations for many activities mandated by the Department of Energy.

CONCERN: (TSA-3) (OA.2-1) (H2/C1) At the Los Alamos National Laboratory, approved administrative controls (safety analyses, operational safety requirements, or their equivalents) are not available for all accelerator facilities or operations as required by AL 5481.1B.

CONCERN: (TSA-3) (OA.2-2) (H2/C1) The occurrence reporting system for incidents at the Los Alamos National Laboratory is inconsistent at some facilities and incomplete at others in that less serious incidents are not always reported and investigated as required by DOE 5000.3A and DOE 5480.19.

CONCERN: (TSA-3) (OA.2-3) (H2/C1) The Los Alamos National Laboratory management has not provided the necessary guidance and oversight to the accelerator organizations to ensure proper procedural controls.

CONCERN: See Concern TSA-4, OA. 3-1.

CONCERN: (TSA-3) (OA.5-1) (H2/C2) No Los Alamos National Laboratory guidance has been provided to define requirements for environmental, safety, and health assessment by accelerator organization management.

CONCERN: (TSA-3) (OA.6-1) (H3/C2) The Los Alamos National Laboratory has no career development programs to ensure continuity of professional and managerial excellence.

CONCERN: See Concern TSA-4, OA.7-1.

4.5.3.2 Quality Verification

CONCERN: See Concern TSA-4, QV.1-3.

CONCERN: See Concern TSA-4, QV.1-4.

CONCERN: (TSA-3) (QV.1-1) (H2/C1)	Los Alamos National Laboratory has not developed and implemented an effective quality assurance program, has not ensured that accelerator organizations have developed and implemented quality assurance programs, and does not perform oversight of accelerator organizations quality assurance activities as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.
CONCERN: (TSA-3) (QV.1-2) (H3/C2)	The organizations responsible for accelerator operations do not have trained quality assurance professionals to ensure that quality assurance plans are developed and implemented as required by the Los Alamos National Laboratory Quality Program Plan, dated March 29, 1989.
CONCERN: (TSA-3) (QV.2-1) (H2/C1)	Formal procedures for procurement and supplier control have not been developed, implemented, and assessed by Los Alamos National Laboratory accelerator organizations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Sections 4 and 7.
CONCERN: (TSA-3) (QV.3-1) (H2/C1)	Formal procedures for receiving and pre-installation inspections have not been developed and implemented by most Los Alamos National Laboratory organizations responsible for accelerator operations as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 8.
CONCERN:	See Concern TSA-4, QV.4-1.
CONCERN: (TSA-3) (QV.5-1) (H2/C1)	Items and hardware are generally not identified and controlled by Los Alamos National Laboratory accelerator organizations to indicate status, maintain quality, and prevent inappropriate use as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 8.
CONCERN: (TSA-3) (QV.5-2) (H2/C1)	Procedures have not been developed and implemented to identify and control nonconforming items for Los Alamos National Laboratory accelerator facilities as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 15.
CONCERN: (TSA-3) (QV.5-3) (H2/C2)	Accelerator organizations have not taken appropriate action in response to the March 4, 1991, memorandum on substandard and counterfeit fasteners that was issued by the Quality Operations Office of the Los Alamos National Laboratory.
CONCERN: (TSA-3) (QV.6-1) (H2/C1)	At the Los Alamos National Laboratory, accelerator organizations have not developed and implemented inspection procedures as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 10.
CONCERN: (TSA-3) (QV.7-1) (H2/C1)	At the Los Alamos National Laboratory, most accelerator organizations have not developed and implemented formal procedures to control special processes as required by DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, Section 9.

4.5.3.3 Operations

CONCERN: (TSA-3) (OP.1-1) (H2/C2) At the Los Alamos National Laboratory, failure to coordinate the interfaces between organizations responsible for operating all components of the Clinton P. Anderson Meson Physics Facility; the Manuel Lujan, Jr., Neutron Scattering Center; and the Weapons Neutron Research Facility adversely affects safe operation of these facilities.

CONCERN: (TSA-3) (OP.1-2) (H2/C1) At the Los Alamos National Laboratory, the separation of responsibilities for the operation of portable linear accelerators--including survey access control and posting--has diminished the responsibility of the line organization for maintaining safe operations as required by DOE 5480.19.

CONCERN: (TSA-3) (OP.2-1) (H1/C1) Los Alamos National Laboratory has not implemented policies for the design, installation, testing, and operation of barriers; moreover, accelerator operations do not ensure that the dose limits of DOE 5480.11 and ANSI N 43.1 are met.

CONCERN: (TSA-3) (OP.2-2) (H2/C1) Operations at accelerators at the Los Alamos National Laboratory are not conducted in accordance with the requirements of DOE 5480.19.

CONCERN: (TSA-3) (OP.2-3) (H2/C1) At the Los Alamos National Laboratory, the response to off-normal conditions at the Ion Beam Facility is not conducted in accordance with DOE 5480.19.

CONCERN: See Concern TSA-1, OP.3-2.

CONCERN: See Concern TSA-4, OP.4-1.

CONCERN: (TSA-3) (OP.4-1) (H1/C1) At the Los Alamos National Laboratory, continuous radiation monitoring systems, for which appropriate monitoring equipment is readily available, are not designed or installed at accelerators in accordance with ANSI N43.1.

CONCERN: See Concern TSA-2, RP.8-5.

4.5.3.4 Maintenance

CONCERN: See Concern TSA-4, MA.1-1.

CONCERN: See Concern TSA-4, MA.2-1.

CONCERN: (TSA-3) (MA.2-1) (H3/C2) At the Los Alamos National Laboratory, facility and industry experiences are not being readily distributed to maintenance personnel at accelerator facilities in a lessons-learned program format as defined in DOE 4330.4A, Chapter 1, Section 3.7.7.

CONCERN: See Concern TSA-4, PP.2-2.

CONCERN: (TSA-3) (MA.2-2) (H2/C2) Welders who have not been trained and certified are performing work on programmatic (Class B) equipment for accelerator facilities at Los Alamos National Laboratory.

CONCERN: See Concern TSA-4, MA.3-2.

CONCERN: (TSA-3) (MA.3-1) (H2/C2) At the Los Alamos National Laboratory, no formal program exists at the accelerator facilities for calibration activities as defined in DOE 4330.4A, Chapter I, Section 3.5.4, and "Albuquerque Operations Office Guidance for Maintenance Management Program," Chapter I, Section 4.5.6, dated December 12, 1990.

CONCERN: (TSA-3) (MA.3-2) (H2/C2) The Los Alamos National Laboratory Calibration Program, conducted by the Standards and Calibration Laboratory, does not have an internal audit program as defined by DOE 4330.4A, Chapter I, Section 3.5.4, and "Albuquerque Operations Office Guidance for Maintenance Management Program," Chapter I, Section 4.5.6, dated December 12, 1990.

CONCERN: See Concern TSA-4, MA.4-1.

CONCERN: (TSA-3) (MA.5-1) (H2/C2) At the Los Alamos National Laboratory, responsibilities of building managers at accelerator facilities are not clearly defined as described in DOE 4330.4A, Chapter I, Section 3.7.4, and "Albuquerque Operations Office Guideline for Maintenance Management Program," Chapter I, Section 4.6.3, dated December 12, 1990.

CONCERN: See Concern TSA-4, MA.6-1.

CONCERN: See Concern TSA-4, MA.7-1.

CONCERN: (TSA-3) (MA.8-1) (H3/C1) Los Alamos National Laboratory has not established requirements to record maintenance activities at accelerators as defined by DOE 4330.4A, Chapter I, Section 3.4.9, and has not established a centralized records retention program that meets the applicable requirements of DOE 1324.2A.

4.5.3.5 Training and Certification

CONCERN: (TSA-3) (TC.1-1) (H2/C2) The Los Alamos National Laboratory accelerator organizations have not established training and qualification/certification requirements that are based on assigned job tasks for each work classification.

CONCERN: See Concern TSA-4, TC.1-2.

CONCERN: (TSA-3) (TC.1-2) (H2/C2) The organizational structure and training system at Los Alamos National Laboratory, including responsibilities and authorities of personnel involved in managing, supervising, and implementing training, is neither well defined nor well understood by personnel in accelerator organizations.

CONCERN: (TSA-3) (TC.4-1) (H1/C1) CAT. II
Accelerator facility personnel at Los Alamos National Laboratory have not received the initial and continuing safety training, including that required by DOE 5480.4 and DOE 5480.11.

CONCERN: (TSA-3) (TC.4-2) (H2/C2)
The Los Alamos Area Office has not enforced requirements to develop, conduct, or evaluate training for accelerator facilities at Los Alamos National Laboratory.

CONCERN: (TSA-3) (TC.10-1) (H3/C2)
At the Los Alamos National Laboratory, some programs for initial and continuing training for supervisors, managers, and technical staff at accelerator facilities have not been established.

4.5.3.6 Auxiliary Systems

CONCERN: (TSA-3) (AX.1-1) (H2/C1)
Auxiliary system descriptions for accelerators at the Los Alamos National Laboratory are not addressed in existing or proposed safety assessments or safety analysis reports as required by AL 5481.1B.

CONCERN: (TSA-3) (AX.1-2) (H2/C2)
Updated drawings and other formal documentation for accelerators at Los Alamos National Laboratory are not always available.

CONCERN: (TSA-3) (AX.1-3) (H2/C2)
Procedures are not provided for accelerator facilities at Los Alamos National Laboratory to assure that off-normal conditions in an auxiliary system will be detected or that compensatory actions will be taken.

CONCERN: (TSA-3) (AX.1-4) (H2/C2)
Auxiliary systems for most accelerators at Los Alamos National Laboratory are not being maintained to assure that they will perform their intended functions.

CONCERN: (TSA-3) (AX.1-5) (H2/C2)
Formal trending programs for auxiliary systems at Los Alamos National Laboratory are not in place at accelerator facilities.

CONCERN: (TSA-3) (AX.2-1) (H1/C1)
Accelerator facilities at Los Alamos National Laboratory do not measure and record data continuously and do not monitor all effluent pathways in accordance with DOE 5400.1 and ANSI N42.18-1974.

CONCERN: (TSA-3) (AX.2-2) (H2/C2)
The evidence does not indicate that engineered features are being used to minimize releases at Los Alamos National Laboratory.

CONCERN: (TSA-3) (AX.3-1) (H2/C1) An As-Low-As-Reasonably-Achievable Program addressing radioactive solid wastes has not been formally and fully developed at Los Alamos National Laboratory as required by DOE 5820.2A.

CONCERN: (TSA-3) (AX.5-1) (H2/C2) A formal system status control program is not in place for ventilation systems at Los Alamos National Laboratory accelerator facilities.

CONCERN: (TSA-3) (AX.5-2) (H1/C2) Los Alamos National Laboratory cannot assure that ventilation systems will provide airflow from clean to less-clean areas at accelerators.

CONCERN: (TSA-3) (AX.6-1) (H2/C2) A formalized program has not been established for training, operation, or surveillance required to maintain auxiliary power supply equipment for the Ion Beam Facility at Los Alamos National Laboratory.

CONCERN: (TSA-3) (AX.7-1) (H3/C2) A formal configuration control program is not in place for auxiliary heat removal systems at Los Alamos National Laboratory.

CONCERN: See Concern TSA-4, QV.4-1.

4.5.3.7 Emergency Preparedness

CONCERN: (TSA-3) (EP.1-1) (H2/C1) Emergency preparedness programs for the Clinton P. Anderson Meson Physics Facility and the Ion Beam Facility at Los Alamos National Laboratory do not provide the documentation and training capabilities required to ensure protection for both onsite and offsite populations during emergencies in accordance with the requirements of DOE 5500.1B, DOE 5500.2B, and with DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: See Concern TSA-4, EP.2-2.

CONCERN: (TSA-3) (EP.2-1) (H2/C1) The Clinton P. Anderson Meson Physics Facility and the Ion Beam Facility at Los Alamos National Laboratory have not developed emergency plan implementing procedures as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-3) (EP.3-1) (H2/C1) The Clinton P. Anderson Meson Physics Facility and the Ion Beam Facility at Los Alamos National Laboratory have not implemented training programs and activities to meet the requirements of DOE 5500.3A (and its predecessor DOE 5500.3); furthermore, management and support personnel at these facilities have not been trained in emergency management requirements and responsibilities outlined in the DOE 5500 series of Orders.

4.5.3.8 Technical Support

CONCERN: (TSA-3) (TS.1-1) (H3/C2)
At the Los Alamos National Laboratory, the selection, qualifications, experience, functional responsibilities, and staffing requirements for technical support are not clearly defined and are not being implemented for the accelerator facilities in accordance with DOE 5480.20 and ANSI 3.1.

CONCERN: (TSA-3) (TS.1-2) (H2/C2)
At the Los Alamos National Laboratory, no formal training programs exist within the accelerator divisions and facilities that meet technical support training program guidelines described in DOE 5480.20.

CONCERN: (TSA-3) (TS.2-1) (H2/C1)
Safety assessments and safety analysis reports have not been completed for most of the Los Alamos National Laboratory accelerator facilities, and those completed do not meet the requirements of AL 5481.1B and DOE 5481.1B.

CONCERN:
See Concern TSA-4, TS.2-2.

CONCERN: (TSA-3) (TS.2-2) (H1/C1)
At the Los Alamos National Laboratory, safety review programs and controls are not in place at the Manual Lujan, Jr., Neutron Scattering Center and the Weapons Neutron Research Facility to ensure that facility operations are properly evaluated as required in DOE 5482.1B, DOE 5480.4, and DOE 5481.1B.

CONCERN:
See Concern TSA-4, TS.3-2.

CONCERN:
See Concern TSA-4, TS.3-3.

CONCERN: (TSA-3) (TS.3-1) (H2/C1)
Several of the accelerator facilities that use computer software programs for diagnostics and control functions have not demonstrated compliance with DOE 1330.1C, the Los Alamos National Laboratory Quality Assurance Program, ASME NQA-1-1989, and ASME NQA-2 for software management validation and verification.

CONCERN:
See Concern TSA-4, TS.4-1.

CONCERN: (TSA.3) (TS.5-1) (H2/C1)
At the Los Alamos National Laboratory, no documented basis has been provided to demonstrate that several accelerator facilities are being monitored for effluents in accordance with DOE 5480.11, 40 CFR 61, and ANSI N13.1.

CONCERN: (TSA.3) (TS.5-2) (H2/C1)
At the Los Alamos National Laboratory, the Health Physics Operations Group, which provides effluent measurement support to the accelerator facilities, does not participate in the Department of Energy Laboratory Quality Assurance interlaboratory comparison program as required by DOE 5400.1, Chapter IV, Section 10.c.

4.5.3.9 Packaging and Transportation

CONCERN: (TSA-3) (PT.1-1) (H2/C1)
The overall management system for accelerator facilities at Los Alamos National Laboratory does not provide control over packaging and transportation activities as required by DOE 5480.3.

CONCERN: (TSA-3) (PT.1-2) (H2/C1)
At the Los Alamos National Laboratory, independent safety oversight has not been provided for packaging and transportation activities in accelerator areas as required by DOE 5480.1B and DOE 5482.1B.

CONCERN: (TSA-3) (PT.2-1) (H2/C1)
At the Los Alamos National Laboratory, formal training and qualification programs are not in place in the accelerator areas for packaging and transportation employees to perform their duties as required by DOE 5480.3 and by 49 CFR 100-199 and 391-396.

CONCERN: (TSA-3) (PT.3-1) (H2/C1)
At the Los Alamos National Laboratory, quality assurance programs for packaging and transportation in the accelerator areas did not meet the requirements of DOE 5700.6B and will not meet those of DOE 5700.6C.

CONCERN: (TSA-3) (PT.4-1) (H2/C1)
At the Los Alamos National Laboratory, a system has not been developed to ensure that all hazardous wastes in the accelerator areas are packaged and transported in accordance with Federal and State regulations as required by DOE 5480.3.

CONCERN: (TSA-3) (PT.6-1) (H2/C2)
At the Los Alamos National Laboratory, operating procedures for the packaging and transportation of hazardous materials and of radioactive and mixed wastes are not properly implemented and controlled in the accelerator areas.

CONCERN: (TSA-3) (PT.8-1) (H2/C2)
At the Los Alamos National Laboratory, onsite transportation of hazardous materials for accelerator areas is not formally documented in standards and procedures.

CONCERN: (TSA-3) (PT.11-1) (H3/C1)
Independent safety appraisals have not been performed by the Los Alamos National Laboratory organization responsible for accelerators as required by DOE 5480.3.

4.5.3.10 Security/Safety Interface

CONCERN: (TSA-3) (SS.2-1) (H3/C2)
At the Los Alamos National Laboratory, the Station Orders for the guard stations controlling entry to the Accelerator Technology Division security zone in TA-53 do not accurately reflect current practices.

CONCERN:
See Concern TSA-4, SS.2-1.

CONCERN: (TSA-3) (SS.2-2) (H1/C1) At the Los Alamos National Laboratory, emergency evacuation routes required for special conditions for the Accelerator Technology Division security zone in TA-53 have not been posted as required by 29 CFR 1910.34.

CONCERN: See Concern TSA-4, SS.4-2.

4.5.3.11 Experimental Activities

CONCERN: (TSA-3) (EA.1-1) (H2/C2) Los Alamos National Laboratory has not implemented a management system for accelerator facilities that defines the relationship between operations personnel and experimenters and ensures safe operation of the facilities.

CONCERN: (TSA-3) (EA.2-1) (H2/C1) Los Alamos National Laboratory has no policy or procedures that define those accelerator experiments that are subject to the independent safety review required by DOE 5482.1B, and independent safety review systems have not been established.

CONCERN: (TSA-3) (EA.3-1) (H2/C2) Los Alamos National Laboratory has no policy or procedures that use risk-based criteria to establish the formality and content of proposals for experimental activities at accelerators.

CONCERN: (TSA-3) (EA.4-1) (H2/C2) At the Los Alamos National laboratory, an effective control system is not in place to ensure that all experimental activities at accelerators are evaluated for safety concerns.

4.5.3.12 Site/Facility Safety Review

CONCERN: See Concern TSA-4, FR.1-1.

CONCERN: See Concern TSA-4, FR.1-2.

CONCERN: See Concern TSA-4, FR.4-2.

CONCERN: See Concern TSA-4, FR.5-1.

CONCERN: (TSA-3) (FR.6-1) (H2/C2) Los Alamos National Laboratory accelerator organizations have not implemented a formal program to collect, evaluate, or disseminate safety-related operating experience to accelerator personnel.

4.5.3.13 Radiological Protection

CONCERN: See Concern TSA-2, RP.1-2.

CONCERN: (TSA-3) (RP.1-1) (H2/C1) Training of radiation protection technicians and radiation workers at facilities with radiation-producing devices does not meet the requirements of DOE 5480.11 and Los Alamos National Laboratory AR 3-1.

CONCERN: (TSA-3) (RP.1-2) (H1/C1)	Qualified expert reviews of accelerator and shielding design, required by ANSI N43.1, did not correct shielding deficiencies in the design of some accelerator facilities at the Los Alamos National Laboratory.
CONCERN:	See Concern TSA-4, RP.1-1.
CONCERN: (TSA-3) (RP.3-1) (H1/C1) CAT. II	The design, installation, maintenance, and testing of accelerator interlock and warning systems at the Los Alamos National Laboratory do not meet the requirements of ANSI N43.1.
CONCERN: (TSA-3) (RP.3-2) (H1/C1)	Contrary to the requirements of ANSI N43.1, not all accelerator facilities at the Los Alamos National Laboratory have been provided with barriers that restrain access to areas where dose limits could be exceeded.
CONCERN:	See Concern TSA-1, RP.3-2.
CONCERN:	See Concern TSA-4, RP.3-1.
CONCERN: (TSA-3) (RP.4-1) (H2/C1)	Work at the Ion Beam Materials Laboratory and with depleted uranium components at the Los Alamos National Laboratory has not been evaluated to ensure compliance with the external exposure control and dosimetry requirements of DOE 5480.11.
CONCERN: (TSA-3) (RP.4-2) (H1/C1)	The Health and Safety Division staff at the Los Alamos National Laboratory is too small to provide sitewide oversight and to conduct periodic surveys and inspections for radiation-producing devices and sources as required by DOE 5480.4, ANSI N543, and ANSI N43.1.
CONCERN: (TSA-3) (RP.4-3) (H2/C1)	Definitions for x-ray generating devices in Los Alamos National Laboratory AR 3-3 do not conform with existing standards, and many x-ray installations do not fully comply with ANSI N543 and ANSI N43.2.
CONCERN: (TSA-3) (RP.4-4) (H1/C1)	Not all x-ray installations at the Los Alamos National Laboratory include access control and warning devices required by ANSI N43.2 and ANSI N543.
CONCERN: (TSA-3) (RP.6-1) (H2/C2)	The testing program for high-efficiency particulate air filters at the Los Alamos National Laboratory does not include periodic testing and replacement of filters on contaminated vacuum cleaners and pumps used at accelerator facilities, nor does it ensure that the filters are certified by an approved Department of Energy facility before installation.
CONCERN:	See Concern TSA-2, RP.8-5.

CONCERN: (TSA-3) (RP.8-1) (H2/C1)
Procedures and training to control the use of portable health physics survey instruments by line personnel are not in place at some Los Alamos National Laboratory accelerator facilities to ensure that the monitoring requirements of DOE 5480.11 and DOE 5400.5 are met.

CONCERN: (TSA-3) (RP.10-1) (H2/C1)
Personnel monitoring and contamination control at the Clinton P. Anderson Meson Physics Facility at the Los Alamos National Laboratory are not always conducted in accordance with the requirements of DOE 5480.11.

CONCERN: (TSA-3) (RP.10-2) (H2/C1)
Los Alamos National Laboratory does not have a program to ensure that the unrestricted release of potentially volume-contaminated material from accelerator facilities is conducted in accordance with the requirements of DOE 5400.5.

CONCERN: (TSA-3) (RP.10-3) (H2/C1)
Prestartup and routine surveys at some Los Alamos National Laboratory accelerators are not performed in accordance with the requirements of ANSI 43.1.

CONCERN: (TSA-3) (RP.11-1) (H2/C1)
As-Low-As-Reasonably-Achievable Programs at facilities with accelerators and radiation-producing devices are not implemented in accordance with the requirements of the Environment, Safety, and Health Manual and lack the formality and coordination of effort necessary to meet the requirements of the DOE 5480.11 Implementation Plan at Los Alamos National Laboratory.

CONCERN: (TSA-3) (RP.12-1) (H3/C1)
Results of safety-related interlock and personal protection system tests for accelerators at Los Alamos National Laboratory are not maintained in accordance with the requirements of DOE 1324.2A, Attachment V-14.

4.5.3.14 Personnel Protection

CONCERN:
See Concern TSA-4, PP.1-1.

CONCERN: (TSA-3) (PP.1-1) (H2/C1)
The Albuquerque Field Office is not fully implementing the requirements of DOE 5483.1A.

CONCERN: (TSA-3) (PP.1-2) (H2/C1)
Los Alamos National Laboratory does not have a system in place to ensure that standard operating procedures for accelerator facilities for operations involving potentially hazardous chemicals and physical agents are reviewed and approved by a health and safety professional as required by DOE 5480.10.

CONCERN: (TSA-3) (PP.2-1) (H1/C1)
Occupational health and safety program documents and procedures applicable to accelerator facilities at Los Alamos National Laboratory do not incorporate requirements mandated by DOE 5480.4.

CONCERN: See Concern TSA-4, WS.4-3.

CONCERN: (TSA-3) (PP.4-1) (H2/C1) Los Alamos National Laboratory has not established or implemented a system to measure performance with respect to occupational safety or industrial hygiene that fulfills the requirements of SEN-29 and DOE 5482.1B.

CONCERN: (TSA-3) (PP.4-2) (H2/C1) Los Alamos National Laboratory has not been responsive to findings identified during Albuquerque Field Office functional appraisals of accelerator areas conducted under DOE 5482.1B.

CONCERN: (TSA-3) (PP.4-3) (H3/C1) The Albuquerque Field Office has not managed functional appraisals for accelerator facilities in accordance with the requirements of DOE 5482.1B and AL 5482.1A.

CONCERN: See Concern TSA-4, WS.3-1.

CONCERN: See Concern TSA-4, PP.6-4.

CONCERN: See Concern TSA-4, PP.6-3.

CONCERN: (TSA-3) (PP.6-1) (H2/C1) Los Alamos National Laboratory has not effectively controlled the consumption of food and the application of cosmetics in the workplace as required by 29 CFR 1910, Subpart Z.

CONCERN: (TSA-3) (PP.6-2) (H1/C2) Los Alamos National Laboratory has not established written procedures ensuring proper response to low oxygen level alarms in accelerator facilities.

CONCERN: (TSA-3) (PP.6-3) (H1/C1) Flammable liquids at Los Alamos National Laboratory are being used with ventilation systems that are not properly rated for flammable vapors as required by 29 CFR 1910.307.

CONCERN: (TSA-3) (PP.6-4) (H1/C1) Los Alamos National Laboratory does not have a ventilation program that implements the requirements of 29 CFR 1910.252.

CONCERN: (TSA-3) (PP.6-5) (H1/C1) Los Alamos National Laboratory has not established an effective program to control radio frequency hazards in accelerator facilities in accordance with ANSI C95.1-1982.

CONCERN: (TSA-3) (PP.6-6) (H1/C1) Los Alamos National Laboratory does not have a program implementing the requirements of the American Conference of Governmental Industrial Hygienists as set forth in "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," dated 1990-1991, with respect to static magnetic fields in accelerator facilities.

CONCERN: Los Alamos National Laboratory has not established a program
(TSA-3) to control cross-connections between potable and nonpotable
(PP.6-7) water systems to ensure compliance with 29 CFR 1910.141.
(H2/C1)

4.5.3.15 Worker Safety and Health (OSHA) Compliance

CONCERN: See Concern TSA-4, WS.3-1.

CONCERN: See Concern TSA-4, PP.6-4.

CONCERN: Individuals required to clean up chemical spills or hazardous
(TSA-3) waste sites at Los Alamos National Laboratory have not
(WS.3-1) received the training required by 29 CFR 1910.120, Hazardous
(H1/C1) Waste Operations and Emergency Response.
CAT. II

CONCERN: See Concern TSA-1, WS.3-1.

CONCERN: See Concern TSA-4, WS.4-1.

CONCERN: Los Alamos National Laboratory does not always provide floor
(TSA-3) guarding, handrails, or fall protection as required by
(WS.4-1) 29 CFR 1910, Subpart D, Walking Working Surfaces.
(H1/C1)
CAT. II

CONCERN: See Concern TSA-4, WS.4-2.

CONCERN: See Concern TSA-4, FP.2-3.

CONCERN: Several accelerator facilities at Los Alamos National
(TSA-3) Laboratory operate equipment that does not comply with the
(WS.4-2) requirements of 29 CFR 1910, Subpart N, Materials Handling
(H1/C1) and Storage.

CONCERN: Several accelerator facilities at Los Alamos National
(TSA-3) Laboratory do not comply with the requirements of 29 CFR
(WS.4-3) 1910, Subpart H, Hazardous Materials.
(H1/C1)

CONCERN: See Concern TSA-4, WS.4-3.

CONCERN: See Concern TSA-4, PP.2-2.

CONCERN: Los Alamos National Laboratory does not fully comply with the
(TSA-3) requirements of 29 CFR 1910, Subpart Q, Welding, Cutting, and
(WS.4-4) Brazing.
(H1/C1)

4.5.3.16 Fire Protection

CONCERN: (TSA-3) (FP.1-1) (H1/C1) CAT. II

All new facilities operated by the various accelerator organizations at Los Alamos National Laboratory have not been constructed in accordance with DOE 6430.1A and DOE 5480.4, nor are facility modifications and experimental setups subject to review and approval by the Fire Protection and Utilities Group.

CONCERN: (TSA-3) (FP.1-2) (H1/C2)

Contrary to the requirements of DOE 5480.7, accelerator organizations at Los Alamos National Laboratory do not have a procedure designed to ensure that the use and storage of combustibles do not threaten important accelerator operations and experiments.

CONCERN: (TSA-3) (FP.2-1) (H1/C1) CAT. II

Most accelerator facilities at Los Alamos National Laboratory are not in compliance with NFPA 101, Life Safety Code.

CONCERN: (TSA-3) (FP.3-1) (H1/C1)

Not all accelerator facilities at Los Alamos National Laboratory require that a fire protection review be performed as part of safety assessments, hazard analysis, experiment reviews, and similar safety evaluations to ensure that fires do not result in an unacceptable radiological or chemical release to the environment in accordance with by DOE 5480.7. and DOE 6430.1A, nor do they require that the Fire Protection and Utilities Group review and approve these documents.

CONCERN: (TSA-3) (FP.4-1) (H1/C1)

Contrary to the requirements of DOE 5480.7, all areas of TA-53 Bldg. 3 at Los Alamos National Laboratory are not provided with automatic fire suppression systems and passive systems designed to ensure that fires do not result in unacceptable programmatic losses.

CONCERN: (TSA-3) (FP.5-1) (H1/C1)

Contrary to the requirement of DOE 5480.7, all accelerator facilities for which property loss due to fire may exceed $1,000,000 are not provided with automatic fire suppression systems, nor do accelerator organizations evaluate facilities for the installation of such systems in which the fire loss potential ranges from $250,000 to $1,000,000.

CONCERN: (TSA-3) (FP.5-2) (H1/C1)

All portable or movable structures utilized by the accelerator organizations at Los Alamos National Laboratory are not constructed, located, or maintained as required by DOE/EV-0043, "Standard on Fire Protection for Portable Structures," dated August 1979.

CONCERN: (TSA-3) (FP.5-3) (H1/C1)

Fire protection features, such as fire-rated separation, are not provided in all accelerator and accelerator support facilities at Los Alamos National Laboratory, and existing fire barrier assemblies are not being inspected and maintained in accordance with DOE 5480.7.

CONCERN: (TSA-3) (FP.7-1) (H1/C1)	The accelerator organizations at Los Alamos National Laboratory are not in compliance with DOE 5480.4, DOE 5480.7, and DOE 6430.1A.

4.8 CATEGORIZATION AND TABULATION OF CONCERNS

4.8.4 Other Selected Facilities and Activities

4.8.4.1 Categorization of Concerns

Concern Number	Potential Hazard Level	Compliance Level
OA.1-1	2	1
OA.1-2	2	1
OA.1-3	3	2
OA.1-4	3	2
OA.1-5	1	1
OA.1-6	1	1
OA.2-1	2	2
OA.2-2	1	1
OA.3-1	3	1
OA.4-1	3	2
OA.6-1	2	1
OA.6-2	3	2
OA.7-1	2	1
QV.1-1	2	1
QV.1-2	2	1
QV.1-3	2	1
QV.1-4	2	1
QV.1-5	3	1
QV.1-6	2	1
QV.1-7	2	1
QV.1-8	3	1
QV.1-9	3	2
QV.3-1	2	1
QV.3-2	2	2
QV.4-1	2	1

Concern Number	Potential Hazard Level	Compliance Level
OP.2-1	1	1
OP.2-2	2	1
OP.2-3	2	1
OP.2-4	2	1
OP.3-1	2	1

* Designates a Category I Concern
** Designates a Category II Concern

OP.3-2	3	1
OP.3-3	2	2
OP.3-4	2	1
OP.4-1	3	1
OP.6-1	2	1
MA.1-1	2	1
MA.2-1	2	1
MA.3-1	2	1
MA.3-2	2	1
MA.3-3**	1	1
MA.4-1	2	1
MA.5-1	2	1
MA.5-2	3	1
MA.6-1	2	1
MA.6-2	2	1
MA.7-1	3	1
MA.7-2	2	1
MA.8-1	2	1
TC.1-1	2	1
TC.1-2	2	2
TC.4-1	2	1
TC.4-2	2	2
TC.4-3	2	3
TC.4-4	2	2
TC.5-1	2	2
TC.5-2	1	1

Concern Number	Potential Hazard Level	Compliance Level
TC.6-1	1	1
TC.7-1	2	2
TC.8-1	3	2
TC.9-1	1	1
TC.10-1	2	2
AX.1-1	2	2
AX.1-2	2	2
AX.1-3	3	1
AX.1-4	2	1
AX.1-5	3	1

* Designates a Category I Concern
** Designates a Category II Concern

AX.1-6	3	1
AX.2-1	2	2
AX.2-2	2	2
AX.5-1	2	1
AX.5-2	2	2
AX.5-3	2	2
AX.5-4	2	1
AX.6-1	2	2
AX.6-2	2	2
AX.6-3**	1	2
EP.1-1**	1	1
EP.1-2	1	1
EP.1-3	1	1
EP.1-4	1	1
EP.2-1	1	1
EP.2-2	2	1
EP.2-3	1	1
EP.3-1	1	1
EP.4-1	2	1
EP.4-2**	1	1
EP.4-3	2	1

Concern Number	Potential Hazard Level	Compliance Level
EP.5-1**	1	1
EP.5-2	1	1
EP.5-3	1	1
EP.6-1	1	1
EP.6-2	2	1
EP.7-1	1	1
TS.1-1	3	1
TS.1-2	2	1
TS.2-1	2	1
TS.2-2	2	1
TS.2-3	2	1
TS.3-1	2	2
TS.3-2	2	1
TS.3-3	2	1
TS.4-1	2	1
PT.1-1	2	2

* Designates a Category I Concern
** Designates a Category II Concern

PT.1-2	1	1
PT.1-3	3	2
PT.1-4	2	1
PT.2-1	1	1
PT.3-1	3	1
PT.3-2	3	1
PT.3-3**	1	1
PT.3-4**	1	1
PT.3-5	3	1
PT.3-6	3	1
PT.4-1	2	1
PT.4-2**	1	1
PT.4-3	1	1
PT.5-1	3	1
PT.6-1	2	1

* Designates a Category I Concern
** Designates a Category II Concern

Concern Number	Potential Hazard Level	Compliance Level
PT.6-2	3	1
PT.6-3	2	2
PT.8-1	2	1
PT.8-2	2	2
PT.8-3**	1	1
PT.8-4	3	1
PT.9-1	2	1
PT.10-1	3	1
PT.12-1	2	1
PT.12-2	3	1
SS.2-1	1	2
SS.3-1	2	1
SS.3-2	2	1
SS.4-1	1	2
SS.4-2	1	2
SS.4-3	1	2
SS.4-4	2	2
EA.1-1	2	1
EA.2-1	2	1
EA.3-1	2	1
EA.4-1	2	1
FR.1-1	2	1
FR.1-2	2	2
FR.2-1	2	1
FR.4-1	3	1
FR.4-2	2	1
FR.5-1	3	1
FR.6-1	2	2
FR.6-2	3	1

Concern Number	Potential Hazard Level	Compliance Level
RP.1-1	2	1
RP.2-1	2	2
RP.2-2	2	1
RP.2-3	2	1

* Designates a Category I Concern
** Designates a Category II Concern

RP.3-1	2	1
RP.3-2	2	2
RP.3-3**	1	1
RP.3-4	2	1
RP.3-5	2	1
RP.5-1	2	1
RP.5-2	2	1
RP.5-3	2	1
RP.5-4	2	1
RP.5-5	2	1
RP.7-1	2	1
RP.7-2	2	1
RP.7-3	2	1
RP.7-4	2	2
RP.7-5	2	1
RP.10-1	1	1
RP.10-2	2	1
RP.10-3	1	1
RP.10-4	1	1
RP.10-5	2	1
RP.10-6	2	1
PP.1-1	2	1
PP.1-2	2	1
PP.1-3	2	1
PP.2-1	1	1
PP.2-2**	1	1
PP.2-3	1	1
PP.2-4	2	1

Concern Number	Potential Hazard Level	Compliance Level
PP.2-5	1	1
PP.2-6	2	1
PP.3-1	1	1
PP.3-2	2	1
PP.4-1	2	1
PP.4-2	1	1
PP.6-1**	1	1
PP.6-2	1	1
PP.6-3**	1	1
PP.6-4**	1	1

* Designates a Category I Concern
** Designates a Category II Concern

PP.6-5	1	1
WS.3-1	1	1
WS.3-2	1	1
WS.4-1	1	1
WS.4-2**	1	1
WS.4-3**	1	1
WS.5-1*	1	1
WS.5-2**	1	1
FP.1-1	2	1
FP.1-2	2	1
FP.2-1**	1	1
FP.2-2	1	1
FP.2-3**	1	1
FP.2-4**	1	1
FP.3-1	1	2
FP.3-2	1	2
FP.3-3	1	1
FP.4-1	1	1
FP.4-2	1	1
FP.5-1	1	1
FP.6-1	1	2

Concern Number	Potential Hazard Level	Compliance Level
FP.6-2**	1	1
FP.6-3	1	1
FP.6-4	1	1
FP.6-5	1	1
FP.6-6	1	1
FP.6-7	1	1
FP.6-8	1	2
FP.6-9	1	2
FP.7-1	1	1
FP.7-2	1	1
FP.7-3	1	2
FP.7-4	1	1
FP.7-5	1	1
FP.7-6	1	2
AS.1-1	2	1

* Designates a Category I Concern
** Designates a Category II Concern

AS.1-2	2	1
AS.1-3	2	1
AS.1-4	2	1
AS.1-5	2	1
AS.1-6	1	2
AS.1-7	2	2
AS.2-1	2	2
AS.2-2	3	2
AS.2-3	2	2
AS.3-1	2	1
AS.3-2	3	1
AS.3-3	1	1
AS.3-4	3	1
AS.3-5	2	2
AS.3-6	3	2

Concern Number	Potential Hazard Level	Compliance Level
ES.1-1	1	1
ES.3-1	2	1
ES.3-2	2	2
ES.3-3	1	1
ES.4-1	2	1
ES.5-1	1	1
ES.5-2	1	2
ES.5-3	2	1
ES.7-1	1	1
ES.7-2	1	1
ES.7-3	2	1
ES.7-4	1	1

* Designates a Category I Concern
** Designates a Category II Concern

4.8.4.2 Tabulation of Concerns

4.5.4.1 Organization and Administration

CONCERN: (TSA-4) (OA.1-1) (H2/C1)
Los Alamos National Laboratory management has not prepared an integrated plan for implementing its environment, safety, and health programs.

CONCERN: (TSA-4) (OA.1-2) (H2/C1)
The basis for the Los Alamos National Laboratory evaluation of Johnson Controls World Services, Inc., environment, safety, and health performance is not clearly defined and does not meet the intent of the initiative established by the Secretary of Energy for measuring contractor environment, safety, and health performance.

CONCERN: (TSA-4) (OA.1-3) (H3/C2)
The Los Alamos Area Office has not established the necessary administrative controls to assure that clear and timely guidance as well as communications to and from the Los Alamos National Laboratory are properly conveyed with respect to Department of Energy Orders and safety-related documentation. (Also see Concern TSA-4, OP.3-3.)

CONCERN: (TSA-4) (OA.1-4) (H3/C2)
Los Alamos National Laboratory has not enforced the use of administrative controls which has resulted in the disposal of valuable equipment as "suspect radioactive waste."

CONCERN: (TSA-4) (OA.1-5) (H1/C1)
The Los Alamos Area Office has not provided sufficient oversight and direction to the Los Alamos National Laboratory with respect to its safety- and quality-related activities.

CONCERN: (TSA-4) (OA.1-6) (H1/C1)
Roles, responsibilities, and interfaces are not clearly defined for and among many of Los Alamos National Laboratory organizations.

CONCERN: (TSA-4) (OA.2-1) (H2/C2)
The Los Alamos National Laboratory has not developed and implemented a plan for managing, organizing, and using its health and safety resources.

CONCERN: (TSA-4) (OA.2-2) (H1/C1)
Safe work control practices are not consistently enforced across the Los Alamos National Laboratory.

CONCERN: (TSA-4) (OA.3-1) (H3/C1)
The Los Alamos National Laboratory has no policy statement regarding safety and health goals, and no process is in place by which sitewide safety and health objectives are communicated through the various levels of the organization and uniquely adapted as measurable goals by each organizational unit as required by DOE 5480.19.

CONCERN: (TSA-4) (OA.4-1) (H3/C2)
The University of California has not been actively involved in the review and oversight of environment, safety, and health activities at the Los Alamos National Laboratory.

CONCERN: (TSA-4) (OA.6-1) (H2/C1)
The Los Alamos National Laboratory has not ensured that environment, safety, and health factors are properly incorporated into performance appraisals and position descriptions as required by SEN-6C-91, "Departmental, Organization and Management Arrangements."

CONCERN: (TSA-4) (OA.6-2) (H3/C2)
Los Alamos National Laboratory has addressed neither the classification, salary grade, and growth opportunities for its environment, safety, and health positions nor the consequences of staff transfer resulting from restructuring of positions. (Also see Concern TSA-3, OA.6-1.)

CONCERN:
See Concerns TSA-4, TS.2-1, and TSA-4, OP.3-1.

CONCERN:
See Concerns TSA-4, OP.3-3; TSA-4, OP.3-4; TSA-4, OA.1-3; and TSA-4, QV.3-1.

CONCERN: (TSA-4) (OA.7-1) (H2/C1)
A consistently applied document control system is not in place at the Los Alamos National Laboratory for important safety-related documentation, and current methods do not provide positive assurance that uncontrolled or outdated versions of "controlled documents" do not become working documents as required by DOE 5700.6B, DOE 5700.6C, DOE 5480.19, and DOE 1324.2A.

CONCERN:
See Concern TSA-2, OA.8-2.

4.5.4.2 Quality Verification

CONCERN: (TSA-4) (QV.1-1) (H2/C1)
The Los Alamos National Laboratory has not implemented a sitewide Quality Assurance Program as required by DOE 5700.6B and DOE 5700.6C.

CONCERN: (TSA-4) (QV.1-2) (H2/C1)
The Los Alamos National Laboratory has not implemented an independent quality assurance audit function as required by DOE 5700.6B and DOE 5700.6C.

CONCERN: (TSA-4) (QV.1-3) (H2/C1)
The Albuquerque Field Office has not implemented programs for the oversight of quality assurance at the Los Alamos National Laboratory as required by DOE 5700.6B and DOE 5700.6C.

CONCERN: (TSA-4) (QV.1-4) (H2/C1)
The Los Alamos Area Office has not established programs for the oversight of quality assurance at the Los Alamos National Laboratory as required by DOE 5700.6B and DOE 5700.6C.

CONCERN: (TSA-4) (QV.1-5) (H3/C1)	The Los Alamos National Laboratory has not established a sitewide records management program as required by DOE 1324.2A.
CONCERN: (TSA-4) (QV.1-6) (H2/C1)	The Los Alamos National Laboratory has not established a sitewide document control program as required by DOE 5700.6B and DOE 5700.6C.
CONCERN: (TSA-4) (QV.1-7) (H2/C1)	The Los Alamos National Laboratory has not ensured that Johnson Controls World Services, Inc., has fully implemented a Quality Assurance Program as required by DOE 5700.6B and DOE 5700.6C.
CONCERN: (TSA-4) (QV.1-8) (H3/C1)	Senior management of the Los Alamos National Laboratory has not taken decisive actions to enforce compliance with DOE 5700.6B and DOE 5700.6C.
CONCERN: (TSA-4) (QV.1-9) (H3/C2)	The Los Alamos National Laboratory has not coordinated and integrated the establishment of its Quality Assurance Program with that of Johnson Controls World Services, Inc.
CONCERN:	See Concern TSA-4, QV.1-1.
CONCERN:	See Concern TSA-4, QV.1-7.
CONCERN:	See Concern TSA-4, QV.1-1.
CONCERN:	See Concern TSA-4, QV.1-7.
CONCERN: (TSA-4) (QV.3-1) (H2/C1)	The Albuquerque Field Office has not transmitted to the Los Alamos National Laboratory the minimum requirements and guidance provided by the Assistant Secretary for Defense Programs for identifying and purging suspect or counterfeit parts and preventing their procurement.
CONCERN: (TSA-4) (QV.3-2) (H2/C2)	The Los Alamos National Laboratory has not established a documented sitewide plan for identifying, purging, and preventing the future procurement of suspect or counterfeit bolts in accordance with industry good practices.
CONCERN: (TSA-4) (QV.4-1) (H2/C1)	The Los Alamos National Laboratory has not implemented a sitewide calibration program that meets the requirements of DOE 5700.6B and DOE 5700.6C.
CONCERN:	See Concerns TSA-4, QV.1-1, and TSA-4, MA.3-2.
CONCERN:	See Concerns TSA-4, QV.1-7, and TSA-4, MA.3-2.
CONCERN:	See Concern TSA-4, QV.1-1.

CONCERN: See Concern TSA-4, QV.1-7.

CONCERN: See Concern TSA-4, QV.1-1.

4.5.4.3. Operations

CONCERN: See Concerns TSA-4, PP.2-2; TSA-4, MA.2-1; and TSA-1, OP.4-1.

CONCERN: See Concerns TSA-4, QV.1-6 and TSA-4, OA.7-1.

CONCERN: (TSA-4) (OP.2-1) (H1/C1) At the Los Alamos National Laboratory, safety analysis documentation for facility operations involving fissile material does not provide results of criticality safety calculations to demonstrate that the operation will be subcritical, as required in DOE 5480.5, paragraph 11.

CONCERN: (TSA-4) (OP.2-2) (H2/C1) No trending and lessons-learned program is in place for unusual occurrence reports at Los Alamos National Laboratory as required by DOE 5480.19 and DOE 5000.3A.

CONCERN: (TSA-4) (OP.2-3) (H2/C1) Safety analysis documentation for TA-8 x-ray generator operations has not identified the location of all radiological areas present during operations as required in DOE 5480.11 and Los Alamos Natinal Laboratory AR 3-7.

CONCERN: (TSA-4) (OP.2-4) (H2/C1) Routine annual radiation monitoring of operational facilities has not been used to properly establish radiological control areas in accordance with DOE 5480.11 and Los Alamos National Laboratory AR 3-7.

CONCERN: (TSA-4) (OP.3-1) (H2/C1) Approved safety analysis documentation does not exist for many of the Los Alamos National Laboratory facilities to give formal basis for safety limits or operational safety requirements in operating procedures as required in DOE 5481.1B.

CONCERN: (TSA-4) (OP.3-2) (H3/C1) Los Alamos National Laboratory has assigned hazard classifications which conflict with AL 5481.1B guidance for hazard class assignment.

CONCERN: (TSA-4) (OP.3-3) (H2/C2) The Los Alamos Area Office is providing unclear guidance to Los Alamos National Laboratory for preparation of nonnuclear safety analysis reports and operational safety requirements.

CONCERN: (TSA-4) (OP.3-4) (H2/C1) Policy direction for preparation of safety analysis documentation and operational safety requirements for nonnuclear facilities has not been implemented by the Program Secretarial Officer (Defense Programs), as required in SEN-6D-91.

CONCERN: (TSA-4) (OP.4-1) (H3/C1)
Narrative logbooks are not maintained by facility operators and routinely reviewed by supervisors at many Los Alamos National Laboratory operating facilities as required in DOE 5480.19.

CONCERN:
See Concerns TSA-4, MA.2-1; TSA-4, QV.4-1; and TSA-1, OP.3-2.

CONCERN: (TSA-4) (OP.6-1) (H2/C1)
At the Los Alamos National Laboratory, records of qualification of operators for specialized equipment operation are not adequately documented as required in DOE 5480.19.

4.5.4.4 Maintenance

CONCERN: (TSA-4) (MA.1-1) (H2/C1)
At the Los Alamos National Laboratory, lack of a sitewide maintenance management plan inhibits effective and efficient implementation and control of maintenance activities to meet the requirements of DOE 4330.4A.

CONCERN: (TSA-4) (MA.2-1) (H2/C1)
Maintenance work is not authorized, conducted, or controlled at the Los Alamos National Laboratory to ensure protection of facility personnel, safe facility operation, or compliance with DOE 4330.4A.

CONCERN: (TSA-4) (MA.3-1) (H2/C1)
Los Alamos National Laboratory does not have a program to ensure that appropriate safety devices are periodically inspected in compliance with ANSI Z358.1-1990.

CONCERN: (TSA-4) (MA.3-2) (H2/C1)
At the Los Alamos National Laboratory, control and segregation of materials for maintenance work is not in accordance with DOE 4330.4A.

CONCERN: (TSA-4) (MA.3-3) (H1/C1) CAT. II
The Los Alamos National Laboratory installation, modification, and maintenance program on cranes is not in accordance with 29 CFR 1910.179.

CONCERN: (TSA-4) (MA.4-1) (H2/C1)
Management of the Los Alamos National Laboratory is not provided information to plan, schedule, and control maintenance that meets the requirements of DOE 4330.4A.

CONCERN: (TSA-4) (MA.5-1) (H2/C1)
At the Los Alamos National Laboratory, the condition of equipment, identification of problems, and correction of deficiencies related to safety, material condition, and housekeeping are not in compliance with DOE 4330.2C or DOE 4330.4A.

CONCERN: (TSA-4) (MA.5-2) (H3/C1)
Corrective maintenance is not fully documented at Los Alamos National Laboratory as required by DOE 4330.4A.

CONCERN: (TSA-4) (MA.6-1) (H2/C1)
The Los Alamos National Laboratory preventive maintenance program does not meet the requirements of DOE 4330.4A. (Also see Concern TSA-4, AX.6-2.)

CONCERN: (TSA-4) (MA.6-2) (H2/C1)
Los Alamos National Laboratory has not implemented a configuration control program as required by DOE 4330.4A.

CONCERN: (TSA-4) (MA.7-1) (H3/C1)
At the Los Alamos National Laboratory, the maintenance history records do not meet the requirements of DOE 4330.4A.

CONCERN: (TSA-4) (MA.7-2) (H2/C1)
Los Alamos National Laboratory has not implemented a predictive maintenance program as required by DOE 4330.4A.

CONCERN: (TSA-4) (MA.8-1) (H2/C1)
Los Alamos National Laboratory has not established policy or guidelines for the use of procedures and related documents required for performing maintenance in accordance with DOE 4330.4A.

4.5.4.5 Training and Certification

CONCERN: (TSA-4) (TC.1-1) (H2/C1)
Los Alamos National Laboratory has not implemented a comprehensive program for training as required in DOE 5480.20.

CONCERN: (TSA-4) (TC.1-2) (H2/C2)
The Los Alamos National Laboratory does not have an effective and comprehensive training recordkeeping system to monitor whether employees and onsite workers have fulfilled environment, safety, and health training requirements necessary to comply with DOE 5480.11 and DOE 5480.20.

CONCERN: (TSA-4) (TC.4-1) (H2/C1)
Los Alamos National Laboratory has not fulfilled all the requirements for General Employee Training as specified in DOE 5480.20 or radiation safety training as specified in DOE 5480.11.

CONCERN: (TSA-4) (TC.4-2) (H2/C2)
The Los Alamos National Laboratory does not ensure that its employees or those of contractors or subcontractors have the technical, environmental, safety, and health literacy required to mitigate risk to themselves or other Laboratory workers.

CONCERN: (TSA-4) (TC.4-3) (H2/C3)
The training expertise within Los Alamos National Laboratory is infrequently used for lessons learned or for assistance in solving other sitewide training issues.

CONCERN: (TSA-4) (TC.4-4) (H2/C2) The Los Alamos National Laboratory does not ensure that contract or subcontract or employees working onsite have received required health and safety training.

CONCERN: (TSA-4) (TC.5-1) (H2/C2) The Los Alamos National Laboratory subcontract evaluation process of Johnson Controls World Services, Inc., does not contain definite criteria and accountability for training. (Also see Concern TSA-4, OA.1-2.)

CONCERN: (TSA-4) (TC.5-2) (H1/C1) Los Alamos National Laboratory has not developed and implemented training in electrical safety based on existing safety risks and 29 CFR 1910, Subpart S, Electrical.

CONCERN: (TSA-4) (TC.6-1) (H1/C1) There is no documented program which ensures that all people who handle fissionable material at the Los Alamos National Laboratory receive appropriate, job-specific criticality safety training as required by DOE 5480.5.

CONCERN: (TSA-4) (TC.7-1) (H2/C2) At the Los Alamos National Laboratory, lack of dedicated training facilities and equipment inhibits the ability to conduct required environment, safety, and health training, including hands-on mastery of skills.

CONCERN: (TSA-4) (TC.8-1) (H3/C2) Los Alamos National Laboratory has not developed a training and qualification program for inspector and other quality control personnel.

CONCERN: See Concern TSA-4, TC.5-1.

CONCERN: (TSA-4) (TC.9-1) (H1/C1) At the Los Alamos National Laboratory, radiation protection technician training does not meet the requirements of DOE 5480.11.

CONCERN: (TSA-4) (TC.10-1) (H2/C2) Los Alamos National Laboratory does not ensure that its managers and supervisors receive the training necessary to fulfill safety and health responsibilities.

CONCERN: See Concern TSA-4, TC.1-1.

4.5.4.6 Auxiliary Systems

CONCERN: (TSA-4) (AX.1-1) (H2/C2) At the Los Alamos National Laboratory, the drainage system in the TA-3 Sigma Complex, Building 66, presents a potential chemical hazard to occupants of the building.

CONCERN: (TSA-4) (AX.1-2) (H2/C2)
In the TA-3 Sigma Complex, Building 66, a Los Alamos National Laboratory safety study revealed that a seismic event could cause the floor of the electroplating area to collapse, resulting in a cyanide-acid mixture that would cause a release of lethal hydrogen cyanide gas.

CONCERN: (TSA-4) (AX.1-3) (H3/C1)
At the Los Alamos National Laboratory, hazard labeling of chemical containers associated with auxiliary equipment is not complete as required by 29 CFR 1910.1200(f)(5)(i).

CONCERN:
See Concern TSA-4, WS.4-1.

CONCERN:
See Concern TSA-4, MA.3-1.

CONCERN: (TSA-4) (AX.1-4) (H2/C1)
At the Los Alamos National Laboratory, in TA-43 Building 1, Health Research Laboratory, illumination in the basement is poor because of equipment modifications and lighting removal, which violates 29 CFR 1910.22(b)(i); tripping hazards and auxiliary equipment with rotating belts and pulleys exist in the area.

CONCERN: (TSA-4) (AX.1-5) (H3/C1)
Los Alamos National Laboratory has a generic deficiency regarding configuration control of operating instructions for auxiliary equipment as required by DOE 5480.19.

CONCERN: (TSA-4) (AX.1-6) (H3/C1)
Los Alamos National Laboratory, has not implemented a program to ensure that tags and labels are controlled, uniform, and current as required by DOE 5480.19.

CONCERN: (TSA-4) (AX.2-1) (H2/C2)
At the Los Alamos National Laboratory, radioactive solutions are being stored in concrete underground tanks without secondary containment in TA-50 Bldg. 1, Liquid Waste Treatment Facility.

CONCERN: (TSA-4) (AX.2-2) (H2/C2)
At the Los Alamos National Laboratory, there is no real time monitoring equipment on the exhaust stacks for the transuranic incinerator in TA-50 Building 37 and the Liquid Waste Treatment Facility in TA-50 Building 1.

CONCERN: (TSA-4) (AX.5-1) (H2/C1)
Los Alamos National Laboratory has not implemented a program for utilizing available data to alert when high-efficiency particulate air filters should be changed as required by DOE 5480.19.

CONCERN: (TSA-4) (AX.5-2) (H2/C2)
At the Los Alamos National Laboratory, in TA-59 Building 1, Occupational Health, air-balancing problems for the supply and exhaust ventilation systems have resulted in flue gas from two gas-fired boilers back-flowing carbon monoxide into the basement area on several occasions.

CONCERN: (TSA-4) (AX.5-3) (H2/C2)
Los Alamos National Laboratory has several operating facilities with air-balancing problems, creating the potential for uncontrolled migration of contaminants into occupied spaces.

CONCERN: (TSA-4) (AX.5-4) (H2/C1)
At the Los Alamos National Laboratory, TA-3 Building 55, which houses the controls for the natural gas incoming pipeline for the steam generators, do not meet the 1991 Uniform Mechanical Code requirements for ventilation.

CONCERN: (TSA-4) (AX.6-1) (H2/C2)
Los Alamos National Laboratory has not implemented a program to assure that Class B equipment associated with auxiliary systems is properly maintained.

CONCERN:
See Concern TSA-4, WS.4-3.

CONCERN:
See Concern TSA-4, OP.4-1.

CONCERN: (TSA-4) (AX.6-2) (H2/C2)
Electric power panel indicator lights for auxiliary equipment throughout Los Alamos National Laboratory are not uniformly color coded as stated in Los Alamos National Laboratory Environment, Safety, and Health Manual.

CONCERN: (TSA-4) (AX.6-3) (H1/C2) CAT. II
The Albuquerque Field Office has not established a plan for the timely resolution of the potential problem associated with the Department of Energy owned 12-inch, high pressure natural gasline which does not meet the requirements of the current code, API 1104.

4.5.4.7 Emergency Preparedness

CONCERN: (TSA-4) (EP.1-1) (H1/C1) CAT. II
The Los Alamos National Laboratory Emergency Preparedness Program has not been developed in accordance with the requirements contained in DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-4) (EP.1-2) (H1/C1)
The Los Alamos National Laboratory did not address all aspects of credible emergencies in detail as required by DOE 5500.1A and DOE 5500.3A (and its predecessor DOE 5500.3).

CONCERN: (TSA-4) (EP.1-3) (H1/C1)
The Los Alamos National Laboratory Emergency Operations Center did not perform its command and control emergency functions in an efficient manner during the appraisal emergency exercise, and the emergency response field teams did not respond in a coordinated manner as required by DOE 5500.1B, DOE 5500.3A (and its predecessor DOE 5500.3), and DOE 5500.4A.

CONCERN: (TSA-4) (EP.1-4) (H1/C1)	The Los Alamos Area Office is not providing oversight of the Los Alamos National Laboratory Emergency Preparedness Program and has not developed and finalized mutual assistance agreements to cover all offsite emergency response agencies that could assist in response to emergencies at Los Alamos National Laboratory as directed by DOE 5500.1A and DOE 5500.3A.
CONCERN: (TSA-4) (EP.2-1) (H1/C1)	The Los Alamos National Laboratory Emergency Response Plan has not been developed using the guidance contained in the DOE 5500 series of Orders; for example, it did not contain emergency action levels and all responsibilities were not identified for all members of the emergency response organization as required in DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3).
CONCERN: (TSA-4) (EP.2-2) (H2/C1)	Guidance and training have not been provided to facility emergency management as required by DOE 5500.1B and DOE 5500.3A (and its predecessor DOE 5500.3) on preparation, development, and drafting specific facility and building emergency response plans and procedures.
CONCERN: (TSA-4) (EP.2-3) (H1/C1)	The Los Alamos National Laboratory Emergency Management Office did not develop an emergency evacuation plan as required in DOE 5500.3A (or its predecessor DOE 5500.3).
CONCERN: (TSA-4) (EP.3-1) (H1/C1)	Los Alamos National Laboratory does not have an emergency preparedness training program document that addresses training requirements by emergency position, instructors qualification, and annual training requalification requirements established in DOE 5500.3A.
CONCERN: (TSA-4) (EP.4-1) (H2/C1)	Los Alamos National Laboratory did not have an emergency drill and exercise program as directed in DOE 5500.3A.
CONCERN: (TSA-4) (EP.4-2) (H1/C1) CAT. II	The appraisal emergency exercise was unsatisfactory in that it demonstrated poor command and control at the Emergency Operations Center and at the on-scene exercise control points, lack of professionalism for both the onsite and offsite field emergency response teams, and the inability of emergency personnel to perform their functions as required in DOE 5500.3 and DOE 5500.3A.
CONCERN: (TSA-4) (EP.4-3) (H2/C1)	Mini-drills for field emergency response teams have not been conducted to ensure that continuity of operations is achieved between management of the Emergency Operations Center and on-scene control points as required by DOE 5500.3A.

CONCERN: (TSA-4) (EP.5-1) (H1/C1) CAT. II
Los Alamos National Laboratory does not have an Emergency Notification System to provide sitewide coverage for issuing emergency instructions as required by DOE 5500.2A.

CONCERN: (TSA-4) (EP.5-2) (H1/C1)
Emergency alarms have not been surveyed to ensure that audio signals can be heard throughout all buildings as required by DOE 5500.2B.

CONCERN: (TSA-4) (EP.5-3) (H1/C1)
The Emergency Operations Center does not have all the documents described in DOE 5500.3A (and its predecessor DOE 5500.3) available for emergency management use.

CONCERN: (TSA-4) (EP.6-1) (H1/C1)
Los Alamos Area Office has not transmitted Los Alamos National Laboratory emergency action levels to offsite agencies as required by DOE 5500.1A or DOE 5500.1B.

CONCERN: (TSA-4) (EP.6-2) (H2/C1)
Los Alamos National Laboratory Emergency Operations Center management does not have a coordinated and approved initial notification or followup notification report for distribution of emergency notifications to State, County, and Tribal emergency management agencies as required by DOE 5500.2B.

CONCERN: (TSA-4) (EP.7-1) (H1/C1)
Los Alamos National Laboratory emergency procedures on radiological and chemical exposure control, decontamination, and site evacuation have not been developed as required by DOE 5500.1B, DOE 5500.3A, DOE 5480.1B, and DOE 5480.10.

4.5.4.8 Technical Support

CONCERN: (TSA-4) (TS.1-1) (H3/C1)
The roles and qualification requirements for environment, safety, and health technical support personnel, and their relationships with line organizations are not clearly defined as required by DOE 5480.19.

CONCERN: (TSA-4) (TS.1-2) (H2/C1)
Los Alamos National Laboratory does not have an organization with the authority or responsibility to maintain day-to-day oversight of the line organizations to ensure compliance with environment, safety, and health requirements.

CONCERN:
See Concern TSA-4, OP.3-1.

CONCERN: (TSA-4) (TS.2-1) (H2/C1)
At the Los Alamos National Laboratory, the process for preparing and reviewing safety analysis documentation does not meet the requirements of AL 5481.1B. (Also see Concerns TSA-4, OP.3-3, and TSA-4, OP.3-4.)

CONCERN: (TSA-4) (TS.2-2) (H2/C1) Los Alamos National Laboratory does not have a comprehensive system for procedure preparation, review, approval, oversight, and control to ensure that procedures accurately address potential health, safety, or environment issues for all activities as required by DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and Los Alamos National Laboratory AR.1-3.

CONCERN: (TSA-4) (TS.2-3) (H2/C1) At the Los Alamos National Laboratory, the Health and Safety and the Environmental Management Divisions have not developed formal procedures or guidance to ensure that technical support to the line organizations is timely, consistent, and accurate as required by DOE 5480.19.

CONCERN: (TSA-4) (TS.3-1) (H2/C2) The as-built drawings program does not reflect the need to update drawings and equipment specifications for critical facilities at the Los Alamos National Laboratory in a timely manner.

CONCERN: (TSA-4) (TS.3-2) (H2/C1) Los Alamos National Laboratory does not have a requirement or procedure for control of modifications to facilities or experimental equipment as required by DOE 5480.19, DOE 5700.6B, DOE 5700.6C, DOE 5480.4, and DOE 6430.1A.

CONCERN: (TSA-4) (TS.3-3) (H2/C1) Los Alamos National Laboratory does not have a plan or procedure for conducting operational readiness reviews that meets the requirements of DOE 5481.1B and DOE 5480.19.

CONCERN: (TSA-4) (TS.4-1) (H2/C1) Los Alamos National Laboratory has no formal procedures or requirements that ensure that safety-related systems are performing satisfactorily as required by DOE 5480.19 and DOE 4330.4A.

CONCERN: See Concerns TSA-4, MA.6-1, and TSA-4, MA.7-2.

4.5.4.9 Packaging and Transportation

CONCERN: (TSA-4) (PT.1-1) (H2/C2) The Los Alamos National Laboratory packaging and transportation program is fragmented and inconsistent, is not operating as a uniform sitewide program, and does not meet the requirements contained in DOE 5480.3 and DOE 5480.19.

CONCERN: (TSA-4) (PT.1-2) (H1/C1) Los Alamos National Laboratory does not have an effective system for preparation, use, and safety review of packaging and transportation procedures as required by DOE 5480.3, DOE 5480.19, and ASME NQA-1-1989.

CONCERN: (TSA-4) (PT.1-3) (H3/C2) Los Alamos National Laboratory has not established an effective internal communication system for resolution of common packaging and transportation problems.

CONCERN: (TSA-4) (PT.1-4) (H2/C1)	Los Alamos National Laboratory does not have a plan for managing, organizing, and using its packaging and transportation resources to meet presently assigned functions and does not meet the requirements contained in DOE 5480.3, DOE 5480.19, and DOE 5480.20.
CONCERN: (TSA-4) (PT.2-1) (H1/C1)	Los Alamos National Laboratory does not conduct and document packaging and transportation training and has not set sitewide training and qualification standards for packaging and transportation employees in accordance with DOE 5480.3, DOE 5480.20, DOE 5610.1, 49 CFR, 40 CFR, 29 CFR, and ASME NQA-1-1989.
CONCERN: (TSA-4) (PT.3-1) (H3/C1)	The Los Alamos National Laboratory packaging and transportation quality assurance manual does not meet the requirements of DOE 5480.3, DOE 5700.6B, and DOE 5700.6C.
CONCERN: (TSA-4) (PT.3-2) (H3/C1)	The Los Alamos National Laboratory independent internal quality assurance audit program for packaging and transportation does not meet the requirements of DOE 5480.3, DOE 5480.19, DOE 5482.1B., DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.
CONCERN: (TSA-4) (PT.3-3) (H1/C1) CAT. II	Los Alamos National Laboratory does not have an internal transportation safety oversight program in place that will ensure and measure compliance with the applicable Department of Transportation and Environmental Protection Agency regulations and with DOE 5400.1, DOE 5480.3, DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.
CONCERN: (TSA-4) (PT.3-4) (H1/C1) CAT. II	At Los Alamos National Laboratory, checklists for packaging and transportation operations do not meet the requirements contained in DOE 5480.3, DOE 5480.19, DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989, and their use is not consistent sitewide.
CONCERN: (TSA-4) (PT.3-5) (H3/C1)	The Albuquerque Field Office does not provide safety oversight of Los Alamos National Laboratory packaging and transportation operations, as required by DOE 5482.1B.
CONCERN: (TSA-4) (PT.3-6) (H3/C1)	The Los Alamos Area Office does not provide safety oversight of Los Alamos National Laboratory packaging and transportation operations as required by DOE 5482.1B.
CONCERN: (TSA-4) (PT.4-1) (H2/C1)	Los Alamos National Laboratory does not have a reliable sitewide system for ensuring compliance with the requirements of DOE 5480.3 and Department of Transportation regulations.

CONCERN: (TSA-4) (PT.4-2) (H1/C1) CAT. II	Contrary to the requirements contained in 49 CFR, DOE 5480.3, and DOE 5480.20, Los Alamos National Laboratory procedures do not preclude loading or transport (including operation of vehicles) of hazardous materials by unqualified, untrained, and uncertified personnel.
CONCERN: (TSA-4) (PT.4-3) (H1/C1)	At the Los Alamos National Laboratory, marking and labelling of packages, and placarding of vehicles, do not conform to Federal regulations 49 CFR and 29 CFR.
CONCERN: (TSA-4) (PT.5-1) (H3/C1)	Los Alamos National Laboratory packaging and transportation accident and incident reporting procedures do not conform to DOE 5000.3A.
CONCERN: (TSA-4) (PT.6-1) (H2/C1)	Los Alamos National Laboratory does not require the consistent application of basic risk management principles to its transportation safety program and has not assessed the level of risk involved in its present operations as required by DOE 5480.19.
CONCERN: (TSA-4) (PT.6-2) (H3/C1)	At the Los Alamos National Laboratory, manifests for offsite shipments and onsite transfers do not meet the requirements of DOE 5480.3 and Department of Transportation regulations.
CONCERN: (TSA-4) (PT.6-3) (H2/C2)	At Los Alamos National Laboratory, traffic safety control provisions for car pools, pedestrians, and bicyclists do not reflect current usage or needs.
CONCERN: (TSA-4) (PT.8-1) (H2/C1)	Los Alamos National Laboratory does not have effective approved procedures covering onsite transfers of hazardous materials as required by DOE 5480.3.
CONCERN: (TSA-4) (PT.8-2) (H2/C2)	Los Alamos National Laboratory procedures for road closures have not been reviewed for safety effectiveness as provided for in DOE 5480.19.
CONCERN: (TSA-4) (PT.8-3) (H1/C1) CAT. II	At the Los Alamos National Laboratory, gas cylinders are stored and transported without proper labelling, marking, and vehicle placarding, contrary to the requirements contained in 49 CFR and DOE 5480.3.
CONCERN: (TSA-4) (PT.8-4) (H3/C1)	At Los Alamos National Laboratory, incorrect use of the Hazardous Materials Transfer Form results in the shipping paper documentation requirements of DOE 5480.3 and the Department of Transportation regulations not being met.

CONCERN: (TSA-4) (PT.9-1) (H2/C1)
Approved procedures for offsite shipments from Los Alamos National Laboratory are not established as required by DOE 5480.3. and DOE 1540.1.

CONCERN: (TSA-4) (PT.10-1) (H3/C1)
Maintenance of shipping records at the Los Alamos National Laboratory does not meet the requirements of DOE 5480.3, DOE 5700.6B, DOE 5700.6C, and ASME NQA-1-1989.

CONCERN: (TSA-4) (PT.12-1) (H2/C1)
The Los Alamos National Laboratory program for the storage, maintenance, and inventory of packagings does not meet the requirements of DOE 5480.3.

CONCERN: (TSA-4) (PT.12-2) (H3/C1)
Los Alamos National Laboratory ships explosives in boxes which do not meet the requirements of Department of Transportation regulations 49 CFR 173 and 178.

4.5.4.10 Security/Safety Interface

CONCERN:
See Concern TSA-4, TS.3-2.

CONCERN: (TSA-4) (SS.2-1) (H1/C2)
The Los Alamos National Laboratory does not have a systematic process that identifies and corrects potentially serious security-related emergency egress interferences.

CONCERN: (TSA-4) (SS.3-1) (H2/C1)
The Los Alamos National laboratory has not performed analyses of the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components, and hazardous materials and processes as required by DOE 5480.16.

CONCERN: (TSA-4) (SS.3-2) (H2/C1)
Responsibilities of facility operations personnel and protective force personnel during security emergencies are not defined in Los Alamos National Laboratory facility emergency plans in accordance with DOE 5500.1B and DOE 5500.3A.

CONCERN: (TSA-4) (SS.4-1) (H1/C2)
Protective force personnel have not received training in the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components, and hazardous materials and processes at Los Alamos National Laboratory facilities.

CONCERN: (TSA-4) (SS.4-2) (H1/C2)
Protective force personnel do not receive facility-specific training in the chemical, radiological, and other hazards to which they might be exposed in most Los Alamos National Laboratory facilities.

CONCERN: (TSA-4) (SS.4-3) (H1/C2) Protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to emergencies at Los Alamos National Laboratory facilities.

CONCERN: (TSA-4) (SS.4-4) (H2/C2) The safety performance statistics of the Mason and Hanger-Silas Mason Company, Inc. protective force organization reflect an abnormally high Lost Workday Case Incidence Rate, and the Los Alamos National Laboratory has not corrected the problem.

4.5.4.11 Experimental Activities

CONCERN: (TSA-4) (EA.1-1) (H2/C1) At the Los Alamos National Laboratory, small multiuser facilities and buildings often lack formality in defining experimental group interactions and information flow as required by DOE 5480.19.

CONCERN: See Concern TSA-4, TS.2-2.

CONCERN: See Concern TSA-4, PP.6-3.

CONCERN: (TSA-4) (EA.2-1) (H2/C1) At the Los Alamos National Laboratory, the relationship between the Health and Safety Division and the line operating groups does not ensure preoperational independent reviews and does not comply with ANSI Z136.1 requirements.

CONCERN: (TSA-4) (EA.3-1) (H2/C1) At the Los Alamos National Laboratory, there is a lack of independent oversight and preoperational approval for experiments which may result in hazards being overlooked in standard operating procedures, contrary to the requirements of DOE 5480.19.

CONCERN: See Concern TSA-4, PP.6-3.

CONCERN: (TSA-4) (EA.4-1) (H2/C1) The Los Alamos National Laboratory's approach to rootcause analysis is flawed and fails to meet the requirements of DOE 5000.3A, DOE 5480.19, DOE 5484.1, and DOE 5481.1B.

4.5.4.12 Site/Facility Safety Review

CONCERN: (TSA-4) (FR.1-1) (H2/C1) The Los Alamos National Laboratory does not have a comprehensive independent internal safety review system for its nuclear and nonnuclear facilities that meets the requirements of DOE 5480.5 and DOE 5482.1B, Section 9.d.

CONCERN: (TSA-4) (FR.1-2) (H2/C2) The Los Alamos National Laboratory has not developed a policy or guidance that ensures all organizations have safety review systems that meet minimum requirements defined by the Laboratory.

CONCERN: (TSA-4) (FR.2-1) (H2/C1) Los Alamos National Laboratory oversight and line safety review organizations do not review all of the safety matters specified by DOE 5480.5 and DOE 5482.1B.

CONCERN: See Concern TSA-4, FR.1-1.

CONCERN: (TSA-4) (FR.4-1) (H3/C1) The Los Alamos National Laboratory independent safety appraisal program, does not require appraisals of facilities other than nuclear facilities as mandated by DOE 5482.1B, Section 9.d.

CONCERN: (TSA-4) (FR.4-2) (H2/C1) The Los Alamos National Laboratory is not performing nuclear and non-nuclear facility appraisals at the frequencies specified by DOE 5480.5 and DOE 5482.1B.

CONCERN: (TSA-4) (FR.5-1) (H3/C1) Los Alamos National Laboratory has not performed triennial reviews of the operation of the internal safety review system in accordance with the requirements of DOE 5480.5, DOE 5480.6, and DOE 5482.1B, Section 9.d.

CONCERN: (TSA-4) (FR.6-1) (H2/C2) The Los Alamos National Laboratory does not ensure that appropriate safety functions review Occurrence Reports for technical accuracy or for information.

CONCERN: (TSA-4) (FR.6-2) (H3/C1) The Los Alamos National Laboratory is not submitting occurrence reports within 10 days as required by DOE 5000.3A, Section 7.d.

4.5.4.13 Radiological Protection

CONCERN: (TSA-4) (RP.1-1) (H2/C1) At the Los Alamos National Laboratory, scheduled inspections and audits are not conducted by health and safety specialists as required by DOE 5480.11 and DOE 5482.1B; the closure of open items from previous audits has not been completed.

CONCERN: See Concern TSA-1, RP.3-1.

CONCERN: (TSA-4) (RP.2-1) (H2/C2) Los Alamos National Laboratory does not have documented procedures for evaluating and managing worker exposures to radioactive materials, as required by DOE 5480.4 and National Council on Radiation Protection and Measurements Report Number 65.

CONCERN: (TSA-4) (RP.2-2) (H2/C1)	The Los Alamos National Laboratory Radiological Occurrence Reporting System is not defined or implemented with trend analysis and followup and is not consistent with DOE 5000.3A.
CONCERN: (TSA-4) (RP.2-3) (H2/C1)	Los Alamos National Laboratory has not implemented a formal sitewide radiological protection performance indicator program as required by DOE 5482.1B and SEN-29-91.
CONCERN:	See Concern TSA-1, RP.3-2.
CONCERN: (TSA-4) (RP.3-1) (H2/C1)	At the Los Alamos National Laboratory, specification of radiologically controlled areas and the posting of the radiological conditions of hot-spots, access points, and perimeters are not consistently in compliance with the requirements of DOE 5480.11.
CONCERN: (TSA-4) (RP.3-2) (H2/C2)	The practice of storing materials and radioactive wastes at Los Alamos National Laboratory does not comply with recommendations given in DOE 4330.4A, Chapter 2.
CONCERN:	See Concern TSA-1, RP.3-1.
CONCERN: (TSA-4) (RP.3-3) (H1/C1) CAT. II	At the Los Alamos National Laboratory, the two gamma irradiators in the TA-43 Health Research Laboratory do not have positive controls for radiological protection as required by ANSI N543-1974.
CONCERN: (TSA-4) (RP.3-4) (H2/C1)	There is no program at Los Alamos National Laboratory to identify deficiencies in radioactive source control and to assure the integrity of encapsulated sources, as required by Los Alamos National Laboratory AR 3-4.
CONCERN: (TSA-4) (RP.3-5) (H2/C1)	The source control and audit program (inventory, location, and custodian) does not comply with Los Alamos National Laboratory AR 3-4.
CONCERN: (TSA-4) (RP5-1) (H2/C1)	The Los Alamos National Laboratory personnel dosimeter can not accurately measure some radiations to which workers are exposed as required by DOE 5480.11.
CONCERN: (TSA-4) (RP.5-2) (H2/C1)	At the Los Alamos National Laboratory an effective personnel dosimeter exchange program is not in place, and this deficiency is an unresolved issue from a previous appraisal conducted under requirements of DOE 5480.15.

CONCERN: (TSA-4) (RP.5-3) (H2/C1)	At the Los Alamos National Laboratory, the correct use and wearing of personnel dosimeters to assure the accuracy of the measurement of worker dose as required by DOE 5480.11 and Los Alamos National Laboratory are not enforced.
CONCERN: (TSA-4) (RP.5-4) (H2/C1)	At the Los Alamos National Laboratory, there is no Health and Safety Division assurance that accurate monitoring of either external or internal exposures is accomplished using current procedures and policies or that DOE 5480.11 monitoring requirements are satisfied.
CONCERN: (TSA-4) (RP.5-5) (H2/C1)	The Los Alamos National Laboratory extremity dosimetry system cannot meet the external radiation monitoring and accuracy requirements specified in DOE 5480.11.
CONCERN: (TSA-4) (RP.7-1) (H2/C1)	Los Alamos National Laboratory is not effectively identifying workers for whom bioassay is required under DOE 5480.11.
CONCERN: (TSA-4) (RP.7-2) (H2/C1)	Procedures for collecting, processing, and analyzing some bioassay samples do not ensure the accuracy, timeliness, and quality of internal dose assessment as required by DOE 5480.11 and Los Alamos National Laboratory AR 3-6, Appendix G.
CONCERN: (TSA-4) (RP.7-3) (H2/C1)	The Los Alamos National Laboratory internal dosimetry program lacks the functional elements of an internal audit program to assure the quality and accuracy of bioassay measurements required by DOE 5480.11 and DOE 5480.1B.
CONCERN: (TSA-4) (RP.7-4) (H2/C2)	At the Los Alamos National Laboratory, characterization of airborne radioactive material is not performed to allow appropriate assessment of internal dose as suggested by DOE 5480.11.
CONCERN: (TSA-4) (RP.7-5) (H2/C1)	At the Los Alamos National Laboratory, the In Vivo Measurements Laboratory cannot provide monitoring appropriate to the workplace or adequate to demonstrate compliance with radiation protection standards as currently required by DOE 5480.11.
CONCERN: (TSA-4) (RP.10-1) (H1/C1)	At the Los Alamos National Laboratory, the lack of thorough radiation protection practices could result in loss of contamination control required by DOE 5480.11 and the release of radioactive materials in excess of limits specified in DOE 5400.5.

CONCERN: (TSA-4) (RP.10-2) (H2/C1)
Surface contamination limits for tritium and pure gamma emitters in Los Alamos National Laboratory AR 3-7, Appendix C, do not comply with the limits specified in DOE 5480.11.

CONCERN: (TSA-4) (RP.10-3) (H1/C1)
At the Los Alamos National Laboratory, engineered controls and radiological re-entry surveys are not performed following the loss of electrical power as required by DOE 5480.11; therefore, contamination control cannot be assured.

CONCERN: (TSA-4) (RP.10-4) (H1/C1)
The Los Alamos National Laboratory radiation protection plans and procedures do not preclude the spread of radioactive contamination to employees and the public as required by DOE 5480.11 and DOE 5400.5.

CONCERN: (TSA-4) (RP.10-5) (H2/C1)
At the Los Alamos National Laboratory, the partial cleanup of sites following test-firing of depleted uranium does not prevent the further release of uranium to the environment or the spread of contamination by workers on the site; satisfactory cleanup is required by DOE 5400.5.

CONCERN: (TSA-4) (RP.10-6) (H2/C1)
At the Los Alamos National Laboratory, there are deficiencies in the procedures and documentation of health physics surveys, bioassay results, and studies on the spread of contamination by airborne transport or other means after test-firings using depleted uranium; these radiological protection procedures are required to document need, quality, and appropriateness as required by DOE 5480.11.

CONCERN:
See Concern TSA-1, RP.11-1.

4.5.4.14 Personnel Protection

CONCERN: (TSA-4) (PP.1-1) (H2/C1)
The Los Alamos National Laboratory line management safety program is not applied in a coordinated fashion with clearly established roles and responsibilities and does not address safety and health programmatic issues as required by DOE 5483.1A, DOE 5480.1B and DOE 5480.10.

CONCERN: (TSA-4) (PP.1-2) (H2/C1)
At the Los Alamos National Laboratory, health and safety personnel resources are not distributed and managed around a strategic plan with established programmatic goals, objectives and priorities, and with clearly defined roles and responsibilities as required by DOE 5480.1B and DOE 5480.10.

CONCERN: (TSA-4) (PP.1-3) (H2/C1)
Los Alamos National Laboratory does not conduct a program to assure and verify the implementation and enforcement of health and safety program requirements as required by DOE 5482.1B, DOE 5480.10, and DOE 5480.9.

CONCERN: (TSA-4) (PP.2-1) (H1/C1)
Administrative requirements in the Los Alamos National Laboratory The Laboratory Manual, Chapter 1, "Environment, Safety and Health" often are not implemented, are not enforced, do not address all credible hazards, and do not comply with various Occupational Safety and Health Administration regulations, DOE 5483.1A, and DOE 5480.10.

CONCERN: (TSA-4) (PP.2-2) (H1/C1) CAT. II
At the Los Alamos National Laboratory hazardous energy sources are not being controlled through a lockout/tagout program which meets, as a minimum, the requirements of 29 CFR 1910.147 and DOE 5480.19.

CONCERN: (TSA-4) (PP.2-3) (H1/C1)
Los Alamos National Laboratory does not conduct effective health and safety review and oversight of Johnson Controls World Services, Inc., as required by DOE 5483.1A, DOE 5480.9 and DOE 5482.1B, which is demonstrated by the numerous noncompliances found in Johnson Controls World Services, Inc., procedures and operations.

CONCERN: (TSA-4) (PP.2-4) (H2/C1)
Roles, responsibilities, and authorities for individuals and groups with safety and health functions are not clearly defined in Los Alamos National Laboratory policy and procedure as required by DOE 5480.1B and DOE 5480.10.

CONCERN: (TSA-4) (PP.2-5) (H1/C1)
The Los Alamos National Laboratory work authorization and permit process does not effectively identify and control safety and health hazards as specified by DOE 5480.19 and DOE 5480.10.

CONCERN: (TSA-4) (PP.2-6) (H2/C1)
At the Los Alamos National Laboratory, the Industrial Hygiene Group, Health and Safety Division, has not established criteria to initiate and conduct many technical functions to assure the quality and adequacy of data collected as required by DOE 5480.10.

CONCERN: (TSA-4) (PP.3-1) (H1/C1)
Los Alamos National Laboratory has neither established the systems and processes, nor clearly assigned the responsibility, to identify, evaluate, and control health and safety hazards as required by DOE 5480.1B and DOE 5480.10.

CONCERN: (TSA-4) (PP.3-2) (H2/C1)
At the Los Alamos National Laboratory, comprehensive and coordinated efforts between the Health and Safety Division, line management, and Medical Services are not established to ensure that occupational exposure to hazardous materials are evaluated and controlled as required by DOE 5480.10.

CONCERN: (TSA-4) (PP.4-1) (H2/C1)
A program to perform health and safety surveillance, oversight, and appraisals has not been implemented at Los Alamos National Laboratory as required by DOE 5480.10 and DOE 5482.1B.

CONCERN: (TSA-4) (PP.4-2) (H1/C1)
At the Los Alamos National Laboratory, effective programs are not in place to identify, evaluate, monitor, and control credible chemical, physical, and safety hazards as required by DOE 5480.10, DOE 5480.4 and Occupational Safety and Health Administrations regulations.

CONCERN:
See Concern TSA-4, WS.3-1.

CONCERN:
See Concern TSA-4, TC.1.1.

CONCERN: (TSA-4) (PP.6-1) (H1/C1) CAT. II
Los Alamos National Laboratory exercises little, if any, management or technical oversight and control of asbestos abatement activities, and abatement actions are not conducted in compliance with 29 CFR 1926.58 and Environmental Protection Agency "Guidance for Controlling Asbestos Containing Materials in Buildings."

CONCERN: (TSA-4) (PP.6-2) (H1/C1)
Los Alamos National Laboratory has not developed and implemented an effective carcinogen program as required by DOE 5480.10 and 29 CFR 1910.1200 and does not consistently enforce its own procedure.

CONCERN: (TSA-4) (PP.6-3) (H1/C1) CAT. II
Laser operations are not in compliance with Los Alamos National Laboratory AR 5-2, ANSI Z136.1-1986, and DOE 5480.4.

CONCERN: (TSA-4) (PP.6-4) (H1/C1) CAT. II
Los Alamos National Laboratory confined space entry is not controlled by a qualified person and procedures do not conform to ANSI Z117.1-1989 which is mandated by DOE 5480.4 and Draft 29 CFR 1910.146.

CONCERN: (TSA-4) (PP.6-5) (H1/C1)
At the Los Alamos National Laboratory, chemical handling and storage does not comply with requirements of Occupational Safety and Health Administration regulations mandated by DOE 5480.4, such as 29 CFR 1910.1200 and 29 CFR 1910, subpart H.

4.5.4.15 Worker Safety and Health (OSHA) Compliance

CONCERN:
See Concern TSA-4, PP.6-4.

CONCERN: (TSA-4) (WS.3-1) (H1/C1)
Los Alamos National Laboratory, does not fully comply with the requirements of 29 CFR 1910.1200, Hazard Communications and 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.

CONCERN: (TSA-4) (WS.3-2) (H1/C1)
At the Los Alamos National Laboratory, emergency eyewash and shower facilities are not always available or readily accessible as specified in 29 CFR 1910, Subpart K, Medical and First Aid.

CONCERN: (TSA-4) (WS.4-1) (H1/C1)
At the Los Alamos National Laboratory, danger, warning, and safety information signs are not consistently posted as required by 29 CFR 1910, and 29 CFR 1926.

CONCERN: (TSA-4) (WS.4-2) (H1/C1) CAT. II
At the Los Alamos National Laboratory, machine guarding does not meet the requirements of 29 CFR 1910, Subpart O, Machinery and Machine Guarding.

CONCERN:
See Concern TSA-4, FP.2-1.

CONCERN: (TSA-4) (WS.4-3) (H1/C1) CAT. II
Los Alamos National Laboratories does not comply with 29 CFR 1910, Subpart S, Electrical, in that electrical hazards present shock or electrocution hazards.

CONCERN: (TSA-4) (WS.5-1) (H1/C1) CAT. I
Excavation work at the Los Alamos National Laboratory is not conducted in accordance with 29 CFR 1926, Subpart P, Excavations, and Subpart C, General Safety and Health Provisions.

CONCERN: (TSA-4) (WS.5-2) (H1/C1) CAT. II
Los Alamos National Laboratory has not developed, implemented, and enforced a comprehensive safety oversight program to ensure that construction subcontractors comply with all applicable sections of 29 CFR 1926.

4.5.4.16 Fire Protection

CONCERN: (TSA-4) (FP.1-1) (H2/C1)
The Los Alamos National Laboratory Fire Protection Program and organization is not well defined and does not achieve compliance with DOE 5480.7.

CONCERN: (TSA-4) (FP.1-2) (H2/C1)
The Albuquerque Field Office is not performing fire protection appraisals of Los Alamos National Laboratory in a manner which will assure compliance with DOE 5480.7.

CONCERN: (TSA-4) (FP.2-1) (H1/C1) CAT. II

Most NFPA 101, Life Safety Code, issues are not being identified or addressed in existing buildings at Los Alamos National Laboratory.

CONCERN: (TSA-4) (FP.2-2) (H1/C1)

NFPA 101, Life Safety Code issues, are not being identified or addressed at the Los Alamos Area Office building.

CONCERN: (TSA-4) (FP.2-3) (H1/C1) CAT. II

At the Los Alamos National Laboratory, review of new designs, major building modifications, and changes in experimental activities are not being thoroughly conducted for NFPA 101, Life Safety Code, concerns or compliance with DOE 6430.1A during design or prior to building occupancy.

CONCERN: (TSA-4) (FP.2-4) (H1/C1) CAT. II

The emergency voice notification systems at Los Alamos National Laboratory are not designed, installed, or maintained in accordance with NFPA 72.

CONCERN: (TSA-4) (FP.3-1) (H1/C2)

At the Los Alamos National Laboratory, automatic fire suppression systems and reliable fire department access for response to prevent an uncontrolled fire and associated hazardous material release are not in place at TA-54.

CONCERN: (TSA-4) (FP.3-2) (H1/C2)

Los Alamos National Laboratory has not evaluated the need for automatic fire suppression in the final high-efficiency particulate air filter system at the TA-3 Chemical and Metallurgical Research Building as required by DOE 6430.1A.

CONCERN: (TSA-4) (FP.3-3) (H1/C1)

The Los Alamos National Laboratory fire alarm computer equipment and associated wiring has not been certified, installed, or maintained in strict compliance with national codes and standards, which include NFPA 72, for the monitoring of Los Alamos National Laboratory and public fire alarms and the dispatching of Los Alamos National Laboratory and County-wide 911 emergencies.

CONCERN: (TSA-4) (FP.4-1) (H1/C1)

Automatic fire suppression systems are not in place at TA-57 to prevent a loss in excess of the limits set by DOE 5480.7.

CONCERN: (TSA-4) (FP.4-2) (H1/C1)

In depth evaluations, required by DOE 5480.7, to assess the vulnerability of Los Alamos National Laboratory to unacceptable program delays and shutdowns have not been completed in depth for all facilities.

CONCERN: (TSA-4) (FP.5-1) (H1/C1)	At the Los Alamos National Laboratory, facilities with a fire loss potential in excess of the limits specified by DOE 5480.7 have not been completely identified.
CONCERN: (TSA-4) (FP.6-1) (H1/C2)	Los Alamos Area Office has not assured that the Los Alamos County Fire Department is provided with a level of training which permits the Department to safely mitigate fires involving hazardous materials or hazardous operations.
CONCERN: (TSA-4) (FP.6-2) (H1/C1) CAT. II	Los Alamos Area Office has not ensured that trained fire department personnel and apparatus will be available to mitigate fire emergencies at nuclear, experimental, and other vital facilities at the Los Alamos National Laboratory under all conditions as required by DOE 5480.7.
CONCERN: (TSA-4) (FP.6-3) (H1/C1)	Los Alamos Area Office has not ensured that the Los Alamos County Fire Department is not provided with a formal fire dispatch and communications capability to ensure prompt response and effective communications on the fire ground, while simultaneously responding to additional events and alarms as required by DOE 6430.1A.
CONCERN: (TSA-4) (FP.6-4) (H1/C1)	Los Alamos Area Office has not ensured the Los Alamos County Fire Department is in compliance with NFPA 1500, nor does it have a Department of Energy approved action plan for bringing the Fire Department into compliance.
CONCERN: (TSA-4) (FP.6-5) (H1/C1)	Los Alamos Area Office has not ensured level of fire department services required by DOE 5480.7 is being maintained or will be maintained in the future.
CONCERN: (TSA-4) (FP.6-6) (H1/C1)	Los Alamos Area Office has not ensured the Los Alamos County Fire Department has prepared preplans for all facilities at Los Alamos National Laboratory as required by the present contract; nor has LAAO ensured that Fire Department Officers in the Operations Division are sufficiently knowledgeable of Facilities at the Laboratory to ensure that they can safely direct the mitigation of fire events as required by DOE 5480.7.
CONCERN: (TSA-4) (FP.6-7) (H1/C1)	Los Alamos Area Office has not ensured that apparatus manning and firefighting levels as mandated by Department of Energy in the implementation of NFPA 1500 are not being met.

CONCERN: (TSA-4) (FP.6-8) (H1/C2)
The Los Alamos Area Office has not ensured that Los Alamos National Laboratory has established a procedure whereby the Los Alamos County Fire Department is notified promptly of changes in facility status or conditions which might affect firefighter safety or their ability to safely mitigate a fire event during routine or emergency operations.

CONCERN: (TSA-4) (FP.6-9) (H1/C2)
Los Alamos Area Office has not ensured the Los Alamos County Fire Department has developed an operational procedure and practice for the delivery of water to locations at the Los Alamos National Laboratory where water supply deficiencies exist.

CONCERN: (TSA-4) (FP.7-1) (H1/C1)
Known deficiencies in the Los Alamos National Laboratory fire protection systems are not being corrected in a timely manner as required by DOE 5480.7.

CONCERN: (TSA-4) (FP.7-2) (H1/C1)
At the Los Alamos National Laboratory, redundant water supplies and associated fire hydrant protection has not been provided for important facilities as required by DOE 6430.1A.

CONCERN: (TSA-4) (FP.7-3) (H1/C2)
The Los Alamos Area Office has not evaluated the potential impacts and means for mitigation of losses from a wildfire.

CONCERN: (TSA-4) (FP.7-4) (H1/C1)
At the Los Alamos National Laboratory, telecommunication equipment is not protected as required in DOE 6430.1A to prevent the loss of fire alarm communications as well as building communications.

CONCERN: (TSA-4) (FP.7-5) (H1/C1)
At the Los Alamos National Laboratory, procedures and policies are not in place to ensure that fire protection equipment is maintained and tested in accordance with National Fire Protection Association codes and to ensure that equipment is removed from service when listing and/or approvals are discontinued.

CONCERN: (TSA-4) (FP.7-6) (H1/C2)
The Department of Energy, Environmental and Health Office, does not have a mechanism in place to inform field elements of changes in fire protection equipment listings.

4.5.4.17 Aviation Safety

CONCERN: (TSA-4) (AS.1-1) (H2/C1)
The Albuquerque Field Office has not ensured that the Los Alamos Airport receive the aviation safety oversight required by AL 5480.13 and AL 5482.1A.

CONCERN: (TSA-4) (AS.1-2) (H2/C1)	Los Alamos National Laboratory has failed to establish and document an aviation safety program as required in AL 5480.13, paragraph 7.g.(1).
CONCERN: (TSA-4) (AS.1-3) (H2/C1)	Los Alamos National Laboratory has failed to provide the necessary staff, equipment, funding, and other support for the conduct of an aviation safety program as required by AL 5480.13, paragraph 7.g.(2).
CONCERN: (TSA-4) (AS.1-4) (H2/C1)	The Los Alamos Area Office has not assured that Los Alamos National Laboratory complies with the management review and audit requirements of AL 5480.13 and AL 5482.1A. (See Concern TSA-4, AS.1-2.)
CONCERN: (TSA-4) (AS.1-5) (H2/C1)	Management of the Los Alamos Area Office has not recommended internal organization, policies, and authorities required to carry out the functions assigned to the Area Office by AL 1120, Chapter IV, Section 13, "Distribution of Functions within the Los Alamos Area Office."
CONCERN: (TSA-4) (AS.1-6) (H1/C2)	The Los Alamos Area Office has not developed a master plan for the Los Alamos Airport as defined in Federal Aviation Administration Advisory Circular 150/5070-6A.
CONCERN: (TSA-4) (AS.1-7) (H2/C2)	The Los Alamos Area Office has not ensured that all airport fire and rescue personnel are trained as required by 14 CFR 139.319 and the Los Alamos Airport Certification Manual.
CONCERN: (TSA-4) (AS.2-1) (H2/C2)	Ross Aviation, Inc., is not in full compliance with the passenger briefing requirements of 14 CFR 121.571(b) and DOE 5480.13.
CONCERN: (TSA-4) (AS.2-2) (H3/C2)	Ross Aviation, Inc., is not in compliance with 14 CFR 121.135(a)(1) and DOE 5480.13 regarding normal and emergency exits.
CONCERN: (TSA-4) (AS.2-3) (H2/C2)	The Ross Aviation, Inc., documentation of windshear ground and flight training does not assure that the requirements of 14 CFR 121.409, 121.419, 121.424, and 121.427 have been achieved.
CONCERN: (TSA-4) (AS.3-1) (H2/C1)	Ross Aviation, Inc., has failed to ensure that all General Maintenance Manuals contain the latest revision in accordance with 14 CFR 121.133(a) and 135.21(a).

CONCERN: (TSA-4) (AS.3-2) (H3/C1) Ross Aviation, Inc., "Post Flight" inspection on the Lear 35 and the King Air is not always performed, as required by the Ross General Maintenance Manual.

CONCERN: (TSA-4) (AS.3-3) (H1/C1) Ross Aviation, Inc., is not in compliance with the emergency exit marking requirements of 14 CFR 121.310; the Department of Energy requires passenger carrying aircraft to comply with 14 CFR 121.

CONCERN: (TSA-4) (AS.3-4) (H3/C1) The Ross Aviation Inc., General Maintenance Manual is not formatted in accordance with 14 CFR 121.133 and 135.23.

CONCERN: (TSA-4) (AS.3-5) (H2/C2) Ross Aviation, Inc., is not in compliance with NFPA 407 and the refueling vehicle markings requirements of the Ross General Maintenance Manual.

CONCERN: (TSA-4) (AS.3-6) (H3/C2) Ross Aviation, Inc., has not complied with aircraft maintenance personnel training requirements of 14 CFR 121.375.

4.5.4.18 Explosives Safety

CONCERN: (TSA-4) (ES.1-1) (H1/C1) At the Los Alamos National Laboratory, transient personnel near several remote operations involving explosives are not protected from possible exposure to overpressures and fragments in excess of those permitted by paragraph 4, Chapter VI, DOE/EV/06149, Explosives Safety Manual.

CONCERN: (TSA-4) (ES.3-1) (H2/C1) Los Alamos National Laboratory does not provide internal appraisals or frequent oversight of explosives activities by qualified explosives safety personnel as required by Chapter VII, DOE/EV/06194, Explosives Safety Manual, and DOE 5482.1B.

CONCERN: (TSA-4) (ES.3-2) (H2/C2) The Los Alamos Area Office safety personnel do not provide oversight of explosives safety concerns at the Los Alamos National Laboratory.

CONCERN: (TSA-4) (ES.3-3) (H1/C1) At the Los Alamos National Laboratory, one explosives machining operation does not contain interlocks required by paragraph 12, Chapter II, DOE/EV/06194, Explosives Safety Manual.

CONCERN: (TSA-4) (ES.4-1) (H2/C1) The explosives training and qualification program of the Los Alamos National Laboratory does not comply with the requirements and scope specified by Chapter V, DOE/EV/06149, Explosives Safety Manual. (Also see Concern TSA-4, TC.1-1.)

CONCERN: (TSA-4) (ES.5-1) (H1/C1)
At the Los Alamos National Laboratory, operating personnel are not always provided the level of protection specified in Chapter VI, DOE/EV/06149, Explosives Safety Manual.

CONCERN: (TSA-4) (ES.5-2) (H1/C2)
At the Los Alamos National Laboratory, several explosives operating and storage structures are not protected from electrical hazards resulting from breaks in nearby electrical service lines as recommended by paragraph 6-10, AMC-R 385-100, AMC Safety Manual.

CONCERN: (TSA-4) (ES.5-3) (H2/C1)
At the Los Alamos National Laboratory, lightning protection for several structures containing explosives is not installed in accordance with Chapter II, DOE/EV/06149, Explosives Safety Manual.

CONCERN: (TSA-4) (ES.7-1) (H1/C1)
At the Los Alamos National Laboratory, transportation procedures and facilities do not comply with requirements in paragraphs 2, 14, and 16, Chapter II, DOE/EV/06149, Explosives Safety Manual.

CONCERN: (TSA-4) (ES.7-2) (H1/C1)
At the Los Alamos National Laboratory, operations not permitted by paragraph 17, Chapter II, DOE/EV/06149, Explosives Safety Manual, are performed in a magazine containing explosives.

CONCERN: (TSA-4) (ES.7-3) (H2/C1)
At the Los Alamos National Laboratory, explosive items are stored in Service Magazines for longer periods than permitted by paragraph 17, Chapter II, DOE/EV/06149, Explosives Safety Manual.

CONCERN: (TSA-4) (ES.7-4) (H1/C1)
A Los Alamos National Laboratory Storage Review Program, as required by paragraph 17.3, DOE/EV/06194, Explosives Safety Manual, has not been established.

4.9 TEAM COMPOSITION AND AREAS OF RESPONSIBILITY

4.9.1 Plutonium and Enriched Uranium

Area of Responsibility	Name/Organization
EH Senior Manager	Oliver D.T. Lynch, Jr. Office of Performance Assessment Department of Energy
S&H Subteam Leader and TSA Team #1 Leader	Charles Grua Office of Performance Assessment Department of Energy
Organization and Administration	Harry J. Groh HJG, Inc.
Quality Verification	John H. Johnson Private Consultant
Operations	David H. Schultz COMEX Corp.
Maintenance	Thomas J. Mazour Private Consultant
Training and Certification	Nels C. Jensen EG&G Idaho, Inc.
Auxiliary Systems	James A. Cox Private Consultant
Emergency Preparedness	Joseph Lischinsky Applied Consultants, Inc.
Technical Support	Manrico C. Lara M.H. Chew & Associates, Inc.
Packaging and Transportation	Geoffry J. Quinn Wastren, Inc.
Nuclear Criticality Safety	O. Clinton Kolar M.H. Chew & Associates, Inc.
Security/Safety Interface	J. Kenneth Anderson Private Consultant

Experimental Activities Site/Facility Safety Review	Phillip A. Lowe Intech, Inc.
Radiological Protection	Carl. M. Stroud Pacific Northwest Laboratories
	James S. Durham Pacific Northwest Laboratories
Personnel Protection	Douglas P. Serpa Private Consultant
Worker Safety and Health (OSHA) Compliance	Jack J. Janda Comprehensive Environmental Health Services, Inc.
	Larry Perkins Martin Marietta Energy Systems
	John E. Sanchez EG&G - Rocky Flats
	Elmer R. Burd Timothy A. DeLong Timothy F. Thompson Halliburton NUS Environmental Corp.
Fire Protection	Wayne D. Holmes Professional Loss Control, Inc.
Natural Phenomena	Stephen J. Eder EQE Engineering Consultants, Inc.
	Michael W. Salman EQE Engineering Consultants, Inc.

Report Support, Observers, and Liaison

Technical Advisor to Team Leader	Neil M. Barss Office of Health Department of Energy
Coordinators	Lydia Guerra M.H. Chew & Associates, Inc.
	Robin Longerbeam Office of Performance Assessment Department of Energy
	Peggy Lewis Office of Quality & Safety Programs Department of Energy
Technical Editor	William E. Mott Private Consultant
Trainee (QV)	John L. McCabe Office of Performance Assessment Department of Energy

4.9.2 Reactor, Critical Assemblies, and Reactor Facilities

Area of Responsibility	Name/Organization
EH Senior Manager	Oliver D.T. Lynch, Jr. Office of Performance Assessment Department of Energy
Team Leader	Leonard M. Lojek Office of Performance Assessment Department of Energy
Organization and Administration and Security/Safety Interface	Lorin C Brinkerhoff Private Consultant
Quality Verification	R. J. (Nick) Wade WASTREN, Inc.
Operations	Robert W. Powell Private Consultant
	Earnest W. Johnson Private Consultant
Maintenance	Whitney Hanson Dolphin Enterprises
Training and Certification	Floyd L. McManus COMEX Corporation
Auxiliary Systems	David M. Johnson WASTREN, Inc.
Emergency Preparedness	George P. Bailey (Lead) Advanced Systems Technology, Inc.
Technical Support	Woodson B. Daspit W.B.D. Consulting Corporation
Packaging and Transportation	Doris E. White Westinghouse Hanford Company

Experimental Activities and Site/Facility Safety Review	Blake P. Brown Private Consultant
	Don L. Hobrock Private Consultant
Radiological Protection	Jack M. Selby Pacific Northwest Laboratories
	Joseph M. Garner Private Consultant
Personnel Protection	Phillip E. McBeath EG&G - Idaho
Worker Safety and Health (OSHA) Compliance	John E. Curtis EG&G - Idaho
	Richard D. Silvey Westinghouse Hanford Company
Fire Protection	Donald E. Kelley San Francisco Field Office Department of Energy
Medical Services	T. Guy Fortney, MD Private Consultant
	Dale E. Minner, MD Oak Ridge Associated Universities

Report Support, Observers, and Liaison

Technical Editor	Janis G. Ramey Private Consultant
Coordinators	Nancy Sanderson EG&G - Rocky Flats
	Olga Jones Lawrence Livermore National Laboratory

4.9.3 Accelerators

Area of Responsibility	Name/Organization
EH Senior Manager	Oliver D. T. Lynch, Jr. Office of Performance Assessment Department of Energy
Team Leader	Douglass S. Abramson Office of Performance Assessment Department of Energy
Organization and Administration; Security/Safety Interface	Leon H. Meyer The LHM Corporation
Quality Verification	William J. Kehew Chicago Field Office Department of Energy
	Richard V. De Rocher Brookhaven National Laboratory
Operations	Joseph J. Shonka Shonka Research Associates, Inc.
Maintenance	Michael D. Kinney WASTREN, Inc.
Training and Certification	Denelle E. Friar Westinghouse Hanford Company
Auxiliary Systems	Anthony N. Fasano Private Consultant
Technical Support	Philip J. Grant WASTREN, Inc.
Packaging and Transportation	John W. Arendt John W. Arendt Associates, Inc.
Experimental Activities; Site/Facility Safety Review	John A. Porter Private Consultant

Worker Safety and Health (OSHA) Compliance	Frederick M. McMillen Private Consultant
	Russell B. Baumeister Yucca Mountain Site Characterization Project Department of Energy
Fire Protection	Walter L. Futrell, Jr. Private Consultant
	James L. Betts Reynolds Electrical & Engineering Company
Personnel Protection	Ronald E. Alexander Environmental Management Associates
Radiological Protection	Steven Masciulli Vertechs, Inc.
	Joaquim G. Stephan Pacific Northwest Laboratory

Report Support, Observers, and Liaison

Coordinators	Stephanie G. West Westinghouse Env. Management Company of Ohio
	JaNae Shanahan EG&G Idaho
Technical Editor	Darla Treat Courtney Program Management, Inc.

4.9.4 Other Selected Facilities and Activities

Area of Responsibility	Name/Organization
EH Senior Manager	Oliver D. T. Lynch, Jr. Office of Performance Assessment Department of Energy
Team Leader	Richard H. Lasky Office of Performance Assessment Department of Energy
Organization and Administration	Bernard R. Kokenge BRK Associates, Inc.
Quality Verification	Howard E. Rew, Jr. Westinghouse Hanford Company
Operations	Lance T. Cole WASTREN, Inc.
	Winston H. Heneveld Private Consultant
Maintenance Engineering	William G. Jacobs Reynolds Electrical and Company
Training and Certification	John R. Doggette Oak Ridge Associated Universities
Auxiliary Systems	J R "Joe" Barkman (Lead) Oak Ridge Chemical Consultants, Inc.
	Robert L. Peterson Private Consultant
Emergency Preparedness	George P. Bailey (Lead) Advanced Systems Technology, Inc.
Technical Support Corporation	J. David Yesso Hallibuton NUS Environmental
	John M. Atwood Private Consultant

Packaging and Transportation	William A. Brobst (Lead) Transportation Environmental, Inc.
Security/Safety Interface and Site/Facility Safety Review	J. Kenneth Anderson (Lead) Private Consultant
Experimental Activities	Orville C. Barr M. H. Chew and Associates, Inc.
	Arthur B. Dennison EG&G Idaho, Inc.
Radiation Protection	Leo G. Faust (Lead) Pacific Northwest Laboratory
	Darrell R. Fisher Pacific Northwest Laboratory
Personnel Protection	Gary J. Gottfried Apex Environmental, Inc.
	Carol L. Vega MSE, Inc.
Workers Safety and Health (OSHA) Compliance	Robert M. Osborn Westinghouse Hanford Company
	Tommie S. Wright Pacific Northwest Laboratory
Fire Protection	Charles W. McKnight (Lead) Westinghouse Idaho Nuclear Company
Aviation Safety	Ruben P. Prichard Private Consultant
	Hugo R. Hoffman Private Consultant
Explosives Safety	Phillip G. Kelly Mason and Hanger-Silas Mason Company, Inc.
	Robert W. Gall San Francisco Field Office Department of Energy

Report Support, Observers, and Liaison

Coordinators	Norma B. Cameron Office of Performance Assessment Department of Energy
	Jan E. Hill EG&G Idaho, Inc.
Technical Editor	L. Warren (Lead) Private Consultant
OSHA 1B Specialists	David M. Drury Tobias E. Drury Delores A. Hagerty Comprehensive Environmental
Health	Services, Inc.