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Technical Safety Appraisal of the Nevada Test Site

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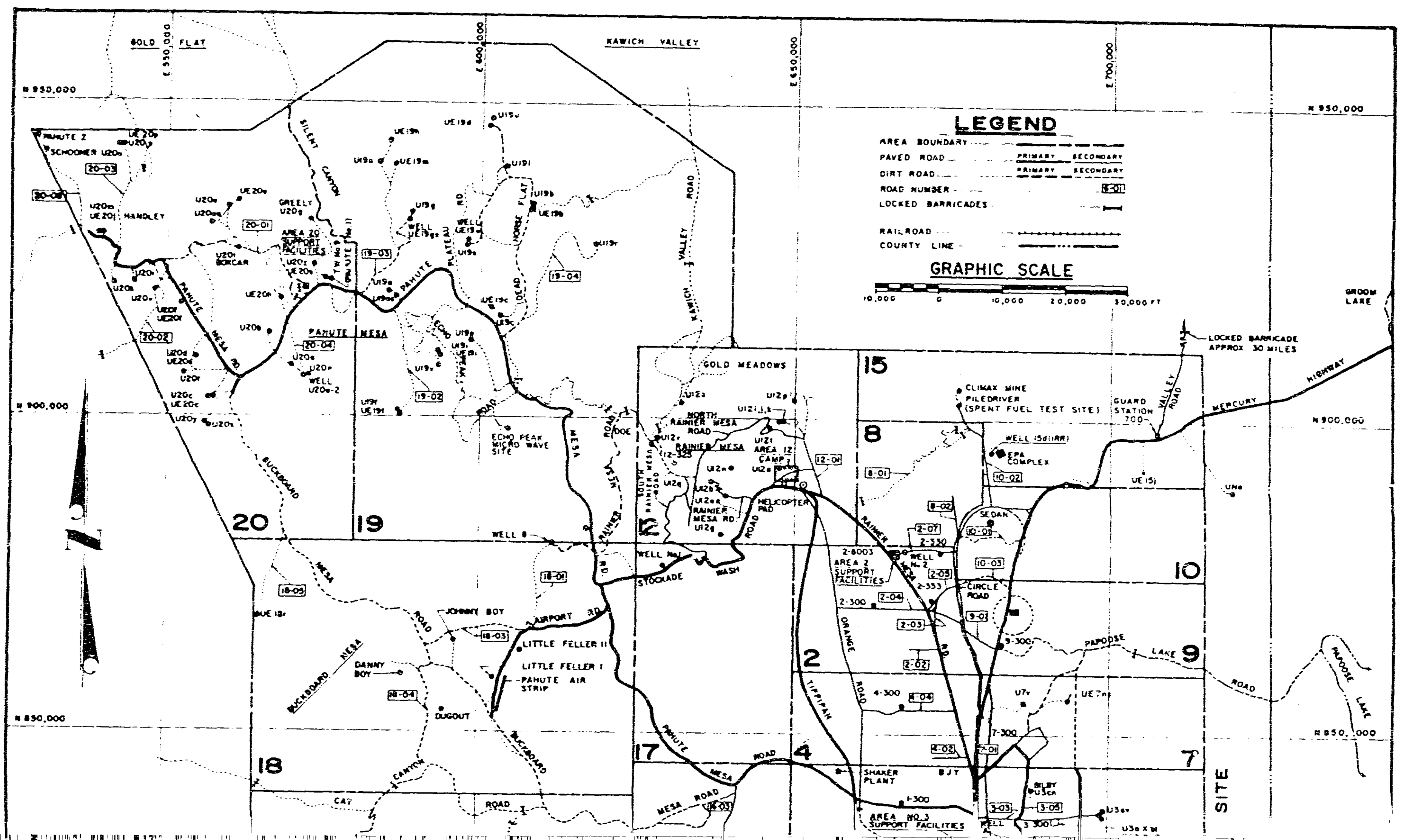
LEGEND
AREA BOUNDARY
PAVED ROAD
DIRT ROAD
PRIMARY
SECONDARY
ROAD NUMBER
LOCKED BARRICADES
RAILROAD
COUNTY LINE
GRAPHIC SCALE
10,000 0 10,000 20,000 30,000 FT
GOLD FLAT
KAWICH VALLEY
GROOM LAKE
LOCKED BARRICADE APPROX 30 MILES
MERCURY HIGHWAY
GUARD STATION 700
VALLEY ROAD
KAWICH VALLEY ROAD
GOLD MEADOWS
CLIMAX MINE
PILEDRIVER
(SPENT FUEL TEST SITE)
WELL 15d(RR)
EPA COMPLEX
SEDAN
CIRCLE ROAD
PAPOOSE LAKE ROAD
PAPOOSE LAKE
RAINIER MESA ROAD
NORTH RAINIER MESA ROAD
SOUTH RAINIER MESA ROAD
AREA 12 CAMP
HELICOPTER PAD
AREA 2 SUPPORT FACILITIES
ORANGE ROAD
TIPPIPAH
SHAKER PLANT
AREA NO. 3 SUPPORT FACILITIES
BJY
STOCKADE WASH
PAHUTE MESA ROAD
PAHUTE MESA RD
PAHUTE MESA
ECHO PEAK MICRO WAVE SITE
SILENT CANYON
AREA 20 SUPPORT FACILITIES
HANDLEY
BOXCAR
GREELY
PAHUTE 2
SCHOONER
HORSE FLAT
DEAD HORSE FLAT ROAD
PLATEAU RD
BUCKBOARD MESA
BUCKBOARD
JOHNNY BOY
DANNY BOY
DUGOUT
AIRPORT RD
LITTLE FELLER II
LITTLE FELLER I
PAHUTE AIR STRIP
CAT CANYON ROAD
WELL 8
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N 950,000
N 900,000
N 850,000
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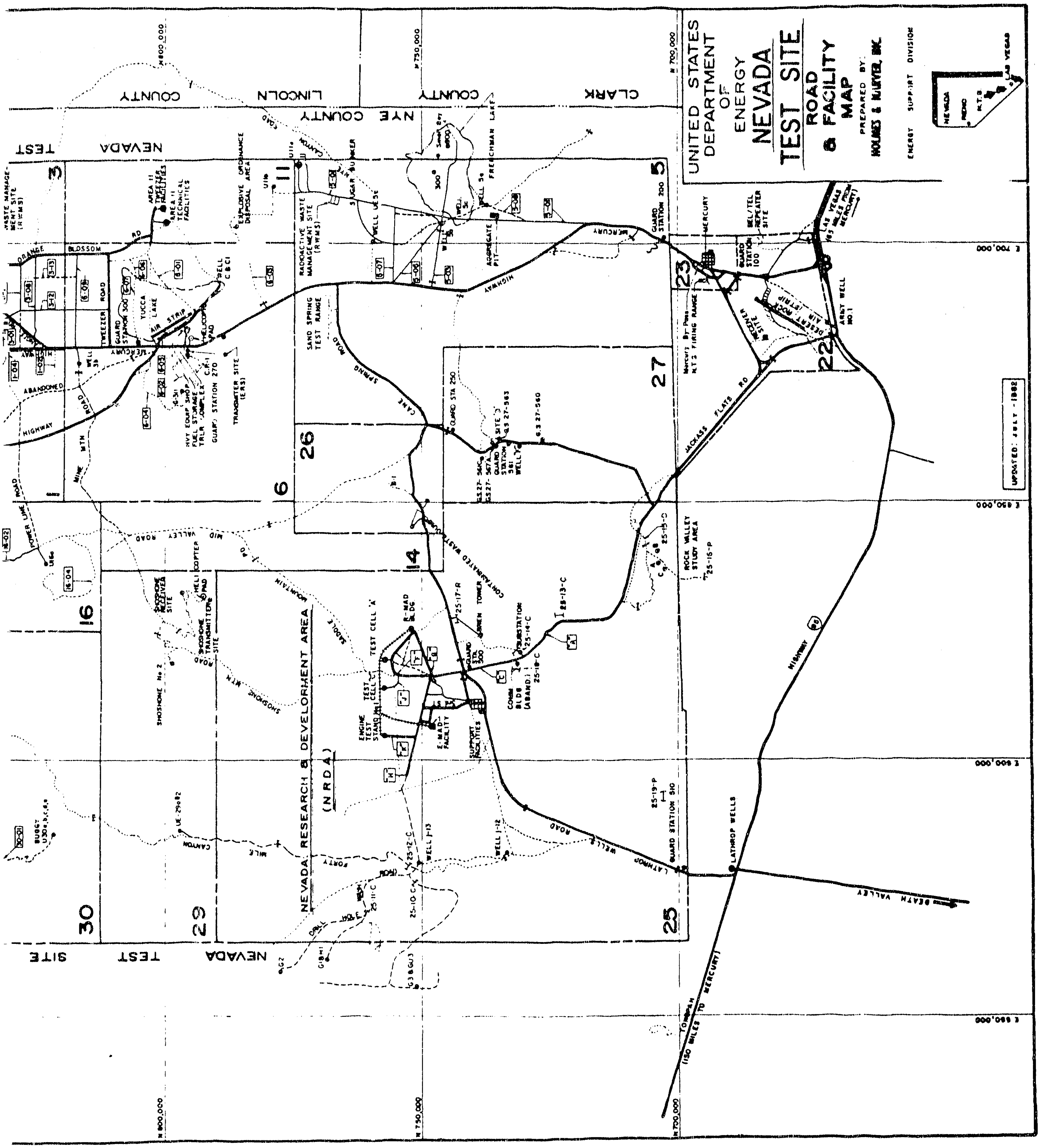
UNITED STATES
DEPARTMENT
OF
ENERGY
NEVADA
TEST SITE
ROAD
& FACILITY
MAP
PREPARED BY:
HOLMES & NARVER, INC.
ENERGY SUPPORT DIVISION
UPDATED: JULY - 1982
NEVADA TEST SITE
NYE COUNTY
LINCOLN COUNTY
CLARK COUNTY
NEVADA RESEARCH & DEVELOPMENT AREA
(NRDA)
MERCURY
HIGHWAY 95
JACKASS FLATS RD
LATHROP WELLS
DEATH VALLEY
150 MILES TO MERCURY
FRENCHMAN LAKE
YUCCA LAKE
AIR STRIP
ROCK VALLEY STUDY AREA
SAND SPRING TEST RANGE
CANE SPRING ROAD
MID VALLEY ROAD
SHOSHONE MTN ROAD
FORTY MILE CANYON
LATHROP WELLS ROAD
GUARD STATION 510
GUARD STATION 100
GUARD STATION 200
GUARD STATION 300
GUARD STA 250
ARMY WELL NO.1
N 800,000
N 750,000
N 700,000
E 700,000
E 650,000
E 600,000
E 550,000
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II. PERFORMANCE EVALUATION

This appraisal found that the safety and health (S&H) program at the Nevada Test Site (NTS) is being implemented by knowledgeable contractors, directed by the user laboratories, often utilizing the leading edge of technology. However, even though DOE Nevada Operations Office (NV) maintains the Nevada Test Site Office (NTSO) at the site, this appraisal found no effective NV S&H oversight presence at NTS. NV S&H staff are positioned at Las Vegas, and generally come to the NTS on a routine basis only in support of a nuclear test.

This lack of daily NV S&H staff presence at NTS appears to be a major factor in the inconsistent application of safety principles, especially in: Training, Radiation Protection, Industrial Hygiene, Low Voltage Electrical Safety, and Hazardous Materials Communications that have been identified during this appraisal. There has been a longstanding lack of NV direction of the NTS S&H activities not directly related to specific nuclear test support. There was, however, evidence that this situation has been recognized, and is being approached in a constructive manner.

Recent NV efforts to identify its S&H problems, as exemplified by the NV initiative to conduct a Mini-TSA of the NTS, have highlighted a number of concerns and recommendations, which, when addressed adequately, will advance the NTS S&H program considerably. Such efforts indicate that NV is moving to gain control of the S&H program at the NTS, and instill a modern safety culture. NV is beginning to organize its approach to the NTS S&H program, defining responsibilities for implementation (including delegation) and oversight, but this process is not yet consolidated and still will require user and contractor acceptance and implementation. A key milestone in this process is the essential agreements, transferring oversight of NTS S&H user laboratory activities to NV from the San Francisco (SAN) and Albuquerque (AL) Operations Offices. There is also a need for improvement of S&H internal review for all of the five principal NTS prime contractors (REECo, H&N, FSN, EG&G and WSI).

In general, OSHA compliance at NTS appears to be satisfactory, although a number of minor discrepancies were identified during this appraisal.

Recognizing a clear need for improvement in its day-to-day involvement in the NTS H&S program, NV has set a new course, and has begun to take the necessary steps to accomplish the required changes, but the process will take several years to effect full implementation.

III. FINDINGS AND CONCERNS

The NTS S&H Program is on the threshold of transition. NV is making progress to gain control of the ES&H Programs at NTS and to instill a modern safety culture; but this process has not been consolidated yet and will require user and contractor acceptance for full implementation. Although there were formal safety documents in use for mainline NTS operations, the formats were not uniform for all contractors and user organizations. This lack of uniformity and lack of formal safety requirements provided by NV/NTSO reflect insufficient NV guidance, which is compounded by the lack of NV oversight and enforcement of DOE safety policies.

In general, the contractors are well organized--they have detailed organizational charts and safety policies, manuals and directives. The S&H Program at NTS is carried out by knowledgeable contractors, directed by the user laboratories, often applying state-of-the-art technology.

T effectiveness of the S&H Program at NTS was generally satisfactory, as reported in subsequent sections. Some concerns were identified by the S&H Subteam; none were Category I. One concerning accountability of personnel in tunnels and shafts, was categorized as Category II. NV took compensatory actions during the appraisal to ensure full accountability of personnel in the tunnels and shafts on an interim basis while a permanent personnel accountability system is developed.

The majority of the concerns are Category III, and can be characterized predominantly in the areas of Emergency Preparedness, Radiation Protection, Personnel Protection (including Industrial Hygiene, Electrical Safety and Hazard Communication) and Training, although shortcomings were found in all areas. OSHA compliance appears good, based on inspections of selected facilities, although some minor deficiencies were observed. The deficiencies/shortcomings observed derive largely from the lack of effective NV/NTSO direction and oversight of the ES&H activities. There is no effective NV oversight presence at NTS. NV ES&H staff are positioned at Las Vegas, and rarely come to NTS on a routine basis except in direct support of a nuclear test. There is no NV ES&H staff daily presence at NTS.

NV has made a significant effort to identify ES&H problems, as exemplified by a recent Mini-TSA of NTS conducted by PAI Corporation (an outside consulting group), which identified a large number of concerns, and the document, Report of the REECo Environment, Safety and Health COmpliance Review Committee, October 1989. Adequate correction of the concerns identified by these evaluations will considerably enhance the NTS ES&H program.

The S&H Subteam identified four Noteworthy Practices: one in Emergency Preparedness, which allows a worker to warn others of a dangerous situation by means of a portable "panic button" while losing no time in exiting; one in Radiation Protection, on REECo development and use of a readout technique for its Track Etch neutron dosimetry; and two in Personnel Protection, on preventing fall injuries of workers around pits, and hazardous warning techniques in high traveled areas of shops.

A. ORGANIZATION AND ADMINISTRATION

The safety review of organization and administration at the Nevada Test Site included examination of the functions of support contractors, i.e., REECo, EG&G/EM, H&N and FSN, and to a lesser extent functions of the user organizations, i.e., LLNL, LANL, and SNL. Also, the management role of NVO/NTSO was examined because of the importance of its function in integrating the safety activities of the multiple contractors and user organizations.

In general, the on-site contractors are well organized. All have detailed organization charts and requisite safety policies, manuals and directives, although the FSN Health and Safety Manual was last updated in 1984 and therefore does not reflect the latest DOE requirements. (It is currently being revised.)

Overall safety coordination responsibility during device testing is specifically assigned to the appropriate user organization. Also, NVO/NTSO assigns responsibility for safety coordination to REECo during site preparation [NTS-SOP-5401, paragraph 3.j.(1)]. However, NVO/NTSO does not require preparation of Safety Assessment Documents (SADs) to record whether formal safety documents (such as safety evaluations and operating limits) must be provided. Although there were formal safety documents in use for mainline NTS operations (e.g., the Los Alamos Safety Manual for Field Test Operations), the formats were not uniform for all user organizations and contractors. This lack of uniformity and the lack of formal safety requirements imposed by NVO/NTSO reflects insufficient Field Office guidance and oversight of NTS operations and insufficient Field Office enforcement of DOE safety policy.

A number of examples cited in other Sections of this report provide further evidence that NVO and NTSO are not providing the management guidance and oversight required to assure an acceptable safety and health program at NTS.

Detailed position descriptions exist for management and employees other than union craftsmen. All personnel except craftsmen have periodic personnel evaluations. Safety is one element of the personnel evaluation process.

The contracts between DOE and the NTS contractors are the Cost Plus Award Fee (CPAF) type. Environment, Safety, and Health (ES&H) accounts for 51% of the CPAF for the REECo contract and 35% for the other contracts. The contractors have been getting excellent ratings from NVO, even though none of the contractors had a detailed safety program plan designed to qualify them for the maximum safety allocation of the contract fee.

REECo and EG&G/EM each prepare annual company safety goals. A review of the REECo goals for the past five years indicated that the goals were not always based on prior year achievements, and therefore, the organization was not challenged to continually improve its safety record. Neither FSN nor H&N formulate written annual company safety goals. The injury and illness ranking of FSN and H&N by the DOE's System Safety Development Center of DOE's architectural/engineering contractors lists FSN fifth (next to the bottom) and H&N sixth (the worst safety record) on a DOE-wide basis. Neither company has a formal program designed to increase the overall level of safety performance and, consequently, enhance their safety ranking.

Corporate support from parent organizations to each of the NTS contractors was minimal. However, at NTS each of these contractors acts as an autonomous entity within its parent corporation, i.e., the DOE contract is always with the local company and not the corporate parent. Nevertheless, each of the local NTS contractors indicated that it can obtain support from the parent organization when needed.

Within the last 18 months, NVO changed the emphasis and increased the oversight for the Unusual Occurrence reporting system, so that many more events are currently being designated and reported as Unusual Occurrences than was the case previous to the change. With this increase in quantities of Unusual Occurrence Reports (UORs), NVO is analyzing the reports to improve its guidance to contractors and user organization on criteria for designation of Unusual Occurrences and thereby to improve consistency in reporting. This effort is directed at eliminating cases where insignificant events are classified as Unusual Occurrences, and toward ensuring that all events with potentially serious consequences are properly classified as Unusual Occurrences.

REECo has the largest number of UORs of all the NTS contractors. However, REECo does not have a formal program to trend UORs to determine common causes and thus provide a mechanism for overall safety improvement. Although the other contractors and user organizations have relatively few UORs, only EG&G/EM is beginning to analyze the occurrences for trends or common causes. NVO, however, plans to analyze all UORs for trends. Another deficiency is that none of the NTS contractors or user organizations has a formal system for tracking progress on implementing corrective actions defined by Unusual Occurrence investigations and cited as recommendations in the UORs.

Some NTS operations do not conform to DOE 5481.1B. The operating contractor was not able to produce a Safety Analysis Report (SAR) for the Liquefied Gaseous Fuels Spill Test Facility (LGFSTF); and neither the SAR for the NTS Low-Level Waste Management activity nor the Preliminary Safety Analysis Report (PSAR) for the Device Assembly Facility contains Operational Safety Requirements.

Controlled documents were adequately regulated and updated. However, H&N allows its Environment, Safety and Health Protection Program Manual to be indiscriminately reproduced. Therefore, there were many uncontrolled working copies of this document, and there was no assurance that the unofficial copies were kept current.

All NTS contractors have an Alcohol and Drug Abuse Program. Each has developed a policy which has been published and distributed throughout each company. In general, each program includes preemployment screening, for-probable-cause screening, and a rehabilitation program. However, not all management personnel have been trained to detect alcohol and drug abuse and no refresher training is offered to management who received their initial training two or three years ago.

OA.2 ADMINISTRATION

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

FINDINGS:

The FSN Health and Safety Manual was last updated in 1984.

The FSN Health and Safety Manual does not fully address new or revised DOE orders issued since 1984.

The current FSN Health and Safety Manual does not require documentation of training for FSN personnel.

The safety inspection procedures contained in the FSN Health and Safety Manual require documenting only deficiencies and therefore do not document the complete scope of the inspection.

FSN is aware of these deficiencies and is currently revising its Health and Safety Manual; however, the completion date has not met established milestones.

CONCERN: (OA.2-1) (H2/C1)

The FSN Health and Safety Manual is outdated and does not reflect recent DOE requirements from orders issued since 1984.

FINDINGS:

The LGFSTF operated by EG&G/EM does not have an SAR, as required by DOE 5481.1B.

The NTS Low-Level Waste Management Operation (for which REECo is responsible) has an SAR that does not conform to the format stipulated by DOE 5481.1B, i.e., there is no section on Operational Limitations, commonly referred to as Operational Safety Requirements (OSRs).

The PSAR for the Device Assembly Facility (DAF) does not contain OSRs.

NVO Order NV 5481.1B of January 25, 1988, stipulates that the NVO Director, Program Management & Planning Division, "Assures that program sponsors are informed of the requirements of DOE Order 5481.1B.", and "Assures completion of such analysis prior to program operational activity." Furthermore, the NVO Order stipulates that NVO Contracting

Officers/Contracting Office Technical Representatives will "Assure that contracts and other appropriate documents contain provisions obligating NVO contractors and subcontractors to comply with the requirements of DOE Order 5481.1B." However, discussions with NVO and NTSO personnel indicated that there was no formal program to prepare Safety Assessment Documents (SADs) to record formally whether SARs and OSRs are required for each NTS operation covered by DOE 5481.1B.

CONCERN: See Concern TS.2-1.

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 injury and illness ranking of architectural/engineering (A&E) contractors, by DOE's System Safety Development Center, for the period 1984 through the second quarter 1989, lists FSN fifth (next to the bottom) and H&N sixth (the worst safety record) for DOE-wide A&E contractors.

Neither FSN nor H&N prepares an annual formal safety program plan. Furthermore, neither FSN nor H&N formulate written annual company goals as a means of improving their overall safety record as compared to other DOE A&E contractors. Both FSN and H&N, however, include health and safety in their personnel evaluation of management and personnel.

CONCERN (OA.3-1) (H2/C2) Neither Fenix and Scisson, Nevada, nor Holmes & Narver has a formal program or plan designed to improve the overall level of safety performance in their operations.

FINDINGS:

The REECo Occupational Safety and Fire Protection Division formulates and publishes safety performance goals as part of its annual safety enhancement program. These goals are for: (1) total OSHA recordable cases; (2) cases resulting in restricted work activity; (3) cases resulting in days away from work; and (4) vehicle accidents.

A review of these goals and actual performance for the last five years showed that the goals for one year did not normally call for an improvement over the previous year's performance. Therefore, REECo is not challenged to decrease its accident frequency and thereby enhance its overall safety performance.

CONCERN: (OA.3-2) (H3/C2) The annual safety performance program formulated by REECo does not always establish goals that stimulate improvement from year to year.

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: There is a general lack of direction or guidance from NVO/NTSO as exemplified by the following:

- Fragmentation of emergency preparedness responsibilities (See Concern EP.1-1).
- Lack of training for DOE emergency cadre (See Concern EP.3-1).
- Lack of guidance regarding systems for classifying emergencies (See Concern EP.6-1).
- Lack of guidance regarding accountability of persons entering underground tunnels or vertical shafts (See Concern EP.7-1).
- No identification of NTS facilities as nuclear facilities (See Concern FR.1-1).
- No coordinated NTS-wide operating experience review program (See Concern FR.6-1).
- Lack of uniform guidance in radiation posting (See Concerns RP.3-1 and RP.3-2).
- No site-wide training standards and requirements (See Concern TC.1-1).
- Lack of management directives regarding packaging and transportation (See Concerns PT.2-1, PT.3-1, and PT.3-2).

There is inadequate oversight by NVO/NTSO of the activities at NTS as noted in the following findings:

- Lack of oversight to ensure radiation worker training (See Concern TC.4-1)
- Lack of oversight of NTS operations regarding packaging and transportation (See Concerns PT.4-1 and PT.8-1).
- Delays in issuance of Quality Assurance (QA) audit reports (See Concern QV.1-2).
- Lack of oversight of NTS industrial hygiene programs (See Concern PP.1-4).

CONCERN: (OA.5-1) (H2/C1) There is a lack of overall guidance and oversight by NVO/NTSO of the activities at NTS.

FINDINGS: Discussions with NVO and NTSO management indicated that, despite efforts over the past few years to improve the quality of management decisions on designating an incident to be an Unusual Occurrence and to upgrade the quality of the UORs, inconsistencies still exist in incident designations between NTS contractors and even between different units of the same contractor. Efforts to classify unusual events according to DOE 5484.1B and DOE 5000.3 have not been completely successful, as exemplified below.

Some incidents, such as the premature initiation of a spill of hydrofluoric acid at the LGFSTF, were not treated as Unusual Occurrences, while other incidents, such as power outages without serious on-site consequences, were classified as Unusual Occurrences.

CONCERN: (OA.5-2) (H2/C2) The treatment afforded incidents that are likely to be designated as Unusual Occurrences is inconsistent between both NTS contractors and user organizations.

FINDING: Discussions with four NTS contractors (REECo, EG&G/EM, H&N, and FSN), three NTS user organizations (LANL, LLNL, and SNL), and NTSO revealed that of the local groups only EG&G/EM is beginning to analyze the results of the unusual occurrence investigations to determine whether there are trends that could identify root causes of generic site problems.

CONCERN: (OA.5-3) (H2/C2) The results of Unusual Occurrence investigations are not trended by user organizations and contractors to yield insights into root causes of generic site problems.

FINDING: None of the site contractors and none of the site user organizations had a formal tracking system in place to follow the status of progress in correcting deficiencies cited in UORs. Periodic status reports of the information in such tracking systems are needed to keep organization management apprised of the status of corrective actions defined by Unusual Occurrence investigations.

CONCERN: (OA.5-4) (H2/C2) No NTS contractor or user organization tracking systems are in place to follow status of progress in correcting deficiencies cited in UORs.

OA.7 DOCUMENT CONTROL

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

FINDINGS: H&N has an Environment, Safety and Health Protection Program Manual dated October 1988. This manual is intended to be a controlled document with rigorous controls to assure that all copies in use are kept current.

There were about 50 controlled copies, with at least one in each work place. However, H&N accepts the practice of letting anyone who wants a copy of the Manual to reproduce it, and use it as an uncontrolled working copy. Allowing uncontrolled working copies of the manual defeats the document control system.

CONCERN: (OA.7-1) (H2/C2) H&N cannot assure that the working copies of their Environment, Safety and Health Protection Program Manual are up-to-date.

OA.8 FITNESS FOR DUTY

PERFORMANCE OBJECTIVE: A 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 action.

FINDINGS:

REECo, FSN, H&N, EG&G, and WSI each has an alcohol and drug abuse policy which has been published and distributed throughout each company.

REECo developed a training program that provides eight hours of training for management personnel, four hours for union stewards, and a one hour abbreviated indoctrination for all other employees. These courses, which include training in techniques to identify substance abusers, were conducted about two years ago and have not been repeated for personnel who had the training at that time.

H&N and EG&G/EM management personnel attended the REECo eight-hour training course. However, not all H&N and EG&G/EM management personnel received this training, and their rank-and-file employees have not received any indoctrination training on substance abuse.

CONCERN: (OA.8-1) (H2/C2) Not all NTS contractor personnel have received substance abuse training, and no refresher training has been given to those who received this training over two years ago.

B. OPERATIONS

This review was of operations at the LGFSTF, the Operations Coordination Center and the tunneling, drilling, and low level waste facilities. The primary review was of the LGFSTF which provides an avenue for government and industry groups to determine the effects of a spill of hazardous liquids and gases and for methods of mitigating the resulting consequences. The LGFSTF has not operated since September 1988. The maximum credible accident resulting from concurrent release of all test fluids at LGFSTF has not been analyzed. There was no safety analysis document that governs the safety envelope under which the LGFSTF must be operated.

The Operations Coordination Center coordinates many activities among, which is the testing of devices. The Center is managed by DOE personnel and coordinates work with all site contractors. Activities at this Center were performed professionally, using manuals for guides.

Low level waste from both on-site and off-site sources is received and the containers inspected and then buried in open trenches with earth overburden. Each waste container is uniquely identified and its location in a burial trench recorded to enable subsequent recovery if required.

The tunneling, drilling, and low level waste facilities are managed by REECo. Labor unions provide journeymen from the required crafts. Apprentices receive appropriate on-the-job training from craft journeymen and specific training from other on-site or off-site contractors.

Logbooks and/or shift reports are maintained at the LGFSTF and at the low level waste, tunneling, and drilling facilities. These logbooks and reports contain the pertinent information that is needed for record purposes. However, some logbook data were not recorded in ink and there was no indication of persons other than the author having read the entries. The LGFSTF logbook was not at the facility.

About half of the REECo procedures have been revised in the last year. There was no requirement for procedures to be reviewed on a specific schedule. There was no place on some procedures to enter the date that the procedure was completed and to indicate that a review had been made to verify that the procedure was properly completed.

OP.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS: An analysis of the maximum credible accident at LGFSTF (e.g., concurrent release of all chemicals at the site) is not required. This analysis should be part of the pre-test documentation.

A document similar to an SAR with Operational Safety Requirements for nuclear facilities did not exist.

CONCERN: See Concern TS.2-1.

OP.2 CONDUCT OF OPERATIONS

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

FINDINGS: A review of the P Tunnel logbook (a bound ledger) revealed that entries were in both ink and pencil. Entries were clear and concise. Each shift's entry was initialled only by the person who made the entry. There is no record that personnel from succeeding shifts and supervision review this logbook.

Discussions with appropriate REECo Management, revealed that for drilling operations, the following reports were completed as permanent records:

- Drilling Shift Report.
- Daily Drilling Report.
- Daily Shift Rig Inspection Report.
- Daily Compressor Report Motor Book.

These reports are signed or initialled by the persons completing them. There was no record on the reports indicating that they were reviewed by higher supervision.

There are no requirements to make entries in ink, to permit no erasures, or to use only a single line through any entry that is to be deleted. A bound logbook was not used to record progress made and other significant events for the drilling operations.

The logbook for LGFSTF operations was in the possession of an individual who was on vacation. This logbook should be retained at the facility.

CONCERN: (OP.2-1) (H3/C2) Some logbooks are not being uniformly maintained at each facility and in a format that is needed for historical and legal records.

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:

A concerted effort has been made in recent months to update the REECo procedures in the Operations and Maintenance Division. About half of the REECo procedures were revised in the last year. Other REECo procedures have approval dates as far back as mid-1985. There is no requirement for periodic procedure review.

All procedures for the LGFSTF were approved in mid-1986. The facility has not been operating recently. Although there is no requirement for periodic procedure review, the facility manager stated that all procedures will be reviewed before they are used again.

CONCERN: (OP.3-1) (H3/C2)
A document that requires operating procedures to be reviewed on a specific schedule does not exist.

FINDINGS:

The document "Spill Test Facility Standard Operating Plan and Facility Operating Procedures" was approved in March 1989, by the facility manager and the DOE Operations Controller Representative. Section 4 of this document contains the operating procedures approved in 1986. There is no place to enter the date that an operating procedure is completed and no place for supervision to sign indicating that the procedure has been reviewed for proper completion of all steps.

During preparation for a test at LGFSTF in 1987, a valving error caused by not following the procedural steps, resulted in damage to the facility piping. A UOR was issued to document this incident.

CONCERN: (OP.3-2) (H2/C2)
Some procedures are neither dated nor signed to indicate that they have been reviewed for accuracy following completion of the steps.

C. MAINTENANCE

NTS on-site maintenance activities addressed during the TSA pertained to real property (DOE 4330.4), vehicle fleet, heavy operating and support equipment, and facilities. To the extent possible, maintenance activities pertaining to NTS test facilities, equipment and instrumentation as provided and/or operated by, or for, EG&G/EM, SNL, LANL, LLNL, and DOD/DNA were also addressed. In addition, the role and responsibilities of NTSO in these maintenance activities were also appraised.

The major portion of the NTS maintenance activities are performed by REECo. These maintenance activities are primarily associated with maintaining the real property, vehicle, heavy operating, and support equipment used in NTS activities. REECo also provides maintenance assistance to the other NTS users, upon request, for test oriented equipment, such as towers, and mining and drilling tools. EG&G/EM provides some on-site maintenance repair and calibration services to the laboratories, as does LLNL.

Overall maintenance activities at tne NTS are consistent with the requirements of DOE 4330.4, and meet the essential requirements of industry standards and good practices.

Real property, vehicle, heavy operating and support equipment maintenance provided by REECo was good and in compliance with DOE 4330.4, industry standards, and good practices. Recently, a computer-based maintenance system has been instituted within the REECo Site Maintenance Group in Area 23 (Mercury). When fully instituted throughout NTS, this system will provide improved tracking and maintenance services. Maintenance activities for special tunnel/mining equipment provided by REECo to DOD/DNA were not structured by a formal maintenance program and organization. Those portions of the NTS on-site maintenance provided by EG&G/EM and LLNL were also in compliance with industry standards, good practices, and acceptable QA standards.

Two concerns involving maintenance activities at NTS were cited. One concern, deals with the assignment of responsibility for maintenance activity without providing the authority or funding to carry out the activity. The other concern deals with lock and tag procedures for electrical boxes and equipment. Reference has also been made to a Personnel Protection (PP) concern regarding collection of flammable materials in a maintenance shop without adequate planning and documentation.

MA.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

Maintenance responsibilities for test facilities, equipment and materials (non-real property items) were not clearly designated and defined.

Responsibility for oversight of equipment maintenance activities is divided among different NVO groups; some in NVO and some in NTSO.

Responsibility for real property maintenance activities (i.e., buildings, HVAC, roads, etc.), fleet vehicles and equipment, and heavy operating equipment was assigned to REECo.

Maintenance of mining equipment for tunnels, such as the jumbos and alpine miners was assigned to REECo but was not structured by a formal, coordinated maintenance program or organization. Repair maintenance was performed when equipment fails and equipment overhaul was performed during equipment downtime. Daily maintenance (oil level checks, greasing, etc.) was performed during shift changes.

Maintenance of test oriented equipment, instrumentation and hardware (i.e., instrument trailers, towers and instrumentation), may be the assigned responsibility of EG&G, REECo, or the affected laboratory; LLNL, LANL, or SNL. In some cases the program, organization, responsibility, and authority to administer and control maintenance activities did not exist or were not specifically defined.

CONCERN: (MA.1-1) (H2/C2) Some non-real property maintenance activities required to ensure safety and compliance with DOE 5700.6B, as well as industry standards and good practices, are being overlooked.

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: Inspection of electrical service boxes in Areas 2 and 12 revealed that some were not in compliance with the National Electric Code.

Observation of a service activity on an electrical switchbox by electrical craftsmen revealed that improper and, in some cases, no lock and tag procedures were used.

CONCERN: (MA.2-1) (H2/C2) Lock and tag procedures are either not used or being improperly implemented.

FINDINGS: Paints and some other flammable and hazardous materials are being collected in a cement block walled room in Building 710 of Area 23. This is part of an effort to control hazardous materials and dispose of them in compliance with current regulations.

No safety plan or inventory of material present in the collection area was available or being maintained.

CONCERN: See Concern PP.6-6.

D. TRAINING AND CERTIFICATION

This review focused on training and certification activities related to site-wide safety training and to job-specific training for personnel who operate and maintain the Defense Waste Management facilities and the LGFSTF.

During the past several years, considerable improvements have been made in training conducted for NTS personnel, including the addition of full-time, professional trainers to contractor staffs. Training responsibilities are widely dispersed both among and within NTS prime contractor organizations. Some of these organizations, such as REECo Environmental Training, provide professional and well-documented programs. However, training and certification programs at NTS are inconsistently implemented, due to a lack of direction provided by NVO/NTSO. NVO/NTSO have recently undertaken an upgrade of the NTS Standard Operating Procedures (SOPs) to provide additional documentation for the conduct of NTS activities. However, this upgrade did not include any SOPs describing training and certification responsibilities, authorities, or standards for NTS. DOE direction is more important at the NTS than at other DOE sites because of the large number of prime contractors and users. NVO/NTSO is the one organizational unit to which all of the contractor and user organizations are responsible. Without NVO/NTSO standards or requirements for training programs (including records and testing), each contractor organization applies its own standards, many of which are left up to individual managers and supervisors to define and apply. Redundancies, inconsistencies and gaps in training result from this approach. For example, for hazard communication training, each contractor and user is allowed to develop different programs. While necessary for job-specific training, different programs result in redundant development of core training, the content of which should be the same for all NTS organizations. In some instances, particularly where on-the-job training is used, there were no training records. In other instances, there were attendance records, but no records of the content of the training provided. Few training programs for NTS personnel included examinations to document that trainees achieved the level of knowledge or skill required.

An effective site-wide requirement was not in place at the NTS to ensure that all radiation workers were provided the training required by DOE 5480.11.

TC.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

There were no written NVO/NTSO instructions or guidance concerning responsibilities, authorities, or standards for the conduct of training at NTS. NVO/NTSO has recently initiated an upgrade of NTS Standard Operating Procedures (SOPs), however, this did not include the development of any SOPs defining responsibilities, standards, or requirements for the training or qualification of NTS personnel.

The lack of site-wide standards or requirements has resulted in inconsistent and uneven training among personnel working in the same facility or area, along with inadequate documentation of training conducted. This is of particular concern at NTS because of the large number of contractor and user organizations on-site.

Fire fighters were trained one-hour per day on job related duties. Captains and chiefs conduct this training without lesson plans or other documentation of training content. During the emergency exercise conducted during this appraisal, the appraisal team observed that fire fighters demonstrated inadequate knowledge of measures to be taken to mitigate a chlorine spill.

Job-specific training for REECo Defense Waste personnel is conducted at safety meetings. No records of training content were maintained.

As discussed in detail in Section PT.5, training provided for personnel who prepare hazardous materials for off-site shipment does not meet the full intent of DOE 5480.3. This training was not supported by lesson plans and examinations.

As discussed in detail in Section EP.3, site-wide training for personnel who are responsible for implementing the NTS emergency plan was not standardized.

User organization personnel (e.g., LLNL) did not participate in NTS radiation worker training programs on the basis that their own training programs provided them with adequate knowledge. However, these training programs did not address NTS-specific radiation protection methods/requirements.

Training records were not maintained by REECo user groups to document general or job specific hazard communication training, and LLNL has not documented job-specific hazard communication training conducted by supervisors.

The Safety and Security Briefing videotape used to provide orientation training is not to up-to-date with respect to present codes, standards, and regulations. Discussions with REECo Environmental Training personnel responsible for this training indicated that they were aware of this deficiency. REECo developed a revised version of this videotape in January 1989 which had been submitted by NVO to DOE Headquarters for approval. Other DOE sites are not submitting their training materials to DOE Headquarters for approval. This practice, with the associated delays, results in these training materials not being used in a timely manner. Furthermore, this orientation training did not provide for any testing of personnel to determine whether they had achieved a satisfactory level of understanding of the material.

Training records for the LGFSTF were not retained as permanent records. Some of the training records only include an attendance list and the subject of the training. Lesson plans, other information describing training content, and examination records were not retained.

Materials used for training of NTS personnel do not always include learning objectives or other components of contemporary lesson plans. While REECo has 13 full-time trainers assigned to various organizational units, written requirements do not exist in all cases for these trainers to either develop or review training materials to ensure that they are adequate from an instructional perspective. None of the NTS prime contractors have any documented requirements with respect to instructor training or qualification.

CONCERN: (TC.1-1) (H2/C1) NVO has not provided site-wide training standards and requirements at NTS, and implementation and effectiveness of training is inconsistent.

TC.3 NUCLEAR FACILITY OPERATIONS OTHER THAN REACTORS

PERFORMANCE OBJECTIVE (Nuclear Facilities Only): The nuclear facility operator and supervisor training and certification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

Initial training for REECo Defense Waste Management Department personnel is a one-time three-day on-the-job training (OJT) session. There were no documented requirements concerning what is to be addressed during this OJT, nor any documentation of the completion of this training.

Job-specific training for waste management operations personnel is conducted through unstructured and undocumented on-the-job training and does not meet requirements of DOE 5480.5.

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

There is no assurance that initial on-the-job training for waste management operations personnel is effective.

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:

Personnel who have access to NTS receive a dosimeter. REECo Company Procedure 1.5.5, "NTS Radiation Worker Training," permits only individuals listed on the radiation worker qualification report to work in a radiological area. Radiation protection technicians in the Field Operations Department were tasked to enforce this requirement. However, this procedure only applies to REECo personnel. Parallel requirement for other NTS personnel do not exist.

The REECo Environmental Training organization publishes a monthly Training Summary Report listing, by organization, the number of radiation workers, the number that are untrained, those that are delinquent in their retraining, and those that are due for retraining within 90 days. This report is provided to each contractor, user, and to NVO. Indications are that neither contractor nor DOE personnel were using this report to rectify training deficiencies. For example, in June 1989 this report indicated that 25 LLNL identified radiation workers had not completed the REECo radiation worker training. This discrepancy was identified in the November 1989 Training Summary Report.

CONCERN: (TC.4-1) (H2/C1) There is no NVO oversight that ensures all NTS contractor, user, and visitor personnel radiation workers are provided the training required by DOE 5480.11.

TC.6 CRITICALITY SAFETY

PERFORMANCE OBJECTIVE (Reactors and Nuclear Facilities Only): Personnel should receive training in nuclear criticality safety consistent with their assigned tasks.

FINDINGS: DOE 5610.3, III.2.a.(1)(g) requires training in safety programs associated with critical duty assignments at NTS. DOE 5480.5, 10.a(10), requires both initial and annual retraining for all personnel who process, store, transfer, or handle significant quantities of fissionable materials. LLNL provides initial criticality safety training for these employees, but not documented retraining.

CONCERN: (TC.6-1) (H2/C1) The LLNL criticality safety training program for NTS personnel does not include documented retraining.

E. AUXILIARY SYSTEMS

Auxiliary safety systems, in the context of this appraisal, are those engineered systems and procedures which are required to help ensure safe operation of a facility. At NTS, most auxiliary systems for water, electricity, power, heat removal, and building ventilation have not been identified as vital to safety. Also, few engineered safety systems require monitoring and testing in accordance with operational safety limitations.

Ventilation air discharged from NTS tunnels was not monitored continuously for radioactivity. During post-shot mine back activities, the air is monitored and routed through high-efficiency particulate air filters prior to discharge, as required. Ventilation fans, filters, and emergency generators are generally tested on a regular schedule in accordance with established maintenance procedures. Backup power supplies are also maintained in accordance with established procedures.

Water released from NTS tunnels has not been continuously monitored and treated to assure it is as low as reasonably achievable (ALARA) for personnel exposure. Future plans call for continuous monitoring of discharge water to allow for appropriate management. Lacking NVO/NTSO approval and guidance, proposed ALARA procedures for water effluent monitoring and control have not been implemented.

Solid low-level wastes from past tunnel activities were not managed either to minimize quantity or to achieve ALARA objectives. Goals have been set to reduce generation and waste segregation has begun. However, ALARA objectives to reduce the production of low-level waste have not been fully achieved.

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:

Reentry tunnel operations have been the largest generator of low-level waste at the NTS, most of which is muck contaminated with radioactivity.

Solid wastes from past NTS tunnel activities have not been managed with engineered safety systems and procedures to minimize the volume nor to achieve ALARA objectives for personnel exposure.

A waste minimization plan has been approved by NVO, and REECo has the responsibility to implement the plan.

REECo has started to segregate low-level solid waste at the tunnels. Goals have been established to reduce solid low-level wastes discharged from tunnel operations.

Additional surveillance and auditing are required to assure that ALARA goals are being met.

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

ALARA objectives to reduce the production of low-level waste for tunnel operations at NTS have not been fully achieved.

F. EMERGENCY PREPAREDNESS

Some emergency preparedness resources are managed and/or conducted by NVO for DOE. These include a regional Radiological Assistance Team (RAT), the Nuclear Emergency Search Team (NEST) program, Aerial Measurement Systems (AMS) program, and Radiological Emergency Recovery Operation (RERO) training program. These programs both increase the depth of resources available to NTS in case of an emergency and magnify the need for appropriate communications and coordination. However, these programs were not evaluated except to the extent that NTS has the capabilities to draw upon them. NTS activities reviewed included the underground test program, the LGFSTF, the tunnelling operations, Area 27, the NTSO Emergency Operations Center (EOC) and Emergency Duty Officer (EDO) program, selected REECo operations, and, to a lesser extent, the other prime contractors and DOE Laboratories on-site.

Historically, emergency preparedness at NTS has received considerable attention, leading to the establishment of some national programs. However, since these programs grew at various times to fulfill varying needs, they were not integrated into a coherent and effective system that assures DOE emergency management objectives are met. For example, each underground nuclear test is planned as if it were going to be a nuclear accident. Weather and fallout trajectories are selected so that protective actions can be implemented; field teams are deployed, and a large on-site area is evacuated, all in preparation for an accidental venting which has not occurred in many years. Each test is categorized, as soon as it is completed, by the resulting release, or lack thereof. Notification of the need for protective actions would begin immediately if required. However, county plans were not up to date and the DOE emergency classifications of DOE 5500.3 (Unusual Event through General Emergency) were not part of the response system. Another example of fragmentation of emergency response includes the EDO program, which is covered by the DOE/EDO Procedures Manual that describes the types of emergency events with which an EDO may have to respond. However, the manual does not give instructions for dealing with them nor, in most cases, references where instructions may be found. Only the notification procedures of the EDO manual were reviewed by the NVO Office of Emergency Response and Program Analysis. Although many of DOE's fire fighters and emergency response personnel from other sites have been trained through the RERO program that NTS operates for the Federal Emergency Management Administration (FEMA), most of the NTS fire fighters and emergency response personnel have not had either this training or an equivalent course.

The result is that emergency preparedness at NTS is an inconsistent and fragmented program. NTSO, the principal DOE presence on NTS, is the principal operator of the site from an emergency preparedness standpoint. However, because NTSO is a part of NVO, the performance of NTSO is not appraised by DOE. Consequently, NTSO's emergency response implementing procedures (such as the EDO and Test Controllers Manuals) were not reviewed by DOE emergency management professionals.

With the exception of accidents during underground testing, there is a lack of definition of maximum credible accidents, making it difficult to determine what accident planning is needed. No training, other than infrequent drills and exercises, has been given to DOE employees who fill emergency cadre positions, including the EDO. Many of the first line responders during the drill conducted on November 16, 1989, lacked training and familiarity with their equipment.

Procedures for accountability of site personnel were informal, generally relying on line management's knowledge of the location of their people, and not taking into account vendor personnel and other visitors who may be badged and on site on a given day. Accountability procedures were seldom exercised for more than a single work group. This is especially serious in the tunneling activities, where numerous workers are exposed to hazards that are inherent in mining and underground construction work. This is a Category II concern, requiring immediate action. As a result of this concern, an effective interim accountability system is now in place, and alternative accountability systems for the long-term are being evaluated. Accurate accountability for personnel in the forward area during a test was assured by a system of searches (on foot, in vehicles and by air) and muster badges.

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 lowest DOE organizational level which is responsible for emergency preparedness (EP) at NTS is the Director, NVO. Reporting to the Director are five principal offices, three of which have significant emergency response duties. The Office of Emergency Response and Program Analysis is responsible for overall emergency management (formerly coordination), including, the NVO Emergency Plan, the NVO Emergency Operations Center (EOC), the Nuclear Emergency Search Team (NEST), and appraisals of NVO contractors. The Office of the AMESH has responsibility for the Radiological Assistance Teams (RAT), and, as such, reports to the San Francisco Operations Office. The Office of the AMOE, Test Operations Division (TOD), has responsibility to plan and prepare for emergencies that may result from nuclear tests, and for the Emergency Duty Officer (EDO) program. The EDO makes initial notifications of emergencies and directs initial mitigating actions on-site. The National Weather Service and Nuclear Support Office also report to the TOD.

The REECo Emergency Preparedness Master Plan, dated January 1987, does not reference the NVO Emergency Preparedness Plan, and states that the Director, NTSO, is responsible for the Operational Condition of NTS (except during tests when the Test Controller is responsible). It does not acknowledge the existence of the DOE EDO (although it does refer to a REECo EDO), and uses only a yellow and red alert system for classification of events, not the system prescribed in DOE 5500.3 and DOE 5500.2A.

The NVO Office of Emergency Response and Program Analysis has no formal review or concurrence authority on the DOE/EDO Procedures Manual (EDO Manual), except for one section that deals with notifications. There is no DOE emergency preparedness presence on-site. REECo's responsibilities for EP were limited to their own operations until a June 15, 1989, revision of NTS-SOP-5501.

Contractor emergency readiness functions are routinely appraised by NVO, some training is given by various contractors, and drills are conducted. NTSO EP functions are not appraised. However, NTSO conducts formal exercises with critiques for accidents during underground testing, and participates in drills performed by contractors.

CONCERNS: Emergency preparedness responsibilities for NTS are fragmented.
(EP.1-1)
(H2/C2)

(EP.1-2) Major activities, including preparation for emergencies
(H2/C2) resulting from weapons tests, have not been subjected to routine oversight by personnel knowledgeable in emergency preparedness.

FINDINGS:

The NVO Emergency Plan and EDO Manual indicate that the EDO must be available 24 hours a day during his/her week long assignment (this is the only responsibility listed for the EDO in the EDO Manual). In practice, the EDO makes initial notifications and assures initial mitigating actions are taken.

The EDO has no functions once the emergency management organization is activated.

In practice, minor events during normal working hours are handled through the Operations Coordination Center. The EDO may or may not be notified.

CONCERN: Responsibilities and interfaces for the DOE Emergency Duty
(EP.1-3) Officer and the Operations Coordination Center are ill-defined.
(H2/C2)

EP.2 FACILITY PLAN AND IMPLEMENTING PROCEDURES

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

FINDINGS:

The NVO Emergency Plan does not identify the accidents it is intended to cope with, and does not address the full spectrum of accidents that may occur at NTS.

There is no NTS Emergency Plan, however, one is being prepared.

The Off-Site Emergency Response Plans and Procedures for an Accidental Venting or Seepage at the Nevada Test Site, July 1987 (The Vent and Seep Plan), addresses accidents that may occur due to a confinement failure during an underground weapons test and contains accident definitions that are compatible with the definitions of DOE 5500.3 and DOE 5500.2A.

The Test Controllers Manual indicates that each underground weapons test will be designated by one of five conditions. These conditions deal with a spectrum of results from an accident: Condition I (indicates that there is no leakage of radioactive material into the atmosphere) through Condition V (where radioactive material has been detected off-site). It was not possible to determine if the NVO Emergency Operations Center (EOC) or DOE Headquarters EOC would be able to properly classify an event according to the categories of DOE 5500.3, given the "Condition" designated by NTS and other information that would be available. No document addressing both classification schemes was available.

There were neither plans nor procedures addressing monitoring, classification of, or mitigation of accidents involving chemicals except for incidents during tests at the LGFSTF.

The Vent and Seep Plan references DOE 5500.2 for emergency action levels (DOE 5500.2 was canceled by DOE 5500.1A of February 26, 1987) instead of those in DOE 5500.3 of August 13, 1981. The Plan, however, explicitly substitutes protective action guides (PAGs) for protective response recommendations (PRRs), making this shortcoming less significant.

CONCERN: (EP.2-1) (H2/C1) Existing emergency plans and implementing procedures are inconsistent and do not facilitate classification of and response to credible emergency events at NTS.

FINDINGS: Five county emergency plans were appended to the Vent and Seep Plan. Only one was signed by county officials.

One of the county plans had no call lists or calling instructions. The remaining four had call lists dated between December 1984 and July 1986.

DOE 5500.1A requires field organizations to assist other agencies in preparing emergency plans.

CONCERN: (EP.2-2) (H2/C1) County emergency plans are neither approved nor current, so emergency coordination and communications with surrounding counties is not assured.

FINDING: Although analysis and planning is done for accidents during tests at the LGFSTF, there was no consideration of a maximum credible accident for the facility. The facility source term (material available for release) may greatly exceed the source term of a single test. Also, consideration of the compatibility of chemicals that may be stored for different experiments was not apparent.

CONCERN: (EP.2-3) (H2/C1) The maximum credible accident at the Liquified Gaseous Fuel Spill Test Facility has not been evaluated or planned for. See also Concern TS.2-1.

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:

There has been no formal training of the NVO or NTSO emergency cadre.

One of the test controllers (who is also Director of NTSO and would ordinarily direct the NTSO EOC in the event of a non-test emergency at NTS) was unfamiliar with the existence of the event classification scheme defined in DOE 5500.3 and DOE 5500.2A.

CONCERN: (EP.3-1) (H2/C2)
DOE emergency cadre personnel have not received training in emergency classification and response.

FINDING:

There were no training or qualification requirements for personnel who serve as emergency duty officer (EDO).

CONCERN: (EP.3-2) (H2/C2)
There are neither training nor qualification requirements for the NTS Emergency Duty Officer.

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:

The last major exercise for a test-related accident was conducted in 1986. A report was issued regarding the exercise. Several recommendations for the Mercury Control Center have not been implemented (e.g., installation of recorders and maps).

A recommendation from an exercise involving a fire in a radioactive waste pit, including a recommendation that fire fighters receive radiation worker training has not been implemented.

CONCERN: (EP.4-1) (H2/C2) Corrective actions from exercises are not implemented in a timely fashion.

FINDINGS:

A drill during the appraisal indicated numerous deficiencies:

- During the initial evacuation, seven personnel remained in facilities that were contiguous to a building affected by a chlorine leak.
- Some of the fire fighters depleted their "30 minute" air bottles in less than 15 minutes.
- One simulated injured worker was placed on the stretcher backwards and had to be turned around before transport.
- Initial traffic control was ineffective and several vehicles went around the roadblock, at least one entered the area of the chlorine leak.
- Fire fighters and industrial hygiene personnel were unaware of the possibility of using a water curtain to decrease chlorine levels.
- The time from when fire fighters were on the scene and suited up until the time the first two simulated "overcome" workers were removed was 20 minutes.
- The last two missing workers were not located until 57 minutes after the chlorine leak was detected. Prompting by the controller to look outside when no one was located inside was necessary or the time frame would have been greater.

- Personnel in protective clothing and self contained breathing apparatus were not able to communicate using their radios.

CONCERN: (EP.4-2) (H1/C2) Proficiency in handling on-site emergencies was not demonstrated.

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:

The NVO Emergency Preparedness Plan, dated July 12, 1988, (NVO Plan) uses emergency classification guidelines that are in accordance with DOE 5500.3 and DOE 5500.2A, but it indicates that emergencies will be announced using a yellow alert and red alert system. The alert system was not integrated with the DOE emergency classification system. A yellow alert calls for supervision to account for their personnel and a red alert calls for sheltering or evacuation, or "commitment of substantial DOE resources or other extremely rapid action." Neither system of event classification was used during the November 16, 1989, drill.

The EDO Manual lists 15 types of emergencies the EDO may be called upon to respond to, but does not give either references or procedures for actions to be taken.

DOE and contractor emergency preparedness staff indicated that credible emergencies include vent or seeps in conjunction with tests, evacuation (due to a natural event or for other reasons), bomb threat, security event, fire with or without explosion, chemical release from the LGFSTF (or material being transported to it), a mass casualty event (such as a serious bus accident or airplane crash), or detonation of high explosive in the device assembly facility (DAF). Neither plans nor procedures addressed chemical spills (except during tests at LGFSTF), or DAF explosions.

The Vent and Seep Plan does not address the fact that the NVO Emergency Control Center (ECC) is staffed during tests, does not address the classification of events, and does not indicate how and under what conditions the notification procedures will be invoked. The Test Controllers Manual classifies tests as "Conditions I through V" as discussed in EP.2.

CONCERN: (EP.6-1) (H2/C1) No document correlates the three separate emergency classification systems used at NTS, providing little assurance that events will be classified according to DOE Orders.

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:

The tunnels and shafts used different accountability systems to determine who is underground at any given time. Several of these facilities used shift rosters (marked or left blank) in conjunction with logbooks for supervisors, support staff, visitors and others who are not normally underground. One used a bar code reader for personnel normally underground in conjunction with a logbook for others.

Logbook use was not rigorously enforced; and a member of the appraisal team entered N Tunnel with two REECo employees, but was not required to sign the logbook.

The record of an evacuation drill at T Tunnel on September 15, 1989, revealed that two personnel were indicated as being underground on the tunnel log, while five were indicated as being underground on the shift roster. The drill record reported a total of nine personnel accounted for and none unaccounted for. No explanation of the discrepancy was indicated.

The LeDoux project is a shaft with working areas mined out at the bottom. The documented accountability system at the LeDoux project is a colored badge system, used to limit the number of people underground at any time and to account for them. However, the system in use during the appraisal was a logbook and shift roster system, similar to that used in some of the tunnels. The member of management who escorted a team member on a tour of surface facilities was signed into the tunnel five hours before the meeting and had not signed out.

The ability to determine the number of people potentially affected by an accident (such as a fire or cave-in) underground is a fundamental part of underground safety and is required by the California Tunnel Code, Mine Safety and Health Administration (MSHA), and other standards for hazardous occupancy.

CONCERN: (EP.7-1) (H1/C1) (Category II) The accountability system for persons underground in tunnels and shafts was not adequate to assure proper personnel accountability so that searches for missing persons could be performed properly.

FINDINGS:

Self-rescue respirators were available in the tunnels and in refuge stations within the tunnels.

Self-rescue respirators contain catalysts to convert carbon monoxide to carbon dioxide. They will not function if they have absorbed moisture, and are, therefore, sealed and weighed every six months. No record of the weighing is maintained with the self-rescuers, as is a common practice at other facilities.

Two of the self-rescuers in an N Tunnel refuge station had broken seals.

A sign in P Tunnel indicated the presence of self-rescuers. In fact, they were located about 25 feet away in a different direction. They were labeled only on the top of a box. The labelling was not visible.

CONCERN: (EP.7-2) (H1/C2) Self-rescue respirators in the tunnels were not maintained in a manner that assures their availability and functional readiness.

FINDINGS:

Although the California Tunnel Code requires that each worker carry an acceptable light when underground (unless there is installed emergency lighting), this provision was not always enforced. A member of the appraisal team was told that it was sufficient for only one individual in each group to have a light.

All of the tunnels, except N, have only one entrance/exit. This does not meet MSHA standards for a working mine. This is permissible under the California Tunnel Code. However, the operation is clearly different than the type of operation for which the Tunnel Code was written. The DOE-mandated Life Safety Code for buildings clearly requires multiple exits for similar occupancy.

Numerous other deficiencies in personnel safety have been identified in the tunnels (see above).

CONCERN: (EP.7-3) (H2/C2) There is a lack of emergency exits from the tunnels and adequate compensatory measures are not in place.

FINDINGS:

There was no system to provide site-wide accountability in a timely manner. For underground tests, sweeps employing numerous people, vehicles, and aircraft assure that no one is in the potentially affected (forward) area.

The only accountability system in place requires that each supervisor know the whereabouts of employees at all times. Some, but not all, facilities test these systems with annual emergency evacuation drills.

During the November 16, 1989, drill, the primary occupants of the facility evacuated in a timely manner. However, personnel in adjacent facilities were unaware of the evacuation until informed by an exercise controller. An announcement was made, however, the speakers did not cover the entire area. No alarm was sounded.

One supervisor required the assistance of his secretary to identify the assembly location for emergency evacuation of his building.

CONCERN: (EP.7-4) (H1/C2) Criteria to determine which locations require accountability to protect personnel in case of an emergency have not been established for NTS, thus, accountability is not assured by existing systems.

FINDINGS:

Area 27 has strict security measures which restrict the ability of an ambulance or other emergency vehicle to make rapid entry in the event of a personnel injury. Neither WSI nor laboratory personnel assigned to Area 27 were aware of procedures covering this type of event.

No one contacted was aware of drills or real events that demonstrated there was adequate access to Area 27 in cases of medical emergencies.

CONCERN: (EP.7-5) (H1/C2) The ability of emergency personnel and vehicles to enter Area 27 rapidly in case of a medical emergency has not been adequately assured.

FINDINGS:

The NTSO facility in Mercury is a wood frame structure without sprinklers, smoke detectors, or fire alarm pull boxes. It houses the Mercury Emergency Operations Center and numerous office facilities.

A security fence around the NTSO office building precludes adequate emergency egress from all but the front door.

CONCERN: See Concern FP.2-1.

G. TECHNICAL SUPPORT

Technical support to user laboratories and agencies at NTS comes primarily from REECo, EG&G/EM, H&N, and FSN. Lines of communication among these organi-zations were well established. Observations and interviews revealed that per-sonnel understand their interfaces with the user laboratories and agencies, as well as their contributions to the principal missions of the site. However, overlapping safety-related authorities, responsibilities, and accountability are not well defined, and not well understood.

Comprehensive safety reviews are required for each engineering design and construction project at NTS. A documented safety review process is used to assure review by appropriate safety disciplines. Design review reports for the new Device Assembly Facility (DAF) demonstrated resolution of a wide variety of safety-related questions from conceptual design through the early phases of construction. Closeout of all engineering projects requires as-built drawings, and the backlog of incomplete as-built drawings is small.

A hazard or accident analysis is required for facilities and operations at NTS. Because of the nature of the work, many facilities and systems operate under a Safety Assessment Document (SAD). Those reviewed demonstrated appropriate identification of potential hazards and accidents; however, they did not describe fully the safety envelopes and the limiting conditions of opera- tion. Further, of the SARs that have been prepared for NTS facilities, some are not up-to-date, and none spell out Operational Safety Requirements (OSRs) with Limiting Conditions of Operation (LCOs).

Procedures reviewed for the Area 27 Device Assembly Facilities were clearly written and contained adequate information to provide effective guidance. These procedures are reviewed and approved annually for technical accuracy and adequacy. Most procedures do not highlight safety limits that can be related to a SAD or SAR.

An analysis of potential nuclear criticality accidents at NTS device assembly facilities concluded that they are of extremely low probability. No criticality alarms are installed at Area 27 facilities and none are planned for the new DAF. The risk of a false criticality alarm during the handling of chemical explosives is greater than the risk of a criticality accident.

Equipment and systems supporting operations are monitored to identify the need for improvements. Some equipment and electronic systems used for technical support are at the leading edge of state-of-the-art technology. Examples include high-frequency electronics and cathode ray tubes, fiber optics arrays, diagnostics software, cables and connectors, and large-hole drilling equipment.

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 should be properly and effectively used to support safe operation of all facilities on the site.

FINDINGS:

SARs at NTS follow the format of DOE 5481.1B, which requires operational limitations. DOE 5480.5 requires the NRC Regulatory Guide format for Operational Safety Requirements (OSRs), which incorporate Limiting Conditions for Operation (LCOs), and actions to be taken if LCOs are not met, as well as Surveillance Requirements.

The LLNL SAR for the Area 27 Baker Facility (dated 1977) was not current. The safety analysis of security upgrades done in 1984 did not update the entire SAR. This was approved by NVO/NTSO because the new Device Assembly Facility (DAF) soon will be in operation. The SAR contains a "Recommendations" section which may or may not specify operational limits and controls.

The LANL SAR for Area 27 Able Site is current as of 1986. However, it does not contain a complete section on operational limitations.

The SAR for the Defense Waste Management Department, dated 1989, contains only a summary of accident investigating measures.

No SAR was available for the LGFSTF.

The PSAR for the new DAF, dated 1986, contains only a cursory section on operating limits.

Additional findings to support this concern are cited in OA.2, OP.1, and EP.2.

CONCERN: (TS.2-1) (H2/C1) Current and complete Safety Analysis Reports that conform to the requirements of 5481.1B are not available for facilities at NTS.

H. SECURITY/SAFETY INTERFACE (SS)

This discipline was addressed during the TSA under Emergency Preparedness (EP) and Site/Facility Safety Review (FR), as applicable.

I. EXPERIMENTAL ACTIVITIES

This discipline was addressed during the TSA under Operations (OP) and Site/ Facility Safety Review (FR), as applicable.

J. SITE/FACILITY SAFETY REVIEW

Review of this discipline focused on NV/NTSO, REECo, and EG&G/EM activities. This review was conducted through observation of safety review activities, including the conduct of a Containment Evaluation Panel and the advisory panel to the Test Controller for a nuclear device test; discussions with line managers and safety review personnel from the above organizations; and reviews of appraisals, reviews, environmental assessments, and safety assessments for the LGFSTF, defense waste management activities, and several ES&H functional areas.

Mechanisms in place to provide independent safety reviews of nuclear device tests were comprehensive. The containment plan for each test is presented several weeks in advance of a proposed test to a Containment Evaluation Panel made up of independent experts, who each categorize the likelihood of containment in a recommendation to the Manager, NV. A Detonation Authority Request (DAR) is prepared, which includes a review of the environmental impact and a nuclear safety study. After the DAR is approved by the DOE Office of Military Applications, the NTSO Test Controller uses an advisory panel consisting of four members: a senior scientist from the sponsoring organization, an EPA scientist with expertise in radiation monitoring, a weather service meteorologist, and a physician with expertise in radiation medicine, who provide consultation before, during, and immediately after the nuclear device test. The LGFSTF has adopted a safety review method modelled after the nuclear device testing program.

In the past, safety reviews/appraisals, other than the event-oriented reviews described above, have been focused on individual contractors, or functional areas of individual contractors (e.g., REECo industrial hygiene). This was at least partially the result of a division of oversight responsibilities for user organizations (e.g., LANL, LLNL) among different DOE Field Offices. On October 13, 1989, a Management Agreement between NV and the DOE Albuquerque Operations Office (AL) was signed, which includes delegation, by the Manager, AL, to the Manager, NV, the authority to appraise, monitor, and provide surveillance over AL contractors at NTS. This agreement is being used as the model for developing a similar agreement between NV and the DOE San Francisco Operations Office (SAN) for SAN contractors. This is an important and necessary first step in providing greater oversight by NV of overall NTS activities/facilities. The agreement between NV and AL has not yet been implemented by NV in a manner that effectively provides the intended oversight.

Another weakness of these independent safety reviews is that the focus has been on individual NTS contractors. As a result, these reviews have not evaluated overall NTS responsibilities or functions. This weakness is particularly important because, unlike other DOE sites where there is only one prime contractor responsible for overall site activities, at NTS, NV/NTSO provides this coordination.

Contractor independent safety reviews have not been formalized to the extent that they meet the requirements of DOE 5482.1B. Some contractors have not established any independent appraisal programs to address these requirements. REECo has established requirements that address some elements of the Order, but has not been conducting appraisals during the past year in accordance with these requirements. Also, there have been no triennial reviews of internal appraisal systems conducted by NVO contractors, as required by DOE 5482.1B. Most NTS prime contractors are relying upon NVO/ES&H Division functional appraisals and reviews to provide feedback on the effectiveness of the contractor safety review functions. This practice is inappropriate because it does not satisfy the requirement for a management-sponsored review of the adequacy of the internal safety appraisal system.

Independent safety reviews, by either NTS contractors, or NVO, did not ensure that the provisions of DOE 5481.1B for safety analysis were met. The most prevalent weakness was that these analyses do not provide for operational limitations (commonly referred to as Operational Safety Requirements) setting forth the approved limits of safe operation.

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, and DOE 5482.1B, Section 9.d.

FINDINGS:

DOE 5480.5 defines a "nuclear facility" as "a facility whose operations involve radioactive materials in such form and quantity that a significant nuclear hazard potentially exists to the employees or the general public. Included are facilities that: (1) produce, process, or store radioactive liquid or solid waste, fissionable materials or tritium... (3) conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations."

NVO has not yet classified any NTS facilities/activities as "nuclear facilities." DOE 5480.5 requires that the ES&H programs for nuclear facilities include, among other things: new safety analysis reports based on NRC Regulatory Guides for standard format and content, documented training programs for personnel who operate and maintain nuclear facilities, Operational Safety Requirements defining the approved limitations of safe operation, and an independent safety review and appraisal system.

The TSA Team concluded that some NTS facilities/activities, such as the Radioactive Waste Management Site, are "nuclear facilities" as defined by DOE 5480.5.

CONCERN: (FR.1-1) (H2/C1)

NVO has not identified NTS facilities/activities that should be classified as "nuclear facilities" in accordance with DOE 5480.5, nor developed programs to meet the requirements of DOE 5480.5 in areas such as safety analysis, documented training, Operational Safety Requirements, and independent safety oversight for these nuclear facilities.

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:

DOE 5482.1B, 9.d(2)(g), requires that internal appraisals provide an independent review of ES&H functions to determine whether reviews are being conducted of changes to procedures, operating limits, proposed experiments, training programs, and organization and staffing.

Discussions with cognizant REECo safety personnel indicated that the need for occupational safety appraisals is based on a comparison of department accident and injury rates with company averages. Only those company units whose safety performance record is poorer than the company average are normally scheduled for appraisal. However, no occupational safety appraisals have been conducted in 1989, and none were scheduled, as of the date of this TSA.

REECo appraisals were conducted by a team that included safety professionals who provide routine ES&H functions; therefore these appraisals were not totally independent.

The SAR of the Defense Waste Management Department, dated March 1989, was not reviewed or approved by the REECo Occupational Safety and Fire Protection Division.

EG&G/EM performs some annual functional safety appraisals, and FSN performs some on a triennial basis; however, neither company covers all elements required by DOE 5482.1B.

H&N and WSI are not conducting appraisals of their ES&H safety functions; rather, they are relying on REECo and NVO to provide this oversight.

CONCERN: (FR.2-1) (H2/C1) NVO prime contractors have not formalized independent safety reviews to address all activities are required by DOE 5482.1B.

FINDINGS:

NVO appraisals are of two types, management appraisals of individual NVO contractors, and functional appraisals of particular contractors (e.g., REECo industrial hygiene). There have been no NVO appraisals of any ES&H areas conducted on a site-wide basis that included user activities. The need for site-wide appraisals is greater at NTS than at most other DOE sites because there is no individual contractor that has overall responsibility for NTS activities. The only NTS organization with responsibility for all contractor activities is NVO/NTSO.

On October 13, 1989 a Management Agreement between the NVO and the Albuquerque Operations Office (AL) was signed, which included the delegation, by the Manager, AL, to the Manager, NVO, the authority to appraise, monitor, and provide surveillance over AL contractors at NTS. This is a positive step in providing increased oversight of activities at NTS, because, in the past, LANL and SNL have not been specifically appraised by NVO. Also, not appraising these organizations meant that overall appraisals of device testing activities were precluded. NVO has not yet translated this Management Agreement into a comprehensive safety oversight program for all NTS activities.

CONCERN: (FR.2-2) (H2/C2) Safety oversight activities address individual contractors and functional areas, but do not provide for an assessment of site-wide activities/facilities.

FINDINGS:

One of the test events involves the use of toxic, corrosive and explosive gases in an underground shaft. LANL personnel working in this area have access to information about these gases. However, most NTS contractor (REECo and H&N) personnel working in the same locations have not been provided information about the specific hazardous materials to which they may be potentially exposed. Rather, they have been briefed on the general characteristics of these gases.

The OSHA Hazard Communication Standard (29CFR1910.1200) indicates that employees have the right to know about the hazards associated with the particular materials to which they may be exposed in the workplace. This includes having available Material Safety Data Sheets (MSDSs) for these hazardous materials.

CONCERN: See Concern PP.7-1.

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:

DOE 5482.1B, 9.d(2)(g), requires that "the internal appraisal system shall be reviewed by management for adequacy of performance every three years, or more often, as required." The only exclusion to this Order is the nuclear weapons safety program administered by DP-1; thus, at a minimum this Order applies to NTS activities such as the LGFSTF and the Radioactive Waste Management Site.

A review of REECo appraisal records and discussions with cognizant REECo safety personnel/managers indicated that REECo management had not yet conducted a documented evaluation of the REECo internal appraisal system. Moreover, as discussed in Section FR.2, other NTS prime contractors have not established internal appraisal systems.

CONCERN: (FR.5-1) (H2/C1)

NVO prime contractors are not conducting triennial reviews of their internal appraisal systems as required by DOE 5482.1B, 9.d(2)(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:

Lessons learned during drillback operations were not being shared between LANL and LLNL to develop better practices in this area.

The Manager of the Area 5 Defense Waste Management Facility indicated that he has never received UORs or other operating experience information from other DOE radioactive waste management facilities.

NTS QA managers have established a practice of conducting quarterly meetings to exchange lessons learned. These meetings have not been held for the last two quarters.

CONCERN: (FR.6-1) (H2/C2) There is no coordinated NTS-wide operating experience review program.

K. NUCLEAR CRITICALITY SAFETY (CS)

This discipline was not addressed during the TSA; however, handling of fissile material was addressed under Auxiliary Systems (AX), as applicable.

L. RADIOLOGICAL PROTECTION

Radiological protection for NTS is conducted under the auspices of DOE/NV and complies with applicable DOE Orders, primarily DOE 5480.11 and NV Order 232 (Radiation Safety Manual). Exposures to radiation resulting from operations at NTS are maintained within the limits set forth in DOE 5480.11, but not as far below all limiting values as reasonably achievable. Radiation protection programs at NTS operations are conducted by REECo, the other prime contractors, or the other users. The programs are subject to review by the Health Physics Branch, NV. In the past, both the review of and involvement in the programs by the NV Health Physics Branch staff has been minimal. Few audits or appraisals were conducted, especially of the three national laboratory users of the site. The frequency of on-site audits and reviews is changing, and as a result, improvements in radiological protection should become evident. Arrangements may be made through NV to obtain radiological services from REECo, if a formal health physics staff is not maintained by the requesting organization.

The radiation protection programs of REECo and the other contractors were proceduralized and reasonably well-documented. Walk-throughs, record reviews, and interviews with radiological protection technologists (RPTs), supervisors, and professional personnel who support NTS radiological protection activities revealed similar attitudes toward radiation protection; however, variations in procedures and policies were evident. Health physics personnel demonstrated an awareness of the requirements and methods for reviewing, classifying, and tracking incidents which have an impact on radiation protection.

Staffing levels in applicable organizations were adequate to support the existing Radiological Protection Program. There were several vacant positions which must be filled in order to implement DOE 5480.11 in a reasonable timeframe.

Technical support in the areas of dosimetry, radiological engineering, ALARA, training, and administration is supplied by the REECo health physics organization in a satisfactory manner.

Portable and most fixed radiation protection instruments were supplied, maintained, and calibrated by REECo. Health physics personnel were trained and knowledgeable in the use and limitations of the various portable instruments. A system documenting the functional testing of both the portable and fixed instrumentation was in place and maintained at the REECo calibration facility.

In the past three years the total personnel radiation exposure has been reduced from 58 man-rem in 1986 to 23 man-rem in 1988. Through October 1989, the total man-rem is 9.2 for the 15,126 persons monitored. Along with this reduction, the maximum individual yearly exposure has been reduced from 579 mrem in 1988 to 525 mrem in 1989. In the area of internal dosimetry, there were two positive cases of internal deposition in 1988, both involving tritium resulting in doses of less than 20 mrem. There have been no cases through October 1989. The reduction in personnel radiation exposures was not correlated to specific trends or changes in radiation related activities at NTS. The air monitoring program needs to be improved, even though there is essentially no airborne activity. The tunnel area needs a thorough evaluation of potential airborne radioactivity levels and breathing zone concentrations.

The number of contaminated areas throughout the site was quite high and the posting of these areas was inadequate. Access to these areas was not controlled sufficiently, due to inconsistencies in policies of the various contractors and users of the site and lack of direction from NVO.

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Facility/site organization and administration should ensure effective implementation and control of radiological protection activities on the facility/site.

FINDINGS:

The full staffing of the prime contractors and most of the users of NTS requires further recruitment and training activities at REECo which are underway. There are 10 Radiation Protection Technicians (RPTs) scheduled to begin the REECo training course on November 20, 1989. LLNL was also understaffed in radiation protection.

REECo field operations staff believe that they are fulfilling an enforcement role (with respect to radiological protection) on behalf of NVO. This is not REECo's function or responsibility and can lead to serious morale problems which in turn can affect REECo's ability to carry out effectively its assigned mission.

The radiation protection programs of the contractors and users of NTS are subject to review by the Health Physics Branch (HPB), NVO. In the past, both the review of and involvement in the programs by HPB staff has been minimal; and there has been little presence of HPB staff at NTS. Very few audits or appraisals were conducted especially of the three national labs and many inconsistencies in these radiation protection programs were observed.

CONCERN: (RP.1-1) (H2/C2)

NVO has not effectively appraised, audited, or enforced DOE radiation protection policies and procedures, nor have they engaged in aggressive oversight of NTS, rather these functions have been performed by REECo, resulting in less than complete coverage for the program.

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: REECo did not have an internal audit program in place, although it had been audited by its parent organization, EG&G. REECo plans to implement its own auditing system by December 31, 1989.

The three national laboratory users have audit programs. LLNL and SNL are in full compliance with DOE 5480.11 but LANL is not in compliance, because its operation was audited by members of Health, Safety, and Environment staff not assigned to NTS, which is also the parent organization of the assigned RP staff.

CONCERN: (RP.2-1) (H2/C1) Neither REECo nor LANL (NTS) have satisfactory internal audit programs which comply with DOE 5480.11.

FINDING: For those operations where radiation exposure is expected (i.e., drillbacks and minebacks) pre-job planning is practiced. This planning includes input and action on the part of radiation protection personnel. Some of the operations that take place during the actual core sampling did not constitute good radiation protection practices, e.g., the higrading of the core samples includes the use of the hands to select the samples for further analysis. This practice leads to considerable hand exposures and, while not in excess of any limits, the practice is outmoded.

CONCERN: (RP.2-2) (H2/C2) The current practice of higrading core samples could lead to excessive hand exposures which are not as-low-as-reasonably-achievable (ALARA).

FINDING: None of the contractors who use REECo dosimetry services has a blind personnel dosimeter audit program. They accept REECo dosimetry without question even though REECo is not DOELAP accredited.

CONCERN: (RP.2-3) (H2/C2) No audit program for personnel whole body dosimetry or for extremity dosimetry is being conducted.

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:

Procedures were in place that detail the radiation protection programs of NTS prime contractors and users. Many are being revised and difficult to locate, especially in the case of LLNL. LLNL incorporates several radiation protection procedures for Area 27 into the procedures associated with device assembly. This makes the procedures classified and, as such, not as accessible as they should be.

Transportation of radiation detector sources, calibration and drillback/mineback diagnostic samples were not performed according to prescribed procedures (NVO-232, Section 11). (See Concern PT.3-2)

Because of past practices and lack of oversight by either NVO or NTSO, drillback/mineback waste was not handled and processed according to current standards. As a result, some posting may not be correct, and incorrect characterization and disposal of some of the wastes may occur.

Posting throughout NTS was inadequate. This is, in part, due to a lack of clear, concise, and precise guidance from DOE. As currently understood, plutonium soil contamination limits have been suggested by NVO for NTS which are more restrictive than those for the Marshall Islands. This places DOE and NVO in an undefensible position. See article, Las Vegas Review - Journal, Friday, November 17, 1989, page 10A. Contamination limit values must be consistent in order to establish any credibility with the limit or the agency establishing the limit. This would permit uniformity in posting those areas.

There was no clear understanding of the ultimate responsibility for control of the posting of individual "test sites" within the boundaries of NTS. This includes responsibility for performing the posting, maintaining the fences, if necessary, and ultimate cleanup and disposal of the cleanup-generated wastes from those individual test sites.

Many of the contaminated sites within NTS can, at various times, be considered occupied and there were no assurances that airborne radioactivity was not present. Several sites where airborne radioactivity might exist had no signage and were not posted or fenced in a manner that prevents inadvertent entry.

Exposure rates, contamination levels, and airborne activity levels on signs were, in many cases, not posted.

NVO has not provided necessary policy, guidance, or procedures to assure the existence of uniform and proper radiation protection procedures and radiological posting at NTS.

CONCERN: (RP.3-1) (H2/C1) Procedures and posting at NTS, are not in compliance with DOE 5480.11.

CONCERN: (RP.3-2) (H2/C2) The lack of direction and oversight by NVO leads to misunderstanding of who is responsible for posting user laboratory sites at NTS.

RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: External radiation exposure controls should minimize personnel radiation exposure.

FINDINGS:

Special equipment was utilized effectively to control exposures, with the exception of the higrading activities. Higrading is the recovery of radioactive materials from the drillback core samples. Although required by the procedures, special equipment was not always utilized and often the samples were removed using gloved hands.

The LANL glovebox used in the higrading procedure is shielded by leaded glass. A plastic viewing window comprises the right side of the glove box so that an observer standing to the right of the glovebox can view the higrading.

Exposure controls were in use, including standard operating procedures (SOPs) and special work procedures (SWPs). These procedures were available at the work site.

CONCERN: (RP.4-1) (H2/C2)

SOPs and SWPs are available but not posted at the entrance to the work sites that clearly define the type of protective clothing requirements, dose rates expected, and other information.

FINDINGS:

An ad hoc ALARA committee exists that includes most of the contractors on NTS that monitor exposure data, procedures, and other exposure control activities. It does not conduct analysis for the purpose of establishing trends.

The use of extremity dosimeters was limited to those processes expected to receive a significant dose. The dosimeter consists of a single TLD chip, is not calibrated to beta radiation, and not tested to determine its ability to correctly measure a dose.

CONCERN: (RP.4-2) (H2/C1)

Extremity exposures and doses cannot be accurately determined nor is the calibration of the dosimeter, as required by DOE 5480.11, appropriate for the types of radiation encountered at NTS.

RP.5 EXTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The routine and accident personnel dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

Personnel at NTS, including visitors, are required to wear a current dosimeter. Dosimeters are changed every quarter for non-radiation workers and monthly for radiation workers.

Extremity dosimetry is issued during higrading activities. The energy dependence of the extremity dosimeter was not known.

Personnel decontamination equipment, supplies, and procedures were provided where appropriate.

"Blind" tests of the dosimetry system were not performed.

CONCERN: (RP.5-1) (H2/C2) The REECo external personnel dosimetry quality assurance plan does not include the requirement for blind dosimeter testing.

FINDING:

The error range (i.e., error bars) of the dosimeters has not been determined.

CONCERN: (RP.5-2) (H2/C2) The error range of dosimetric measurements is not determined, as required by DOE 5480.11.

FINDINGS:

REECo is participating in DOELAP but has not been certified in all categories. These deficiencies have been identified and an action plan has been prepared for retesting.

The procedure for assigning dose from a lost dosimeter is to compare the doses of other workers from the same location. The frequency of not returned and tardy dosimeter exchanges was quite high, approximately 1% to 2%.

CONCERN: (RP.5-3) (H2/C2) The high frequency of not returned and tardy dosimeter exchanges increases the possibility of missing a significant exposure.

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

Eating, drinking, and smoking policies in contaminated or potentially contaminated areas were not applied uniformly for all NTS contractors.

REECo does not permit eating, drinking, or smoking, but LANL and LLNL permit smoking and drinking within potentially contaminated areas. The inconsistent application of requirements could lead to violations of REECo rules by REECo employees.

CONCERN: (RP.6-1) (H2/C1) Permitting eating, drinking, and smoking in contaminated or potentially contaminated areas is not in compliance with DOE 5480.11.

FINDING:

The tritium monitor in Area 27 - Able (LANL), although not in use, was out of calibration during the time when a device was being assembled.

CONCERN: (RP.6-2) (H2/C1) The use of instruments that are out of calibration is unacceptable and not in compliance with ANSI-323.

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

REECo's internal dosimetry quality control program for bioassay utilizes blind samples but does not require or include internal audits.

Particle size and solubility studies are not performed for radioactive contaminants which could be ingested.

The whole body counter has not been calibrated since 1983.

CONCERN: (RP.7-1) (H2/C1)

REECo does not have an internal dosimetry program which complies with the requirements of DOE 5480.11.

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.

FINDING: Portable neutron instrument calibration sources were not traceable to the National Institute for Standards and Technology (NIST). All other calibration sources are traceable to NIST and are appropriate for the ranges and types of radiation encountered at NTS.

CONCERN: (RP.8-1) (H2/C1) Portable neutron instruments are not calibrated in accordance with DOE 5480.11.

FINDING: Instruments have not been tested to ensure that they are not susceptible to radio frequency fields. This is of concern due tc the high level of radio communication at NTS and the fact that all portable radiation monitoring instruments are exposed to those transmissions.

CONCERN: (RP.8-2) (H2/C1) REECo portable radiation monitoring instrumentation at NTS is not in compliance with applicable ANSI standards relating to radio frequency susceptibility.

FINDING: Bldg 600 (LLNL) has several portable radiation monitoring instruments which were out of calibration.

CONCERN: (RP.8-3) (H2/C1) LLNL calibration of portable radiation monitoring instruments is not in compliance with the requirements of DOE 5480.11.

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: A fixed tritium monitor located at the Area 27 Alpha Facility (LANL), although not in operation, was out of calibration.

The use of plastic tubing with the tritium samplers was observed. The use of this tubing is a poor health physics practice.

CONCERN: See Concern RP.6-2.

FINDING: Air sampling was observed in the N-Tunnel. The data obtained from these samples are not indicative of anything other than perhaps the presence of airborne radioactivity in the work areas or ventilation effluent.

CONCERN: (RP.9-1) (H2/C1) The air monitoring program in the tunnel operations cannot quantify airborne radioactivity as required by DOE 5480.11.

RP.10 RADIOLOGICAL MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiological exposures.

FINDING: Dose rates were not consistently nor adequately posted in most radiation areas, e.g., former event sites.

CONCERN: (RP.10-1) (H2/C1) Posting of radiation areas and documentation of survey results of specific test sites are not in compliance with the requirements of 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).

FINDING: The prime contractors at NTS have ALARA programs, but did not have formal charters or goals. However, several of these organizations were in the process of further developing their ALARA programs to be more consistent with the guidance and requirements of DOE 5480.11.

CONCERN: (RP.11-1) (H2/C1) ALARA programs for the prime contractors at NTS do not have established goals and milestones as required by DOE 5480.11.

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.

FINDING: Radiation surveys of sites and facilities were maintained but not readily retrievable.

CONCERN: (RP.12-1) (H2/C1) Survey records were not readily accessible, as required by DOE 5480.11.

FINDING: Records for previous REECo employees were maintained on-site for two years. Older records for former REECo employees were also maintained and provided within 15 days of an official request, as required by DOE 5480.11. NVO has established a policy to provide those records within 30 days of the request. NVO does not have a DOE exemption for this policy.

CONCERN: (RP.12-2) (H2/C1) NVO's policy of acknowledging requests for occupational radiation exposure records for former NTS employees (30 days) is not consistent with DOE 5480.11 requirements (15 days).

FINDING: REECo procedures state that employees are to be notified of their occupational exposure annually. However, occupational exposure reports have not been provided to employees for the years 1986 through 1988.

CONCERN: (RP.12-3) (H2/C1) Annual occupational exposure information is not being distributed to REECo employees, as required by DOE 5480.11.

M. FIRE PROTECTION

This appraisal included inspections at the three fire stations, the Area 12 and 23 cafeterias, LGFSTF, and the N, P, and G Tunnels; and observation of the emergency preparedness exercise held on November 16, 1989.

At NTS, the daily responsibilities for fire protection engineering and Fire Department services are provided through the contracted services of REECo. REECo provides Fire Department services to NTS through their Fire Protection Services (4 Chief Officers, 9 Captains, 15 Engineers, and 17 Fire Fighters) through three fire stations (Area 6, 12, and 23) and Fire Protection Engineering utilizing three Fire Protection Engineers and support from user laboratories on-site. The staffing arrangements consist of 24-hour a day operations at all fire stations with three Fire Department personnel at each of the fire stations in Areas 6 and 12 and eight personnel assigned to the fire station located in Area 23. Personnel from the Area 23 fire station also provide fire response capabilities to aircraft operations at Desert Rock Airport (DRA) on an as-needed basis.

Previous fire protection appraisals, surveys, and inspections have identified over 140 deficiencies that were still open as of October 1989. These outstanding deficiencies have been evaluated resulting in a priority listing, with budget estimates made and projected compliance dates established. These deficiencies have been published in a document entitled, Report of the REECo Environmental, Safety and Health Compliance Review Committee, October 1989.
Fire protection systems, where provided, were installed, tested and maintained in accordance with the appropriate NFPA Codes and Standards as required by DOE 5480.4.

Fire Department personnel make inspections of NTS facilities on a monthly basis. These inspections are rotated among the work shifts, resulting in all Fire Department personnel performing an inspection of each facility at least quarterly. However, the training provided to Fire Department personnel who conduct these inspections is not documented (i.e., course outline and performance tests).

The performance characteristics of the existing water supply system are documented. Annual water flow tests are performed and results recorded.

This appraisal identifies some of the previously acknowledged deficiencies and has identified additional deficiencies in the areas of Life Protection, and Fire Department Operations.

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities on-site should provide adequate life safety provisions against the effects of fire.

FINDINGS: The following violations of NFPA 101, "Life Safety Code," were noted:

- Exit lights were nonfunctional in the following buildings: the Firehouse in Area 23, the Cafeteria in Area 23, the old Air Response Team Hangar in Area 6, and Bldg. 110 in Area 23.
- A cigarette ash can was blocking egress stairs from the basement of the Cafeteria building in Area 23.
- The fire doors from the laundry rooms in Buildings 531 and 532 were blocked open on numerous occasions.
- The design of the new Device Assembly Facility in Area 1 results in the utilization of a common path of travel to reach the required exits. Common paths of travel are not permitted in high hazard areas.
- The storage mezzanine in Building 750 (Area 23) has one recognized means of egress. Two means of egress are required.
- Building 111 (NTSO Building) has only one means of egress. The perimeter fence configuration blocks the required second means of egress.

CONCERN: (FP.2-1) (H2/C1) Numerous facilities at NTS are not in compliance with the egress maintenance provisions of NFPA 101 (Life Safety Code), as prescribed by DOE 5480.4.

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:

There has been no documented compliance review of NFPA 1500.

Responses to fires that require the wearing of self-contained breathing apparatus must include a minimum of five qualified responders. Minimum response from fire stations in Areas 6 and 12 is made with three qualified responders. REECo requested an exemption to this requirement from NVO in September 1989. NVO has not responded to the request, as of the date of this appraisal. Compensatory measures are in effect for Areas 6 and 12, which require fire station personnel responding to fires in these areas to wait for additional personnel before initiating the use of self-contained breathing apparatus.

CONCERN: (FP.6-1) (H2/C1)

A compliance program for NFPA 1500 (as required by DOE Order 5480.4) has not been established.

FINDINGS:

The November 16, 1989, emergency response drill demonstrated the Fire Department's lack of training. Poor response was noted in the following areas:

- No water supply was established.
- Search and rescue operations did not utilize any safety precautions for the fire fighters, i.e., protective water curtains, the "buddy system" for search teams, safety ropes that could be utilized to facilitate an emergency evacuation of Fire Department personnel.
- Search and rescue operations were dependent upon input from industrial hygiene personnel. This dependency was due to an admitted lack of training in the response to hazardous material incidents.

Training documentation does not include course outlines or participant proficiency documentation.

Fire Department personnel do not receive regular training involving live fire evolutions for structures.

CONCERN: (FP.6-2) (H2/C2)

The Fire Department has not demonstrated the capacity to promptly terminate and mitigate the effects of a fire in a safe and effective manner.

N. PACKAGING AND TRANSPORTATION

REECo ships a variety of hazardous materials, substances and wastes off-site. A review of recent shipping records indicated that the shipments comply with DOE 5480.3, which mandates compliance with 49 CFR 100 through 199.

Some NTS site tenants prepare their own hazardous materials, and radioactive materials packages for off-site shipment. Other tenants may bring these materials to REECo for packaging and/or shipping. Radioactive materials packages are routed through REECo Radioactive Materials Control (RAMATROL) for a check and radiation survey before leaving the site.

There was no centralization or coordination of the on-site movement of hazardous materials. On-site movements of hazardous materials may be made by almost any NTS user. REECo Supply distributes hazardous materials from their warehouse to end users. Other end users may get hazardous materials from a tenant (e.g., LLNL or LANL) warehouse. An additional unknown number of on-site movements of hazardous and/or radioactive materials may be made by the various NTS activities without any central coordination.

Personnel assigned to the REECo, LLNL, and LANL warehouses and REECo Traffic Section were trained, although some training was not current. Much of the hazardous materials training was obtained via on-the-job training (OJT). The OJT was not supported by lesson plans, checklists, or other documentation. There was no requirement that OJT instructors be certified, nor that they receive appropriate technical training or instructor training.

Vehicles used to transport hazardous materials were properly maintained.

A review of drum and bulk storage of hazardous materials and substances revealed several deficiencies: drum storage areas were not diked and/or not protected from damage by vehicles, some bulk storage tanks were not bermed, berms were not impermeable, and drum and tank labels were illegible.

PT.2 MANAGEMENT DIRECTIVES

PERFORMANCE OBJECTIVE: Management should develop and implement a system of directives that will provide for effective implementation of DOE Orders, Federal and state regulations, and good industrial practices in operations involving packaging, material movement and handling, and transportation.

FINDINGS:

There is no REECo requirement that directives be subjected to routine review.

NTS-SOP-5409, Management of Hazardous Materials and Hazardous Wastes, June 15, 1989, directs NTSO to assure that NTS organizations "...submit plans which include appropriate provisions for the management and control of hazardous materials and wastes." There was no schedule or due date for submission of the plans. To date, no plans have been received.

NTS-SOP-5409, Part II, "Procedures and Standards," references U.S. Department of Transportation (DOT) regulations. However, in Part II, para. 3.c., "Training," there is no mention that personnel training shall be conducted to ensure compliance with 49 CFR 100 through 177.

CONCERN: (PT.2-1) (H2/C1) NVO and REECo management directives do not assure packaging and transportation operations meet the requirements of DOE 5480.1, 5480.3, 5480.4, and 1540.1.

PT.3 POLICIES AND IMPLEMENTATION PROCEDURES

PERFORMANCE OBJECTIVE: Policies and implementation procedures should be documented and should reflect conformance with applicable DOE Orders (including DOE 5480.3 and 5480.5), Federal and state regulations, and good industrial practices.

FINDINGS:

There were no procedures for handling, storing or distribution of compressed gas cylinders in the REECo Supply Department cylinder storage area. A procedure was being developed.

There was no REECo policy or procedure which requires that an employee who packages or transports hazardous materials be qualified for a particular job or how such qualification should be achieved and/or demonstrated. There was no policy regarding employees who had not completed training, or who failed an examination. There was no requirement or mechanism to keep employee knowledge up-to-date through recurrent training.

The training course, "Introduction to Procedure Writing," is available to REECo employees; however, there was no REECo requirement that procedures be standardized or be subjected to routine review.

DOE 5480.13 is silent regarding hazardous materials packaging requirements for (DOE owned or leased) public aircraft. LLNL makes shipments of "Class A Explosives" aboard its "long term leased aircraft" operated by Aviation Methods, Inc. (AMI). Such shipments are forbidden on common carrier cargo only aircraft (49 CFR 100 through 177). By not assuring that packaging requirements comply with 49 CFR 100 through 177, DOE, the DOE San Francisco Operations Office, and LLNL are not following accepted industry practices for the transport of "Class A Explosives."

CONCERN: (PT.3-1) (H3/C1) NVO policies and procedures for handling, packaging and shipping hazardous materials, substances, and wastes, do not meet the full intent or requirements of DOE 5480.1A, 5480.3, and 5480.4.

FINDINGS:

DOE 5480.3 does not adequately address the safety aspects of intra-site movements of hazardous materials, substances and wastes (including radioactive, mixed, and hazardous wastes); therefore, DOE 5480.1A was used to evaluate the overall safety aspects of these NTS intra-site materials movements.

NVO has not established safety standards or operating requirements for the on-site movement(s) of all hazardous materials. An NTS Onsite Transportation Manual is being developed by REECo at NVO's direction.

NVO-232, Radiation Safety Manual for the Nevada Test Site, Section 11, "Shipment of Radioactive Material," requires the transportation of radioactive materials be made in accordance with DOT regulations. There are no provisions in the Manual for "exceptions" to these regulations for some special movements of radioactive materials which may occur on the site.

REECo Radioactive Materials Control (RAMATROL) Detailed Operating Procedures (draft, August 1989), Section 1.8.4.1, Paragraph c., regarding packaging requirements for on-site movements of radioactive materials, conflicts with NVO-232, Section 11.

LANL on-site movements of radiation source No. 27177 were not in accordance with NVO-232, Section 11.

Radioactive materials inbound for other contractors or tenants, other than REECo, were not necessarily checked at the main gate. The consignee must call to have the packages surveyed by RAMATROL or have their own personnel perform the survey.

REECo Supply Division is responsible for the distribution of hazardous materials, through its several warehouses, to the user, and return, if necessary. Although some NTS users consult the REECo Supply and Property Management hazardous materials computer program for guidance, the user then may move the material to any other on-site location. There is little, or no, guidance or control of the latter movements.

At the Atlas Wireline Well 3 Yard radiation source storage area, one source was not properly locked in its package. The package markings on one source were illegible.

When moving radiation sources on site, Atlas Wireline drivers did not have "shipping papers" in their possession.

CONCERN: (PT.3-2) (H2/C1) Onsite handling, packaging and movement of hazardous materials, substances and wastes is not in accordance with the requirements of DOE 5480.1A, and NVO-232.

PT.4 MANAGEMENT CONTROL SYSTEMS

PERFORMANCE OBJECTIVE: Management control systems should be in place to assure that safety and compliance requirements are effectively carried out in the packaging and transportation activities.

FINDINGS: A review of available records indicates that there is no NVO safety oversight of packaging and transportation operations.

CONCERN: (PT.4-1) (H3/C1) NVO safety oversight of packaging and transportation operations does not meet the full intent of the health, safety, and environmental protection requirements of DOE 5480.1A.

FINDINGS: Flammable liquids are stored in "Butler Buildings" near the main warehouse. The buildings are marked "Hazardous Materials," but they are not marked "Flammable Liquids," or "Flammable Materials," nor are the buildings marked with their number or other identifier (for emergency response purposes). A work request was submitted on November 20, 1989.

Although nitrogen tube trailers are properly maintained, there is no requirement for this in the REECo Safety Manual, Central Pressure System Certification Program. Several compressed gas cylinders in the main cylinder storage area were not properly secured in their upright positions.

CONCERN: (PT.4-2) (H2/C1) The control of handling, storage and intra-site movements of hazardous materials, substances and wastes (including hazardous, mixed, and radioactive) do not meet all the requirements of DOE 5480.1A.

FINDINGS: The NTS Spill Prevention Control and Countermeasures (SPCC) program does not establish requirements for: Spill prevention (e.g., procedures, and tankage standards), spill control (e.g., secondary containment), or spill countermeasures (e.g., cleanup protocol).

Supply Storage Area: There was no secondary containment for drums of liquid hazardous materials and the diesel fuel storage tank. The drums were not protected from damage by vehicles. A work request was submitted on October 30, 1989.

T Tunnel Storage Area: There was no secondary containment for drums of liquid hazardous materials and the diesel fuel storage tank. The drums were not protected from damage by vehicles. A work request was submitted on October 30, 1989.

Area 6 Fuel Facility: Tanks for bulk storage of gasoline, diesel, ethylene glycol, lube oil and kerosene are bermed, but the berms were not impermeable. The loading/unloading stations were not diked. The cement retaining area at the base of the diesel storage tank was filled with dirt.

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Although nitrogen tube trailers are properly maintained, there is no requirement for this in the REECo Safety Manual, Section 29, Pressure System Certification Program. Several compressed gas cylinders in the cylinder storage area were not properly secured in their upright positions.

CONCERN: (PT.4-2) (H2/C1)

The control of handling, storage and intra-site movements of hazardous materials, substances and wastes (including hazardous, mixed, and radioactive) do not meet all the requirements of DOE 5480.1A.

FINDINGS:

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Area 6 Fuel Facility: Tanks for bulk storage of gasoline, diesel, ethylene glycol, lube oil and kerosene are bermed, but the berms were not impermeable. The loading/unloading stations were not diked. The cement retaining area at the base of the diesel storage tank was filled with dirt.

Area 6 Fuel Facility: A temporary drum storage area was not diked nor was the area cordoned to protect the drums from vehicular damage.

Area 23 Fuel Facility: Tanks for bulk storage of diesel fuel and gasoline were bermed, but the berms were not impermeable. The loading/unloading stations were not diked. The berm drain valves for the Area 23 bulk storage tanks were closed, but were not locked in the closed position.

N Tunnel: There was no secondary containment around the diesel fuel storage tank. A work request to correct the problem was submitted on October 30, 1989.

Radioactive Waste Management, Area 3: There was no secondary containment around the diesel fuel storage tank. The tank was not labeled. A water tank at this site was not labeled.

LGFSTF: There was no secondary containment for the bulk storage tanks Yard: There was no secondary containment around a tank of transformer oil and drums of waste transformer oil.

T Tunnel: An earthen dam for Evaporation Pond No. 4 was leaking contaminated water which is flowing out of the radiation controlled area. DNA has provided assurance that the next, and last, earthen dam in the line of dams has been appropriately engineered. No action has been taken to line the evaporation ponds or arrest the leak in the dam for Pond No. 4.

Atlas Wireline Well 3 Yard: There was no secondary containment around drum storage; the drums were not protected against vehicular damage. There was no secondary containment around four gasoline bulk storage tanks; the associated fueling station was not diked. A diesel fuel tank, located at the rear of the site, had faded labels and was not diked.

Area 6 Line Yard: Although drum storage and polychlorinated biphenyls (PCB) handling in Bldg. 6-158 is in compliance with existing requirements; there was no secondary containment for drum storage in the adjacent storage yard; and the drums were not protected from the likelihood of vehicular damage.

REECo Safety Manual, Order No. FP-2, "Loading and Unloading Petroleum," directs that "small spills shall be washed down with water or covered with dirt." This is not consistent with good industrial practice.

Earthen berms made of compacted soil may not be designed to contain liquids or sloshing liquids.

Many above ground tanks, such as those for liquefied propane, were marked to indicate their contents (for emergency response purposes); however, some of the markings were faded and/or partially unreadable.

CONCERNS: (PT.4-3) (H3/C1) The NTS spill prevention, control and countermeasures program does not meet the requirements of DOE 5480.4 and 40 CFR 112.

PT.5 STAFFING AND TRAINING

PERFORMANCE OBJECTIVE: Staffing should be adequate in terms of technical skill and numbers of staff assigned to carry out the packaging and transportation safety program. Personnel are properly trained to the requirements of DOE 5480.3 which includes the requirements of 49 CFR 100-199 and 10 CFR 71. Training is provided, but is not limited to, packaging personnel, truck drivers, fork lift operators, emergency response personnel (police, fire) and their respective supervisors.

FINDINGS:

There were no "job task analyses" to determine the specific qualifications or training needed by personnel assigned to packaging and transportation duties.

REECo Occupational Safety Code, E-8, establishes policy that Maintenance & Operations drivers who transport explosives receive hazardous materials training every three years. A review of several drivers' training records indicated that their hazardous materials training was not current. There was no similar requirement for drivers who transport hazardous materials.

The training of REECo teamsters assigned to the LANL Warehouse at CP-100 was not current.

Refresher training for Atlas Wireline personnel who package and transport radioactive sources was accomplished via safety meetings. The program was not formal or documented.

Hazardous materials training for LANL personnel assigned to the LANL Warehouse (at CP-100) was not documented. The supervisor's hazardous materials training was not current.

Training requirements for personnel assigned to the REECo Traffic Section were established, but not documented. Not all training was current. When completed, Purchasing Systems and Methods (SAM) 7219, "Training Traffic Personnel for Certifying Shipping Papers for Hazardous Material," (draft, June 15, 1989) is intended to satisfy this requirement.

Training requirements for LLNL personnel assigned to the LLNL Warehouse were established, but were not documented. This deficiency was noted in a March 29-30, 1989, DOE San Francisco Operations Office appraisal of LLNL/NTS operations; the appraisal was forwarded to LLNL on June 2, 1989. Training was current.

Training of REECo personnel who handle compressed gas cylinders was accomplished via on-the-job train The training program was neither formal or documented.

materials. Although classroom, examination materials, and student records were satisfactory, there were some deficiencies in the program: the classroom workbooks were not dated (to reflect course revisions as well as changes in various regulations), there were no lesson plans, and the same final examination was used for successive courses and makeup exams. The students were permitted to consult with each other during the open-book final examination.

Although the user of a hazardous material may package the material to be moved on-site or shipped off-site, there were no provisions or requirements that the user be trained in, or otherwise be knowledgeable of, packaging and transportation requirements.

CONCERN: (PT.5-1) (H3/C1) The training program for all personnel who prepare hazardous materials for off-site shipment did not meet the full intent of DOE 5480.3, which includes the training requirements of 49 CFR 100 through 199 and 10 CFR 71. In addition, the training program for personnel who handle or may be involved with intra-site movements of hazardous materials did not meet the full intent of the safety, health, and environmental protection requirements of DOE 5480.1A (See Concern TC.1-1).

FINDINGS:

REECo Company Procedure 3.2.51, "Hazardous Material Control," requires hazardous materials packages being moved on-site be marked, labeled, or accompanied by "shipping papers." Since emergency response personnel have not received documented DOE-related training to recognize labels and placards, they may not be aware of specific hazards when responding to a hazardous materials incident.

Deficiencies in responding to hazardous materials spills were evident during the emergency drill conducted on November 16, 1989 (see EP.4).

The emergency response organizations, including REECo, the Fire Department, the Sheriff's Department, and WSI personnel, have not taken full advantage of the REECo "Hazardous Materials" course offered on-site and the REECo "First On Scene" courses offered off-site.

CONCERN: (PT.5-2) (H3/C1) Preparation for response to transportation incidents involving hazardous materials do not meet the full intent of the health, safety, and environmental protection requirements of DOE 5480.1A.

PT.8 APPRAISAL OF OPERATIONS

PERFORMANCE OBJECTIVE: Periodic appraisals of operations should be conducted with regard to the packaging and transportation of all hazardous material, substances, and waste. Response to appraisals should be positive and timely.

FINDINGS:

The NVO Quality Assurance audit program did not include the safety aspects of hazardous materials packaging and transportation functions at NTS.

The most recent NVO appraisal of the REECo Traffic Section included the period October 1986 to September 1988. Although the appraisal included traffic management functions, it did not include safety and on-site movements of hazardous materials.

CONCERN: (PT.8-1) (H2/C1)

NVO safety oversight of NTS operations does not include packaging and transportation, and does not meet the requirements of DOE 5482.

PT.9 INTERNAL AUDIT PROGRAMS

PERFORMANCE OBJECTIVE: Internal audits conducted on the shipping and transporting of hazardous materials should be timely, independent, and auditable. The audits should determine the degree that operations comply with DOE packaging and transportation safety requirements.

FINDINGS:

LLNL packaging and transportation activities at the NTS have not been audited by LLNL.

The most recent internal audit of REECo packaging and transportation functions was done in June 1986. The audit reviewed traffic functions, but did not include hazardous materials packaging and transportation functions.

DOE 5480.3 and DOE 5482.1B require routine internal audits of packaging and transportation, and contractor operations, respectively.

CONCERN: (PT.9-1) (H3/C1) LLNL and REECo internal audit programs do not meet the full intent of DOE 5480.3 and 5482.1B.

O. QUALITY VERIFICATION

The number of organizations and the diversity of their missions at NTS presents a considerable challenge to NV in providing QA oversight and guidance. The purposes of quality verification are to review system and personnel performance for evidence of quality (as opposed to "paper" compliance), and to review quality programs for evidence that the organization(s) is in pursuit of excellence in the areas of problem identification, root cause analysis, and corrective actions taken.

NV and the NTS contractors all have made improvements in their quality programs. NV Quality Assurance Division (NV/QAD) is currently performing audits and surveillance more dedicated to examining implementation of quality practices than documentation of program description, keeping pace with the evolution of the NV and contractor quality programs. Contractors were performing meaningful internal audits and surveillances, and were strengthening their quality effort through a variety of activities including, but not limited to, redefinition of document hierarchy, procedures, interface control, and responsibilities. The concept of line management having responsibility for quality is accepted; the understanding of exactly what that means is growing.

Minor deficiencies noted were pointed out to the counterpart and responsible parties at the time of observation and are not reported here. This appraisal identified three quality verification concerns. The Quality Assurance Committee has failed to meet on a quarterly basis not fulfilling its functions as defined in NV11XB.1-12. NV/QAD audit reports are not always issued promptly, delaying effective identification of root causation and implementation of corrective action. The identification and control of items located in the Area 2 and 3 storage yards did not meet the requirements of NQA-1, Supplements 8.S-1 and 13.S-1.

QV.1 QUALITY PROGRAMS

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

FINDING: NV11XB.1-12 of 22 September 1989, Committee and Panels Handbook (a revision of an earlier version), has defined the authorization for and functions of the Quality Assurance Committee (pp 75,76) since March 1987. The committee bylaws, Article V, Section I, state that meetings shall be held at least once per calendar quarter. The last meeting of the committee was March 14, 1989.

CONCERN: (QV.1-1) (H3/C1) The NTS Quality Assurance Committee does not meet on a quarterly basis and therefore is not fulfilling its functions as defined in NV11XB.1-12.

FINDINGS: NVO/Quality Assurance Division (NVO/QAD) audit closeout meetings, properly included as part of the audit process, were not consistent in how deficiencies or concerns were communicated to the audited organizations. Some closeout meetings do not include distribution of written descriptions of deficiencies or concerns.

For five NVO/QAD FY 1989 QA audits, audit reports were issued three to ten weeks following completion of the audit. The NVO approval process is a contributing factor to some of the delay.
Delays in documenting audit deficiencies have contributed to difficulties experienced by the audited organizations in developing timely, accurate, and adequate audit responses; the credibility of NVO/QAD; and the importance of the audit function, are thereby de-emphasized.

CONCERN: (QV.1-2) (H2/C2) NVO/Quality Assurance Division quality assurance audit reports are not always issued in a timely manner.

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

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

FINDINGS:

The REECo Quality Assurance Program Manual does not contain a company implementing procedure that addresses handling, storage, and shipping; REECo therefore cannnot properly audit related practices.

The Area 2 Holding Yard for controlled (event-related) equipment exhibited the following deficiencies:

- Uncontrolled items were in mixed storage with controlled items
- Not all items were identifiable; many were obsolete
- Approximately 200 drums of depleted uranium scrap pieces were in the yard
- Several tons of unusable lead cable trays were in the yard

Craft storage practices in Area 2 and Area 3 did not provide adequate protection for items. Oxidation of materials was widespread.

CONCERN: (QV.5-1) (H2/C1) Identification and control of items in the Area 2 and Area 3 holding yards does not adequately address the requirements of ANSI/ASME NQA-1-1986, Supplements 8.S-1 and 13.S-1.

P. PERSONNEL PROTECTION

NTS conducts a variety of activities involving safety and health risks. DOE and each of the NTS contractors have health and safety organizations to assist in the minimization of risks, and no situations involving imminent danger to employees or the public were encountered. Safety and health risks are of the type covered in the OSHA standards (which are mandated by DOE Orders). These include potential exposures to mechanical, health and electrical hazards.

The organizational structure of NTS is complex and fragmented, resulting in: ambiguity in definition of responsibility, discrepancies in the application of codes and standards, and some organizational elements having low assurance of comprehensive health and safety coverage.

Observations revealed that NTS appropriately handles mechanical hazards in conformance with OSHA requirements. For example: those units requested to produce an OSHA 200 Log were able to do so; posters regarding the DOE Safety Standards Program were found in locations visited; and compliance reviews of 12 shops revealed only 10 minor violations of OSHA standards. Commonly cited safety violations throughout industry, such as improper tool rest distances, barrier guard clearance violations, and failure to maintain welding carts and fire extinguishers in a safe mode, were observed in only a few instances.

REECo has a pivotal role in health protection at NTS. Most of the potentially exposed workers are REECo employees and other site contractors receive industrial hygiene services from REECo on an as requested basis. NV's role is to provide oversight, which suffers from some of the organizational ambiguities discussed earlier.

Management of health hazards has received additional emphasis in recent years, and the REECo industrial hygiene organization has expanded. The result is an industrial hygiene organization that does not have the experience and stature to proactively manage health protection. For example, exposures are not appropriately documented for REECo and especially for non-REECo employees, and personnel protective equipment is often the primary means of protecting workers when, in fact, engineering controls are both feasible and required by the applicable DOE and/or OSHA standards.

The respiratory protection program was fundamentally sound, with some weaknesses noted. An asbestos evaluation and tracking program was in place. Monitoring of operations involving handling of asbestos (e.g., brake system maintenance) had been performed. Surveys to determine the presence of asbestos in buildings were performed only in concert with other surveys. There was no separate effort to develop an asbestos inventory based on physical samples.

Current industrial hygiene monitoring efforts are providing improved documentation of exposure conditions. While the program thrust has been correctly directed at short-term exposures, more documentation of time-weighted average exposures (by days/months/years) is desirable. Most OSHA standards for air contaminants are based upon eight-hour time-weighted average exposures. There was inconsistency in exposure recordkeeping, dependent on the organizations involved. Typically records may exist for one group of employees within an area, but they may not exist for employees of other organizations who work in close proximity. Mechanisms for providing estimates, based on actual sampling

or appropriate professionally-based projections, were nonexistent. Recent staff increases may alleviate these problems.

REECo has the primary responsibility for electrical safety since they maintain and operate the electrical transmission and distribution system. REECo's approaches to the safety of personnel working on the transmission grid and the distribution and service systems were different.

Electrical safety policy, safety knowledge and compliance for the transmission grid was adequate. However, line management is given considerable latitude in the application of safety policy to the lower voltage systems (distribution and service systems). Many electrical substations, constructed to temporary standards, have been in use for many years. Clearance, lockout and tagout procedures, established for high voltage systems, were not consistently applied to voltages of 4160 or less. Other concerns include: the fact that circuit designs often employ oversized wire, resulting in slow response of protective devices; circuit identification was often illegible; the accuracy of older drawings was questionable; and conductors were not confined to substations (loose, unprotected conductors can be extremely dangerous). Recent attrition among electrical tradesmen make these safety deficiencies potentially more serious.

Action toward resolution of some of these electrical safety concerns have been made by the REECo Occupational Safety and Fire Protection organization. A draft NTS safety code revision addresses some of the lockout/tagout concerns; however, it has been in draft form for over a year. Significant pending revisions to OSHA Subpart S (Electrical) are expected to necessitate additional changes.

PP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

FINDINGS:

Often REECo personnel, other prime contractors, and subcontractors work together and are therefore exposed to the same chemicals and physical stresses. Often only the REECo employees are monitored and assumed to be representative of all the workers in the area.

Exposure data received on REECo employees are not shared with the employers of other potentially exposed workers. Some measurements are required by OSHA (e.g., noise).

CONCERN: (PP.1-1) (H2/C1)

There is no mechanism to assure that occupational exposure measurements are used to document the exposure of non-REECo employees.

FINDINGS:

REECo's NTS Industrial Hygiene (IH) Department is responsible for field operations, laboratory analysis, and environmental health. This Department has grown from 17 employees to over 50 within the last year. Of these, the number of industrial hygienists grew from eight to sixteen. Turnover has been high and there is difficulty getting Q-cleared industrial hygienists. Two hygienists are certified.

REECo IH has six industrial hygienists assigned to the four active tunnels: three on the day shift, two on swing and one on night shift. Only two of the tunnel hygienists are Q-cleared. During event preparation, on reentry teams and mine backs, Q-cleared hygienists are required. This leaves critical underground operations without adequate IH coverage.

Although REECo has initiated an Asbestos Management Program, and has conducted walk-through surveys of a number of buildings, only 2 percent of the total NTS buildings (1,347) have been sampled. Buildings are surveyed for asbestos in conjunction with IH annual surveys, and when an engineering work order for building modifications are submitted.

CONCERN: (PP.1-2) (H2/C2)

Some NTS facilities are not receiving adequate industrial hygiene support coverage.

FINDINGS:

DOE 5480.4 indicates that the "Federal Mine Safety and Health Act of 1977," as amended, is a statutory requirement for DOE facilities. DOE also adopts, in 5480.4, the Tunnel Safety Orders, Administrative Code, Title 8, Chapter 4,

Subchapter 20, State of California, and OSHA's 29 CFR 1926, "Safety and Health Regulations for Construction," as DOE policy requirements. 29 CFR 1926.800 addresses underground construction.

A November 1986 letter from NVO to NTSO and NTS contractors, indicates that only the California Tunnel Code and 29 CFR 1926.800 apply to the tunnel operations. This conflicts with DOE 5480.4.

Application of these standards has resulted in concerns regarding emergency egress from tunnels (EP.7-3), ventilation system adequacy (which has been addressed by NTSO), and electrical code adequacy in tunneling operations (PP.6-5).

CONCERN: (PP.1-3) (H2/C2) Health and safety standards applied to tunnelling operations do not comply with DOE 5480.4.

FINDINGS:

There are three industrial hygienists in the NVO Environmental, Safety and Health Office. One is in the NVO Environmental Protection Division, and is responsible for IH Program Reviews and functional IH appraisals. Two industrial hygienists are in the Health Physics and Defense Waste Division, and are responsible for QA surveillances, program management and technical oversight. There are no hygienists in the Safety and Health Division (of which IH responsibility is a major portion) or in the Quality Assurance Division.

There was no single DOE representative to contact regarding IH status on NTS. The identification, evaluation, and control of environmental factors and stresses likely to be found at NTS are not clearly assigned to one organizational element within NVO.

Control of important environmental factors and stresses can not be effectively coordinated among the numerous NTS contractors, nor can integration of industrial hygiene factors listed in DOE 5480.10 be achieved, without appropriate NVO oversight.

CONCERN: (PP.1-4) (H2/C2) NVO oversight of NTS industrial hygiene programs is incomplete.

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 REECo Industrial Hygiene (IH) Department established computerized data collection systems for REECo's incoming material safety data sheets (MSDSs), respirator fit tests, polychlorinated biphenyls (PCB) training, and asbestos tracking. However, due to the illness of an employee who is responsible for input, current information was not available during the appraisal.

REECo worker exposure records were maintained on a separate computer system and on hard copy. Because of difficulty retrieving computerized records, no exposure records have been entered for the last two years.

CONCERN: (PP.2-1) (H2/C2)

REECo's computerized worker exposure files are inadequate to support data retrieval and trend analysis. (See Concern RP.12-1).

FINDINGS:

REECo uses internally generated "Safety Codes" to disseminate safety information on site.

A proposed revision to the REECo Electrical Safety Code, C-8, was developed in 1988 to improve electrical safety, but has not been approved or issued.

CONCERN: (PP.2-2) (H1/C2)

Delay in approval of the REECo Electrical Safety Code has delayed implementation of electrical safety improvements.

PP.3 MANAGEMENT OF HEALTH AND SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Chemical, physical, and/or other environmental stresses arising in the workplace should be identified, evaluated and controlled.

FINDINGS:

Tunnelling is performed with continuous miners, causing excessive levels of dust. Respirators, instead of water mist, are used for dust control.

Some of the jack-leg hammers in use are excessively noisy. Worker are therefore required to use two types of hearing protection. Sound suppressants are available and could be attached to the hammers.

Although new equipment is specified with health protection specifications [not always in accordance with Mine Safety and Health Administration (MSHA) standards equipment in service that becomes excessively noisy is not removed from service to reduce the hazard.

OSHA, the California Code and MSHA standards require noise reduction by engineering controls in preference to (or in addition to) hearing protection.

CONCERN: (PP.3-1) (H2/C1)

Personnel protection is used as the primary control for health hazards, when engineering controls or administrative controls are both feasible, and required under the hierarchy of controls established by OSHA, the Mine Safety and Health Act, and the California Tunnel Standards.

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:

FSN is an architectural and engineering firm whose employees may mix cement and work around drilling equipment.

Cement formulations are used that include silica flour, which has a relatively high percentage of respirable silica compared to other cement formulations.

FSN depends on REECo for industrial hygiene services at NTS. FSN must request these services from REECo; and they receive the sampling results from REECo. However, FSN has not made such a request, and did not have records of the noise or silica exposures of their employees.

CONCERN: (PP.4-1) (H2/C2) Exposures to noise and silica are not determined and documented for FSN employees.

FINDINGS:

REECo provides extensive industrial hygiene monitoring services in the tunnels, including continuous and discrete-period air sampling.

Most air samples have been of short duration, in an attempt to assess the instantaneous environmental conditions, select appropriate controls or protective equipment, and validate those choices.

Little attention has been paid to evaluating long-term, low-level exposures, although many stresses present in tunnelling are chronic rather than acute concerns. In addition, most OSHA health standards are based on eight-hour time-weighted average concentrations.

CONCERN: (PP.4-2) (H2/C2) Long-term exposures to air contaminants and noise are not documented.

PP.5 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS

PERFORMANCE OBJECTIVE: Site/facility operations should comply with DOE-prescribed standards for the evaluation and control of occupational health standards.

FINDINGS:

REECo requires respirator fit tests for employees every two years while ANSI Z88.2 requires annual fit testing for respirator users.

REECo will issue a respirator to an employee only if there is evidence of a fit test for that respirator within the previous two years. It was not possible to determine the conditions under which other contractors issue respirators.

ANSI Z88.2 requires annual training for respirator users and training for the supervisors of respirator users. REECo assigns the responsibility for annual training of respirator users (in the interim year between fit tests) to the supervisors, but gives them no special training in respiratory protection.

Different respirators may be selected by different employers for use on the same job. This may create confusion and undermine confidence in the program. For underground operations, it has been resolved that REECo will determine the types of respirators to be used. No such resolution exists for above ground operations.

Signage for and care of self-rescuers in tunnels was inadequate (See Concern EP.7-2).

CONCERN: (PP.5-1) (H2/C1) NVO provides no assurance that the site-wide use of respirators is in compliance with ANSI Z88.2.

PP.6 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS

PERFORMANCE OBJECTIVE: Work places should be free of uncontrolled physical hazards and be in compliance with DOE-prescribed occupational safety standards.

FINDING: Both communications and power conductors have been abandoned in or near electric supply substations without concern for remote termination. It is difficult to establish the location of the "other end" of these cables. Any system fault will result in a voltage that is transferred to the remote end of the cable.

CONCERN: (PP.6-1) (H1/C2) Conductors are abandoned in or near electrical supply substations without proper isolation or insulation.

FINDINGS: At construction sites, most of the electric circuits have been labeled using tape and a marking pen. Most of these labels at the older sites are no longer readable.

Legible circuit identification is a basic requirement for workers; however, deteriorated labels, time and turnover of personnel make circuit identification difficult.

CONCERN: (PP.6-2) (H2/C2) Unlabeled and potentially mislabeled circuits present electrical hazards to personnel.

FINDING: The basic design philosophy for low voltage service is to base protective breaker rating on the wire size. Wire size used is normally very conservative for the load. This tends to result in slow opening by the protective devices. Slow opening increases the risk to workers, since time is directly related to the electrocution formula.

CONCERN: (PP.6-3) (H2/C2) Clearing times for low voltage service circuits are not reviewed.

FINDINGS: Tagging and lockout procedures for substations under the control of the Power, Electronics and Communication (PEC) Department were established. Tagging and lockout procedures for "construction site" substations not under the control of PEC were developed by the "Cognizant Departments" and were not uniform.

There have been near serious or near miss events resulting from tagging failures. The most recent was documented in a letter dated October 20, 1989, from REECo, Occupational Safety and Fire Protection to REECo, Field Operations Department. A training program directed at correcting this situation is being developed.

REECo's revised Electrical Safe Work Practices Manual was not published as of November 29, 1989.

Work was observed where circuits were "cleared for work" but were not tagged out.

CONCERN: (PP.6-4) (H1/C2) Clearance tagging and lockout is not consistent for construction site substations.

FINDINGS:

Construction standards were applied to electrical substations which may, in fact, be in place for many years.

The Climax Shaft ventilation substation was shut down at NTSO's direction due to electrical code violations.

CONCERN: (PP.6-5) (H2/C1) Electrical substations to support construction do not comply with all applicable electrical codes.

FINDING:

Paints and other flammable and hazardous materials are being collected in a cement block walled room in Building 710, Area 23. This is part of an effort to collect such materials, and dispose of them in compliance with environmental regulations. There was no inventory of these materials.

CONCERN: (PP.6-6) (H2/C1) Open storage of flammable materials is a violation of OSHA standards.

PP.7 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.

FINDINGS:

Employees who enter downhole shafts and other areas may work in the presence of gases.

Employees are trained in the nature of potential gaseous hazards, means of detecting their presence or release, and methods of protecting themselves against adverse effects. Gas concentrations were measured and used to estimate the exposure of individuals in the area. However, specific identity of some gases may be withheld from employees.

Access to medical and exposure records is required by OSHA 29 CFR 1910.20 and DOE 5483.1A, I.5d.

CONCERN: (PP.7-1) (H2/C2) Employees are not currently informed of the identity of some gases under the OSHA regulations and DOE 5483.1A, and no procedure exists to identify these gases to the employees.

FINDINGS:

REECo Industrial Hygiene has a computer system which contains material safety data sheets (MSDSs) for materials purchased through REECo.

Other contractors can contribute MSDSs to the system and REECo will enter them.

REECo provides read-only access to its MSDS file for other contractors.

CONCERN: (PP.7-2) (H2/C2) The lack of a site-wide hazardous materials authorization process impedes compliance with the Hazard Communication Standard (29 CFR 1910.1200).

FINDINGS:

H&N has a hazard communication program. The program includes training and access to MSDSs.

A review of MSDSs revealed that many were very old, predating the November 1985 deadline for manufacturers, importers, and distributors of hazardous chemicals to meet expanded disclosure requirements. Some of these old sheets did not meet the expanded disclosure requirements.

CONCERN: (PP.7-3) (H2/C1) H&N's lack of current material data sheets, and failure of old data sheets to provide adequate disclosure, violates the Hazard Communication Standard (29 CFR 1910.1200).

Q. AVIATION SAFETY

The EG&G/EM Security Helicopter, Airborne Response Team (ART) aviation management, operations, aircraft/flightline, refueling operations and facilities, maintenance, life support equipment, security, and operating experience were reviewed, and in most areas were improved over the July 17-19, 1988, NVO appraisal of EG&G/EM aviation safety. There are three separate refueling systems at NTS, two at Desert Rock Airport (DRA) and one at CP-1. Increased safety, economy, and efficiency could be realized by the integration of these three refueling systems. There is a concern regarding the lack of a suitable ART hangar. Many deficiencies in the new ART hangar under construction indicate the lack of an adequate preoccupancy analysis recommended in last year's appraisal report. The temporary Area 25 ART facilities are adequate and routine maintenance activities are accomplished now but will become very difficult as winter approaches. The safety analyses performed on the Area 25 facilities and on numerous high risk security helicopter operations were proper, effective, and enhanced safety.

An accident involving a collision with the ground during a Night Vision Goggle (NVG) flight occurred on October 1, 1989. The Accident Investigation Board met during this appraisal, and soon will release its report with recommended corrective actions. This accident highlighted some concerns listed in this report. The accident rate for NTS helicopter operations involving NVG night flight is high enough to justify a concern. In particular, the lack of two pilot operations and tighter controls for NVG training, possibly balancing risks and mission effectiveness, need to be addressed. Another concern is the lack of instrument capability in the ART helicopters and pilots.

The recently published EG&G/EM Aviation Policies and Operations Manual is a noteworthy document. The EG&G/EM pilot training records were accurate and complete.

The aviation activities at NTS were controlled well by the Operations Coordination Center (OCC), although, DRA is not included in OCC control.

Many past coordination problems, potentially serious, are being routinely addressed through the Nellis Air Force Base Airspace Management quarterly meetings and the U.S. Air Force/DOE liaison working groups. However, there are still areas of concern for mid-air collision potential and efforts need to continue among all aviation users to alleviate these potential problems.

Another concern was that the local Federal Aviation Administration (FAA) Flight Standards District Office (FSDO) Manager withdrew in April 1989 from the operational and maintenance surveillance program previously established between NVO, EG&G/EM, and FAA. Several misconceptions existed within DOE and FAA as to the "Public Aircraft" status of DOE-owned aircraft and DOE's requirement for their aircraft to have a valid Airworthiness Certificate. Of particular concern is a contemplated action for NVO to surrender their Airworthiness Certificates contrary to DOE policy, which would result in forfeiting the most cost effective means of assuring DOE aircraft airworthiness.

Aviation safety is satisfactory at NTS. A few concerns addressed require more funding, but all require timely management action, decisions, and resolution. These aviation safety concerns indicate a probable root cause management concern and are listed in Section 2.3, Key Findings and Noteworthy Practices.

AV.1 AVIATION MANAGEMENT

PERFORMANCE OBJECTIVE: Aviation organization, administration, and safety programs should ensure the provision of proper aircraft, facilities, and effective implementation and control of aviation and associated safety activities.

FINDINGS:

In the NVO Aviation Safety Appraisal of EG&G/EM conducted July 19-21, 1988, Recommendation 11.1 stated, "Expedite MORT system analysis of Airborne Response Team (ART) and Nellis Air Force Base (AFB) hangar/facilities/programs to determine pre-occupancy adequacy for commencing operations." There was insufficient documentary evidence available to make a determination whether this recommendation had ever been effectively followed through to completion.

Inspection of the new ART hangar and facility, as it currently exists, indicated safety deficiencies too numerous to list. Included are a dip in ramp and sharp turn such that the helicopter on its dolly could not negotiate positioning from hangar to pad. The pad shoulders pitch and soft soil are inadequate and do not meet FAA standards. The housing space is too small. The hangar door has unplanned space large enough to walk through.

There is inadequate winter maintenance capability and helicopter protection provided at the Area 25 temporary facility, which increases the potential for unsafe operations.

Construction of the new ART hangar facility is behind schedule with large cost overruns which have necessitated modifications to the original design package and which have decreased the original safety design of the facility. There is no evidence that the modifications have received any safety review. Currently, construction is halted pending new state permits.

CONCERN: (AV.1-1) (H3/C1) There is no assurance that the safety of the construction modifications for the new Airborne Response Team hangar are adequate for the originally intended use of the hangar.

AV.2 AVIATION OPERATIONS

PERFORMANCE OBJECTIVE: Aviation 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 DOE and FAA standards.

FINDINGS:

DOE Order 5480.13 requires aircraft certification by the FAA. This policy has utilized the FAA Airworthiness Certificate System as the most cost effective and economical means of airworthiness assurance for DOE public aircraft. Since 1981, FAA has assisted DOE at the local level in maintaining DOE Airworthiness Certificates.

In April 1989, the local FAA Flight Standards District Office (FSDO) Manager withdrew from the operational and maintenance surveillance program previously established between NVO, EG&G/EM, and FAA. This created serious problems concerning the Airworthiness Certificate for the Convair 580, N30EG, owned by DOE and operated by EG&G/EM.

Interviews and documentation reviews indicated that DOE is considering surrendering all the Airworthiness Certificates for DOE-owned, EG&G/EM operated aircraft (including the BO-105 security helicopters operating at NTS), and declaring these aircraft to be "Public Aircraft."

The DOE-owned, EG&G/EM-operated security helicopters are "Public Aircraft" by definition. DOE has mandated that they be FAA certified and possess an Airworthiness Certificate even though this is not required by FAA regulations. If FAA assistance is not available, DOE can maintain its Airworthiness Certificates utilizing the FAA standards and procedures and EG&G/EM personnel with proper FAA certificates. However, this may not provide the same assurance of safety as direct FAA oversight.

CONCERN: (AV.2-1) (H3/C1) NVO will loose its current cost-effective means of assuring the airworthiness of its aircraft and will not be in compliance with DOE Order 5480.13, should the Airworthiness Certificates be surrendered.

CONCERN: (AV.2-2) (H3/C1) Unilateral surrender of the aircraft Airworthiness Certificates by NVO may set a precedent whereby all other DOE aircraft may have their Federal Aviation Administration Airworthiness Certificates involuntarily withdrawn.

FINDINGS:

Although NTS security helicopter operations do not require fully-certified instrument capabilities in the helicopters, current NVO policy is that operations should be safely conducted, even if instrument flight conditions are inadvertently encountered.

It is required that NTS security helicopters be capable of instrument flight.

NTS security helicopter N7EG, which crashed recently, was capable of instrument flight. Helicopter N5EG is not equipped for and capable of instrument flight. The backup NTS security helicopter N2909L is equipped for and capable of instrument flight.

All of the EG&G/EM Airborne Response Team pilots have FAA Airline Transport Pilot ratings, but some are restricted to Visual Flight Rules operations because they lack instrument ratings. They are working for these instrument ratings. The pilot involved in the recent accident was not instrument qualified.

CONCERN: (AV.2-3) (H2/C1) NTS security helicopters and pilots are not capable in all circumstances, of safe flight in inadvertent instrument conditions.

AV.8 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experience should be evaluated, and appropriate action taken to improve safety and reliability of aircraft and crew members.

FINDINGS:

On October 1, 1989, NTS security helicopter N7EG experienced a "collision with the ground," and several bounces, while involved in night visual flight rules (VFR) night vision goggle (NVG) training. The Accident Investigation Board is still in progress and requirements for corrective actions are anticipated soon.

NTS security helicopter operations commenced on February 6, 1984. Since that time 4,309 flight hours have been logged as of November 14, 1989. Three significant accidents have occurred at NTS during this period. One involved an engine failure due to an ingested rag, and the other two accidents involved night NVG training flights.

The overall accident rate is about 70 per 100,000 flight hours. The rate for night NVG training is slightly less than 50 per 100,000 flight hours. The NTS rate is cause for concern. It is about five times higher than most high hazard helicopter operations.

The last published DOE minimum altitude for NVG operation was 300 feet altitude, established in 1986.

The last meeting of the DOE Helicopter Security Operations Council was held in May 1988. A meeting scheduled for November 1989 was cancelled. The minimum altitude of 125 feet with descent allowed 3 to 5 miles out from the landing area for NVG training was established for all DOE security helicopters at the May 1988 meeting of the Council. Minutes for the May 1988 meeting were not reviewed and approved, so the new flight limitation (minimum altitude) has not become effective.

NTS conducts NVG training with single pilot operation and 125 feet minimum altitude.

CONCERN: (AV.8-1) (H1/C1)

The NTS policy permitting single pilot operations of security helicopters contributes to unsafe flying conditions and the lack of tighter controls for night vision goggle training, balancing mission effectiveness against hazard/risk, contributes to a high accident rate.

IV. 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. Four Noteworthy Practices were identified during this TSA: One in Radiation Protection; one in Emergency Preparedness; and two in Personnel Protection. They are described in this Section.

EP.5 EMERGENCY FACILITIES, EQUIPMENT AND RESOURCES

PERFORMANCE OBJECTIVE: Emergency facilities, equipment and resources should adequately support site/facility emergency operations.

NOTEWORTHY PRACTICE: The configuration of the evacuation alarm system in the LGFSTF facility is unique. In addition to "panic button" alarms at various fixed locations, each worker carries a portable "panic button" transmitter unit. Receiver antennae at various locations near the perimeter of the chemical handling and storage area receive the signal and activate the evacuation alarms.

This configuration allows a worker to warn others of a dangerous situation while losing no time in exiting.

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.

NOTEWORTHY PRACTICE: REECo utilizes a Track Etch Dosimeter (TED) for its neutron dosimeter. The TED consists of three foils of a plastic referred to as CR-39. There is currently an ongoing research program to develop and place this material into use throughout DOE. However, problems encountered with the quality of the plastic foils, specifically surface defects, have slowed the implementation significantly. REECo has developed a readout technique which uses an oblique angle lighting arrangement rather than the direct pass-through lighting, typical of most microscopes and, as a result, reduced the surface defect impacts to a tolerable almost insignificant level. The result of this is that instead of discarding up to 90% of the plastic as defective foils most, if not all of it, can be used for dosimeter use. The savings are substantial when the plastic costs upwards of $500 per sheet (~ 500 foils).

PP.6 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS

PERFORMANCE OBJECTIVE: Work places should be free of uncontrolled physical hazards and be in compliance with DOE-prescribed occupational safety standards.

NOTEWORTHY PRACTICE: The REECo Maintenance Tire and Lube Shop, Area 23, Bldg. 710, has an innovative way of preventing fall injuries for personnel working around pits.

Portable nets are provided, to be installed over the open area of pits used to allow employees to perform work under motor vehicles. The employee working in the pit walks down the stairway into the pit, adjusts the net in place, and commences work.

By using this tool, employees in the pits are protected against large objects or other employees falling onto them, and employees at floor level are protected against falling into the pit.

This innovative device has reportedly been shared with other DOE facilities, but originated at NTS-REECo Fleet Operation Shops.

PP.7 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.

NOTEWORTHY PRACTICE: The REECo Maintenance Shops are providing a poster board in highly traveled areas of their shops which displays the warning symbols for hazardous chemicals and also has a notebook entitled "Hazcom," which has current Material Safety Data Sheets (MSDSs) in it; they plan to add appropriate safety clothing and equipment at these stations such as, aprons, gloves, goggles and hard hats as they become available.

APPENDIX A

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 designee, is 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 close-out 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, fatality, or loss of the facility.

Hazard Level 2. Has the potential for causing minor occupational injury or illness, major property damage, or has 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, 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 improvement for their own sake--not deficiency driven).

APPENDIX B

Categorization and Tabulation of Concerns

Using the criteria in Appendix A "System for Categorizing Concerns," all of the Concerns have been categorized as Category III for seriousness except EP.7-1. Sections 4.8.1 and 4.8.2 are provided as convenient reference tables. However, the user is cautioned to read the basis for each Concern, provided in Section III, in order to fully understand it.

APPENDIX B-1

Categorization of Concerns

Concern Number	Potential Hazard Level	Compliance Level
OA.2-1	2	1
OA.3-1	2	2
OA.3-2	3	2
OA.5-1	2	1
OA.5-2	2	2
OA.5-3	2	2
OA.5-4	2	2
OA.7-1	2	2
OA.8-1	2	2
OP.2-1	3	2
OP.3-1	3	2
OP.3-2	2	2
MA.1-1	2	2
MA.2-1	2	2
TC.1-1	2	1
TC.3-1	2	2
TC.4-1	2	1
TC.6-1	2	1
AX.3-1	2	1
EP.1-1	2	2
EP.1-2	2	2
EP.1-3	2	2
EP.2-1	2	1
EP.2-2	2	1
EP.2-3	2	1
EP.3-1	2	2
EP.3-2	2	2
EP.4-1	2	2
EP.4-2	1	2
EP.6-1	2	1
EP.7-1 (CAT II)	1	1
EP.7-2	1	2
EP.7-3	2	2
EP.7-4	1	2
EP.7-5	1	2
TS.2-1	2	1

Concern Number	Potential Hazard Level	Compliance Level
FR.1-1	2	1
FR.2-1	2	1
FR.2-2	2	2
FR.5-1	2	1
FR.6-1	2	2
RP.1-1	2	2
RP.2-1	2	1
RP.2-2	2	2
RP.2-3	2	2
RP.3-1	2	1
RP.3-2	2	2
RP.4-1	2	2
RP.4-2	2	1
RP.5-1	2	2
RP.5-2	2	2
RP.5-3	2	2
RP.6-1	2	3
RP.6-2	2	1
RP.7-1	2	1
RP.8-1	2	1
RP.8-2	2	1
RP.9-1	2	1
RP.10-1	2	1
RP.11-1	2	1
RP.12-1	2	3
RP.12-2	2	1
FP.2-1	2	1
FP.6-1	2	1
FP.6-2	2	2
PT.2-1	2	1
PT.3-1	3	1
PT.3-2	2	1
PT.4-1	3	1
PT.4-2	2	1
PT.4-3	3	1
PT.5-1	3	1
PT.5-2	3	1
PT.8-1	2	1
PT.9-1	3	1
QV.1-1	3	1
QV.1-2	2	2
QV.5-1	2	1

Concern Number	Potential Hazard Level	Compliance Level
PP.1-1	2	1
PP.1-2	2	2
PP.1-3	2	2
PP.1-4	2	2
PP.2-1	2	2
PP.2-2	1	2
PP.3-1	2	1
PP.4-1	2	2
PP.4-2	2	2
PP.5-1	2	1
PP.6-1	1	2
PP.6-2	2	2
PP.6-3	2	2
PP.6-4	1	2
PP.6-5	2	1
PP.6-6	2	1
PP.7-1	2	2
PP.7-2	2	2
PP.7-3	2	1
AV.1-1	3	1
AV.2-1	3	1
AV.2-2	3	1
AV.2-3	2	1
AV.8-1	1	1

APPENDIX B-2

Tabulation of Concerns

A. Organization and Administration

CONCERN: (OA.2-1) (H2/C1) The FSN Health and Safety Manual is outdated and does not reflect recent DOE requirements from orders issued since 1984.

CONCERN: (OA.3-1) (H2/C2) Neither Fenix and Scisson, Nevada, Inc., nor Holmes & Narver has a formal program or plan designed to improve the overall level of safety performance in their operations.

CONCERN: (OA.3-2) (H3/C2) The annual safety performance program formulated by REECo does not always establish goals that stimulate improvement from year to year.

CONCERN: (OA.5-1) (H2/C1) There is a lack of overall guidance and oversight by NV/NTSO of the activities at NTS.

CONCERN: (OA.5-2) (H2/C2) The treatment afforded incidents that are likely to be designated as Unusual Occurrences is inconsistent between both NTS contractors and user organizations.

CONCERN: (OA.5-3) (H2/C2) The results of Unusual Occurrence investigations are not trended by user organizations and contractors to yield insights into root causes of generic site problems.

CONCERN: (OA.5-4) (H2/C2) Neither REECo, EG&G/EM, H&N, FSN nor any of the NTS user organizations have a tracking system in place to follow the status of progress in correcting deficiencies cited in UORs.

CONCERN: (OA.7-1) (H2/C2) H&N cannot assure that the working copies of their Environment, Safety and Health Protection Program Manual are up-to-date.

CONCERN: (OA.8-1) (H2/C2) Not all NTS contractor personnel have received substance abuse training, and no refresher training has been given to those who received this training over two years ago.

B. Operations

CONCERN: (OP.2-1) (H3/C2) Some logbooks are not being uniformly maintained at each facility and in a format that is needed for historical and legal records.

CONCERN: (OP.3-1) (H3/C2) A document that requires operating procedures to be reviewed on a specific schedule does not exist.

CONCERN: (OP.3-2) (H2/C2) Some procedures are neither dated nor signed to indicate that they have been reviewed for accuracy following completion of the steps.

C. Maintenance

CONCERN: (MA.1-1) (H2/C2) Some non-real property maintenance activities required to ensure safety and compliance with DOE 5700.6B, as well as industry standards and good practices, are being overlooked.

CONCERN: (MA.2-1) (H2/C2) Lock and tag procedures are either not used or being improperly implemented.

D. Training and Certification

CONCERN: (TC.1-1) (H2/C1) NV has not provided site-wide training standards and requirements at NTS, and implementation and effectiveness of training is inconsistent.

CONCERN: (TC.3-1) (H2/C2) There is no assurance that initial on-the-job training for waste management operations personnel is effective.

CONCERN: (TC.4-1) (H2/C1) There is no NV oversight that ensures all NTS contractor, user, and visitor personnel radiation workers are provided the training required by DOE 5480.11.

CONCERN: (TC.6-1) (H2/C1) The LLNL criticality safety training program for NTS personnel does not include documented retraining, as required by DOE 5610.3 and 5480.5.

E. Auxiliary Systems

CONCERN: (AX.3-1) (H2/C1) ALARA objectives to reduce the production of low-level waste for tunnel operations at NTS have not been fully achieved.

F. Emergency Preparedness

CONCERN: (EP.1-1) (H2/C2) Emergency preparedness responsibilities for NTS are fragmented.

CONCERN: (EP.1-2) (H2/C2) Major activities, including preparation for emergencies resulting from weapons tests, have not been subjected to routine oversight by personnel knowledgeable in emergency preparedness.

CONCERN: (EP.1-3) (H2/C2) Responsibilities and interfaces for the DOE Emergency Duty Officer and the Operations Coordination Center are ill-defined.

CONCERN: (EP.2-1) (H2/C1) Existing emergency plans and implementing procedures are inconsistent and do not facilitate classification of and response to credible emergency events at NTS.

CONCERN: (EP.2-2) (H2/C1) County emergency plans are neither approved nor current, so emergency coordination and communications with surrounding counties is not assured.

CONCERN: (EP.2-3) (H2/C1) The maximum credible accident at the Liquefied Gaseous Fuels Spill Test Facility has not been evaluated or planned for. See also Concern TS.2-1.

CONCERN: (EP.3-1) (H2/C2) DOE emergency cadre personnel have not received training in emergency classification and response.

CONCERN: (EP.3-2) (H2/C2) There are neither training nor qualification requirements for the NTS Emergency Duty Officer.

CONCERN: (EP.4-1) (H2/C2) Corrective actions from exercises are not implemented in a timely fashion.

CONCERN: (EP.4-2) (H1/C2) Proficiency in handling on-site emergencies was not demonstrated.

CONCERN: (EP.6-1) (H2/C1) No document correlates the three separate emergency classification systems used at NTS, providing little assurance that events will be classified according to DOE Orders.

CONCERN: (EP.7-1) (H1/C1) (Category II) The accountability system for persons underground in tunnels and shafts was not adequate to assure proper personnel accountability so that searches for missing persons could be performed properly.

CONCERN: (EP.7-2) (H1/C2) Self-rescue respirators in the tunnels were not maintained in a manner that assures their availability and functional readiness.

CONCERN: (EP.7-3) (H2/C2) There is a lack of emergency exits from the tunnels and adequate compensatory measures are not in place.

CONCERN: (EP.7-4) (H1/C2) Criteria to determine which locations require accountability to protect personnel in case of an emergency have not been established for NTS, thus, accountability is not assured by existing systems.

CONCERN: (EP.7-5) (H1/C2) The ability of emergency personnel and vehicles to enter Area 27 rapidly in case of a medical emergency has not been adequately assured.

F. Technical Support

CONCERN: (TS.2-1) (H2/C1) Current and complete Safety Analysis Reports that conform to the requirements of DOE 5481.1B are not available for facilities at NTS.

I. Site/Facility Safety Review

CONCERN: (FR.1-1) (H2/C1) NV has not identified NTS facilities/activities that should be classified as "nuclear facilities" in accordance with DOE 5480.5, nor developed programs to meet the requirements of DOE 5480.5 in areas such as safety analysis, documented training, Operational Safety Requirements, and independent safety oversight for these nuclear facilities.

CONCERN: (FR.2-1) (H2/C1) NV prime contractors have not formalized independent safety reviews to address all activities that are required by DOE 5482.1B.

CONCERN: (FR.2-2) (H2/C2) Safety oversight activities address individual contractors and functional areas, but do not provide for an assessment of site-wide activities/facilities.

CONCERN: (FR.5-1) (H2/C1) NV prime contractors are not conducting triennial reviews of their internal appraisal systems as required by DOE 5482.1B, 9.d(2)(d).

CONCERN: (FR.6-1) (H2/C2) There is no coordinated NTS-wide operating experience review program.

K. Radiological Protection

CONCERN: (RP.1-1) (H2/C2) NV has not effectively appraised, audited, or enforced DOE radiation protection policies and procedures, nor have they engaged in aggressive oversight of NTS, rather these func- tions have been performed by REECo, resulting in less than complete coverage for the program.

CONCERN: (RP.2-1) (H2/C1) Neither REECo nor LANL (NTS) have satisfactory internal audit programs which comply with DOE 5480.11.

CONCERN: (RP.2-2) (H2/C2) The current practice of higrading core samples could lead to excessive hand exposures which are not as-low-as-reasonably-achievable (ALARA).

CONCERN: (RP.2-3) (H2/C2) No audit program for personnel whole body dosimetry or for extremity dosimetry is being conducted.

CONCERN: (RP.3-1) (H2/C1) Procedures and posting at NTS, are not in compliance with DOE 5480.11.

CONCERN: (RP.3-2) (H2/C2) The lack of direction and oversight by NV leads to misunderstanding of who is responsible for posting user laboratory sites at NTS.

CONCERN: (RP.4-1) (H2/C2) Standard Operating Procedures and Special Work Procedures are available but not posted at the entrance to the work sites that clearly define the type of protective clothing requirements, dose rates expected, and other information.

CONCERN: (RP.4-2) (H2/C1) Extremity exposures and doses cannot be accurately determined n nor is the calibration of the dosimeter, as required by DOE 5480.11, appropriate for the types of radiation encountered at NTS.

CONCERN: (RP.5-1) (H2/C2) The REECo external personnel dosimetry quality assurance plan does not include the requirement for blind dosimeter testing.

CONCERN: (RP.5-2) (H2/C2) The error range of dosimetric measurements is not determined, as required by DOE 5480.11.

CONCERN: (RP.5-3) (H2/C2) The high frequency of not returned and tardy dosimeter exchanges increases the possibility of missing a significant exposure.

CONCERN: (RP.6-1) (H2/C3) Permitting eating, drinking, and smoking in contaminated or potentially contaminated areas is in conflict with good health physics practices.

CONCERN: (RP.6-2) (H2/C1) The use of instruments that are out of calibration is unacceptable and not in compliance with ANSI-323.

CONCERN: (RP.7-1) (H2/C1) REECo does not have an internal dosimetry program which complies with the requirements of DOE 5480.11.

CONCERN: (RP.8-1) (H2/C1) REECo portable radiation monitoring instrumentation at NTS is not in compliance with applicable ANSI standards relating to radio frequency susceptibility.

CONCERN: (RP.8-2) (H2/C1) LLNL calibration of portable radiation monitoring instruments is not in compliance with the requirements of DOE 5480.11.

CONCERN: (RP.9-1) (H2/C1) The air monitoring program in the tunnel operations cannot quantify airborne radioactivity as required by DOE 5480.11.

CONCERN: (RP.10-1) (H2/C1) Posting of radiation areas and documentation of survey results of specific test sites are not in compliance with the requirements of DOE 5480.11.

CONCERN: (RP.11-1) (H2/C1) ALARA programs for the prime contractors at NTS do not have established goals and milestones as required by DOE 5480.11.

CONCERN: (RP.12-1) (H2/C3) Survey records were not readily accessible.

CONCERN: (RP.12-2) (H2/C1) Annual occupational exposure information is not being distributed to REECo employees, as required by DOE 5480.11.

L. Fire Protection

CONCERN: (FP.2-1) (H2/C1) Numerous facilities at NTS are not in compliance with the egress maintenance provisions of NFPA 101 (Life Safety Code), as prescribed by DOE 5480.4.

CONCERN: (FP.6-1) (H2/C1) A compliance program for NFPA 1500 (as required by DOE Order 5480.4) has not been established.

CONCERN: (FP.6-2) (H2/C2) The Fire Department has not demonstrated the capacity to promptly terminate and mitigate the effects of a fire in a safe and effective manner.

M. Packaging and Transportation

CONCERN: (PT.2-1) (H2/C1) NV and REECo management directives do not assure packaging and transportation operations meet the requirements of DOE 5480.1, 5480.3, 5480.4, and 1540.1.

CONCERN: (PT.3-1) (H3/C1) NV policies and procedures for handling, packaging and shipping hazardous materials, substances, and wastes, do not meet the full intent or requirements of DOE 5480.1A, 5480.3, and 5480.4.

CONCERN: (PT.3-2) (H2/C1) Onsite handling, packaging and movement of hazardous materials, substances and wastes is not in accordance with the requirements of DOE 5480.1A, and NV-232.

CONCERN: (PT.4-1) (H3/C1) NV safety oversight of packaging and transportation operations does not meet the full intent of the health, safety, and environmental protection requirements of DOE 5480.1A.

CONCERN: (PT.4-2) (H2/C1) The control of handling, storage and intra-site movements of hazardous materials, substances and wastes (including hazardous, mixed, and radioactive) do not meet all the requirements of DOE 5480.1A.

CONCERN: (PT.4-3) (H3/C1) The NTS spill prevention, control and countermeasures program does not meet the safety requirements of DOE 5480.4 and 40 CFR 112.

CONCERN: (PT.5-1) (H3/C1) The training program for all personnel who prepare hazardous materials for off-site shipment did not meet the full intent of DOE 5480.3, which includes the training requirements of 49 CFR 100 through 199 and 10 CFR 71. In addition, the training program for personnel who handle or may be involved with intra-site movements of hazardous materials did not meet the full intent of the safety, health, and environmental protection requirements of DOE 5480.1A (See also Concern TC.1-1).

CONCERN: (PT.5-2) (H3/C1) Preparation for response to transportation incidents involving hazardous materials do not meet the full intent of the health, safety, and environmental protection requirements of DOE 5480.1A.

CONCERN: (PT.8-1) (H2/C1) NV safety oversight of NTS operations does not include packaging and transportation, and does not meet the requirements of DOE 5482.

CONCERN: (PT.9-1) (H3/C1) LLNL and REECo internal audit programs do not meet the full intent of DOE 5480.3 and 5482.1B.

N. Quality Verification

CONCERN: (QV.1-1) (H3/C1) The NTS Quality Assurance Committee does not meet on a quarterly basis and therefore is not fulfilling its functions as defined in NV11XB.1-12.

CONCERN: (QV.1-2) (H2/C2) NV/Quality Assurance Division quality assurance audit reports are not always issued in a timely manner.

CONCERN: (QV.5-1) (H2/C1) Identification and control of items in the Area 2 and Area 3 holding yards does not adequately address the requirements of ANSI/ASME NQA-1-1986, Supplements 8.S-1 and 13.S-1.

O. Personnel Protection

CONCERN. (PP.1-1) (H2/C1) There is no mechanism to assure that occupational exposure measurements are used to document the exposure of non-REECo employees.

CONCERN: (PP.1-2) (H2/C2) Some NTS facilities are not receiving adequate industrial hygiene support coverage.

CONCERN: (PP.1-3) (H2/C2) Health and safety standards applied to tunneling operations do not comply with DOE 5480.4.

CONCERN: (PP.1-4) (H2/C2) NV oversight of NTS industrial hygiene programs is incomplete.

CONCERN: (PP.2-1) (H2/C2) REECo's computerized worker exposure files are inadequate to support data retrieval and trend analysis. (See Concern RP.12-2).

CONCERN: (PP.2-2) (H1/C2) Delays in approval of the REECo Electrical Safety Code also has delayed implementation of electrical safety improvements.

CONCERN: (PP.3-1) (H2/C1) Personnel protection is used as the primary control for health hazards, when engineering controls or administrative controls are both feasible, and required under the hierarchy of controls established by OSHA, the Mine Safety and Health Act, and the California Tunnel Standards.

CONCERN: (PP.4-1) (H2/C2) Exposures to noise and silica are not determined and documented for FSN employees.

CONCERN: (PP.4-2) (H2/C2) Long-term exposures to air contaminants and noise are not documented.

CONCERN: (PP.5-1) (H2/C1) NV provides no assurance that the site-wide use of respirators is in compliance with ANSI Z88.2.

CONCERN: (PP.6-1) (H1/C2) Conductors are abandoned in or near electrical supply substations without proper isolation or insulation.

CONCERN: (PP.6-2) (H2/C2) Unlabeled and potentially mislabeled circuits present electrical hazards to personnel.

CONCERN: (PP.6-3) (H2/C2) Clearing times for low voltage service circuits are not reviewed.

CONCERN: (PP.6-4) (H1/C2) Clearance tagging and lockout are not consistent for construction site substations.

CONCERN: (PP.6-5) (H2/C1) Electrical substations to support construction do not comply with all applicable electrical codes.

CONCERN: (PP.6-6) (H2/C1) Open storage of flammable materials is a violation of OSHA standards.

CONCERN: (PP.7-1) (H2/C2) Employees are not currently informed of the identity of some gases under the OSHA regulations and DOE 5483.1A, and no procedure exists to identify these gases to the employees.

CONCERN: (PP.7-2) (H2/C2) The lack of a site-wide hazardous materials authorization process impedes compliance with the Hazard Communication Standard (29 CFR 1910.1200).

CONCERN: (PP.7-3) (H2/C1) H&N's lack of current material data sheets, and failure of old data sheets to provide adequate disclosure, violates the Hazard Communication Standard (29 CFR 1910.1200).

P. Aviation Management

CONCERN: (AV.1-1) (H3/C1) There is no assurance that the safety of the construction modifications for the new Airborne Response Team hangar are adequate for the originally intended use of the hangar.

CONCERN: (AV.2-1) (H3/C1) NV will lose its current cost-effective means of assuring the airworthiness of its aircraft and will not be in compliance with DOE Order 5480.13, should the Airworthiness Certificates be surrendered.

CONCERN: (AV.2-2) (H3/C1) Unilateral surrender of the aircraft Airworthiness Certificates by NV may set a precedent whereby all other DOE aircraft may have their Federal Aviation Administration Airworthiness Certificates involuntarily withdrawn.

CONCERN: (AV.2-3) (H2/C1) NTS security helicopters and pilots are not capable in all circumstances, of safe flight in inadvertent instrument conditions.

CONCERN: (AV.8-1) (H1/C1)

The NTS policy permitting single pilot operations of security helicopters contributes to unsafe flying conditions and the lack of tighter controls for night vision goggle training, balancing mission effectiveness against hazard/risk, contributes to a high accident rate.

APPENDIX C

Team Composition and Areas of Responsibility

Technical Safety Appraisal
Nevada Test Site

Areas of Responsibility	Name Organization
EH Senior Manager	Oliver D. T. Lynch, Jr. Office of Safety Appraisals Department of Energy
Team Leader	Blake P. Brown Office of Safety Appraisals Department of Energy
Organization & Administration	Lorin C Brinkerhoff Private Consultant
	Leon H. Meyer Private Consultant The LHM Corporation
Quality Verification	Rex N. Lutz ARINC Research Corporation
Operations	Woodson B. Daspit Private Consultant
Maintenance	Harry W. Heiselmann Scientech, Inc.
Training & Certification	Thomas J. Mazour Private Consultant
Emergency Preparedness	Linda F. Munson Evergreen Innovations, Inc.
Technical Support & Auxiliary Systems	Glenn A. Whan Professor Emeritus University of New Mexico
Packaging & Transportation	John M. Cece RISC, Inc.
Site/Facility Safety Review	Thomas J. Mazour Private Consultant

Radiological Protection	Leo G. Faust Pacific Northwest Laboratory
	James S. Durham Pacific Northwest Laboratory
	Douglas P. Serpa Chemrad Corporation
Occupational Safety	John C. Enright Occusafe Inc.
Electrical Safety Support (Part Time)	Donald A. Gillies Private Consultant
Industrial Hygiene	Diann M. Kraft-Puzon Systematic Management Services, Inc.
Fire Protection	Eugene H. Mitman Princeton University Plasma Physics Laboratory
Aviation Safety	Reuben P. Prichard RPX Inc.
<u>Training/Support/Liaison</u>	
DP Team Leader in Training	Jon H. Todd, Major, USA Office of Weapons Safety and Operations Department of Energy
Coordinators	Mary E. Meadows Office of Safety Appraisals Department of Energy
	Rita A. Bieri Los Alamos National Laboratory
Report Technical Manager	Dale A. Moul Battelle Memorial Institute
Liaison with the Team	Vern F. Witherill Nevada Operations Office Department of Energy
	Timothy P. Zvada Nevada Test Site Office Department of Energy

APPENDIX D

Biographical Sketches of Team Members

Technical Safety Appraisal
Nevada Test Site

NAME: Blake P. Brown (Team Leader)

ASSOCIATION: DOE/Headquarters - Office of Safety Appraisals

EXPERIENCE: 31 years

- Team Leader of 15 previous Technical Safety Appraisals and follow-up reviews
- Department of Energy
  - Team Leader, Technical Safety Appraisals
  - Program Manager, Nuclear Criticality Safety
  - Nuclear Safety Engineer, Appraisals and Safety Reviews
- Atomic Power Development Associates, Detroit, Michigan
  - Systems Engineer
- Phillips Petroleum Company, Idaho National Engineering Laboratory
  - Chemical Research Engineer

EDUCATION: B.S., Chemical Engineering, University of Idaho

OTHER: DOE Representative on ANSI N-16 Committee on Nuclear Criticality Safety
Past Secretary-Treasurer and member of Board of Directors of Nuclear Engineering Division, American Institute of Chemical Engineers.

NAME: Lorin C Brinkerhoff (Organization and Administration)

ASSOCIATION: Private Consultant

EXPERIENCE: 36 years

- Private Consultant
  - Provides consulting services in the areas of organization and administration, operational criticality, and operations
- DOE, Office of Safety Appraisals
  - Technical Safety Appraisal Team Leader,
  - Reactor and Nuclear Facility Safety Specialist
- Aerojet General Corporation, Nuclear Rocket Development Center (Nevada Test Site)
  - Senior Nuclear Engineer
- Lawrence Livermore National Laboratory (Nevada Test Site)
  - Manager, Nuclear Critical Facility
- Phillips Petroleum Co., Idaho Test Site
  - Reactor Foreman
- Hanford Test Site, General Electric Co.
  - Graphite Research Analyst

EDUCATION: B.S., Chemical Engineering, University of Utah

OTHER: Past member of ANS-15 Standards Committee on Research Reactor Safety
Past member of ANSI N-16 Standards Committee on Nuclear Criticality Safety
Listed in:
Who's Who in the East
Who's Who in the World

NAME: John M. Cece (Packaging and Transportation)

ASSOCIATION: Menehune Marine Services

EXPERIENCE: 31 years

- Served on Technical Safety Appraisals of Plutonium Finishing Plant, Feed Materials Production Center, PUREX, H-B Canyon, Rocky Flats, Hanford Tank Farms
- Member of team which completed peer review of Rocky Flats Safety Analysis Report (SAR)
- Safety Consultant, Hazardous Materials Packaging and Transportation: Participated in safety reviews of 36" pipeline (Texas); chemical manufacturing plant (Connecticut); private clients
- Marine Surveyor
- U.S. Department of Energy
  - Manager, Hazardous Materials Packaging and Transportation, Office of Operational Safety
- U.S. Department of Transportation (Coast Guard)
  - Manager, Transportation Safety R&D

EDUCATION: Ph.D., Physical Chemistry, University of Rhode Island
B.S., Engineering, U.S. Coast Guard Academy

NAME: Woodson B. Daspit (Operations)

ASSOCIATION: W.B.D. Consulting Corporation

EXPERIENCE: 38 years

- Consultant
  - Provides consulting services in the areas of reactor operations, auxiliary systems, technical support, reactor design, and general reactor technology
  - Prior TSA Team Member on six appraisals and one appraisal followup
- Du Pont, Savannah River Plant
  - Senior Reactor Associate for advanced studies
  - Process Associate for advanced studies: Procedure enhancement, training, and simulator procurement
  - Chief Supervisor for reactor physics: Hydraulics, heavy water technology, production reactor charge design, test reactor technical assistance, and manual and automated production calculations
  - Site Emergency Response Committee member
  - Responsible for mechanical, electrical, and instrument assistance groups
  - Area Assistance: Direct assistance to reactor operating personnel, wrote incident reports, reviewed job plans, process improvements, etc.
  - Shielding and Instrumentation Group Leader
  - Experimental Physics: Critical facility start up, construction checkout, and planning and performing experiments for application to production reactors
- U.S. Naval Ordinance Test Station
  - High explosive research including use of very high speed photography

EDUCATION: M.S., Physics, Louisiana State University
B.S., Physics, Louisiana State University

OTHER: American Nuclear Society
Sigma Xi
Sigma Pi Sigma

NAME: James S. Durham (Radiological Protection)

ASSOCIATION: Battelle-Pacific Northwest Laboratory, Richland, Washington

EXPERIENCE: 9 years

- Battelle-Pacific Northwest Laboratory
  - Research Scientist, Dosimetry Technology Section, Health Physics Department: Responsible for organizing, planning, equipment developing, and data analysis of the various dosimetry systems
- University of Illinois
  - Nuclear Engineer: Performed measurements using LW-115 type 2B (a cellulose nitrate Solid State Nuclear Track Detector (SSNTDs) on a Dense Plasma focus (DFF) machine. Simulated the Cleveland Clinic/NASA Lewis Research Center neutron beam using the Monte Carlo code package HETC (High-Energy Nucleon-Meson Transport Code). Developed a model for the internal dosimetry for emitters of a mouse using integrable point-kernel methodologies. Performed internal dosimetry calculations for radiolabeled monoclonal antibodies used in cancer research. Developed computer codes which calculate the dose to spheres from uniformly distributed alpha and beta sources, both within the sphere and external to the sphere

EDUCATION:
B.S., Nuclear Engineering, University of Illinois
M.S., Nuclear Engineering, University of Illinois
PhD., Nuclear Engineering, University of Illinois

NAME: John C. Enright (Personnel Protection - Occupational Safety)

ASSOCIATION: OCCUSAFE Inc.

EXPERIENCE: 17 years

- OCCUSAFE, Inc.
  - Consultant: Provides consulting services to program administration, and technical liaison with the academic, governmental, and labor communities applying expertise in the industrial hygiene and safety field
- General Motors Corporation
  - Held technical positions with automotive components manufacturing division and the corporate staff, as well as administrative responsibilities for major divisions. Presented technical papers at professional seminars within the automotive industry. Presented papers at the Joint Conference on Occupational Health. Assisted with peer review for papers published in the American Industrial Hygiene Association Journal
  - Provided technical consultation and support to epidemiological studies of workers involved in wood and metal model and pattern making
  - Participated as team leader in multidisciplinary technical teams in resolving major occupational health and product health and safety questions and concerns. This included identifying and measuring air contaminants released by the deployment of supplemental inflatable restraints, and measuring contaminants volatilized from vehicle interior materials under hot conditions

EDUCATION: B.S., Engineering, Purdue University
M.B.A., Engineering, University of Dayton

OTHER: Member, American Industrial Hygiene Association
Member, American Academy of Industrial Hygiene
Member, Michigan Industrial Hygiene Society
(Director, 1985-1987, President Elect., 1987-1988, President, 1988-1989)
Certified Industrial Hygienist
Certified Safety Professional

NAME: Leo G. Faust (Radiological Protection)

ASSOCIATION: Chief Scientist, Health Physics Department Battelle-Pacific Northwest Laboratory

EXPERIENCE: 31 years

- Battelle-Pacific Northwest Laboratory
  - Various management positions covering all phases of health physics
  - Broad range of health physics and dosimetry research and development activities, including various dosimetry upgrade programs
  - Serves on several national and international standards committees, both as a participating member and as chairman of working groups
  - DOE representative to the Interagency Intrinsic Radiation (INRAD) Committee and Joint Radiation Protection Group
- General Electric Company at the Hanford Atomic Energy Project
  - Managed the radiation monitoring program of the Hanford Laboratories
  - Responsible for establishing improved routine surveillance programs resulting in better contamination control and reduced exposures
  - Developed and applied radiological engineering criteria for new and old facilities; performed dose rate determinations and shielding calculations

EDUCATION: B.S., Physics, Humboldt State College
Graduate studies in Physics and Nuclear Engineering
University of Washington Center for Graduate Study

OTHER: Health Physics Society Fellow and American Nuclear Society Member (active committee member in both organizations)
Authored and co-authored numerous technical publications and presentations.

NAME: Donald A. Gillies (Personnel Protection - Electrical Safety)

ASSOCIATION: Private Expert

EXPERIENCE: 40 years

- Private Expert
  - Electric Utility Consultant: Extends consulting services in Electric Utility Operation, Maintenance, Equipment Performance, and safety related issues
- Bonneville Power Administration, Portland, OR
  - Chief Technical Expert on Maintenance: Developed long-range plans for all maintenance activities
  - Chief, Branch of Maintenance: Managed professional engineers, technical specialists, and clerical employees. Provided guidance to the maintenance program for safe and reliable operation of the electrical system. Responsibilities included substation, transmission, system protection, power system control and nonelectric plant maintenance
  - Department Head to the Substation Maintenance Section with responsibility for the programming and coordination of all substation and nonelectric plant maintenance

EDUCATION: B.S., Electric Engineering, Washington State College

OTHER:
I.E.E.E. Fellow Member
Member of I.E.E.E. Transformer and Transmission and Distribution Committees
Chairman Working Groups on Safety and Regulations and Transformer Installations
CIGRE - Served as expert to U.S. Representative of Study Committee 4 (Protection) and currently serving as expert of Study Committee 12 (Transformers)

NAME: Harry W. Heiselmann (Maintenance)

ASSOCIATION: SCIENTECH, Inc.

EXPERIENCE: 30 years

- Nuclear Safety Programs
  - Testing and Equipment Maintenance
  - Manufacture and Maintenance
  - Quality Assurance Programs
- DOE Energy Programs
  - Electric Vehicle Program
  - Technical Safety Appraisals
  - Tiger Team Participant
- Industrial and Commercial
  - Product Research and Development
  - Developed Radiation Protection and Monitoring Systems

EDUCATION: B.S., Mechanical Engineering, Illinois Institute of Technology
University of Idaho Graduate Courses
Jet Propulsion Lab/U.S. Army Guided Missile School

OTHER: Member, American Society Mechanical Engineers/Idaho Section Officer
Registered Professional Engineer: Idaho, Illinois
Member, American Nuclear Society/Symposium Finance Chairman

NAME: Diann M. Kraft-Puzon (Personnel Protection - Industrial Hygiene and Tunnel Safety)

ASSOCIATION: Systematic Management Services, Inc.

EXPERIENCE: 18 Years

- Systematic Management Services Project Management Specialist and Environmental, Safety and Health (ES&H) Specialist
  - Task Leader on the Support Service Contract to the Defense Programs' ES&H Coordination Group
  - Task Leader on the Support Service Contract to the Strategic Petroleum Reserve's Distribution Enhancement effort
- Phoenix Safety Associates
  - Project Manager on the Environmental Protection Agency's (EPA) Superfund Site, Lehigh, Pennsylvania. Represented EPA's on-site representative and conducted industrial hygiene surveys both on and off-site
- Headquarters, Mine Safety and Health Administration, Department of Labor, Washington, D.C.
  - Industrial Hygienist
  - Conducted special industrial hygiene studies and investigations. Team Leader on asbestos, heat stress, lead exposure, silica flour and vermiculite studies, etc. Respiratory protection training and hazardous dust specialties

EDUCATION: B.S., Biological Sciences and Chemistry, The George Washington University
M.B.A., Management, Tulane University

OTHER: Member, American Industrial Hygiene Association
Member, American Association of Cost Engineers
Member, American Management Association

NAME: Rex N. Lutz (Quality Verification)

ASSOCIATION: ARINC Research Corporation

EXPERIENCE: 14 years

- ARINC Research Corporation
  - Nuclear Quality Assurance Consultant
- Pennsylvania State University
  - Research and Faculty Assistant
- U.S. Department of Energy
  - Savannah River Operations, Nuclear QA Auditor
- Baltimore Gas and Electric Company
  - Nuclear Engineer
- U.S. Navy
  - Submarine Service

EDUCATION: B.S., Nuclear Engineering, Pennsylvania State University
M.S., Nuclear Engineering, Pennsylvania State University

OTHER: American Society for Quality Control (ASQC) - Certified Quality Engineer
Member, ASQC Quality Audit Technical Committee

NAME: Thomas J. Mazour (Site/Facility Safety Review, Training, and Certification)

ASSOCIATION: Private Consultant

EXPERIENCE: 19 years

- Private Consultant
  - Participated in 14 Technical Safety Appraisals and two Tiger Team assessments
  - Developed and presented training for DOE site surveillance personnel. Developing training program for DOE Tiger Team members
  - Conducted evaluations of operations and operations training for a nuclear utility based on INPO Plant Evaluation criteria
  - Evaluated operations, organization and administration, and training areas for NRC inspections of commercial nuclear power plants
  - Revised TSA performance objectives and criteria based on experience from first round of TSAs
- Analysis and Technology, Inc.
  - Supported the NRC in evaluating utility training programs and developing training review criteria areas and regulations
  - Evaluated operations and emergency operating procedures areas for nuclear utilities based on NRC criteria
- Burns and Roe, Inc.
  - Design Engineer and Licensing Engineer
- U.S. Navy
  - Nuclear Weapons Officer and qualified as Chief Engineer, Navy Nuclear Power Plants

EDUCATION:
Sc.D (candidate), Management Systems, University of New Haven
M.S., Industrial Engineering, University of New Haven
M.B.A., University of New Haven
B.S., Mathematics, U.S. Naval Academy

OTHER:
Registered Professional Engineer (Nuclear/Mechanical)
Adjunct faculty member, University of New Haven; instruct industrial engineering and operations research courses

NAME: Leon H. Meyer (Organization and Administration)

ASSOCIATION: The LHM Corporation - President

EXPERIENCE: 36 years

- Technical Expert under contract to Oak Ridge Associated Universities and EG&G Idaho. Served on 23 Technical Safety Appraisals for DOE/EH

- Savannah River Plant, E.I. Du Pont de Nemours & Company, Aiken, SC

  - Program Manager: Responsible for Safeguards and Security, Long-Range Planning, Budget Coordination, Quality Assurance, Environmental Control, Energy Conservation, and Away-From Reactor Spent Fuel Storage

- Atomic Energy Division, E.I. Du Pont de Nemours & Company

  - Program Manager, Technical Division: Responsible for the Defense Waste Processing Facility and the LWR Fuel Reprocessing Design Project

- Savannah River Laboratory, E.I. Du Pont de Nemours & Company, Aiken, SC

  - Assistant Director
  - Director, Separations Chemistry and Engineering Section
  - Research Manager, Separations Chemistry Division
  - Research Supervisor, Separations Engineering Division: Responsibilities in areas of chemical separations; plutonium, uranium, and thorium processing; and tritium technology

EDUCATION: B.S., Chemical Engineering, Georgia Institute of Technology
M.S., Chemistry, Georgia Institute of Technology
Ph.D., Physical Chemistry, University of Illinois

NAME: Eugene H. Mitman, III, (Fire Protection)

ASSOCIATION: Princeton University, Princeton, New Jersey

EXPERIENCE: 18 Years

- Princeton University, Princeton, New Jersey
  - Fire Protection Engineering, Safety Office, Plasma Physics Laboratory: Responsible for providing guidance to Laboratory for compliance with DOE Orders, review of proposals for new and existing facilities in the area of fire protection and life safety.
  - Safety Technician in the Safety Office, Plasma Physics Laboratory: Radiation monitoring and record keeping.
  - Safety Technician in Emergency Services Unit, Plasma Physics Laboratory: Responsible for testing and inspection of fire protection systems and manual fire extinguishment.

EDUCATION:
B.S., Engineering Technology, Oklahoma State University
B.S., Fire Protection and Safety Engineering Technology, Oklahoma State University
Associate Degree, Fire Protection and Safety Engineering Technology, Oklahoma State University

OTHER: Member of Capitol View Fire Company, Morrisville, PA

NAME: Dale A. Moul (Report Technical Manager)

ASSOCIATION: Battelle-Columbus Operations

EXPERIENCE: 19 years

- Battelle-Columbus Operations
  - Participated in TSAs for Paducah Gaseous Diffusion Plant, Idaho Chemical Processing Plant, High Flux Beam Reactor, and Rocky Flats Plant, and Feed Materials Production Center
  - Associate Section Manager, Systems Safety and Security Unit: Manages personnel involved in performing safeguards, security and safety reviews of DOE weapons complex and NRC nuclear facilities. Participates in technical aspects of selected work efforts involving physical security, safety/safeguards interactions, and emergency readiness
  - Program Manager, DOE Office of Security Evaluations support contract for inspections and evaluations of safeguards and security of DOE facilities
  - Member, Nuclear Weapons Modernization Task Force, Safeguards and Security Subcommittee
- NUSAC, Inc./Wackenhut Advanced Technologies Corporation
  - Manager/Director, Special Projects: Led and participated in support projects for private industry, the nuclear industry, and government involving emergency preparedness, safety/safeguards issues, emergency response training, and legal aspects of regulatory issues
- U.S. Army - Six years of experience involving counterintelligence and physical security assignments. Led teams of inspectors and investigators that performed penetration inspections and counterintelligence/security audits of military installations

EDUCATION: J.D., Law, University of Maryland
B.S., Social Science, Michigan State University

OTHER: Member, Virginia State Bar Association
Certified Protection Professional, American Society for Industrial Security (ASIS)
Member, Institute of Nuclear Materials Management
Member, Standing Committee on Disaster Management, ASIS

NAME: Linda Munson (Emergency Preparedness)

ASSOCIATION: Evergreen Innovations, Inc.

EXPERIENCE: 16 Years

- Evergreen Innovations
  - Project Manager for EPRI Radwaste Desk Reference
  - Consultant to Battelle-Northwest on TMI cleanup
  - TSA participant: Industrial Hygiene, Emergency Readiness, and Radiation Protection
- Battelle, Pacific Northwest Laboratories
  - Associate Section Manager, Dosimetry Technology Section
  - Project Manager for various technical assistance programs including cleanup of TMI and upgrade of the RMI Health Physics program
  - Participated in the team appraisal of six uranium mills for and with the NRC
  - Appraised, with DOE-HQ, Emergency Preparedness of Rocky Flats
  - Participated in six Emergency Preparedness exercises for NRC
- UNC Nuclear Industries
  - Manager, Industrial Safety responsible for industrial hygiene, industrial safety and fire protection at N Reactor and the associated fuel fabrication facilities
  - Managed the preparation of Environmental Information Reports and license applications for various nuclear facilities, primarily uranium mills, and fuel fabrication plants
  - Evaluated decontamination alternatives for the West Valley Reprocessing Plant

EDUCATION: M.S., Analytical Chemistry, Iowa State University
B.A., Chemistry
U.S. International University Short courses in Radiation Protection, Industrial Hygiene, Industrial Safety, MORT, Respiratory Protection, Management, and Communications

NAME: Reuben P. Prichard (Aviation Safety)

ASSOCIATION: RPX, Incorporated

EXPERIENCE: 43 Years

- RPX, Incorporated, McLean, VA
  - President: Provides consultation services for aerospace safety and management, aviation systems, operations, systems and engineering analysis, explosives, hazardous materials, transportation and packaging, training and motivational programs
- Flight Assurance Corporation, Washington, DC
  - Senior Vice President: Provided consultation services on management and safety of aviation systems, policy, and independent overviews
- Department of Energy, Washington, DC
  - Director, Safety Engineering & Analysis Division: Responsibilities for environment safety and health assurance, safety analysis and review system, aviation, nuclear energy, quality assurance, training, and operational safety
- National Aeronautics and Space Administration, Washington, DC
  - Director of Safety and Environmental Health and Assistant Director of Safety for Aviation and Chief, Flight Crew Operations: Responsible for astronaut training and readiness; planning, management, and overview of some aspects of Mercury, Gemini, Apollo, Skylab, Space Shuttle Programs; NASA prototype research aircraft; and for overall NASA safety and environmental health policy and overview
- United States Navy
  - Naval Aviator and Test Pilot
  - Director, U.S. Naval Test Pilot School, Naval Air Test Center

EDUCATION:

B.S., U.S. Naval Academy
B.S.A.E., U.S. Naval Postgraduate School
M.S., Flight Performance Stability and Control, Princeton University

OTHER:

DOE Distinguished Career Service Award for Safety Contributions
Team Leader and Member, numerous Comprehensive ES&H and Aviation Safety Appraisals at NASA and DOE Field Installations
Member, AIAA, ISASI, System Safety Society, Helicopter Association International Soaring Society
FAA Commercial Pilot and Flight Instructor - Airplanes, Instrument Helicopters, Gliders
Professional Engineer, Engineering Safety

NAME: Douglas P. Serpa (Radiological Protection)

ASSOCIATION: Chemrad Corporation

EXPERIENCE: 18 Years

- Stone and Webster Engineering Corp.
  - Senior Principal Scientist
  - Responsible for the development of the Radiation Protection and ALARA programs for the Atomic Vapor Laser Isotope Separation Production Plant being developed by LLNL and MMES

- Chemrad Corporation
  - Marketing Representative and Senior Health Physics Engineer
  - Responsible for providing health physics engineering services on company matters and most recently has been involved in the asbestos removal program at the General Electric Nuclear Center at Vallecitos.

- Airplanes, Inc.
  - President and CEO: Responsible for all aspects of the operation of Airplanes, Inc., as well as a DOE and FAA approved hazardous material transport program for the transport of various classified radiological materials and for emergency transport of radiation accident response teams and victims.

- Pacific Gas & Electric Company
  - Senior Nuclear Generation Engineer: Directed a special projects section which was responsible for in-plant radiochemistry, health physics computational, and general health physics support. Developed and directed the redesign of the personnel radiation dosimetry program. Provided expert testimony on the behalf of PG&E for NRC licensing of Diablo Canyon Nuclear Power Plant.
  - Health Physicist: Served as a Staff Health Physicist in PG&E's Department of Engineering Research and directed PG&E's environmental radiation monitoring programs at Humboldt Bay and Diablo Canyon Nuclear Power Plant.

EDUCATION: A.S., Chemistry, Modesto Junior College
B.S., Zoology and Chemistry, University of California
M.S., Biophysics and Radiation Protection, Texas A&M University

OTHER: Member, Health Physics Society
Member, ANS/ANSI Committee on Standardization of In-Plant Radiation
Member, IEEE Society

NAME: Jon H. Todd, Major, U.S. Army (DP Team Leader in Training and Aviation Safety)

ASSOCIATION: Headquarters Department of Energy
Department Assistant Secretary for Military Application
Office of Weapons Safety and Operations (DP-22)

EXPERIENCE: 18 years

- Defense Programs representative for previous Technical Safety Appraisals (Rocky Flats, LLNL Pu Facility, and LANL TA55)
- U.S. Army
  - Seven nuclear weapons duty assignments

EDUCATION: B.A., University of Nevada, Reno

NAME: Glenn A. Whan (Technical Support and Auxiliary Systems)

ASSOCIATION: Emeritus Professor, Chemical and Nuclear Engineering, University of New Mexico

EXPERIENCE: 33 Years

- Participated in DOE Technical Safety Appraisals from 1986 to 1989 for: Oak Ridge Y-12 Plant, Portsmouth and Paducah Gaseous Diffusion Plants, Idaho Chemical Processing Plant, Hanford Plutonium Finishing Plant and PUREX Plant, Rocky Flats Plants, and West Valley Facility.

- Professor and Department Chairman, Chemical and Nuclear Engineering Department, University of New Mexico, 1957-85

- International Atomic Energy Agency Technical Expert, Reactor Experimentation, 1966-67

- Los Alamos National Laboratory

  - High Temperature Gas-Cooled Reactor Safety Analysis, 1974-75; Nondestructive Assay Measurements for SNM, International Safeguards, 1983 to present

- Other Nuclear Safety Reviews

  - DOE Independent Review Committee for Transuranic Waste, Chairman one year, 1980-84
  - NRC Nuclear Criticality Safety Appraisal Team, Nuclear Fuel Services Corporation, Erwin, Tennessee, 1986
  - DOE Readiness Review Team, PUREX and PFP, Hanford, Washington, 1986-88
  - Nuclear criticality safety analysis, Oak Ridge K-25 Decommissioning Project, 1987-89
  - ESD SAR Review, criticality safety, Lawrence Livermore National Laboratory, 1988

EDUCATION: B.S., Chemical Engineering, Indiana Institute of Technology
M.S., Chemical Engineering, Montana State University
Ph.D., Chemical Engineering, Carnegie-Mellon University

OTHER: Fellow, American Nuclear Society
Professional Engineer, Nuclear Engineering, New Mexico

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