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# Technical Safety Appraisal of the West Valley Demonstration Project

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# TECHNICAL SAFETY APPRAISAL OF THE WEST VALLEY DEMONSTRATION PROJECT

SEPTEMBER 1989

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# WEST VALLEY DEMONSTRATION PROJECT

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# I. INTRODUCTION

This report presents the results of one in a series of Technical Safety Appraisals (TSAs) being conducted of DOE nuclear operations by the Assistant Secretary for Environment, Safety, and Health Office of Safety Appraisals. TSAs are one of the initiatives announced by the Secretary of Energy on September 18, 1985, to enhance the DOE environment, safety and health program.

This report presents the results of a TSA of the West Valley Demonstration Project (WVDP). The appraisal was conducted by a team of exerts assembled by the DOE Office of Safety Appraisal and was conducted during onsite visits of June 26-30 and July 10-21, 1989. West Valley, about 30 miles south of Buffalo, New York is the location of the only commercial nuclear fuel reprocessing facility operated in the United States. Nuclear Fuels Services, Inc. (NFS) operated the plant from 1966 to 1972 and processed about 640 metric tons of spent reactor fuel. The reprocessing operation generated about 560,000 gallons of high-level radioactive waste, which was transferred into underground tanks for storage. In 1972 NFS closed the plant and subsequently decided not to reopen it.

In 1980 Congress passed the West Valley Demonstration Project Act, Public Law 96-368, to demonstrate that liquid waste from the reprocessing of spent fuel could be managed safely in the United States. The Act authorizes DOE to take responsibility for the facilities formerly operated by NFS. It also directs DOE to solidify the high-level waste in a form suitable for transportation and disposal; develop suitable containers; transport the waste to a Federal repository for permanent disposal; dispose of low-level and transuranic waste produced by the project; and decontaminate and decommission the tanks, facilities and any material and hardware used in conjunction with the project, in accordance with Nuclear Regulatory Commission (NRC) requirements. The costs of the project are shared by DOE (90 percent) and the New York State Energy Research and Development Authority (NYSERDA) (10 percent).

NYSERDA currently owns the site.* Figure 1 shows the location of all major facilities. DOE's operating contractor for the WVDP is West Valley Nuclear Services Inc. (WVNS), a subsidiary of Westinghouse Electric Corporation. DOE's Idaho Operations Office (DOE/ID) oversees the project and has resident representatives at the site.

Current activities at the site include: Storage of liquid radioactive waste and associated sludge in underground, concrete shielded, carbon steel tanks; storage of spent reactor fuel; design, construction, and testing of processing equipment; liquid waste processing by ion-exchange and concentration; cementification of low-level waste; vitrification of sludge and ion-exchange resins; packaging, on-site transport, and storage of radioactive waste; and decontamination and decommissioning of obsolete equipment and facilities.

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* Also on the site are low-level waste burial grounds, which NYSERDA oversees under the jurisdiction of the State of New York. This appraisal excluded consideration of the burial grounds.

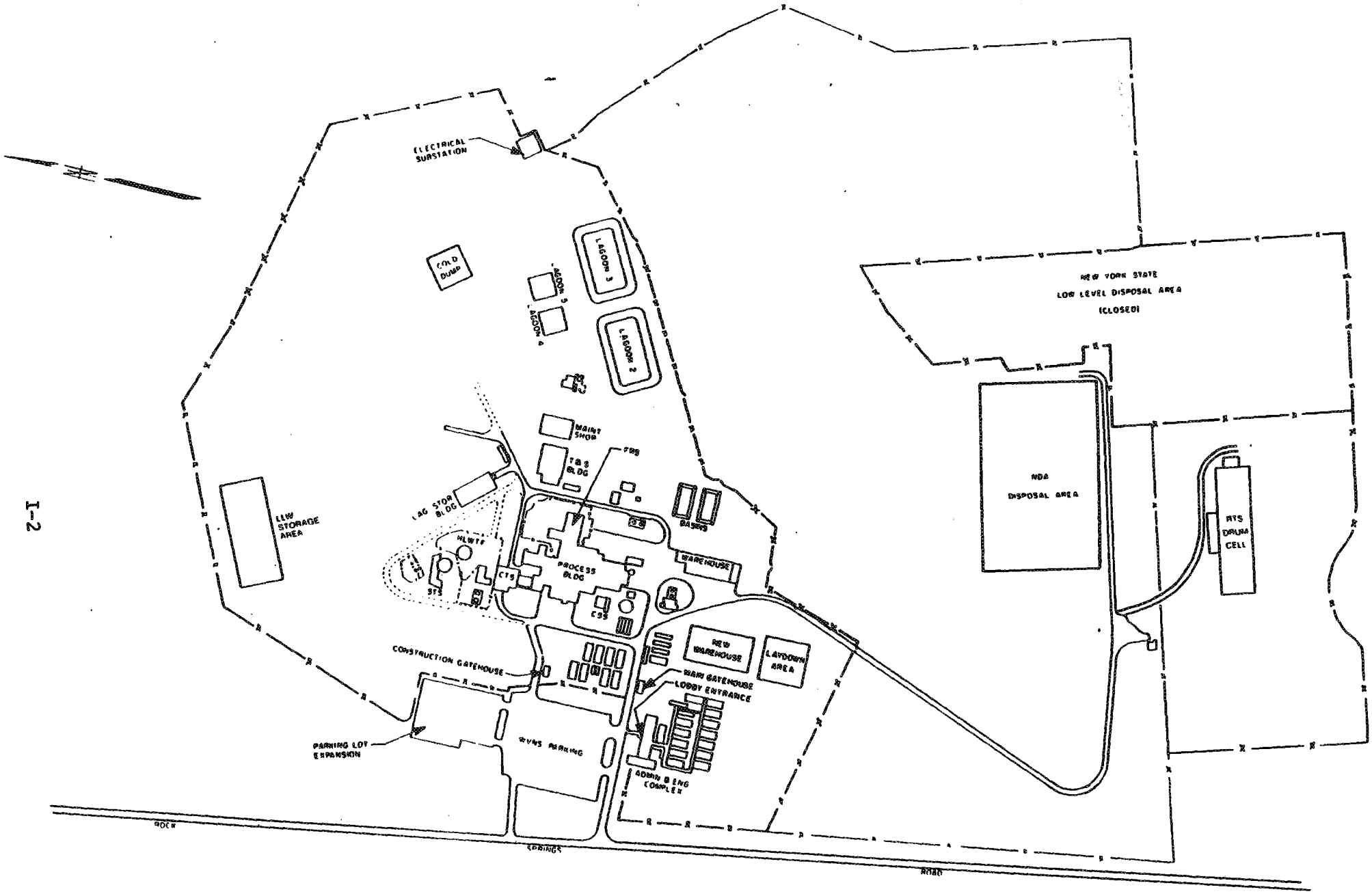


Figure 1: WVDP LIMITED AREA

Facilities at the site include: underground storage tanks; Integrated Radwaste Treatment System; holding lagoons; waste compactors; Vitrification Facility; Component Test Stand; Fuel Receipt and Storage Area; equipment decontamination room; Emergency Operations Center; and administrative complex.

The principal hazards presented by operations at this site include radiation fields, ingestion and inhalation of radioactive materials, reactive industrial chemicals and common occupational hazards associated with construction and with the storage, treatment and disposal of waste.

WVDP was originally envisioned as a 6 to 8 year project. However, the project may extend to perhaps 20 years because of planned reductions in annual funding and unavailability of approved sites for final disposal of solidified wastes. This means that the inherited WDVP facilities, many of which were not designed to current standards, may pose safety and health issues not previously considered relevant to the original project. Some implications of this programmatic change were addressed during this assessment.

The TSA was guided by Mr. Oliver D. T. Lynch, Jr., Director, DOE Safety Inspection Division. Mr. Blake P. Brown of the DOE Office of Safety Appraisals was the Team Leader. The team consisted of DOE employees, contractors, and consultants, all chosen for their subject matter expertise. The members of the team and their principal assignments are listed in Appendix C. The biographical sketches of the team members are in Appendix D.

Since a TSA is designed to evaluate an operating facility, it is accepted as a given that the facility and its equipment have been appropriately designed, constructed, and tested, and that the current SARs adequately evaluate the risks presented by the operations. This appraisal does address, however, whether the facility design and its current operations are consistent with the SARs, and particularly whether the current operations are being conducted within the bounds of the OSRs established for the operation of the facilities. This appraisal was unusual in that the Department of Justice was simultaneously conducting an investigation at this site. As a matter of prudence, the contractor ceased IRTS and delayed vitrification operation and maintenance activities for one week. Consequently, this report does not have the usual depth in operations, maintenance, and emergency preparedness that would be obtained by observing actual activities and drills.

The appraisal team's efforts were guided by a set of pre-established Performance Objectives with supporting criteria. Section III of this report contains the findings and concerns relative to each Performance Objective. Appendix A contains a description of the system for categorizing concerns. The concerns identified by the team are categorized and tabulated in Appendix B.

A concern addresses a situation that, in the judgment of the team members: (1) reflected less than full compliance with a DOE order or mandatory safety standard; (2) threatened to compromise safe operation; or, (3) if properly addressed, would substantially enhance the excellence of that particular operation, even though the operation was judged to have a currently acceptable margin of safety. Because of this last category, addressing the excellence of the operation, more concerns are reported than would otherwise result from an appraisal which was oriented solely toward compliance.

This appraisal is an evaluation at a fixed point in time. As a result, improvements to safety that were planned, but have not yet been completed, are identified as concerns if the team judged that failure to complete the improvements would have significant adverse impact on the safety of plant operations.

In addition to identifying concerns, the team sought exceptional successes in accomplishing Performance Objectives. Such "Noteworthy Practices" are identified in Section IV. Other DOE sites and facilities are encouraged to adopt these Noteworthy Practices if applicable to their operations.

The report has been validated for factual accuracy with WVNS and DOE/ID. The team shared its findings and concerns with the management of WVNS and DOE/ID West Valley site representatives in an exit meeting held on July 21, 1989.

The team expresses its appreciation for the excellent cooperation exhibited by all personnel of WVNS and for the hospitality and support of the DOE Idaho Operations Office.

## II. PERFORMANCE EVALUATION

This was the first TSA conducted at West Valley although various evaluations by the Idaho Operations Office, the Nuclear Regulatory Commission and internal assessments by corporate and site management of the operating contractor have taken place during DOE operation of the facility. Based on the TSA team interviews and insights, management of WVDP reflects a strong nuclear safety ethic with safety responsibility, authority and lines of communication for safety matters generally well defined and effective. Senior management was found to be effectively involved in site safety activities (more strongly in nuclear matters) and frequently present in the operating facility. Early implementation of a nuclear grade Quality Assurance program has successfully emphasized the individual contribution of workers to quality and safety and has led to a pervasive safety attitude in the WVDP work force. Operations are controlled by authorized procedures based on appropriate supporting technical bases. The team found the operators competent and knowledgeable in the procedures and the equipment they operate.

Against this background of overall good performance this appraisal did identify a number of areas where corrective actions and improvements should be made as part of the continuing management of safety at WVDP. Many of the findings indicate weakness in the self-assessment activities being performed at WVDP, particularly with regard to non-nuclear aspects of the safety program. In these areas the team often noted insufficient attention to detail, lack of rigorous implementation of known requirements and in some cases inadequate knowledge of applicable requirements. In addition there were three areas (Emergency Preparedness, Personnel Protection, and Fire Protection) that represent significant shortcomings in the WVDP safety program and thus deserve direct management action.

In each of the above three areas the appraisal team found many of the components of a fully satisfactory program present, but the rigor and discipline fostered by effective management oversight was missing. As a result there has been tolerance of prolonged periods of inadequate staffing in disciplines key to the conduct of these programs, and known deficiencies have been allowed to persist. In a number of instances the deficiencies noted in this TSA were common to findings already listed in Westinghouse or other WVDP internal appraisals as well as DOE and NRC evaluations; e.g., Westinghouse 1987 appraisal findings on various aspects of Emergency Readiness; and the identified need for formal maintenance inspection and testing programs for fire protection equipment that was identified in surveys and appraisals as early as 1982, but not yet fully implemented.

Although the overall safety performance at WVDP is good, this appraisal indicates the need for more consistent and knowledgeable management oversight both by the contractor on site and DOE as the responsible operator.

# III. REVIEW FINDINGS

All of the Performance Objectives which applied to the West Valley facility are discussed in this section. Although not a separate technical area, QA is specifically addressed in Organization and Administration (OA), Maintenance (MA), Training and Certification (TC), Technical Support (TS), Radiological Protection (RP), and Fire Protection (FP).

The factual findings which follow the statement of each Performance Objective were drawn from: (1) observing routine operations and the physical condition of the facilities; (2) talking with management, technical, and craft personnel; and (3) reviewing policy statements, records, procedures, and other documents. A Finding preceded by an * indicates the direct contribution of that Finding to the Concern which follows.

Concerns are found under the most directly relevant Performance Objective. In many cases, findings contributing to the concern can also be found under other Performance Objectives. When this is the case, cross-references have been provided. Each concern has been rated in accordance with the system described in Appendix A. The results are given in Appendix B and are summarized below. To understand the full intent of any concern, it is necessary to read the underlying basis.

Sixty concerns are identified in this report. All of them are Category III. Addressing these concerns with appropriate corrective actions will improve safety at this site. Category III concerns are expected to be addressed in a normal, responsive manner.

Resolving individual concerns may be insufficient to prevent similar occurrences in the future; the underlying factors or root causes also need to be articulated and addressed. Drawing upon the relevant experience of its members, the appraisal team has tried to identify underlying causal factors in developing its statements of concern. This effort is imperfect at best given the team's limited time and understanding. Therefore, the appraisal team encourages WVNS to consider the findings and concerns to be possibly symptomatic of deeper root causes. Corrective actions identified and taken from that perspective are more likely to assure that safety improvements are sustainable.

## A. ORGANIZATION AND ADMINISTRATION

WVNS management has established an effective, well documented, and understood organization to accomplish the WVDP mission. The primary characteristics of this organization are open and extensive communication between all parties and a safety philosophy that gives proper priority to safety.

The Westinghouse Electric Corporation, of which WVNS is a part, has aggressive programs supporting the WVNS safety program. WVNS management has benefited from the use of these "value added" programs which are part of Westinghouse's relationship with DOE.

The WVNS QA program complies with DOE 5700.6B. QA manuals and procedures address all areas of the DOE recommended standard ANSI/ASME NQA-1-1986, including supplements. Implementation of the program as documented was found in each of the following areas - organization, QA program, training and indoctrination, design control, procurement control, document control, construction and installation, inspection and test control, packaging, nonconformance control, quality records and audits.

The achievement of current QA program status is a credit to WVNS. The early decision to develop a program to address all elements and supplements of NQA-1 is showing benefits, principal of which is the pervasive positive attitude toward quality. Supplementing these efforts is the commitment to the WVNS Total Quality program being pursued as part of a corporate program.

As with any quality program, areas for improvement remain. WVNS is working on such improvement in tracking and trend analysis, root cause analysis and laboratory quality.

Corrective actions for identified deficiencies exhibit some weaknesses particularly with regard to timeliness. Although the team reviewed many examples of problem identification and successful resolution, less effective situations were identified involving fire protection, emergency preparedness, and document control. Inadequate staffing was identified in several areas as a primary cause of the inability to meet planned safety objectives or implement DOE requirements.

The nature of many of the concerns identified by the TSA team indicates weaknesses in the self appraisal activities being performed at WVDP. Inattention to detail, lack of rigorous implementation of known requirements, and, in some cases, lack of complete knowledge of applicable requirements are clear contributors to concerns involving procedure review and compliance.

Appropriate and specifically assigned goals and objectives are tracked by management and provide the bases for safety program improvements. High visibility at the workplace by all levels of management provide assurance that procedures are being followed and reinforce management's commitment to safe operations. To some extent this may be undermined by the possible perceptions of low relative importance placed on safety in employee job descriptions and performance evaluations.

## OA.1 FACILITY ORGANIZATION AND ADMINISTRATION

**PERFORMANCE OBJECTIVE:** Management should organize and administer the operation to provide for effective implementation of facility activities relating to safety and health.

**FINDINGS:**

- The WVDP quality assurance (QA) program is described in the facility WVDP (approved) documents: Quality Management Manual; Quality Assurance Procedures Manual; Laboratory Quality Assurance Program Manual.
- WVNS quality policy is provided in WV-120, Rev. 3 (May 3, 1989), approved by the company president.
- The documented QA program complies with the requirements of DOE (and DOE/ID) 5700.6B, "Quality Assurance," by addressing all sections of ANSI/ASME, NQA-1-1986, and related supplements.
- The laboratory QA program is receiving an appropriate level of attention via both audits and internal reviews. The importance of this effort to successful accomplishment of WVDP objectives is recognized.
- The DOE/ID has provided QA overview in the form of annual QA audits from 1983 through 1989. DOE/ID audit reports from 1987 and 1988 indicate that the WVDP QA program was in compliance with DOE 5700.6B. The final report of the June 1989 DOE/ID QA Audit has not yet been delivered to WVNS.
- Review of the QA working paper file for VF-001 WVNS-CS-134 "Vitrification Facility Civil/Structural Installation" provided evidence of strong QA involvement including preaward surveys, definitions of hold points in the construction specification, ongoing surveillance activities, nonconformance reports, and requests for and follow up on corrective actions.
- WVNS has taken the QA initiative in several areas, examples include the following:
  - initiation of a Nondestructive Examination (NDE) training program that has provided necessary site staffing levels of NDE level II inspectors
  - development of QA Technician Qualification Standards similar to those used by operations for training and qualification
  - participation in the competition for the 1989 George Westinghouse Total Quality Awards

- o The QA audit and surveillance programs appear to provide total coverage of quality program concerns across the WVNS organization.

- * It is not normal practice to include review of compliance with other DOE requirements (e.g., the mandatory standards specified in DOE 5480.4) as part of QA audits.

- * WVNS maintains a record of DOE and DOE/ID directives received that includes what instructions were provided (e.g., compliance required). WVNS has not performed a requirements analysis that could provide the various units of WVDP with definitive direction.

- * WVNS relies upon internal reviews performed by representatives of the responsible staff and line organizations for identification of deficiencies in their own programs. Concerns identified by the appraisal team indicate that lack of attention to detail, lack of rigorous implementation, and lack of clear understanding of related requirements are contributing factors to deficiencies not revealed by the self appraisal programs.

**CONCERN:** (OA.1-1) (H2/C2)

Self appraisal activities are not providing the assurance that non-QA requirements are fully understood and completely addressed by organizations responsible for implementation. See Concerns MA.3-1, RP.2-1, FP.5-4, and ER.4-1.

**FINDINGS:**

- o Current organization charts and charters exist for all organizational units. They clearly define duties, authorities, and responsibilities and are understood by all parties. This material is currently assembled in a document entitled WVNS Key Personnel, which was prepared for this TSA visit. This material could be made a part of the WVNS management system and entered into the controlled document system since it serves the function of an Organization Manual or Charter Document found in many other organizations.

- o Job descriptions have been prepared for all jobs but are not necessarily in the hands of the incumbent employees. However, all employees interviewed believed their duties were clearly defined, understood, and consistent with their assigned tasks.

- o Management is receptive to and supportive of legitimate staffing needs particularly those directly affecting safety performance. This is routinely assessed by all levels of management based on current and future program needs.

- * WVNS managers and supervisors hold that staffing levels are not an impediment to the safe and efficient accomplishment of the WVNS mission. However, in some

areas (Fire Protection Emergency Planning, Personnel Protection and Criticality Safety) the team believes that more resources could be desirable.

**CONCERN:** (OA.1-2) (H3/C2) Insufficient staffing is a primary reason for the inability to meet planned objectives or implement DOE requirements in Emergency Planning, Personnel Protection, Fire Protection, and Criticality Safety.

**FINDINGS:**

- Resource constraints caused by reduced budgets are resulting in a stretch-out of the Project end date and other concomitant changes. The Project was originally envisioned as a 6 to 8 year "fast tracked" effort but now appears to be of the order of 20 years. Management is taking this into account in several ways. Staffing continuity, which was not considered to be a problem initially is now actively being considered as are decisions regarding temporary facilities versus more permanent facilities. This is also effecting ALARA, fire protection, and other safety planning goals.

- There is a large number of programs to involve employees in formulating and fostering improvements in safety at the workplace. Many are sponsored by Corporate Westinghouse, some by WVNS, DOE, and local business organizations. They include such things as wellness, safety suggestions, and quality improvement programs. They are well publicized in employee newspapers and bulletin boards.

- There is an active union/management safety program called the Safety Observer Program. It is supported by management and has been effective in resolving the smaller workplace safety problems, fostering safety awareness, and as a defuser of potential labor/management safety issues. A significant amount of training is provided to the six union members from the various operating organizations who serve on a voluntary basis for 1 year. Management believes this training effort is worthwhile in that it provides a broadening base of trained and safety conscious workers. The committee operates in an informal manner with cursory minutes and little indication of closure on recommended courses of action. Improved minutes, with indicated closure which could then be posted at various workplace locations could have the added benefit of reinforcing managements commitment to safety.

## OA.2 MANAGEMENT OBJECTIVES

**PERFORMANCE OBJECTIVE:** Facility management objectives should ensure commitment to safe operation, including enforcement of work practices and procedures.

**FINDINGS:**

- o The 900 series of the Policy and Procedures Manual specifies management's policy, goals, and objectives relative to the various aspects of the WVNS safety program.

- o Specific, measurable, health and safety goals are contained in various documents such as the DOE Award Fee Evaluation Criteria supplied to WVNS every trimester, the "Quality Improvement Plan," and the weekly "Short-Term Action Plan."

- o Specific ALARA, accident reduction, environmental release, and productivity goals are assigned to the various operational units. Periodic trend analyses of these data are provided to these units and are generally posted in the work place to provide stimulus and feedback to the work force.

- o Some goals and objectives are the result of various internal and external health and safety appraisals and audits.

- o All goals and objectives are specifically assigned in a consistent manner to appropriate line and staff organizations. They are regularly tracked through the "Open Items List" which is published monthly and widely distributed through the various management levels. Top management is regularly briefed (weekly and monthly) on progress towards achievement of goals and objectives.

- * A review of the "Open Items List" indicates about half of the externally generated open items (including appraisal by Westinghouse, NRC, and DOE) are overdue (56 out of 107) and 80 percent of these are the responsibility of Radiological and Environmental Safety organization. See Performance Objectives ER.2, RP.2, TC.1, TC.5, and Concerns FP.5-1, FP.5-3 for additional information regarding the lack of timely correction of identified deficiencies.

**CONCERN:** (OA.2-1) (H2/C2) Identified deficiencies have not been corrected in a timely manner.

## OA.3 CORPORATE SUPPORT

**PERFORMANCE OBJECTIVE:** There should be evidence of corporate interest and support for safe operations.

**FINDINGS:**

- The Westinghouse Electric Corporation, of which WVNS is a part, is responsible for the operation of a number of DOE sites. Westinghouse has established corporate policies in various health, safety, and environmental areas. These policies are supportive of and consistent with DOE policy.

- These Westinghouse policies give high priority to safety and environmental performance. The WVDP "Project Values" statement signed by the Pres-ident, WVNS, and the DOE Site Manager states that the "utmost attention to safety and environment" will be given to the performance of the work.

- The Westinghouse Corporation has established a number of corporate health and safety overview functions most notable of which is the Government Operations Nuclear Safety and Environmental Oversight Committee, which is composed of mostly non-Westinghouse recognized experts, who provide independent oversight of these facilities. This committee performed a review at WVNS in September 1988. Recommendations and corrective actions resulting from this review are being tracked and reported quarterly in the Quality Improvement Program (QIP).

- The operation of a large number of DOE facilities has provided Westinghouse an opportunity to establish task forces on issues of common concern such as training, quality, radiation protection, etc. A directory of available experts from within these various activities is being established.

- The President, WVNS has used experts from other Westinghouse facilities to perform TSA-type appraisals of WVNS. He has called upon expertise for specific problems, and when necessary has been able to get temporary help to meet short term needs.

- The President, WVNS attends staff meetings held every other month by the Vice President for Government Operations. He has frequent telephone contact with Corporate Headquarters and writes monthly reports in which the lead item is always safety performance.

**CONCERN:** None

## OA.4 MANAGEMENT ASSESSMENT

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

**FINDINGS:**

- o WVNS Procedure WV-987 provides the basis for the site Critique Program for event evaluation and reporting.

- o The QA organization has been issuing quarterly and annual root cause and trending analyses of event and deficiency reports (UORs, Critiques, Nonconformance Reports, Request for Corrective Actions, and Quality Clarification Reports). Examples reviewed include (by document number) the following: JA:88:0008; JA:88:0069; JA:88:0088; JA:88:0121; and FC:89:0058.

- o WVNS had an evaluation of the WVDP Critique Program performed by Westinghouse Idaho Nuclear Company during January 24 through February 2, 1989, that has led to considerable rethinking of this program. Currently, documents intended to improve identification of root causes are in the WVNS review process. These include a revision of WV-987, comments to Draft DOE/ID 5000.3, and training documents. An instructive memo, "Proposed Actions for Root Cause Analysis of Critique Reports", from D. L. Shugars to Staff, dated June 6, 1989, provides a complete description of related changes.

- o The QA audit program is providing periodic internal review of the implementation status of the quality assurance program which meets the requirements of DOE 5700.6B.

- o WVNS has a system that is providing the staff with information on lessons learned from WVNS operations, other DOE activities, and the nuclear industry. This includes distribution of UORs, NRC Licensee Event Reports, regular workplace meetings, etc.

- o Managers and supervisors, from the President, WVNS on down, are frequent visitors at the workplace. Based on the numerous interviews with managers and supervisors, these visits help assure that procedures are being followed, to determine the condition and status of facility operations and to foster open communications.

- o Measures have been taken to relieve first line supervisors of administrative burdens so they can spend more time in the workplace.

- o Trend analysis is performed, to varying degrees, by most operational units and is summarized for use by management in determining the efficiency and effectiveness of operations. The Manager, Strategic Planning and Program

Administration prepares executive summaries of the most significant data and trending analysis and provides a monthly briefing to management (DOE/ID and WVNS). Additionally, every week DOE/ID and WVNS management are briefed on the status of items requiring "quick action."

**CONCERN:** None.

## OA.5 PERSONNEL PLANNING AND QUALIFICATION

**PERFORMANCE OBJECTIVE: Personnel programs should ensure that positions are filled by highly qualified individuals.**

FINDINGS:

- o An active manpower planning and recruitment program is in effect at WVNS. Aside from the annual budget review, frequent meetings to assess manpower needs are held between personnel and line departments. Top management is active in the program and makes early commitments to fill staffing needs, enabling expedited recruitment.

- o Good communications links with other DOE facilities, local government agencies, schools and industrial organizations enables the recruitment process to make its needs known rapidly and select from potential candidates.

- o Merit and ability as well as socioeconomic factors are the basis for filling vacancies. Filling a professional position usually takes between two and four months and clerical positions usually two weeks. Hard to fill, highly specialized positions such as fire protection engineering and occupational health have taken much longer (6-8 months).

- o Job qualification standards have been established and are used in recruiting for open positions. These standards are reviewed periodically to assure they meet current job requirements. A review of selected current incumbents indicated that they meet their job qualification standards.

- o Analysis of turnover statistics over the past three years indicates a rate of less than 12 percent/year. This includes one year that involved a layoff of approximately 7 percent of the WVNS staff. No particular trends or problem areas in specific job disciplines are indicated by the statistics, which are about average for industry. Management is aware that due to the changing programmatic nature of the project, there is a need to develop long term manpower programs to account for retirements, etc. WVNS has begun this process to assure continuity of manpower for the project.

- o Career development is a part of the WVNS human resources program. Currently this activity is independent of wage and salary reviews. However, future plans are to make this an integral part of the annual employee performance evaluation process so that employee and supervisor can look at the whole picture at one time.

- * A formal employee performance appraisal system is in effect covering all classes of employees to differing degrees. Safety performance is not always one of the rating factors. Hourly employees, who comprise most of

the operating personnel, do not have a clearly identified safety rating factor. Where safety is rated, it is not given the perspective and importance it could have. A new evaluation process for exempt employees that will be used in the next cycle of performance evaluations has greater emphasis on the rating of safety performance. It could be extended to the other labor categories.

* Job descriptions exist for almost all WVNS positions, but not all incumbents have been provided copies of their job descriptions. Many of these job descriptions do not discuss safety related aspects of the job or place safety in top priority.

**CONCERN:** (OA.5-1) (H3/C3) The treatment of safety in job descriptions and performance evaluations is inconsistent with management's stated emphasis on safety.

## OA.6 DOCUMENT CONTROL

**PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support facility requirements.**

**FINDINGS:**

- o The WVNS document control system is described in total by the following:
  - WV-100, Rev. 3 of November 6, 1988, "Policy and Procedure Preparation and Format"
  - WV-103, Rev. 4 of January 9, 1989, "Controlled Distribution Documents"
  - QM-6, Rev. 2 of July 1, 1988, "Document Control"
  - EP-6-001, Rev. 0 of April 22, 1988, "Engineering Document Control"
- o The four documents listed above constitute the WVNS document control requirements that apply to document control systems for both Project Documents and Department/Service Documents.
- o Central Document Control administers the program for all controlled project documents except the following Department/Service documents - Accounting Handbook, Computer Protection Program Procedures, Environmental Monitoring Procedures, Procurement Manual, Quality Assurance Construction Inspection Program Plan, Standard Operating Procedures, and Standard Instruction Procedures. For these documents, the responsibility for control is assigned to the cognizant manager.
- o The conformance of commercially provided permanent records storage facilities to NFPA codes was evaluated. No violations were noted.
- o The automated records management and retrieval system provides identification of specific stored records by various sorting and searching methods (e.g., keyword search, document type, document number).
- o Interim records storage on site is provided by fire-rated file cabinets (1/2, 1, and 1-1/2 hour) with the concurrence of the DOE Project Office (Letter, Bixby to Thomas, August 26, 1988).
- o Radiation work permits and radiological surveys for specified months in 1984 and 1986, all previous revisions of the WVNS Radiological Control Manual, individual Standard Operating Procedures, and Radiological Control Procedures were all successfully retrieved when requested by the team.

- o Retrievability of records was tested during the appraisal period by specific requests from the Department of Justice. Approximately 50,000 document pages were retrieved, reproduced, and provided within a one week period.

- o The centralized project document control system is in compliance with the requirements DOE 1324 (series) and 5700.6B. DOE/ID provided oversight and guidance during a records management functional assistance visit to WVNS in April 1989. Suggestions for further improvement to the WVNS system are documented (Letter, Ortega (WVPO) to Thomas, April 12, 1989).

- o Three of the decentralized document control systems were examined. The QA Construction Inspection Program Plan and Standard Operating Procedures were found to be adequately controlled with only minor exceptions. A description of Radiological Control Procedures control follows.

- * Radiation and Safety Radiological Control (RC) Procedures were identified to be outside of the WVNS definition of controlled documents (WV-103). This is a contributing factor to the lack of a conforming document control system for these two volumes of procedures.

- * Identification, review, revisions, and records maintenance for RC procedures are not being accomplished in accordance with the requirements specified in WV-100, WV-103, and QM-6.

- * WV-100, section 5.0, requires annual review of procedures; department managers must maintain evidence of these reviews. RC-ADM-9 establishes that RC procedures will be reviewed on a 3-year cycle, conflicting with the policy requirement.

**CONCERN:** (OA.6-1) (H3/C2) Radiological Control Procedures are not controlled in accordance with the requirements of DOE 5700.6B.

**FINDINGS:**

- o SARs are controlled as project documents.

- o Facility SARs have been issued for the project activities to date (SAR-001 through SAR-011).

- o Those SARs requiring approval by DOE/ID per the requirements of DOE 5481.1B have been reviewed and approved.

- o WVDP Operational Safety Requirements (OSRs) have all received DOE review and approval. Revisions since initial approval have received the same level of overview and approval.

**CONCERN:** None.

## OA.7 FITNESS-FOR-DUTY PROGRAM

**PERFORMANCE OBJECTIVE:** **A facility fitness-for-duty program should identify persons who are unfit for their assigned duties as a result of drug or alcohol use, or other physical or psychological conditions, and remove them from such duty and from access to vital areas of the facility.**

**FINDINGS:**

- o An interim policy on substance abuse was issued in January 1989. This policy supplements the existing Employee Assistance Program. The program as currently envisioned appears appropriate to WVNS.
- o Information on the substance abuse policy and other aspects of the program have been provided directly to employees at the work site and at home.
- o All managers and supervisors have been provided appropriate training and techniques on identifying and handling suspected substance abusers and personnel with other problems that might impair their fitness-for-duty.
- o Management at all levels support the program and personnel are encouraged to use the program which is entirely confidential, company paid for, and without stigma. Failure to participate when warranted can lead to disciplinary action up to and including termination.
- o Currently the program applies to all new hires. Ultimately, after negotiation with the bargaining unit (to commence shortly), the testing program will apply to all WVNS personnel.
- o The policy on substance abuse has not yet been applied to subcontractors. WVNS has commented on the draft order and is awaiting implementation guidance from DOE/ID.

**CONCERN:** None.

## B. OPERATIONS

Operations at the WVDP involve the STS, the LWTS, and the CSS. These are new facilities that use certain components or structures of the old plant. The STS decontaminates the high-level waste supernatant by ion exchange through columns of zeolite for removal of cesium; the decontaminated supernatant is passed to the LWTS for evaporation and the concentrate produced is mixed with cement and other additions in the CSS. Cement product is placed in square drums for storage on-site pending development of means for disposal. While the appraisal team was on site, these systems were actively operating only a few days, thus limiting opportunities for observation.

WVNS conducts operations in accordance with controlled, authorized procedures, which include appropriate references to OSRs and Technical Requirements and to supporting technical and operational data sources. Operations supervision and operators are competent and knowledgeable in the procedures, and show an appropriate appreciation of the need for safety in the operations; continuity among shifts is facilitated by shift logs and separate turnovers between supervisors and operators. System configurations are controlled through an Engineering Department procedure that requires an approved Engineering Change Notice for any change.

Some deficiencies were noted, for the most part due to inadequate attention to administrative detail in the preparation, review, and implementation of procedures. For example, implementation of the lock and tag procedure in the operations group and in the CTS is inconsistent and varies from the procedural requirements. Color coding of control panel valve position indicators are not uniform between the STS and the CSS systems. Housekeeping in the new areas of the plant and in the frequently used portions of the old plant is satisfactory, but needs improvement in less frequently occupied areas.

## OP.1 CONDUCT OF OPERATIONS

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

**FINDINGS:**

- Operators are free of nonoperational duties, based on discussions with operators and observation of activities underway at the time of the appraisal

- In the IRTS facilities, access to control rooms is by access card; in the CTS, similar access controls have not yet been instituted, but no evidence was seen of problems resulting from the lack of positive access control. Control room activities were being conducted in a professional manner.

- Operations are controlled by approved Standard Operating Procedures (SOP) and are conducted in accordance with detailed operating plans prepared quarterly and updated as required; SOPs are required by WVNS policies and procedures for conduct of operations affecting quality, and include data sheets where appropriate.

- Field changes to operating procedures are subject to the same controls and signature requirements as the original procedures; supervisors are responsible for assuring that the procedure books used in the operating areas are current, and the QA Department periodically audits the procedure books for compliance.

- Procedure documents are controlled and distributed by a central document control group in accordance with WV-103 and SOP 00-1; based on discussion with both management and operators, the operations personnel are informed in a timely manner of new procedures and changes to procedures.

- A forced shutdown of any facility requires the preparation of an UOR in accordance with WV-987; operations shutdown for OSR violations may not be restarted until WVNS management and the Manager, DOE/ID have approved resumption of operation.

- Both shift supervisors and operators maintain shift logs that report operational events, off-normal conditions, and significant operational data; the logs are well kept and informative.

- Tests, measurements, and surveillance activities required by the OSRs are tracked by the Site Support Manager, who issues weekly a list of all such activities due to be performed during the month, including those performed by the operators. Documentation of completion is noted in this list.

- o WV-120 mandates a QA program for functional activities involved in production of WVNS end items, products, and services; the QA Department routinely audits operational activities for conformance to the QA requirements.

- o The UORs reported for 1987 through 1989 do not reflect any repetitious occurrences; there have been no forced shutdowns, according to operations management.

- * Operating Safety Requirement OSR/TR-IRTS-3 requires that "SPARE TANKS OF SUITABLE CORROSION RESISTANT MATERIAL SHALL BE MAINTAINED WITH SUFFICIENT CAPACITY AND APPROPRIATE COOLING PROVISIONS TO ACCOMMODATE THE CONTENTS OF THE LARGEST TANK IN WHICH RADIOACTIVE LIQUID OF EACH CORROSIVE CHARACTERISTIC IS STORED."

  This OSR and its backup statement was modified slightly from the original (Nuclear Fuel Services, Inc.) Technical Specification and together strongly imply that there should always be sufficient volume in Tank 8D-1 to accommodate all of the contents of Tank 8D-2, which contains the high-level waste liquid and sludge.

- * WVNS has interpreted the OSR to permit the existence of less capacity in Tank 8D-1 than would be required to accommodate the contents of Tank 8D-2, provided there exist procedures and equipment to remove sufficient liquid from Tank 8D-1 to create such capacity in a timely manner. The contents of Tank 8D-1 are low-level condensate from Tank 8D-2, flush water from the STS, and a small volume of zeolite from the STS system; currently the water has an activity level of 14 Ci/mL. The equipment is in place for removing this water and a procedure and the equipment for transferring the liquid waste from Tank 8D-2 are available.

- * There is no suitable procedure in place for the removal and handling of the low-level water in Tank 8D-1.

- * At times in the past year or more, there has been less free capacity than would be required to accommodate instantaneously the liquid volume in Tank 8D-2; WVNS does not regard this as an OSR violation, in the light of the history of the OSR and the intended means of accommodating the situation, i.e., removing sufficient low-level waste from Tank 8D-1 to create the required capacity.

**CONCERN:** (OP.1-1) (H3/C3) The wording of OSR/TR-IRTS-3, particularly the of its technical basis, preclude a clear determination of what constitutes a violation.

| | |
|---|---|
| **CONCERN:**<br>(OP.1-2)<br>(H3/C2) | There is no clearly applicable WVNS emergency procedure for removing low-level water from Tank 8D-1 in the event it becomes necessary to transfer liquid from Tank 8D-2. |

## OP.2 OPERATIONS PROCEDURES AND DOCUMENTATION

**PERFORMANCE OBJECTIVE:** Operations procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the facility.

**FINDINGS:**

- SOPs are prepared by Support Engineers and reviewed and approved by Operations, R&S, and QA; the Document Control Center publishes and controls the procedures and receives for filing the data sheets that are specified in some procedures.
- Procedures are prepared in accordance with a format specified by SOP 00-2; references to applicable OSRs and TRs are included where they apply in the procedure.
- The OSRs and TRs have been selected to provide a comfortable margin of safety between the safety limits of the processes and the normal operating ranges; for example, TR-IRTS-5 requires a minimum decontamination factor (DF) of 1,000 across the STS Ion-Exchange Columns, but a DF of 1,500 has been specified as an operating control, and the system has routinely operated at DFs in excess of 4,200.
- References to applicable supporting technical and operational data sources necessary to a complete understanding of the procedures are included, as is identification of special tools/equipment required to perform the procedure and any special precautions necessary in executing the procedure.
- Temporary changes to procedures and temporary procedures are not used; changes may be initiated by anyone who perceives a deficiency in an existing procedure (or other need for change) and are processed in a formal manner, requiring signatures of the same organizational positions as sign the original procedure.
- Procedures are located in the operating areas where they are required; in some cases, excerpts from procedures are posted on control panels for rapid reference. These bear the procedure number and revision number, but are not signed.
- Where required by new or revised procedures, the need for supplemental training is indicated by a Notice of Training submitted with the draft procedure (or change) and forwarded to the Training Department; in other cases, operators are acquainted with changes to operating procedures by the Shift Supervisors. There is no formal requirement for acknowledgment by the operators that they have familiarized themselves with the changes.

- Except for the Fuel Receiving and Storage (FRS) area, there are no movements of fissile material in the WVDP; fuel movements in the FRS are controlled by procedures specifically authorizing the movement.

**CONCERN:** None.

## OP.3 FACILITY STATUS CONTROLS

**PERFORMANCE OBJECTIVE:** Operations personnel should know the status of the systems and equipment under their control and should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

**FINDINGS:**

- Changes to the system configuration must be made through the Engineering Change Notice (ECN) procedure (EP-3-007), and require as a minimum, signature of the Cognizant System Design Manager, plus appropriate signatures from the QA and R&S organizations; work orders involving configuration change must be so identified.

- Where an ECN affects operations, the Cognizant Facility Operations Manager is responsible for changing any operations documents (SOPs, etc.) that were affected by the ECN; the resulting new procedures or Field Changes are communicated to the operating groups by the document distribution procedures.

- Operations logs are maintained by both shift supervisors and operators; logs are up-to-date, are informative, and record significant plant status information.

- The outgoing graveyard shift supervisor prepares daily summaries of plant operations and status and sends them to the IRTS Operations Manager.

- The Lock and Tag procedure (SOP 00-4) specifies conditions under which systems must be locked and tagged, and assigns the operations supervisor the primary responsibility for control of lock and tag protection to operational systems within the plant. His/her signature or that of a senior designee is required on every tag, and his lock is the first to be applied.

- The responsible system supervisor is required to perform a physical inspection of all locks and tags monthly and update the lock and tag log as appropriate. The Main Plant Shift Supervisor is responsible for maintaining the log and for resolving any interface problems where a lockout affects more than one system.

- The use of caution tags is authorized and defined by an approved procedure (SOP 00-5). Caution tags may be used by system supervisors/managers to control components or equipment entirely under their control. A log must be maintained in the area shift office or control room.

- No caution tags were seen which carried procedural information or instructions.

* Caution tags were seen with accompanying locks; while not prohibited by the procedure, this practice is not explicitly permitted.

* In the main plant, some valves were locked and tagged with a danger tag; other identical valves were only tagged, which violates the lock and tag procedure.

* SOP 00-4 requires the inspection by the Shift Supervisor of a plant system on which work has been done before returning the system to service. Contrary to this requirement, the supervisor in the CTS stated that systems on which maintenance has been performed are accepted essentially on the basis of certification by the maintenance staff that the work has been completed satisfactorily.

* No caution tag log was being maintained in the CSS control room.

**CONCERN:** (OP.3-1) (H2/C2) Some elements of the lock and tag procedure are being violated.

## OP.4 OPERATIONS STATIONS AND EQUIPMENT

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

**FINDINGS:**

- o Control rooms, though constrained in two cases by either insufficient space or inefficient arrangement, are clean, have all instrumentation and controls necessary for operation of the respective facilities, and appear to be managed in a professional manner.

- o Plant wide communications are clearly audible in the control rooms.

- o Due to the nature of the test operations in the CTS, there is some interference to convenient access to some of the equipment; operation of this equipment will be fully remote in the final plant; therefore, this is a temporary inconvenience.

- o The newer construction in the STS and the LWTS/CSS have modern, well-marked control rooms with computerized control systems; the CTS is similarly equipped.

- o Housekeeping in the new plant facilities and in frequently occupied portions of the older facilities was acceptable. However, the Team observed some less frequently visited areas of the plant where housekeeping was substandard, as cited in succeeding bullets.

  - The alternate EOC in the Bulk Storage Warehouse was not clean.

  - Housekeeping was poor in the product packaging area and near the back door to the manipulator service area.

  - Tools were improperly stored and trash was evident on the floor on the old plutonium loadout corridor.

  - Housekeeping needed attention on the stairway to the CSS stack.

**CONCERN:** None.

## OP.5 OPERATOR PERFORMANCE

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

FINDINGS:

- Operator training includes classroom sessions alternating with on-the-job training in a formally structured program.
- Before being assigned to a specified progression category (i.e., to a particular plant), operators are examined by both written and oral tests and a walk-through of the system they have trained on; following successful completion of these, they are formally certified by operations management.
- Operators have commented that some of the videotapes presented in the classroom training are out-of-date and do not conform to current operations (see also Concern TC.4-1).
- Weekly workplace meetings serve to acquaint the operators with program status, procedure changes, and plant modifications; the operators contacted consider these meetings to be very useful.
- Operators show an awareness of procedure requirements and of the necessity for following procedures; they are well briefed on the OSRs and TRs and understand the necessity for following them in the operation of the facilities.
- Supervisors are competent and show a thorough understanding of the systems they are responsible for operating; operators were observed to be competent in carrying out their duties, and showed evidence of a clear understanding of their duties, including the ability to diagnose off-normal operating conditions.
- Upgrading from the Senior Operator classifications to fill a supervisory vacancy in the operations group is permitted by the union contract, but there appears to be no WVNS policy governing the conditions under which this is done.
- Comments were made by several operators concerning the lack of sufficient supervisory personnel to cover all three shifts in the LWTS/CSS and the current practice of routinely upgrading from the operator group to fill the vacancy. One Senior Specialist who regularly serves as a

supervisor expressed concern about not having been fully qualified at the shift supervisor level, and a more junior operator observed that he did not feel fully comfortable about reporting to a fellow operator on a routine basis.

**CONCERN:** None.

## OP.6 SHIFT TURNOVER

**PERFORMANCE OBJECTIVE:** Turnovers conducted for each shift station should ensure the effective and accurate transfer of information between shift personnel.

**FINDINGS:**

- (Note: The sparsity of operations during the period of this appraisal limited the extent to which meaningful observations could be made.)
- Turnovers are conducted separately between the supervisors and the operators; supervisors' turnovers involves passing of information regarding the status of the plant systems, current operating data, planned activities for the coming shift, and other pertinent information.
- The graveyard shift supervisor prepares a daily summary report of the 24-hour period. This serves to inform both management and the day shift supervisor of past and projected activities.
- Incoming operators and supervisors arrive 15 to 30 minutes ahead of shift change time, and outgoing personnel stay past shift change time to accomplish the turnover. This is regarded by both operators and supervisors as adequate overlap to accomplish an orderly and effective turnover.
- Incoming shift supervisors read and initial the shift log for the preceding shifts; shift logs are generally informative as to plant status and activities.

**CONCERN:** None.

## OP.7 HUMAN FACTORS

**PERFORMANCE OBJECTIVE: Human factors considerations should be evident in the design of systems, controls, and displays to facilitate the observation and interpretation of instruments, alarms, and other information, and the operation and maintenance of equipment.**

FINDINGS:

- o Human factors considerations have not previously been formally addressed under that defined context at WVDP. However, they are being considered in the design of the new vitrification facility, according to the WVDP design engineers assigned to the project. Special attention is being given to lighting, internal communications systems, computerized control displays for plant operation, equipment and piping labeling, and avoidance of traffic and overhead bumping hazards. For example, lighting standards will be provided to conform to the requirements of ID-12044.

- o No program is underway to retrofit existing operations with improved human factors.

- * Color coding of panel lights is not uniform throughout the plant; for example, the significance of the red/green valve position indicating lights is reversed between the STS and the CSS control panels. Within any production unit such as the STS or the CSS, however, the color coding is uniform. Although the operators are presently assigned to a single facility, future transfers are possible.

CONCERN: (OP.7-1) (H2/C2) Inconsistency between color coding of valve position lights in the CSS and STS control panels could confuse operators during operations or an emergency.

- o Audible alarms for different events are readily distinguishable. Site wide communications systems are reliable and intelligible in most areas. In some stairwells in the Process Building and the utility room intelligibility is marginal. Significant use is made of hand held radio transceivers for personnel assigned to tasks in distant areas of the site.

- o Work areas appear to be well lighted.

- * Some valves in the Process Building and some possible process lines were either unlabeled or were labeled with alphanumeric codes.

- * Discussion with operations personnel indicated the possibility that some of the unlabeled lines were not currently in use; however, there was no way of visually making that determination. No survey of the Process Building process lines was available for review.

* Many temporary process lines in the CTS are unmarked.

**CONCERN:** (OP.7-2) (H3/C2) Some equipment valves and process lines in active service were unlabeled or inadequately labeled. Mistaken identity could adversely affect safety.

## C. MAINTENANCE

The WVNS Maintenance Department is structured, staffed, and supported to satisfy the maintenance needs of the WVDP. Skilled and dedicated workers perform maintenance under supervisors who are knowledgeable in the discipline involved. WVNS uses formalized procedures to track and control work. The facility is adequately maintained as evidenced by the observed quality of workmanship and the noted absence of maintenance related deterioration of active equipment.

Three concerns and one noteworthy practice were identified. Several instances of the Maintenance Department staff not following specified procedures in the work control process prompted the first concern. The second concern regards the inconsistent use of safety glasses or other eye protection in the vicinity of maintenance equipment in the shop. The final concern involves the absence of a requirement for the Maintenance Department to review or approve facility designs for maintainability. The noteworthy practice is the visual records of as-built facilities which help maintenance staff assess complex jobs prior to undertaking the work.

## MA.1 MAINTENANCE ORGANIZATION AND ADMINISTRATION

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

**FINDINGS:**

- o The Maintenance Department line organization delineates job functions including; staff control/support, various craft disciplines, custodial, and instrumentation functions. There is one group of persons assigned to a major work project under a dedicated Maintenance Supervisor.

- o The match up between work to be done and the maintenance support available is satisfactory based upon the present maintenance backlog. Within the past year, two reassignments and several new hires have enhanced the Maintenance Department's ability to respond to operating and support needs.

- o In addition to departmental charters, each supervisory and exempt salary maintenance staff has an Exempt Position Description (Form 31215C), which delineates major responsibilities and specifications. Recently established Quality Goals (Form KMG1918:FAC-80) include accident and radiation exposure goals.

- o Established procedures for administrative controls (such as Lock-and-Tag, Industrial and Radiation Work Permits, etc.) were in place and (with one exception) being used based upon field observations and interviews with the Maintenance staff. See Concern MA.3-1.

- o In several maintenance-supported meetings attended by the appraiser there were times when priority assignment or schedule status were an issue, but there were no instances in which the responsibilities or authorities of the Maintenance Department were questioned.

- o The Site Support Manager formally monitors maintenance performance weekly in such areas as overtime percentage, backlog status, and project and activity staffing levels and status.

- * Although performance appraisals are given to the first-line (bargaining unit) workers, the appraisal result has little effect on individual rewards. There is only a brief mention of safety performance in the 90-Day Probationary and none in the annual Hourly Performance Evaluation forms. The two completed performance evaluations for Maintenance Department Supervisors (Form LUV-T322) that were examined had no mention of safety performance or responsibility.

**CONCERN:** See Concern OA.5-1.

## MA.2 FACILITY MATERIAL CONDITION

**PERFORMANCE OBJECTIVE:** The material condition of components and equipment should be maintained to support safe operation of the facility.

**FINDINGS:**

- The use of Work Orders (Form WV-1206), Shop Orders (Form WV-1710), and Operating Plant Deficiency Reports (OPDR, WV-1709) are employed to address facility deficiencies.
- Based upon the examination of numerous instruments, gauges, and controls, calibration stickers were up-to-date and visible; those items noted appeared to be functional except as indicated by tags.
- Most electrical and electronic equipment is shielded from the weather. A building construction project was noted where climate protection was not provided for an electrical distribution system.
- Test, maintenance, and operating equipment exhibited proper mechanical supports, tie-downs, and other restraints. Mechanical devices which supported operations (stirrers, valves, samplers, slides, etc.) all seemed operable as noted during plant tours.
- In all parts of the plant observed, the structural systems, walkways, and other systems were in good repair.
- Effective lubrication and fluid leak control was exhibited. There is weekly preventive maintenance lubrication. No oil or other fluid leaks were observed. See Performance Objective MA.4.

**CONCERN:** None.

## MA.3 CONDUCT OF MAINTENANCE

**PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and efficient manner to support facility operation.**

FINDINGS:

- o Authorization for work is the completed Work Order, Shop Order, or Operating Plant Deficiency Report. Control is regulated by identified sign-off requisites as work progresses plus completion acknowledgments (which can include Quality Assurance).

- * One instance was seen where no formal work authorization nor Industrial Work Permit were in effect during some maintenance work (installation of a 220-volt line).

- * Although specified procedures were employed in areas such as the Instrument Calibration Laboratory, one case was noted where an outdated procedure was being used.

- * Examination of completed Operating Plant Deficiency Reports (OPDRs) revealed that the blank spaces for Radiological and Industrial Work Permit (RWP and IWP) numbers were not always entered even though the cognizant Radiation and Safety Department representative had indicated need for one or both of these documents.

- * A Field Change on February 14, 1989, was issued to SOP 00-10, "Use of Operating Plant Deficiency Report (OPDR)," which defined the manual addition of a priority block on the OPDR tag until new tags become available. In examining files of completed OPDRs initiated since that date, it was determined that this requirement has not been followed.

CONCERN: (MA.3-1) (H2/C2) The Maintenance Department staff does not consistently follow WVNS procedures.

FINDINGS:

- o Supervisors of maintenance personnel are directly involved in reducing their staff's radiation exposure; this is reflected in the Quality Goal Document and actual annual exposure levels.

- o During observation of maintenance field work, proper support from health physics, quality assurance, and operating personnel was provided. Signatory requirements from these groups are often identified.

- o Specified procedures were employed in some areas such as in the instrument calibration laboratory (although one case was noted where a noncurrent procedure was being used).

- o Field work covered by Work Orders contains the sequenced activities and procedures as defined by the Engineering

Department. Drawings, sketches, and equipment manuals were in use in some maintenance field work.

- Good housekeeping was evident in the maintenance shops. Tool storage was orderly; administrative control was used to segregate special-use abrasive wheels and saws. Locked ovens were used to store moisture sensitive welding rods. In the manipulator repair area, a dedicated set of tools was available for this specialized effort.

- In response to an earlier independent audit, all lock-and-tag stations were retagged during June 1989. This included updated logs in the master record book in the shift supervisor's office.

- Workers observed were aware of post-completion requirements (such as quality inspection and acceptance of the weld repair on a procured grapple). The quality requisites are identified on the work order used by the maintenance workers.

- First-hand inspection of completed Work Orders provided documentation that the work was completed is required by specified sign-off blocks. Should a Quality Assurance inspection be required during an interim step or upon completion, this activity is performed by an inspector certified to the level specified by the Work Order. The record of this quality inspection is retained by the Quality Assurance Section.

- Maintenance supervisors are promoted from "within the ranks" so first-hand knowledge of the work function is ensured. Formal Westinghouse Position Descriptions seen for maintenance supervisors specified that four to six years experience in the work field was required.

- During observations of maintenance work being done in radiological control areas, proper attention was given to practices defined by the Radiological Work Permit.

- WVNS staff performs most maintenance work at WVDP. Some activities (such as excavating) are subcontracted out to local firms. Safety and health policies under which these subcontractors are governed are covered in "West Valley Nuclear Services Safety, Health, and Security Rules for On-Site Services," WV-19012 and "General Provisions - Fixed Price Construction Subcontracts," WV-0109(a).

- Discussions with maintenance workers indicated a positive attitude in carrying out their assignments. That attitude likely contributes to the quality of the maintenance-generated material.

- o Supervisors were often observed to be in the field with their working staff. Estimates as high as 60 percent for a supervisor being in the field were given during interviews.

- o Pre-job briefings provide an effective explanation of the impending work and the requisites to perform the job safely and effectively.

- o Safety-related information such as DOE/ID letters and accident case reports from other sources are disseminated to supervisors directly and to the working staff during the weekly maintenance meetings. A monthly meeting devoted wholly to safety is held for the entire Maintenance Department also.

**CONCERN:** None.

## MA.4 PREVENTIVE MAINTENANCE

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

**FINDINGS:**

- The Maintenance Department's preventive maintenance (PM) program effectively promotes a safe facility operation. The scheduled periodic PM on ventilation, compressor, and utilities systems has contributed to the result that no losses of these systems have occurred since the WVDP inception (per WVNS personnel).
- The frequency for PM is required to be specified as part of the engineering work of the installation per WVDP procedures.
- There was no backlog (expired or delinquent) of items scheduled for PM based upon examination of the PM logs. Maintenance management has a dedicated cadre whose first priority is safety/PM activities.
- Up-to-date documentation of the PM activities was on file in the PM coordinator's office. A monthly computer print-out identifies those items to be serviced; once-a-week call-outs are given for those weekly lubrication PMs.
- Two types of predictive surveillance are performed at WVDP: Oil samples from the circuit breakers and main transformer are analyzed and the vibration signature is evaluated on the Ingersoll-Rand compressor on an annual basis.

**CONCERN:** None.

## MA.5 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

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

FINDINGS:

- o A properly maintained reservoir of tools and materials to support maintenance work was evident:
  - Often-used components are readily available in stocked rooms adjacent to the shop,
  - Locked rooms and cabinets under the supervisor's control contained specialized or restricted use items,
  - The general warehouse (which has limited personnel access) supplies less-often used parts and materials (spot checks verified the physical existence and location of items that were listed on the inventory printout),
  - Safety-related items (respirators, clothing, safety glasses, etc) are stored in a localized area of the main warehouse; provisions for emergency or expedited procurement of supplies are available per Form WV-19063.
- o Tools are not routinely decontaminated and reused at WVDP. Contaminated facilities, such as the manipulator repair shop and the cement solidification system, retain maintenance tools within the contaminated areas.
- o National Institute of Standards and Technology traceable standards are maintained in the limited-access controlled-environment instrument shop. The calibration and certification requirements of bench and field use instruments and gauges are controlled by use of a computer-generated maintenance schedule.
- * The maintenance shop has available the appropriate safety-related equipment such as hard hats, goggles, and welding masks. However, the wearing of safety glasses in the maintenance shop was arbitrary in that wearing glasses was required only if operating equipment. This violates 29 CFR 1910.133 (Eye and Face Protection).
- * Some instance were seen where maintenance staff approached running lathes without safety glasses. They were not operating the equipment but were near enough for chips to have presented an eye hazard. WVNS management recognized this deficiency and issued a change-in-policy letter (dated July 5, 1989) requiring wearing of safety glasses in the equipment area and outside of those boundaries if work was being performed there.

CONCERN: (MA.5-1) (H2/C1) The policy regarding wearing of eye protection in the maintenance shop did not cover all personnel at risk of injury.

FINDINGS:

- Formal control of materials used in maintenance work is not ensured nor defined after withdrawal from the warehouse but WVNS personnel stated that no misuses have been noted using their informal labeling techniques. No nuclear coded material requirements are now specified although that might change upon installation of the production vitrification system.

- The maintenance shops exhibit sufficient illumination, services, and operating space to carry out the in-shop work effectively.

- The quality requirements applicable to maintenance and warehouse operations are identified in WVNS QM-8, "Identification and Control of Materials, Parts, and Components." A locked cage for incoming items which require QA acceptance is used to hold those parts which, after proper acceptance by QA, are "green tagged" and released to the Distribution Department.

CONCERN: None.

## MA.6 WORK CONTROL SYSTEM

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

**FINDINGS:**

- WVNS issues a daily report which provides the percent completion of priority items plus the status of all maintenance purchase orders. A weekly report addresses scheduled maintenance activities (Work and Shop Orders plus Operating Plant Deficiency Reports or OPDRs), backlog by category (3,600 hours or about 6 weeks at the time of the appraisal), overtime (about 12 percent), and the 3-month projected maintenance schedule.

- Three different types of work orders are used at WVDP. See Performance Objective MA.3.

- Industrial or Radiological Work Permit (IWP, RWP) or both can be required on Work Orders and OPDRs. Maintenance mechanics stated that they receive ALARA advice as well as the job-related radiological needs during the pre-job briefing from the Radiological Protection staff.

- Job scoping is performed by experienced planners who detail the steps, materials, drawings, and time requisites which are included on the Work or Shop Order. Examination of completed work orders verified completion of signature call outs which would validate work completion. See Performance Objective MA.3.

**CONCERN:** None.

## MA.7 PROCEDURES AND DOCUMENTATION

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

**FINDINGS:**

- o The Engineering Procedure (EP) series of documents identifies the practices for formally implementing drawings, specifications, and procedures, including changes thereto.

- o Although most maintenance work is of a routine nature, WVNS has fabricated mock-ups to prove out maintenance procedures in instances where complexity or accessibility are problems.

- * Examination of the EP document series indicated that the Maintenance Department is not required or necessarily given the opportunity to review or approve facility designs.

- * WVNS did not assess the Column D dump valve in the Supernatant Treatment System for maintainability as required in 2.3.1.3 of WVNS-DC-013. The valve failed and it presents a difficult problem to resolve.

- * Two air diaphragm pumps in Tanks 50-D-001 and 50-D-004 of the Supernatant Treatment System were placed in an irretrievable and unmaintainable location. One failed which necessitated abandoning the two pumps in place and installing alternates.

- * The design for removing manipulators in the Supernatant Treatment System was reviewed and a monorail system requested by the Maintenance Department. This request was disapproved via ECN because of the advance stage of construction. The final installation necessitated the incorporation of several specialized carts, hoists, and jigs which could affect adversely the effective (and thus safe) repair on these high-maintenance items.

**CONCERN:** (MA.7-1) (H2/C2) The Maintenance Department has no defined responsibility to review or approve designs which would require maintainability after the facility is put into service.

**FINDINGS:**

- o WVNS has begun the practice of photographing and detailed video recording of as-built facilities. This practice is designed to give the maintenance workers a better appreciation of the physical layout, space limitations, and other such considerations when planning and performing work in contaminated areas. See Noteworthy Practice.

- The procedures to be used in carrying out maintenance work receive the same approval authorizations as the Work Order itself.

- Sketches, formal engineering drawings, and photographs have been used and are specified in the procedures to help better carry out maintenance work.

- Many completed Work Orders displayed stepwise sign-offs. The requirement is identified by a "+" sign on the far left column.

- There were instances when procedures generated by the Maintenance Department were inadequate, erroneous, or unexpected events occurred which prevented completion of the work as planned. This is resolved by "cognizant engineer" action (usually a Field Change).

**CONCERN:** None.

## MA.8 MAINTENANCE HISTORY

**PERFORMANCE OBJECTIVE:** Maintenance history should be used to support maintenance activities and optimize equipment performance.

**FINDINGS:**

- All maintenance work on DOE capital equipment procured by WVNS is entered onto that item's record card upon completion of the work. The date, type of work, and person who performed it is entered each time maintenance is done.
- The records are retained in accordance with DOE 1324.2.
- Most items have had only one or two unplanned maintenance events. Manipulators, particularly the Model Gs, have exhibited more-than-expected maintenance needs. The Maintenance Department has formally alerted Operations (October 25, 1988 memorandum) regarding the concern in this area and a trend study by the Maintenance Coordinator was initiated but is not yet complete.

**CONCERN:** None.

## D. TRAINING AND CERTIFICATION

The WVDP has extensively used Qualification Standards to structure and control the training and certification/qualification programs for facility personnel. The Qualification Standards address skills and knowledge in administrative requirements, radiological and nuclear safety, industrial health and safety, process operations, plant safety, and hazardous materials safety that trainees are required to demonstrate prior to qualification. The areas in which WVNS uses Qualification Standards include operations, maintenance, radiochemistry, environmental laboratory, quality assurance, radiological controls, and physical security.

WVNS has a central Training and Communication Department staffed with five training coordinators. This Department shares the responsibility for conducting plant-wide safety training with line organizations and is responsible for maintaining training records. With one exception, the plant-wide safety training observed was consistent with DOE requirements and accepted industry practice. The exception was lifting and handling training which was inconsistent with applicable documentation.

The Training and Communication Department shares responsibility with line organizations for developing, conducting, and evaluating job-specific training. The responsibilities of both organizations are defined in plant policies and procedures. However, training policies and procedures do not address written examinations, instructor qualification, and training program evaluation.

While the team found the operators and operations supervisors to be knowledgeable of their jobs, DOE requirements related to continuing training on emergency/abnormal procedures are not being satisfied. Also, written training policies do not provide for adequate supervision of trainees.

## TC.1 ORGANIZATION AND ADMINISTRATION

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

**FINDINGS:**

- The Prerequisites Sections of Qualifications Standards address selection criteria including education, experience, and health requirements based on job needs. Health requirements are further defined in the WVNS Occupational Health Manual.

- Policy and Procedure, WV-538, "Personnel Indoctrination and Training," defines the organizational structure and responsibilities for the training and qualification of WVNS personnel.

- The Training and Communications Manager, who reports to the Human Resources Manager, is directly supported by five training coordinators, two clerks and one communications specialist.

- The Training and Communications Department has complete responsibility for new employee orientation, radiation worker training, hazardous material training, supervisor skills training, and training records management. The Training and Communications Department shares the responsibility for operator and other qualification programs with line management.

- Training records of two randomly selected operations personnel were reviewed. These records were complete and maintained in a manner consistent with Revision 1 of Training and Communications Policy and Procedure, T-60, which is in review. Training records are identified in this procedure revision as lifetime records as defined in DOE 1324.2A. Training records are maintained on-site in fireproof file cabinets. Upon termination of WVNS employees or a course, the files are sent to an off-site records repository. Subcontractor employee training records are retained on-site.

- New employee orientation, radiation worker training, and respirator training are scheduled monthly to ensure that an opportunity is provided for all personnel to establish and maintain their qualification in these areas. A computer records system is used as a tickler to alert appropriate training and line management personnel of the need to schedule training to ensure that personnel maintain job specific qualifications.

- WVNS has developed and uses Qualification Standards to structure the training of operator and many technician positions on-site. In addition to all operator positions (a total of 18 different qualification standards), there are Qualification Standards for quality assurance,

environmental laboratory, radiological controls, mechanical maintenance, and physical security personnel. The development and use of these Qualification Standards is, in most cases, a joint effort between the training and line organizations. Discussions with supervisors and job incumbents and a review of the Qualification Standards by team members indicated that these standards provide a comprehensive basis for ensuring that personnel are adequately qualified for assigned tasks.

- o Most Training and Communication Department Policies and Procedures in effect in June 1989 were dated in 1983. These procedures did not reflect current practices in several areas. This deficiency was identified during the Westinghouse appraisal of October 1987. (See Concern OA.2-1.) During the appraisal, revisions to several of these procedures were in progress and/or review, and some were issued, which will bring these procedures in line with current practices.

- o A computer-generated written examination development system has been implemented for some qualification and training programs. This system provides a different examination for each administration and is planned to be used for all examination development.

- o Procedures have been developed for conducting and documenting oral boards. Reviews of training records and discussions with operations personnel indicated that these procedures are being implemented.

- * There are no procedures or other documented requirements for the administration, control, or review and approval of written examinations.

- * For the training programs evaluated, only one version of written examinations was used. In most cases, the same examination was administered for a year or more. One examination has been used for more than four years.

- * The technical content of the Lifting and Handling Devices written examination was inconsistent with information provided in the WVNS Hoisting and Rigging Manual. This examination also exhibited weaknesses in the construction of test questions. This examination and some other written examinations reviewed by the team were not approved by either subject matter expert or training personnel.

- * Procedures and policies have not been established to define all the components of a comprehensive training system. Components not addressed are: training program evaluation, instructor training and qualification, and identification of the required content of training and qualification programs.

* Several different approaches to the development and structure of qualification standards have been implemented, some of which are not as effective or comprehensive as others. Examples of Qualification Standards whose structure and content could be improved are those for initial and continuing training of Security Inspectors.

* Most training and qualification programs do not benefit from a structured training evaluation program which considers feedback from areas such as job performance, written and oral examination results, industry operating experience, and relevant performance indicators.

* For the on-the-job training session observed by the team, the instructor/evaluator would have benefited from better techniques for on-the-job instruction and evaluation.

**CONCERN:** (TC.1-1) (H2/C2) Training policies and procedures do not address written examination development, control, and administration; instructor training and qualification; training program evaluation; or methods to identify the required content of training and qualification programs.

## TC.2 REACTOR OPERATIONS

**PERFORMANCE OBJECTIVE: The reactor operator and reactor supervisor training and certification programs should be based on Standard ANS 3.1-1980 (Draft), as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions.**

This Performance Objective does not apply to this facility.

## TC.3 NUCLEAR FACILITY OPERATIONS OTHER THAN REACTORS

**PERFORMANCE OBJECTIVE:** 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:

- Selection criteria for operators are defined in the prerequisites sections of operator Qualification Standards. These criteria include education, experience, and health requirements based on job needs.

- Initial training and qualification programs for WVDP operators are defined in job specific Qualification Standards. These Standards include both skills and knowledge appropriate to the job and address the topics required by DOE 5480.5, Section 10.

- Operations supervisors are selected from the ranks of plant operators who have completed the Supervisory Skills Qualification Standard. Collectively, the operator and supervisor Qualification Standards address the topics required by DOE 5480.5, Section 10 for operations supervisors.

- Operator Qualification Standards address classroom, self-study, and on-the-job training and provide a structured basis for operator training and qualification.

- WVNS Training and Communications Policy and Procedure, T-40, Rev. 1, "Qualification of Operational Personnel," defines the responsibilities for and structure of operator and operations supervisor training and qualification programs.

- The Appraisal Team observed the conduct of classroom and on-the-job training for operations personnel. With the exception of weaknesses addressed elsewhere in this section, the training was conducted in a professional manner and both students and instructors demonstrated positive attitudes and adequate skills and knowledge.

- Interviews with operators and shift supervisors indicated a positive attitude toward learning. Cooperative and professional relationships between training and operations personnel were observed.

- Training and Communication Department Policy and Procedure T-40 describes the WVNS policy regarding failure of qualification and requalification examinations. The training records of a qualified operator who had failed a requalification examination were reviewed. This review indicated that these procedure T-40 requirements are being followed.

- o A review of selected training records indicated that annual written examinations on emergency/abnormal procedures have been administered.

- * DOE 5480.5, Section 10.a (7) requires that "retraining and reexamination shall be required at least annually on all procedures for handling abnormal nuclear facility conditions and emergency situations relative to the employee's assigned responsibilities." Review of operator requalification training program content and discussions with operators and shift supervisors indicated that there is no formal continuing training provided with respect to abnormal or emergency procedures.

CONCERN: (TC.3-1) (H2/C1) The requirements of DOE 5480.5 with respect to annual retraining on emergency/abnormal procedures are not being met.

FINDINGS:

- * Training and Communications Policy and Procedure, T-40, "Qualification of Operational Personnel," Section 3.12, defines "under the direction of a qualified individual" to mean personal immediate supervision by qualified personnel who are or can be in contact with the individual either visually or by radio or telephone conversation.

- * Nuclear industry practice with respect to "under the direction of a qualified individual" is such that qualified personnel can prevent trainees from taking inappropriate actions. The team did not judge radio or telephone communications to provide this level of control. Discussions with operators and shift supervisors indicated that it was not common practice to use radio or telephone communications to provide direct supervision of trainees.

CONCERN: (TC.3-2) (H3/C2) Training policies and procedures provide less control of trainees in the plant by qualified operators and supervisors than nuclear industry practice.

## TC.4 PERSONNEL PROTECTION

**PERFORMANCE OBJECTIVE: The personnel protection training programs should develop and improve the knowledge and skills necessary for facility personnel to perform their assigned job functions, while minimizing exposure of individuals to radiation and chemicals to as low as reasonably achievable.**

FINDINGS:

- o WVNS Radiological Control Manual, Part 2, provides training requirements for nonradiation worker and new employee orientation, radiation worker qualification, radiological control technician qualification standards, and the respiratory protection training program.

- o WVNS Radiological Control Procedure RC-DOS-12 specifies methods to pull the dosimeters for all radiation workers who are overdue for or do not satisfactorily complete Radiation Worker Training, thus denying their access to radiologically controlled areas.

- o WVNS Policy and Procedure WV-988 of May 23, 1986, describes the employee "right-to-know" program, which is based on the requirements of 29 CFR 1910.1200. This program includes training for all on-site personnel. Personnel are separated into three groups depending on their job responsibilities with respect to hazardous chemicals.

- o On June 19, 1989, a training implementation plan was distributed for hazardous waste operations and emergency response based on the requirements of 29 CFR 1910.120 for both hazardous waste workers (24 hours of training) and remedial action/uncontrolled activities workers (40 hours of training). Training to implement these requirements was in progress during this appraisal, but is not yet completed.

  A training vendor is providing the 24-hour hazardous material handling training. This training does not address plant-specific engineering controls and also includes some materials that are redundant with information addressed in radiation worker and respirator training.

- o WVNS Policy and Procedure WV-538 defines the training requirements for unescorted visitors and temporary employees which includes Security, Nonradiation Worker, Safety, and Emergency Alarm Response training.

- o Radiological Control Technicians (RCT) are available on all shifts to support plant operations and maintenance. These RCTs have a well structured training and qualification program that is controlled through Qualification Standards. The program is primarily implemented through self-study. The top level RCT

position requires certification by the National Registry of Radiation Protection Technologists.

- o Training with respect to hazardous material handling, radiation worker qualification, and respirator qualification was observed by the team. This training was conducted by individuals who were knowledgeable of the subject area. Training materials adequately addressed the subject areas.

- * The team observed classroom training on lifting and handling devices. The lesson plan had no objectives, date, revision number, or approval signature, all of which are required by Training Department Policy and Procedure T-21, "Standard Format for Systems Descriptions and Lesson Plans." The written examination used for evaluating this training had no date, revision number, or approval signature. This same examination had been used since the lesson was developed several years ago.

- * The information provided in this lifting and handling device training with respect to hand signals for stop, emergency stop, and swing is inconsistent with that in Chapter 5 of the WVDP Hoisting and Rigging Manual. With the exception of reference to the use of tags on rigging and tackle, the WVDP Hoisting and Rigging Manual was not addressed in this training. The manual was provided to the students in this training session.

**CONCERN:** (TC.4-1) (H2/C2) Lifting and handling training is inconsistent with both the WVNS Lifting and Handling Manual and Training and Communications Department Policies and Procedures.

## TC.5 MAINTENANCE PERSONNEL

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

**FINDINGS:**

- In March 1989, development of Qualification Standards was completed for mechanical maintenance personnel. The ten areas of proficiency addressed in these Qualification Standards are: gas and arc welder fabrication, lubrication, pipe fitter, millwright, machinist, fabricator, master slave manipulator repair, pump/turbine repair, hydraulics, and engine repair.

- The Qualification Program Manual for WVNS Maintenance Mechanics defines the implementation schedule of these Qualification Standards for existing maintenance mechanics. This schedule requires from 6 months to complete the Qualification Standards for Mechanic B level personnel, to 18 months for specialists and senior specialists. For new hire mechanics the completion of these Qualification Standards will be required for advancement to the next pay grade/job classification.

- A review of these Qualification Standards indicated that they are comprehensive; address the safety aspects of task performance, work permit precautions and requirements; and are adequate to verify trainee competence.

- A trailer has been set aside for mechanical maintenance personnel self-study. This trailer includes two self-study carrels with videotape capability. Vendor self-study manuals and videotapes are used to guide completion of Qualification Standards. A schedule has been established that provides at least one day per month for each mechanic to dedicate to completion of Qualification Standard requirements.

- Discussions with managers in the Maintenance Department indicated that only 3 personnel had left the Department of approximately 50 people over the last 6 years.

- Qualification Standards modeled after those developed for mechanical maintenance personnel are under development for both electricians and instrument technicians. These Qualification Standards are planned for completion by the end of 1989.

- Maintenance Supervisors have been promoted from the ranks of the crafts they supervise and thus are knowledgeable of the equipment and facilities for which they supervise the maintenance.

**CONCERN:** None.

## TC.6 CRITICALITY SAFETY

**PERFORMANCE OBJECTIVE: Personnel should receive training in nuclear criticality safety consistent with their assigned tasks.**

**FINDINGS:**

- Section 7 of the WVNS Radiological Control Manual defines criticality safety requirements, including personnel selection and training.
- The WVNS Training and Communications Department is responsible for criticality safety training. Line supervisors are responsible for preoperational training and briefings. The Radiation and Safety Manager is responsible to review the criticality safety training program content.
- The content of the classroom criticality safety training was reviewed and found to address the requirements of DOE 5480.5 for fissile material handlers. The Qualification Standards for operators were reviewed and found to address nuclear criticality safety and applicable Operational Safety Requirements.
- The only area in the WVDP where criticality alarms are installed is the Fuel Receiving and Storage (FRS) Area, which has limited key card access. Personnel who are allowed unescorted access to the FRS Area must complete a checklist which, among other things, includes items related to emergency evacuation such as listening to an audiotape recording of the criticality alarm.
- Annual evacuation exercises of the WVDP are required and conducted. No evacuation exercise to date has assumed an accidental criticality.

**CONCERN:** None.

## TC.7 TRAINING FACILITIES AND EQUIPMENT

**PERFORMANCE OBJECTIVE: The training facilities, equipment, and materials should effectively support training activities.**

FINDINGS:

- The Training and Communications Department has three classrooms, four self-study carrels, and a training resource center under its direct control. In addition, conference rooms and other WVNS facilities are also available for training use.
- The Maintenance Department has established two self-study carrels in the maintenance area to facilitate completion of Qualification Standards. These carrels are equipped with videotape players and monitors, and vendor developed videotapes for mechanical maintenance training.
- The Training Resource Center includes lesson plans and related reference materials for the training activities for which the Training and Communications Department is responsible.
- A conference room in the administrative area is available for large group presentations which exceed the capacity of training classrooms.
- WVNS has the capability to produce video training programs. This capability has been used to develop training materials for respirator training and for portions of other training programs.
- Qualification Standards have been developed for a broad spectrum of operations, maintenance, technician, quality assurance, and security personnel. These standards provide a comprehensive means to coordinate and structure training for these positions.

CONCERN: None.

## TC.8 QUALITY CONTROL INSPECTOR AND NONDESTRUCTIVE EXAMINATION TECHNICIAN

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

**FINDINGS:**

- The WVDP Laboratory Quality Assurance Program Manual, Section 3.0 provides general training and qualification requirements for analytical laboratory technicians, while ACP 3.1 "Training and Testing" provides specific training requirements and directions for training. These documents require formal qualification to use a method, based on completion of training and testing on the method. Qualification is certified by the Manager, Analytical and Process Chemistry.

- The WVNS Quality Management Manual, Sections QM 2-2 and QM 2-3 provide training and qualification requirements for inspection and test personnel, and quality assurance program auditors, respectively. These sections require formal documentation of the basis for qualification of these personnel. WVNS Quality Assurance Procedures, Sections QAP 2-1 and 2-2 establish qualification requirements of inspection and test and nondestructive examination (NDE) personnel, respectively.

- There are eight Quality Assurance (QA) Technicians with three additional positions authorized. One is a QA Technician C, two are QA Technicians B, three are QA Technicians A, and two are Senior QA Technicians. These technicians are responsible for NDE and other quality control activities, as well as QA surveillances.

- NDE Level III certification is provided through contract with a QA vendor. This Level III provides certification by examination of WVNS NDE Level II examiners. This program is based on American Society of Nondestructive Testing (ASNT) Standard SNTC-1A, 1988.

- Qualification Standards have been developed for all QA Technician positions. These Standards address QA program elements, plant systems, process control inspections, and construction inspections. These Standards, developed in 1988, have been reviewed and approved by both the Training and Communications Department and line management. Both new-hire and incumbent QA Technicians are required to complete them. The team judged these Qualification Standards to provide an adequate basis to verify trainee competence.

- The QA organization has two weld inspectors certified by the American Welding Society (AWS) and three concrete

construction inspectors certified by the American Concrete Institute.

**CONCERN:** None.

## E. AUXILIARY SYSTEMS

Auxiliary systems employed by the WVDP range in age from those originally designed and installed in the 1960s for use in fuel reprocessing to new systems designed and installed in the 1980s specifically for the WVDP. Appropriate adaptations and tie-ins were made to permit use of the older systems for the new purposes, and their performance has been satisfactory. However, with recent programmatic changes that may triple the necessary period of use of auxiliary systems from the original 6-8 year expectations, previous decisions may no longer be appropriate. Commendably, WVNS recently undertook a study of replacing much of the original utility equipment with equipment more appropriately sized to the needs of the WVDP and more likely to function effectively for the duration of the project. In addition to safety and reliability improvements, this study indicates significant resulting operating cost savings.

Liquid and gaseous effluents are adequately monitored for radioactive releases. The treatment systems and practices are effective in keeping all releases well within all requirements and guidelines, and no undesirable trends are evident.

Solid radioactive wastes are accumulating at the WVDP, and it will be several years before impediments are removed to permit ultimate disposal. Consequently, safety of interim storage of these wastes is of greater than usual concern. All solid wastes are stored out of exposure to weather, many in special tent-type structures. Recently it was found that a drum rolling cementing process for the solid wastes from low-level waste treatment operations left residual liquid in many drums, resulting in drum leakage. A replacement cementing process is under development. Meanwhile, these wastes are being interim-stored in metal drums with polyethylene liners. Concerns are expressed about the effectiveness of the procedures and loading operations to avoid getting moist waste between the liner and the metal drum as well as about updating procedures following operational changes. Also, one building is being used for temporary storage of about 50 drums of hazardous materials. Acceptable building contents, storage duration times, and procedures for building operations are not defined.

Only a small quantity of fissile material is stored by the WVDP, principally in the form of 125 spent LWR fuel elements awaiting final approval for shipment to INEL for a dry storage test. The remaining fissile material is stored in 33 drums in accordance with DOE 5480.5 except for labeling requirements.

The WVDP employs five separate ventilation systems, three of which are newly installed and two of which were part of the original reprocessing plant systems. Required and prudent safety practices are generally followed in operation of all five systems. However, concern is expressed about the training and practices employed in assuring safe laboratory hood inlet velocities. It is also of concern that removal of some highly radioactive sections of the old ventilation systems is being deferred until final decommissioning; with the recent significant extension of expected project duration, reconsideration of this type of decision is appropriate.

Vital supply systems and heat removal systems are operated and maintained effectively and no violations of requirements in DOE orders concerning such systems were detected.

## AX.1 EFFLUENT HOLDUP AND TREATMENT

**PERFORMANCE OBJECTIVE:** Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment meets DOE and EPA standards.

**FINDINGS:**

- o Three liquid effluents are routinely monitored and released from WVDP as follows:
  - About 10 million gallons per year of water are released from Lagoon 3 in several batches per year. This water has been previously treated in a Low Level Waste Treatment Facility to remove particulates and dissolved strontium and cesium isotopes and to adjust its pH. Samples are taken of all batch inputs to this lagoon and analyzed to confirm acceptability for release. Samples from Lagoon 3 itself are taken and analyzed daily during each batch release. This is the only liquid released with any potential for measurable radioactivity.
  - About 33 million gallons per year of water are released annually through the Equalization Basin. Major sources of this water are the Sewage Treatment Plant, utility systems, and unused incoming supply water. Samples of this released water are taken periodically and analyzed for several radioisotopes as well as for iron and other chemical constituents.
  - A French drain allows about 3 million gallons per year of water from rainfall and ground seepage to leave the site continuously. This effluent is sampled and analyzed three times per month.
- o Water released from Lagoon 3 is analyzed for total alpha, total beta, H-3, C-14, Sr-90, I-129, Cs-137, U-234, U-235, U-238, Pu-238, Pu-239, and Am-241. All releases in recent years have been well below the DOE Derived Concentration Guides (DCG) for drinking water. The isotope most closely approaching these guides in 1988 was Cs-137 at about 14 percent, and the total radioactivity was under 40 percent of DCG.
- o Gaseous effluents are released through five monitored stacks; these are on the main plant, the STS, the CSS, the Contact Size Reduction Facility, and the Supercompactor Facility. The first four of these stacks are equipped with redundant alpha and beta monitors (which are continuously monitored by alarms) and particulate and charcoal filters which are changed and analyzed weekly. Also, except for the CSS stack, these stacks are equipped with a desiccant-type moisture collector for measuring tritium release. The stack on the Supercompactor Facility has an alarmed constant air monitor.

- o Gaseous effluent releases from all stacks are consistently well below DOE DCG for breathing air for all of the dozen isotopes measured. The closest approach in 1988 to these guides was for Am-241 in the main plant stack gas at about 15 percent.

- * High-level neutralized liquid waste that is to be processed in the WVDP is stored in Tank 8D-2 which is a large underground carbon-steel tank. This tank is located on a drip pan in a concrete vault. The drip pan is equipped with bubbler-type liquid-level detection devices which are checked for operability monthly and are equipped with high-level alarms. ORS IRTS-3, "Maintenance of Spare HLW Storage Capacity," requires that spare tank capacity be maintained to which the high-level liquid waste could be transferred if a leak were to be detected and confirmed. Tank 8D-1 serves as this spare tank; it is of identical size and design. Tank 8D-1 contains condensate from evaporative cooling of the high-level waste as well as equipment and loaded zeolite from the STS. The usable volume in Tank 8D-1 was adequate at the time of the appraisal to hold the liquid volume of high-level waste stored in Tank 8D-2, as required by OSR-IRTS-3. (However, there is an ambiguity concerning OSR-IRTS-3 in this respect. See Concerns OP.1-1 and OP.1-2.) A similar pair of much smaller stainless steel tanks is used for storing the acidic high-level THOREX waste. Requirements in OSR-IRTS-3 were also being met during this appraisal for this waste.

- o Low-level wastes from all sources in the WVDP are collected in Lagoon 2 and processed continuously in the Low Level Waste Treatment Facility. This facility first removes suspended solids by flocculation with iron hydroxide. The resulting sludge is removed by a centrifuge and sent through a chute into metal drums with polyethylene liners that are being stored pending development of an effective new cement solidification process.

- * The team observed a single loading during this appraisal. The combination of imperfect positioning of the drum under this chute and the relatively large size of the chute opening caused some sludge to go between the metal drum and the liner and to contaminate the lip. This creates a potential for drum leakage during storage, but introduces additional low-level waste from the process of cleaning the lip.

CONCERN: (AX.1-1) (H3/C2) Inadequate equipment design and procedural control in loading drums that receive sludge from the centrifuge in the Low Level Waste Treatment Facility could compromise package integrity.

FINDINGS:

- o Following sludge removal, the clarified liquid waste is passed through an anthracite filter for particulate removal and through two ion exchange columns for final removal of strontium and cesium isotopes. The effluent is sent alternately to Lagoons 4 and 5 for monitoring prior to batch transfer to Lagoon 3 for periodic release to Frank's Creek. The anthracite filter is backwashed to Lagoon 2 when the pressure drop across it reaches the alarm level of 10 inches of water. The spent ion exchange resin is unloaded into polyethylene-lined metal drums which are sent to storage pending solidification in cement. This operation is performed several times each year.

- * Standard Operating Procedures exist for each of the effluent treatment and monitoring operations. Operators, technicians, and supervisors were knowledgeable of the systems, operations, and procedures. However, not all procedures were changed promptly either by a field change or revision when significant operating changes were made.

CONCERN: See Concern TS.7-2.

FINDINGS:

- o Operating personnel understood the activity levels at which liquid effluents must be recycled rather than released. Gaseous effluent alarm levels were also understood, as well as actions that would be required in the event of an alarm. Records are maintained of the performance of all equipment used in treating liquid and gaseous effluents.

- o Total curie content and volume of each liquid and gaseous effluent are determined and recorded. These data are included in the annual WVDP Site Environmental Monitoring Reports. Thirteen-month trend charts are prepared and reviewed for the radioactive content of each of the effluent streams. These charts have shown no significant variations in releases for any constituent in any effluent during the past year.

- o Both sets of alpha and beta monitors on each of the four stacks are checked daily and calibrated every 6 months. Records of these calibrations are maintained. These monitors are located in separate cubicles having low background readings so that they are capable of making useful readings. As indicated earlier, each of these monitors is connected to an alarm system which would give prompt warning of any significant system malfunction or abnormal release.

CONCERN: None.

## AX.2 RADIOACTIVE AND NONRADIOACTIVE SOLID HAZARDOUS WASTES

**PERFORMANCE OBJECTIVE: Radioactive and nonradioactive solid hazardous wastes should be controlled and handled to minimize the volume generated and provide for safe storage and transportation.**

FINDINGS:

- o Radioactive and nonradioactive solid wastes stored on-site include:
  - Class A radioactive waste in 55-gallon drums and 90-$ft^3$ boxes (about 4,800 drums and 1,200 boxes as of July 1989; about 20,000 drums and 5,000 boxes are expected.)
  - Class C cement waste from the CSS in square 71-gallon drums stored in the Drum Cell (about 4,100 drums in storage as of July 1989; about 15,000 drums are expected).
  - Small quantities of Class B and TRU waste.
  - Various materials (mostly metals from facility decommissioning) with container surface dose rates up to tens of R/hr. This material is stored behind heavy shielding in a separate building. Additional volume reduction of this material is planned.
  - Various mixed waste and nonradioactive hazardous material (less than 100, 50-gallon drums).
- o Procedures are in place for handling, storing, packaging, and shipping solid radioactive wastes. The adequacy of these procedures is addressed in Performance Objective TS-7.
- o WVDP personnel are trained in radioactive waste handling, storing, packaging, and shipping operations and in the regulations governing these activities. Training and regulatory compliance are discussed in Performance Objective TS-7
- * Mixed waste, nonradioactive hazardous material, and unknown materials awaiting chemical analysis are stored in the "Kerosene Building." WVDP personnel indicate that storage of nonradioactive hazardous wastes in this building will be temporary, although storage of mixed wastes will continue. Written plans defining the current and future uses of the Kerosene Building, acceptable contents, and operating procedures do not exist.

CONCERN: (AX.2-1) (H3/C2)

A well-documented utilization plan and operating procedures do not exist for the Kerosene Building.

## AX.3 STORAGE AND HANDLING OF FISSILE MATERIAL

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

FINDINGS:

- o Only a small quantity of fissile material is stored by the WVDP, all of which is designated for eventual shipment to other sites. This fissile material is stored in three areas as follows:
  - One hundred twenty five spent LWR fuel elements remain in storage canisters underwater in the fuel storage pool pending final approval for shipment to INEL for a dry storage test.
  - Thirty drums containing a total of about 775 grams of fissile material, largely Pu-239, are stored in the Ram Equipment Room (RER).
  - Three containers of dry debris from cleanup of the Chemical Process Cell were placed on a special table in the General Process Cell (GPC) in 1987. The debris in these containers includes low-enriched uranium (<5 percent U-235) with estimated U-235 equivalent contents ranging from 386 grams to 506 grams.
- o Personnel handling fissile material are trained in safe practices for handling and storing fissile material. Interviews with three employees indicated they had retained much of the knowledge gained in this training. See Performance Objective TC-7.
- * The 30 drums of fissile material in the RER are stored in accordance with requirements of DOE 5480.5, except that the labeling of drums is incomplete. These labels include the drum number, the radiation level, and the surface smear level, but give no indication of the fissile content. To obtain that information, one must use the drum number to obtain the fissile content from records on file. The three, largely inaccessible, drums in the GPC are not labeled, and it would be impractical to do so.

CONCERN: (AX.3-1) (H3/C1)

No indication of fissile content was included on labels on 30 stored drums of fissile material as required by DOE 5480.5.

FINDINGS:

- o Fissile material is stored in approved areas, and accountability control is performed periodically as required by DOE 5480.5.
- o Operational Safety Requirement GP-11, "Storage Canister Loading and Spacing," provides limiting conditions for operation to assure that stored fuel is maintained in a

subcritical configuration. These limiting conditions will apply when the remaining 125 spent fuel elements are loaded into the two fuel shipping casks for transport to INEL.

- o Operational Safety Requirement TR-GP-12 "Fissile Material Limits and Requirements for Waste Packages" provides drum limits and handling restrictions for the other two types of fissile material. The applicable Standard Operating Procedures provide adequate assurance against criticality.

CONCERN: None.

## AX.4 VENTILATION SYSTEMS

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

FINDINGS:

- The WVDP employs the following five separate ventilation systems: Main Plant, Cement Solidification System, Supernatant Treatment System, Contact Size Reduction Facility, and the Supercompactor Facility. The first two were part of the original reprocessing plant systems; the other three were added during the WVDP.

- The ventilation systems all follow the conventional practice of having air flow from clean to less clean areas. Provisions were made to permit rebalancing these systems periodically; this is vital after any significant building modification occurs. For example, the main plant ventilation system was recently rebalanced following extensive remodeling of the Analytical Chemistry Laboratory.

- Periodic inspection and preventive maintenance are performed on each of the ventilation systems. However, the main plant ventilation system and the CSS ventilation system both have sections in which radiological conditions preclude thorough visual examination.

- All of the ventilation systems contain filter banks consisting of roughing prefilters and high-efficiency particulate air (HEPA) filters.

- Operational Safety Requirement, GP-3, "Building and Vessel Ventilation System Operability," places many restrictions and requirements on HEPA filter testing and operation, which are reflected in Standard Operating Procedures. These restrictions include:

  - Instrumentation to measure and record the differential pressure across the operating final HEPA filter in all ventilation systems must be operable and shall be calibrated at least annually.

  - Alarms shall be provided to annunciate high differential pressure across each operating final HEPA filter at 75 percent of the greatest differential pressure for which that filter has been qualified in accordance with specification MIL-F-51068C. HEPA filters are required to be changed when the differential pressure reaches 8.5 inches of water (or 6.5 inches of water for the CSS filter).

  - An alarm shall be provided to annunciate low differential pressure on each final operating HEPA

that must be set within three inches of water of the operating differential pressure and shall be adjusted weekly.

- o All HEPA filters are pretested before use with dioctyl phthalate (DOP) to 99.97 percent efficiency in accordance with ANSI N510-1980. In place HEPA filters are similarly tested to 99.95 percent efficiency annually and after each filter change.

- o Spare blowers are in place for each ventilation system, and each is arranged to come on line automatically in the event of a failure of the on-line blower.

- o In the event of a power failure, continuity of ventilation system operation is assured by a combination of emergency diesel generators and steam-driven blowers. See Performance Objective AX.5

- o Operational Safety Requirement GP-3 permits continued operation for up to 10 days while a faulty spare blower or filter system is repaired. In the case of the main plant ventilation system, operation beyond 10 days is allowed if repairs require more than 10 days and the Radiation and Safety Committee has approved a plan for expedient repair or replacement of the failed unit.

- * Training, procedures and physical devices to assure safe laboratory hood opening velocities were not in evidence at the time of this appraisal. None of six laboratory technicians interviewed was aware of the requirements, procedures or mechanisms to assure adequate hood velocities. Some were under erroneous impressions, such as that requirements existed only when working with radioactive materials in the hood.

- * The general topic of safe hood velocities was incl-uded in the training qualification standard for all of the levels of laboratory technician. Adequate training, was not given to laboratory technicians on this topic.

CONCERN: See Concern PP.2-1.

FINDINGS:

- * Many sections of the main plant ventilation system are still highly radioactive from prior reprocessing activities. An example is the vent washer system which, though no longer used, requires the use of 1/4-inch lead shielding on some Analytical Chemistry Laboratory floors and walls to meet ALARA program goals.

- * When the project duration was envisioned to be six to eight years, many decisions were made about the desirable extent of early decontamination and decommissioning. Recent events have significantly extended the probable project duration and the accompanying time of exposure to

remaining hazards. However, many of these earlier decisions have not been reconsidered.

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

Decisions to retain radioactive components of existing ventilation systems have not been reevaluated in light of the recent significant increase in probable project duration.

## AX.5 VITAL SUPPLY SYSTEMS

**PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services needed by the facility.**

FINDINGS:

- Continued supply of vital services to the WVDP is provided by a combination of installations. Electric power supply is made more reliable by connections at all times to two separate commercial supply systems. In the event of a power failure, an on-site emergency diesel generator automatically comes on-line to provide power to selected vital loads. The plant water system is completely contained within the WVDP from its source to its disposal. Continued supply of cooling water is provided by installed spare pumps that automatically come on-line when needed.

- Standard Operating Procedures are in place and are used for operating these systems. These procedures cover emergency actions in the event of an outage. Operators are trained in the use of these procedures.

- Adequate monitoring systems are in place and periodically tested to provide operators with an immediate warning of a system shutdown.

- A preventive maintenance program is employed to increase the reliability of transformers, pumps, blowers, monitoring devices, and other equipment related to vital services. See Performance Objective MA.4.

- Corrosion coupons and ultrasonic testing are used to infer the extent of deterioration of some of the inaccessible areas of equipment, tanks, and piping used in the WVDP.

- Most backup supply systems come on-line automatically when primary sources fail. However, operators are trained in remedial measures should the automatic restart devices fail.

- The main plant emergency diesel generator and the STS emergency power generator are tested quarterly to determine their automatic start capability and performance for at least one hour under their usual operating loads. These tests meet the requirements of IEEE 308-1980, Section 7, and are required by Operational Safety Requirement TR-GP-5 as are those covered by the next four findings.

- Inspections of the emergency generators, fuel supplies, and proper alignment of switches and valves required for standby operation are made daily and the results are recorded.

- The spare boiler feed pumps, boiler draft fans, and plant water pumps are operated at least quarterly to determine performance for at least one hour under an operating load.

- The auxiliary head-end vent blower and the main plant spare exhaust blower are operated quarterly to determine their automatic start capability and their performance for at least one hour under an operating load.

- The STS emergency power generator is operated quarterly for 30 minutes without electrical load and for 1 hour with electrical load.

- Many of the utility systems providing steam, compressed air, cooling water, and emergency power are aging and sized for an entirely different use than that needed by the WVDP. In view of the recent significant increase in probable project duration, a study was undertaken by WVNS of complete replacement of current utility equipment. This study is comprehensive and deserves serious consideration.

**CONCERN:** None.

## AX.6 HEAT REMOVAL

PERFORMANCE OBJECTIVE: The heat removal system should reliably remove heat as required from the reactor or process.

FINDINGS:

- o A single cooling water system is employed for all heat removal at WVDP. This system was originally installed in the 1960s for use in the reprocessing operations at West Valley and has a far larger capacity than is needed for WVDP operations. A spare steam driven pump is in place to provide for continued operation of this system in the event of failure of the usual electrically driven pump. Also, a smaller electrically driven pump is in place and connected to the emergency power load which provides adequate cooling during power outages. Both spare pumps come on line automatically when needed.

- o Standard Operating Procedure 32-6, "Cooling Water System," gives detailed instructions for operating this system, and operators are trained in its use.

- o An alarmed radiation detection system continuously monitors the cooling water. This detection system is recalibrated every 6 months.

- o Effluent releases from the cooling water system are described more fully under Performance Objective AX.8.

CONCERN: None.

## AX.7 ENGINEERED SAFETY SYSTEMS

**PERFORMANCE OBJECTIVE: Engineered safety systems should be reliable and available to provide protection to the facility when needed.**

FINDINGS:

- o Where applicable, engineered safety systems are employed by the WVDP to help assure safe operation of equipment. However, the need for such systems in the WVDP is limited.

- o Limit switches, mechanical stops, and engineered grapple hook lengths are employed on the fuel handling cranes at the fuel receiving and storage basin to assure retention of adequate shielding when fuel storage canisters are moved and to avoid other unsafe or undesired motion of these cranes.

- o The main plant ventilation system is included in the emergency power load to assure that personnel are protected from contamination seepage from cells and other contaminated spaces even in the event of a power outage. Similar protection is provided by the STS emergency power generator for that facility and by a diesel powered blower in the CSS facility. These systems are discussed in greater detail under Performance Objective AX.5.

CONCERN: None.

## AX.8 COOLANT CLEANUP SYSTEMS

PERFORMANCE OBJECTIVE: Recirculating coolants should be cleaned continuously or intermittently to minimize the buildup of contamination and reduce corrosion.

FINDINGS:

- o WVDP has a single recirculating cooling water system in which cooling is provided by evaporation in a cooling tower. The system was designed to dissipate far more heat than is currently necessary or than is likely to be necessary during the remainder of the project. Particulate matter is continuously removed by an in-line filter on a side stream of the recirculating cooling water. The filter is automatically back-flushed to the interceptor upon reaching a preset pressure drop. Standard Operating Procedure 32-6 "Cooling Water System" gives detailed instructions for operating this system.

- o An alarmed radiation detection system monitors the cooling water. This detection system is recalibrated every 6 months. Historically, no radioactivity has been detected in this system.

- o Sodium silicate is added to the cooling water daily to inhibit corrosion, and its effectiveness is measured by corrosion coupons placed in various parts of the system which are periodically analyzed. This additive has only been in use for about two years, replacing the sodium hexametaphosphate additive used for the preceding 10 years. The sodium silicate improves corrosion resistance, based on results of corrosion coupon analysis. It was necessary recently to replace the main plant cooling water header due to excessive corrosion, probably caused primarily by use of the less effective earlier corrosion inhibitor and about 12 years of even earlier operation with no inhibitor at all.

- o Bromine is added daily to control algae growth.

- o Cooling water is analyzed daily to assure proper pH corrosion inhibitor concentration, bromine residual, and conductivity.

- o No backup cooling water cleanup system exists. Until recently, the cooling water was not filtered at all and it only had to be replaced annually. To date, filter downtimes have been limited to a few hours.

- o Technical Requirement GP-8 requires that in-line alarms be set to correspond to a concentration of 10 pCi/mL. This requirement is being met and assured by recalibration of the instrumentation every 6 months.

- o The in-line cooling water radiation alarms are tested every 30 days as required by Technical Requirement GP-8,

and records of this testing are maintained by Radiation and Safety Department personnel who perform the tests.

**CONCERN:** None.

## F. EMERGENCY READINESS

Emergency readiness at the West Valley Demonstration Project (WVDP) was evaluated against DOE orders and industry practices. The evaluation is based on: The Emergency Plan and Implementing Procedures, SARs, supporting procedures of other WVDP departments, scenarios and critiques from past drills, training plans and records, interviews with WVDP personnel, and review of plant facilities.

Those credible accidents that have been identified for the WVDP are all radiological in nature, and would not result in consequences that would require protective actions off-site. Accordingly, the emergency preparedness program focuses on on-site corrective and protective measures and notifications of off-site interested parties. Possible off-site consequences of criticality and chemical releases have not been evaluated for emergency planning purposes. On-site plans for coping with these events are also incomplete.

An Emergency Plan and Implementing Procedures are in place. The emergency operations center appears to be adequate. Call lists assure that staff with appropriate knowledge of the operations and resources are available. Numerous opportunities for training and participation in drills are provided to both on-site and off-site emergency responders. However, numerous minor deficiencies in various aspects of emergency preparedness indicated a lack of overview and discipline; for example, emergency cabinets had out of date respiratory protection equipment, environmental air sampling procedures were lacking, personnel were placed on the emergency call list without verification that they were adequately trained, and many program deficiencies, discovered by a 1987 Westinghouse appraisal, remained uncorrected.

Circumstances during the current appraisal forced the canceling of the planned emergency preparedness exercise. This prevented first hand observation of site evacuation and accountability, fire brigade response, cooperation with the West Valley Volunteer Fire Department, activation of the Emergency Operations Center and conduct of a drill critique. Review of the program indicates that these areas have received considerable emphasis and past deficiencies have been few.

## ER.1 ORGANIZATION AND ADMINISTRATION

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

FINDINGS:

- The West Valley Demonstration Project Emergency Plan and Procedures Manual, WVDP-022, Rev. 2, dated April 1988 defines the emergency organization structure and includes interfaces with the DOE, New York State Emergency Management Organization, the County Response Organizations, and the WVDP On-Site Emergency Organization.

- Because circumstances prevented conduct of an emergency drill or exercise during the TSA, the issue of management's ability to retain command and control of the facility during all phases of an accident was not definitively evaluated. However, based on the records and critiques from past drills and exercises few difficulties in this area have been identified.

- Resources for emergency preparedness are addressed in Performance Objective ER.4.

- The Plan contains implementing procedure G-26, "Strict Order of Call/Staff Augmentation." It is normally updated quarterly. Revision 6 was dated June 1989. It defines both primary responders and alternates for all positions except for assembly area coordinator. The responsibilities of those in critical positions are defined in implementing procedures, and checklists are provided for use during various types of emergencies.

- Based on interviews, training records, and drill critiques it appears that personnel with critical emergency assignments have an adequate understanding of their roles during emergencies, although not all have received training and some are not on the distribution of the Emergency Plan. The Shift Supervisor interviewed was well aware of his duties as on-scene commander and of the resources he had available for emergency use.

- Personnel for various technical support functions such as drafting (for access to plant drawings), radiological control, dose assessment, etc. are designated on the call list along with alternates.

- Procedure G-25 requires a major exercise annually, radiological drills semiannually, environmental monitoring drills annually, medical drills involving a simulated contaminated individual (with off-site participation) annually, fire drills on each shift annually, and communications tests monthly. Each exercise and drill is followed by a critique session and

written critiques were available for past major exercises and some drills. It appeared that they were an effective tool for identifying areas for improvement. Responsibilities are assigned for making corrections and corrective actions are tracked on the "open items" list, a monthly report to managers.

* The responsibilities of the Emergency Planning and Preparedness Coordinator (EPPC) are defined in various implementing procedures within the emergency plan, especially G-24, "Emergency Preparedness Training" and G-25, "Emergency Preparedness Emergency Exercises, Drills, Tests, and Evaluations." Chapter 1, Section 13 requires annual review and approval of the Emergency Plan. However, no record of this review was available and the plan was in need of revisions as noted in ER.2.

* Radiation and Safety Radiological Procedures Log, RC-ADM-9, Rev. 1 dated April 11, 1989 calls for review of the Emergency Plan every three years. Review of the Emergency Plan was scheduled for January 1989 in this document.

**CONCERN:** (ER.1-1) (H2/C2)

The Emergency Plan and Implementing Procedures has not been reviewed and revised as required by WVNS.

## ER.2 FACILITY EMERGENCY PLAN

**PERFORMANCE OBJECTIVE: The Emergency Plan and its supporting documents should provide for effective response to abnormal conditions.**

FINDINGS:

- o The Emergency Plan and Implementing Procedures was approved by WVNS and issued through a controlled system with copies issued to two County emergency management organizations, two local volunteer fire companies involved with the plant, two NRC offices, NYSERDA, and DOE as well copies to plant staff on-site.

- o The Plan incorporates the definition for Unusual Event, Alert and Site Emergency that are compatible with, or directly from DOE 5500.2, February 26, 1987. The Plan also contains an addendum which contains an "Emergency Classification Table" giving emergency classifications as a function of OSR values. The classification of General Emergency has been omitted from the current Plan since the Plan indicates it is not a credible event for the site.

- * Credible accidents which are addressed by the Emergency Plan are defined in letter HE:88:0036 from D. R. Steffes (approved by C. J. Roberts) to R. A. Gonzalez, dated February 18, 1988. It presents abbreviated summaries of credible accidents in the Vitrification and Sludge Mobilization Systems, the STS, the LWTS, and the CSS. These credible accidents appear to be taken directly from SARs with the exception of the description of the evaporator portion of the CSS where the letter indicates a greater potential for accidental criticality than indicated in the SAR.

- * The above letter dismisses the potential far off-site releases of chemicals with the statement, "On-site storage of acids and caustics present the possibility of generation of chemical vapors which could move off site. However, small inventories and separated storage makes this type of accident unlikely." This conclusion is incorrect in that a January 1988 NRC monitoring team, reported (in March of 1988) that, "Three large storage tanks containing incompatible chemicals were located in two large diked areas.... there was a common drain from one diked area into the waste water receptor ditch." Also, the presence of up to 600 pounds of chlorine was not addressed in the letter.

- * Chemical contamination has received greater emphasis since the letter and Plan were issued. The critique of an October 1988 exercise identified the need to be able to monitor chemical concentrations off-site and it assigned responsibilities to do this, however, this has not yet been done.

* A patch kit for damaged chlorine cylinders was procured about 2 years ago. However, there is no appropriate protective clothing for chlorine exposure and no portable chlorine monitoring equipment is available. See Performance Objective ER.6.

* In the absence of defined chemical accidents it is not possible to determine that the assembly point, the Bulk Storage Warehouse, would be habitable under all conditions requiring site evacuation.

CONCERN: (ER.2-1) (H2/C2) Credible accidents involving chemicals have not been defined and appropriate emergency response planned.

FINDINGS:

* In accordance with the guidance of the letter mentioned above, the Emergency Plan identifies six credible radiological emergencies and gives the radiation dose to the maximally exposed off-site individual for each. The Plan states that radiological emergencies at WVDP may include inadvertent nuclear criticality, but it does not include specific plans or projected off-site doses for such an event.

* Commercial reactor fuel is stored on site and the fuel storage facility is equipped with nuclear accident dosimeters (NADs) and criticality alarms.

* In general, the WVNS program treats criticality as credible with respect to preventative measures, and alternately credible and incredible with respect to emergency response measures. For example:

  - Criticality safety is addressed in the Radiation Control Manual and emergency procedures (prompt evacuation) and reentry are discussed.

  - Training in criticality safety emphasizes preventative measures but also includes emergency evacuation training.

  - Evacuation routes have not been marked and practice evacuations are not held.

  - Off-site effects and response measures are not addressed in any of the documentation reviewed.

  - There are deficiencies in personnel nuclear accident dosimetry and no procedures to quickly identify those involved in a criticality are available. See Performance Objective RP.5.

* See Performance Objective TS.9.

CONCERN: (ER.2-2) (H2/C2)

Statements in the Emergency Plan regarding the credibility of accidental criticality are inconsistent. Planning for nuclear criticality accidents is incomplete.

FINDINGS:

* An independent review of emergency preparedness in the form of a Westinghouse technical safety appraisal in November 1987 identified the discrepancy noted above in criticality planning in Rev. 1 of the Plan; however, Rev. 2 did not correct it.

CONCERN:

See Concern OA.2-1.

FINDINGS:

* DOE 5500.3 (August 31, 1988) indicates that emergency planning zones are "site specific and developed by the field offices with the Assistant Secretary, Environmental Protection, Safety, and Emergency Preparedness, EP-1, concurrence." A September 24, 1987 letter from W. W. Bixby to J. L. Knabenschuh approves the Emergency Plan dated September 18, 1987.

  An inconsistency in that Emergency Plan was pointed out in the March 14, 1988, NRC Site Monitoring Report (letter Bellamy to Hurt). The inconsistency was that the Plan indicated that events requiring public relocation are not credible but notification procedures included provisions to shelter or evacuate the public out to 10 miles. In response to this, the Plan was revised, deleting the emergency planning zones and the definition of General Emergency. Revision 2 was issued April 1988, "For Interim Use Pending DOE/ID Approval." A May 26, 1988, letter from D. J. Harward to W. W. Bixby requested approval of the Plan and indicated that there had been oral agreement for interim use. A June 1, 1988, letter from W. W. Bixby to the director of the ID Operational Safety Division requested "comments/approvals" by June 28, 1988. No response has been received, and there is no evidence of further inquiry. The item is tracked on the Commitment Status Report.

* An April 29, 1988, DOE appraisal recommended that "site specific emergency plans [should be submitted] to DOE/ID for approval," and cited DOE/ID 5500.2 as the basis.

CONCERN: (ER.2-3) (H3/C1)

DOE/ID has not fulfilled its responsibility in defining site specific emergency planning zones as required by DOE 5500.3.

FINDINGS:

o A "Strict Order of Call" procedure specifies plant staff to be called for emergencies.

* The Emergency Plan contains copies of agreements with Bertrand Chaffee Hospital and the West Valley Volunteer Fire Department dated December 4, 1987 and April 21,

1982, respectively. A Memorandum of Understanding, dated April 14, 1989, on hospital and ambulance services which was signed by these entities and plant officials was on file, but was not yet included in the Plan.

* The Emergency Plan calls for annual reviews of the Plan and updates as needed. This was done (using INPO criteria) prior to issue of Rev. 2 in April 1988. It has not been done since then.

* The critique of an emergency exercise in October 1988 recommended numerous revisions in implementing procedures. None of these were issued at the time of this appraisal although at least one had been drafted and call lists had been updated since that time.

* The Emergency Plan provides site evacuation procedures and addresses personnel accountability but does not address the possible need to evacuate the Emergency Operations Center (EOC). During the appraisal, the statements were made that provisions had been made for an alternate EOC at the Little Valley Joint Technical Information Center Facility and at the Bulk Storage Warehouse. (There is no evidence that the entire emergency cadre is aware of these provisions.)

* DOE 5500.3 requires, "Resources and expertise...for rapid assessment of radiological hazards including a unified dose assessment capability."

* Appendix B of the Plan, "Maximum Individual Dose Commitment Calculation Guide (To Be Updated), Rev. 2, April 1988" is a 4-page procedure for hand calculation of dose to off-site personnel. In discussions with the personnel responsible for radiation dose assessment they did not refer to the existence of this procedure but indicated that a variety of computer codes are available for chemical and radiological atmospheric dispersion modeling and dose assessment. The application of these codes to emergency situations has not been proceduralized.

CONCERN: See Concern ER.1-1.

FINDINGS:

* None of the implementing procedures in the Emergency Plan address off-site sampling or monitoring during emergencies. Four Environmental Monitoring Procedures deal with emergency power to the environmental monitoring lab, rapid response gamma radiation survey, vegetation sampling, and soil sampling. They are dated 1984 and 1986. Procedures are not available for rapid response air sampling (either radiological or chemical) although there is equipment available for radiological air sampling. Personnel from the environmental laboratory were reportedly trained to do this sampling but it is not

included in their qualification standard. The emergency response organization was not aware of this deficiency.

CONCERN: (ER.2-4) (H3/C2) Radiological air sampling and dose assessment methods for emergency use are not covered in current procedures.

## ER.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:

- o Emergency response training is accomplished by formal classroom training, self study guides, and table-top and in-plant drills and exercises.

- o Plant operators and supervisors must pass a written test and oral board examination. Emergency procedures are included. Supervisory oral examinations emphasize priorities during multiple and compounded emergency conditions.

- o Written critiques for past major exercises and some drills indicated that they were effective tools for identifying areas for improvement. Responsibilities are assigned for making corrections and corrective actions are tracked on an "open items" monthly report to managers. The speed at which corrective actions were made was sometimes disappointing in that there are a large number of open items from both the 1987 Westinghouse Technical Safety Appraisal and the 1988 site evacuation exercise. See Performance Objective ER.2.

- o Drills, especially those involving personnel injury, personnel contamination incidents, and fires have been realistic. They have included the use of wound simulation kits, use of thorium welding rod to simulate radioactive contamination and actual vehicle fires (on a junk vehicle). Simulation is permitted only when actually performing an action would result in excessive risk to personnel or equipment.

- o Procedure G-25 requires a major exercise annually, radiological drills semiannually, environmental monitoring drills annually, medical drills involving a simulated contaminated individual (with off-site participation) annually, fire drills on each shift annually, and communications tests monthly. Each of these is followed by a critique session (except communications tests). Although there is frequent training, no checks are made to assure that drills are conducted as specified.

- * In 1988 there were two drills and one exercise. However, none involved a simulated contaminated individual with off-site participation.

- * Records of training content and participation are maintained. However, there is no verification to assure that people have been trained before they are placed on the emergency call list. A review of persons on the

emergency call list showed that most had received training on the emergency plan and had participated in one or two table top drills in the first portion of 1989. Only the positions of Operational Support Manager and the recently established positions of secretary and fax operator were staffed by persons who had not participated in any of the table top drills this year.

* Approximately 25 persons with primary or alternate emergency response duties (according to the strict order of call list) are not on the controlled distribution list for the Emergency Preparedness Plan and Procedures. Presumably they have copies available in their work area, but this has not been confirmed by the contractor.

CONCERN: (ER.3-1) (H2/C2) There is no assurance that personnel have adequate emergency response training and current information before they are assigned emergency response duties.

## ER.4 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

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

FINDINGS:

- o A dedicated EOC is available and equipped with radio and telephone communications capability, fax machines, dose assessment computers (linked to the environmental laboratory computers where calculations are normally done), status boards, procedures, and check sheets.

- o An adjacent library served as the technical support center. It contained copies of SARs, drawings, etc.

- o There are numerous cabinets containing emergency equipment on site. Most had break-away locks.

- o A personnel decontamination facility is maintained in the Bulk Storage Warehouse that serves as the assembly area in the event of a site evacuation.

- o Two or more self contained breathing apparatus are stored at several locations on-site. They are inspected monthly and repaired and filled as necessary by a trained technician. Bottled compressed air is used to refill cylinders as needed.

- o Emergency cabinets in the area of the environmental laboratories contained various supplies including instruments with current calibration stickers. No list of the cabinet contents was available in the cabinet. However, the Safety and Environmental Assessment Department had a master inventory list that designated 80 different types of supplies and equipment for emergency use. The use of most of these is covered in procedures other than the emergency procedures for environmental monitoring.

- * A van has been procured to transport emergency equipment on site. It contains fire extinguishers, first aid supplies, chemical spill response equipment, and other items. There is not yet an inventory list for the equipment in the van.

- * The environmental monitoring group has procedures for rapid responses gamma monitoring, soil sampling and vegetation sampling during emergencies. There is also emergency power supply for the Environmental Laboratory. No procedure for emergency air sampling was available. See Performance Objective ER.1.

- * The emergency plan assigns responsibility for maintenance of the emergency cabinets to the operations group. The shift supervisor was not aware that this was operations responsibility and had not been doing it. Masks in one

kit were dated 1984. All kits were inspected, outdated items replaced, and the monthly check added to the operation's routines during the appraisal.

* Equipment was not available for assessment of most chemical releases off-site. pH and conductivity meters could be used for waterborne releases but no equipment was available to monitor most other chemicals, for example, a chlorine release.

* A single individual, The Emergency Planning and Preparedness Coordinator, is responsible for preparing updates of the Emergency Plan and Implementing Procedures for management approval, preparation for drills and exercises, documentation of critiques, preparation of emergency readiness training materials and the conduct of much of the emergency readiness training for the emergency cadre and off-site groups. In addition, this same individual is an active participant in the Training Resource and Data Exchange (TRADE), Steering Committee for emergency preparedness.

* Responsibility to evaluate emergency preparedness functions performed by other WVDP Components (except for drill performance) has not been assigned to the Emergency Planning and Preparedness Coordinator.

**CONCERN:** See Concern OA.1-2.

**CONCERN:** (ER.4.1) (H2/C2) Deficiencies in the emergency preparedness program are not being identified and corrected.

## ER.5 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:

- o The Emergency Plan classifies emergency events in accordance with current DOE guidance with the exception that the General Emergency classification is omitted based on the fact that accidents resulting in a general emergency have not been identified. Emergency action levels as a function of OSR limits are defined in an appendix to the Emergency Plan.

- o The Emergency Plan identifies some credible accidents and the maximally expected occupational radiation dose. In addition, all the SARs are located in the technical library adjacent to the Emergency Operations Center.

- o The emergency cadre includes support staff who are expected to have current knowledge of the inventory of chemicals and radionuclides in various plant systems.

- o The environmental group had curie to radiation dose conversion tables available to convert air sample results to radiation dose. These were site specific values developed for safety evaluations.

- o There are provisions for written logs of emergency events. In addition, a closed circuit television has recently been installed in the EOC to allow the technical support staff to view the status boards. Consideration is being given to adding a VCR recorder to the system to create an additional record of emergency information.

- o A conference call system, with the calls placed by the commercial operator, is used to disseminate information to the state, off-site DOE, NRC, and other off-site agencies.

- * The Emergency Plan contains data on the stack monitors and radiation detection instrumentation in the plant, including the measurement range and normal readings. For the STS the description in the current plan does not accurately represent the instrumentation. This deficiency had not been detected by the WVNS self evaluation or document review systems.

CONCERN: See Concerns ER.4-1 and TS.3-1.

## ER.6 PERSONNEL PROTECTION

PERFORMANCE OBJECTIVE: Personnel protection procedures should control and minimize personnel exposure to hazards during abnormalities, ensure that exposures are accurately determined and recorded, and ensure proper medical support.

FINDINGS:

- The Emergency Plan indicates that it may be necessary to exceed routine exposure limits (5 rem/year or 3 rem/quarter) to save lives or valuable property. It also indicates that such exposure may be taken only by volunteers who are briefed on the extent of such risks by the Emergency Director or his delegate. This statement is followed by more specific guidance.

- The Emergency Plan and implementing documentation clearly indicates that radiological contamination is not to impede emergency egress or medical treatment of an injured worker. Provisions are made for the control, survey, and decontamination (using nonemergency guidance) of workers in the assembly area. There are also provisions for contamination control and decontamination at the hospital of an injured worker.

- An agreement with the West Valley Volunteer Fire Department and Bertrand Chaffee Hospital provide for the transportation and treatment of an injured contaminated person. The hospital staff has received 16 hours of training from the plant emergency planning staff this year. Training has also been given to the volunteer fire department personnel annually.

- First aid available on-site on all shifts includes care by first aid and CPR trained workers and New York State Licensed Emergency Medical Technicians. A nurse also serves on day shift, Monday through Friday. A defibrillator has been procured and personnel trained and certified in its use.

- A computerized system can be used to provide a listing of personnel on-site at any time, based on electronically read badges. In the case of a site evacuation, exiting personnel deposit their badges in a box as they exit. Security inspectors remain on-site and run the badges through the reader, producing a print out for accountability purposes about 20 minutes after the initial evacuation alarm.

- The accountability feature of the computer is tested daily on a low occupancy shift and everyone on the list is accounted for. If someone has neglected to log out, an investigation is done and the accountability system reset to the actual occupancy.

- o Self-contained breathing apparatus are available in numerous locations on site and from the volunteer fire department. Filter respirators are stored in the emergency cabinets even though they are not an approved device for use in an unknown atmosphere. Some dual purpose respirators are available, but are not designated for emergency use.

- * Some deficiencies in the emergency egress provisions of the facility have been noted. See Performance Objective FP.1.

CONCERN: See Concern FP.1-1.

FINDINGS:

- * Evacuation routes are not marked for emergency exit in case of an accidental criticality.

CONCERN: See Concern ER.2-2.

FINDINGS:

- * A chlorine cylinder repair kit is available, however, there is no suitable protective clothing for its use. Personnel were trained but have not been retrained.

CONCERN: (ER.6-1) (H1/C2) Use of the chlorine cylinder repair kit without additional training and appropriate protective clothing could lead to personnel injury.

FINDINGS:

- * According to the SAR, western New York averages one tornado per year. The design basis tornado involves winds up to 160 mph (relatively low by tornado standards). The most severe tornado on record for the area occurred in Jamestown, New York, less than 50 miles from the site in 1945, causing about $5 million in damages.

- * Most of the office staff is housed in trailer-type construction that does not appear suitable for occupancy during tornado conditions.

- * Although the emergency plan covers a "natural events" category of events, there is no site specific guidance for tornados indicating, for example which structures are suitable for occupancy and what precautions should be taken in case of tornado sightings.

- * The emergency planning staff has recognized the need for more specific tornado planning.

CONCERN: (ER.6-2) (H1/C2) Planning and preparation for a tornado does not provide specific guidance for the protection of personnel.

## G. TECHNICAL SUPPORT

Technical support for operations at WVDP comes primarily from departments within Plant Services and Radiological and Environmental Safety. Discussions with operations managers and supervisors verified that technical support is generally effective for safe operations of the facility. Construction projects and facility modifications are executed using sound engineering practices with review of safety related concerns. Plant Engineering, however, does not procedurally review all work orders. Also, the R&S Department does not have formal internal procedures to ensure that safety issues have been resolved prior to approval of procedures and engineering documents. The analytical laboratories contribute on a timely basis to support efficient and safe operations and to assure product quality.

Staffing and resources for technical support are judged to be adequate, although difficulty has been experienced in hiring qualified and experienced specialists in some safety disciplines. Qualified specialists have examined extensive test data for trends and analyzed the data to improve equipment performance and product quality.

Shift engineers help to resolve operational and safety-related issues as well as assist in ensuring compliance with DOE Orders and OSRs. Safety related limits and cautions are generally referenced and highlighted in procedures. Procedures are reviewed annually, but unless a procedure is revised, documentation of current and correct status is required only every five years. The release of radioactive effluents from the facility has been reduced in recent years due to continuing efforts.

WVDP has a defined and documented nuclear criticality safety program. However, the program lacks a specialist to focus attention on criticality safety issues and good practices. Although the risk of a criticality accident at this facility may be small, sufficient fissile material remains on site to require a fully implemented nuclear criticality safety program.

In recent years there have been off-site shipments of hazardous materials from the WVDP, principally spent nuclear fuel returned to utilities, hazardous chemical wastes sent to disposal facilities, and samples sent for laboratory analysis. These shipments were performed properly without packaging or transportation incidents. Some of the procedures for on-site waste packaging and transportation are incomplete or outdated. Some deviations from the approved procedures for waste compacting and packaging were observed.

## TS.1 FACILITY MODIFICATIONS

**PERFORMANCE OBJECTIVE:** Technical support services required by the facility to execute modifications should be carried out in accordance with sound engineering principles.

**FINDINGS:**

- o A review of two project files for the Integrated Radwaste Treatment System (IRTS) verified that modifications are executed addressing sound engineering practices including codes and standards mandated by DOE 5480.4.
- o Projects for facility modifications are carried out by the Plant Engineering Department in accordance with WVNS Engineering Procedures (EPs) EP-1-001 through EP-17-001.
- o A Cognizant Engineer coordinates the participation of appropriate technical specialties from project definition and planning to final completion and acceptance.
- o The cognizant manager with overall modification responsibilities assures review of appropriate specialties beyond those required by EPs.
- o WVNS policy to assure that facility designs and design changes receive formal, technical, interdisciplinary review, and approval is documented in WV-906, Safety Review Program, EP-3-003 'PR', EP-3-007 'ECN'.
- o Technical Manuals are prepared for the installation, operation, and maintenance of each engineered system.
- o Modifications are reviewed for completeness prior to final acceptance in accordance with EP-3-011, "Review, Approval, and Engineering Release." As-built drawings, technical manuals, and procedures are required prior to engineering release. Where required, the SAR or its updates must also be approved prior to final acceptance.
- o A specific requirement that Plant Engineering review all work orders does not exist. Requirements for approval by Maintenance, Operations, and R&S are believed by WVNS to be adequate to assure that engineering review is requested when necessary.

**CONCERN:** None.

## TS.2 ORGANIZATION AND ADMINISTRATION

**PERFORMANCE OBJECTIVE: Technical support organization and administration should ensure effective implementation and control of technical support.**

FINDINGS:

- Technical support for operations at WVDP is provided by Radiological and Environmental Safety and Plant Services. The lines of responsibility for technical support groups within those organizations are described in organizational charts.

- Responsibilities and authorities are clearly defined in organizational charters. Managers and supervisory personnel interviewed were knowledgeable about their roles to support plant operations.

- Plant Engineering provides engineering support to operations for the Integrated Radwaste Treatment System (IRTS). It also provides engineering services for operation of the main plant as well as engineering support for site-wide modifications.

- The Radiation and Safety Department is responsible for radiological protection, industrial safety, industrial hygiene, fire protection, and emergency preparedness.

- An Environmental Laboratory, within the Safety and Environmental Assessment Department, conducts on-site and off-site sampling, monitoring, and analysis of effluents.

- The Analytical and Process Chemistry Laboratory carries out routine analyses for process control, product development, product quality assurance, and waste classification.

- Interviews with technical support managers indicate that staffing and resources are adequate to effectively support operations. For some safety disciplines, i.e., fire protection, criticality safety, and industrial hygiene, difficulties have been encountered in hiring qualified and experienced individuals. See Concern OA.1-1.

- Annual performance appraisals are required for technical support personnel. These appraisals, which are related to job responsibilities and requirements, are intended to enhance individual performance.

- The WVNS QA organizations pursue an active independent review schedule of audits (QM-18, QAP 18), surveillances (QAP 10-3), construction inspections (QAP 10-4), and procurements (QAP 4, 7, 10, and 15).

- The QA audit and surveillance programs provide broad, formalized coverage of plant implementation of quality

program requirements. These reviews result in Request for Corrective Actions, Nonconformance Reports, and Critiques.

- o QA involvement in purchase requisitions was evaluated using purchase order number 19-31269 that provided for procurement of high-level waste canisters from two vendors. Complete QA involvement was evident including development of specifications, preaward QA/QC surveys of finalists, hold point, preshipment and receipt inspections, and vendor process qualification.

**CONCERN:** None.

## TS.3 PROCEDURES AND DOCUMENTS

**PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, and should be effectively used to support safe operation of the facility.**

FINDINGS:

- o Engineering Release (ER) require that the SAR be complete and current for operations systems (EP-3-011). Operational Safety Requirements (OSRs) for the Integrated Radwaste Treatment System (IRTS) were current.

- o Example procedures reviewed for the Analytical Laboratory, criticality safety, and Engineering contain adequate information for users to understand and perform effectively.

- o The cognizant manager authorizes and approves the preparation of procedures. Engineering procedures are issued, controlled, distributed, and filed by Engineering Document Control (EP-6-001).

- o Document control for operating procedures requires that a signed document control transmittal form be returned. A review of records showed that a few of these forms have not been returned for more than three months.

- o Procedures are reviewed annually by the department manager to ensure that they are up to date. But unless a procedure is changed, documentation of current and correct status is required only every five years.

- o Field Changes (FCs) are issued for minor changes to procedures when it is determined that safety related issue's are not affected by the revision. Status reports on SOPs showed only a few with three or more field changes without revision. The SOP for fuel loading into shipping casks has 21 field changes, but no fuel has been loaded for more than three years. Prior to additional fuel loading the SOP is scheduled for complete revision.

- o The Engineering Change Notice (ECN) is used to change a facility or system design or design document. ECNs reviewed for the IRTS were found to be reviewed and approved by Operations, R&S, and Maintenance.

- * The R&S Manager and the QA Manager sign off on all new SOPs, SOP revisions, FCs, and ECNs where required. However, the R&S Department does not have a formal documented procedure to ensure that all safety issues have been reviewed prior to approval.

- * The safety of work practices at WVDP is strongly based on the Industrial Work Permit (IWP) system. A review of work packages during this appraisal, however, provided evidence that adequate safety review by all safety

disciplines was not uniformly implemented in IWP practices. See Concern PP.7-1.

* A review of design packages during this appraisal verified that engineering projects do not always require safety review by fire protection personnel.

CONCERN: (TS.3-1) (H2/C2) The Radiation and Safety Department does not have internal procedures and documentation to ensure that all safety-related disciplines provide input to resolve safety issues at WVDP.

## TS.4 EQUIPMENT PERFORMANCE TESTING AND MONITORING

**PERFORMANCE OBJECTIVE: Equipment performance testing and monitoring conducted by technical support groups to assure operations are within safety parameters and limits should be effective.**

FINDINGS:

- o Performance data are routinely monitored during test and production campaigns and are trended by trained analysts to improve process operations and product quality.

- o Quality Engineering has carried out process capability studies in support of operational readiness for the Integrated Radwaste Treatment System (IRTS). Monitoring of equipment performance and product quality and the statistical analysis of data led to the process control plan. The resulting compressive strength on cement drums exceeds the design criterion.

- o The vitrification process is still in the test phase. Process Development is currently characterizing the statistical error bands around the process variables important to producing quality glass. A system model is being developed to reduce more than 300 data points to the 10 or 20 most important for process control. This study is also leading to instrument failure data and analysis.

- o The analytical and process chemistry laboratory supports waste management, vitrification, IRTS and plant operations as well as development tests and experiments. The resources available were verified to be adequate to provide high quality analyses with acceptable turnaround times.

- o All analyses require an analytical request form signed by the responsible manager and all results are provided on hard copy for transmittal and storage. Discussions with operations managers verified that the technical support from the analytical laboratory is of timely high quality.

- o Because of the experimental nature of the vitrification process, a large number of analysis samples are required and a backlog of about 1000 samples exists in the analytical laboratory. The majority of that backlog is for samples to provide data for statistical analysis of performance. Those analyses necessary to support the safety of day-to-day operations are processed on a timely basis.

- o The Analytical Laboratory maintains statistical quality control on all instrumentation and analytical methods. It also participates in round robin analyses with other DOE laboratories and in proficiency testing with the EPA and the New York State Department of Health.

- The Analytical and Process Laboratory organizationally reports to the QA Manager. The associated quality program described in the Laboratory QA Program Manual complied with ANSI/ASME NQA-1 1986 and ANST 1009-C.

**CONCERN:** None.

## TS.5 EVALUATION OF OPERATING EXPERIENCES

**PERFORMANCE OBJECTIVE: Industry and in-house operating experiences should be evaluated by technical support analysts and appropriate actions taken to improve facility safety and reliability.**

FINDINGS:

- Evaluations of the operating experience of the Integrated Radwaste Treatment System (IRTS) are performed by Quality Engineering analysts who were judged to be knowledgeable about process operations. Corrective actions and process improvements are made in response to lessons learned in each campaign.

- IRTS Engineering provides support to operations in the evaluation of long-term trends and performance efficiencies. Shift engineers support operations for process monitoring, compliance with OSRs, data evaluation, maintenance support, procedure preparation, and facility modifications. Discussions with operations managers and operators verified this support by shift engineers to be helpful and effective.

- Attendance at seminars and conferences to disseminate the WVDP experience is encouraged. For example, several papers were presented at the ANS meeting in Atlanta in June within a session on Waste Management.

- Effective procedures are in place to inform operations personnel responsible for safety and reliability of relevant industry and in-house operating experience through the Unusual Occurrence Report (UOR) system and occurrence critique minutes.

- Lessons learned from other DOE and industry facilities, especially other waste management facilities, are also collected and analyzed relative to the WVDP activities.

CONCERN: None.

## TS.6 ENVIRONMENTAL IMPACT

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

FINDINGS:

- Airborne effluents from the WVDP are released through the main stack and four smaller stacks. Exhaust air samples are continuously filtered and monitored as described in Performance Objective AX.1.
- Quarterly composite filter samples are analyzed for Sr-90, Pu/U isotopes, Am-241, and gamma emitting isotopes. Quarterly charcoal filter samples are analyzed for I-129 on all of the stacks except the Supercompactor Facility stack.
- Radioactivity release from the main stack contributes more than 98 percent of the total alpha activity discharge to the atmosphere, but is generally more than an order of magnitude below DOE Derived Concentration Guides.
- More than 8 million gallons of liquid were discharged from Lagoon 3 to the environment in 1988 compared to 9.5 million gallons in 1987. The total radioactivity released in 1988 was 27 mCi (gross alpha plus beta), down from 34 mCi released in 1987.
- The largest single source of radioactivity released to surface waters is the discharge from the low-level waste treatment facility through Lagoon 3 into Frank's Creek. However, the average total effluent discharge during 1988 was less than 40 percent of the Derived Concentration Guides.
- Pollution control and abatement projects reviewed during the appraisal include: upgrade of the Sewage Treatment Plant; spill prevention, control, and countermeasures; and RCRA compliance and site characterization.
- Gaseous and liquid discharges to the environment are reported annually to DOE, NRC, EPA, and New York State in the Site Environmental Monitoring Report.
- The activities of the Environmental Laboratory are routinely reviewed as part of the OSR-based QA surveillance program. This was verified by review of Inspection Services schedules and surveillance files.

CONCERN: None.

## TS.7 PACKAGING AND TRANSPORTATION OF RADIOACTIVE AND NONRADIOACTIVE MATERIAL

**PERFORMANCE OBJECTIVE:** Performance of the packaging and transportation functions should assure conformance with existing standards and accepted practices as given in DOE 5480.3, and its references.

FINDINGS:

- o Training, quality assurance, regulatory compliance, and record keeping for packaging and transporting materials are in compliance with DOE 5480.3.

- o WVDP maintains fissile material shipment records that meet DOE 5480.3 requirements. Additional information is contained in Performance Objective AX.3.

- o The most complete and detailed procedure for packaging and off-site transportation of nonradioactive material is in a WVNS policy and procedure document (WV-660). The WVNS policy and procedure documents provide management guidelines, not detailed implementing procedures. WVDP personnel recognize this and are revising WV-660 and writing a series of new SOPs.

- o WV-660 does identify DOE 5480.3 as the principal document guiding the WVDP material packaging and transportation program.

- o Various WVDP SOPs address on-site packaging and transportation of specific materials (e.g., Low-Level Waste Treatment Facility sludge, Cement Solidification System waste form). In addition, SOP 9-2 provides instructions for packaging radioactive wastes generated by routine operations.

- * Several SOPs provide instructions for on-site disposal of low level radioactive wastes. Since on-site disposal ceased in 1986 and is unlikely to be resumed for some years, these instructions are irrelevant.

- * Instructions for on-site transport of radioactive materials is provided in various places, including the WVDP Radiological Control Manual, SOP 8-19 (for liquids), and various Training Department courses. A single source of definitive procedures for on-site transport is a possible alternative, particularly since off-site shipments of these materials have largely stopped, while on-site transportation is increasing. This was also noted in a WVDP facility review by DOE/ID in February 1988.

* No implementing procedure was identified that provides guidance for handling and packaging nonradioactive materials, such as chemical wastes, that might be encountered during WVDP operations. Such procedures are called for in WV-995 (Hazardous Substance Control Program).

CONCERN: (TS.7-1) (H3/C2)

Some of the procedures for material packaging and transportation are incomplete or out of date.

FINDINGS:

- o Radioactive materials routinely handled, packaged, transported, and stored on the WVDP site include:
  - Class C cement waste form (about 450 drums per month)
  - Class A low-level waste (about 85 drums and about fifteen 90-$ft^3$ waste boxes per month)
  - Small quantities of Class B and TRU waste.
- o Hazardous materials transported from the WVDP site are limited to:
  - Small analytical samples
  - Small shipments of nonradioactive hazardous materials to authorized disposal facilities
  - 125 commercial nuclear fuel assemblies being shipped to the INEL for a research program, scheduled for 1990.
- o The WVDP staff is identifying and collecting nonradioactive hazardous materials for off-site disposal. More than 95 percent of the hazardous materials collected to date have been shipped to licensed disposal facilities.
- o The team observed a nonradioactive hazardous mat-erial collection, packaging, and shipping campaign. It was conducted properly, applicable regulations were followed, and the operation received careful engineering and quality assurance attention.
- o Numerous on-site shipments of low-level radioactive waste were observed using good transportation practices, including radiation surveys, proper tiedowns, correct forklift practices, and appropriate vehicle speeds.
- o The Waste Management Operations and the Waste Engineering organizations are presently understaffed, though efforts are underway to fill the vacancies.

* Radioactive wastes, mixed wastes, hazardous materials, and unknown materials awaiting chemical analysis are stored in the area referred to as the "Kerosene Building." Some repackaging of wastes and materials also occurs here. There are no specific procedures governing operations or specifying acceptable contents for this area. See Concern AX.2-1.

* Procedures for packaging and storing wastes prohibit free liquids in low-level waste drums. Sludge from the Low Level Waste Treatment Facility (LLWTF) contains free liquids because sludge solidification has been temporarily stopped. This sludge is stored in the Lag Storage Building pending development of an improved cementing process. See Performance Objective AX.1.

* A violation of SOP 9-5, Rev. 4 for the radioactive waste compactor located in the Waste Reduction and Packaging Area (WRPA) was observed when the operator repeatedly failed to halt the compactor ram to verify that it would clear the sides of the waste container.

* Good waste minimization practices were violated when two uncontaminated 55-gallon drums were compacted along with low-level radioactive trash. Subsequent inquiry revealed that metal drums are specifically prohibited from the WRPA compactor. Neither the SOP nor postings at the compactor identified metal drums as unacceptable for compaction.

* In 1988, metal waste drum interior corrosion by free liquid was observed in the cemented sludge from the Low Level Waste Treatment Facility (LLWTF). Recent practice at the LLWTF has been to place the sludge inside a polyethylene liner that is in turn located inside the metal waste drum. This practice has not yet been written into the appropriate SOP, even though it has been practiced for over 9 months.

* Poor radiological practices were observed in the packaging of LLWTS sludge. See Concern AX.1-1.

* Drum stops in the LLWTF drum room conveyor did not properly disengage to allow the drums to move down the conveyor into the shipping truck. An operator standing outside the drum room used a "cheater bar" to reach into the drum room (which is a smearable contamination zone) to disengage the stops. This operation is not addressed in the SOP. The "cheater bar" was readily available, implying it is regularly used. Also, one of the two LLWTF operators was not wearing the required hearing protection.

| | |
|---|---|
| CONCERN:<br>(TS.7-2)<br>(H2/C2) | Strict adherence to procedures for some waste packaging operations does not occur and evolutions in operations are not promptly incorporated in the Standard Operating Procedures. |

## TS.8 REACTOR ENGINEERING

**PERFORMANCE OBJECTIVE (Reactors Only): Reactor engineering activities should ensure optimum nuclear reactor operation without compromising design, safety, or nuclear fuel limits.**

This Performance Objective does not apply to WVDP.

## TS.9 CRITICALITY SAFETY

**PERFORMANCE OBJECTIVE: Specialized support for criticality safety issues should be fully integrated into the operation of the facility, and the handling and storage of fuel by facility personnel.**

FINDINGS:

- o A nuclear criticality safety program is defined and documented in Section 7, Criticality Safety, in WVNS Radiological Control Manual, WVDP-010, Revision 2, July 1985. Policies, responsibilities, and procedures for critical safety practices at the WVDP are specified.

- o Responsibility for criticality safety is assigned to the R&S Department.

- o One PhD nuclear engineer with experience in criticality and shielding analysis has been primarily responsible for functional activities. He has since transferred to Process Technology but is still available for consultation. Attempts to hire another criticality engineer have not been successful.

- o A review of a sample of criticality safety analyses verified that conservative assumptions are used. The degree to which independent review of analyses is possible at WVDP is limited by the supply of qualified persons. For those analyses which suggest a significant potential for criticality risk, independent review has been referred to other Westinghouse facilities or outside contractors.

- o Fissile material at WVDP is controlled within Criticality Control Zones. These zones are well defined and appropriately posted as such. Nuclear criticality safety is generally achieved by mass control or with engineered control systems.

- o Operating procedures denote criticality safety limits. New and revised procedures are reviewed by the R&S Manager for conformance with these limits.

- o Three criticality alarms are installed near the storage pool, which contains 125 spent fuel elements. Other storage areas contain only small quantities of fissile material and are not considered to have a credible risk of a criticality accident. The alarm system conforms to the requirements of ANSI/ANS 8.3-1986.

- * WVDP contains significant quantities of fissile material in areas that have not yet been decontaminated. Future activities to pump sludge from Tank 8D-2 will also involve kilogram quantities of fissile material.

* WVDP does not have a specialist at this time to focus attention on criticality safety issues and good practices.

* The criticality safety emergency plan is deficient in several areas, e.g. calibration of nuclear accident dosimeters (see Concern RP.5-2) as well as procedures for immediate identification of exposed individuals and evacuation routes and drills. See Concern ER.2-2.

CONCERN: (TS.9-1) (H2/C2) WVDP does not have a fully-implemented nuclear criticality safety program.

## H. SECURITY/SAFETY INTERFACE

The WVDP has the lowest safeguards/security classification (Class C) assigned to DOE nuclear facilities. Few safeguards/security modifications have been made to the plant since it became a DOE demonstration project. Those few have been minor. However, WVNS did not use established plant procedures for the design reviews of these modifications. Thus, there is no documented evaluation of these modifications by appropriate safety and operations personnel for possible increased risk.

Prior to being assigned to a shift, each security inspector must complete Qualification Standards to demonstrate skills and knowledge regarding plant facilities, radiation and hazardous materials safety, emergency plans and procedures, first aid, and accident prevention. Each security shift conducts monthly drills that aid the security force in maintaining proficiency in security and safety.

Managers of the Security Department have satisfied themselves that the weapons provided to the security force could be safely used in the vicinity of WVDP facilities and equipment. However, the analysis justifying this conclusion has not been documented in accordance with DOE requirements.

## SS.1 SAFETY OF IMPROVEMENTS

**PERFORMANCE OBJECTIVE:** Security/safeguards improvements should not create or increase hazards that would impede the safe, reliable operation or shutdown of the facility in normal, abnormal, or emergency situations.

**FINDINGS:**

- o WVNS Quality Management Manual, Section QM3 establishes requirements for design control of all engineering design activities. WVNS Engineering Procedures, EP-3-002 and EP-3-003, provide requirements for design criteria and design reviews, respectively.

- o EP-3-003 specifies that a design review be conducted for even the lowest assignable quality level ("N").

- * Discussions with managers of the Security Department indicated that security systems have not been subject to design reviews based on the above requirements. The most recent security system modification, which involved a revised key card entry control system, was designed under contract to WVNS by a security system vendor. A security lieutenant was assigned as the "cognizant engineer" for procurement of the equipment. This individual indicated that reviews by safety and operations personnel of this modification were conducted informally, but not documented.

**CONCERN:** (SS.1) (H2/C2) Security/safeguards modifications have not been formally evaluated by appropriate safety and operations personnel for possible increased risk to safe operation of the facility.

## SS.2 COMPATIBILITY

**PERFORMANCE OBJECTIVE: Security/safeguards improvements should use design criteria consistent with the facility equipment/structures being protected.**

FINDINGS:

- The WVDP has a Class C physical security classification, which is the lowest rating for a nuclear facility. There are no security/safeguards improvements either completed or planned that would physically affect any facility structures or their systems.
- The WVNS Firearms Safety and Procedures Manual provides detailed guidance on the safety and operation of firearms, and on the training required to develop and maintain proficiency in the use of firearms.
- Security Inspectors must satisfactorily complete radiation worker training and annual radiation worker requalification, which provide them with information on the radiological hazards associated with WVDP facilities.
- Qualification Standards have been developed and implemented for both initial and continuing training of security inspectors. These Qualification Standards address skills and knowledge with respect to plant facilities and equipment, radiation safety, hazardous materials handling and storage, emergency plans and procedures, first aid and cardiopulmonary resuscitation, evacuation procedures, controlled substance recognition, and accident prevention.

CONCERN: None.

## SS.3 EMERGENCY ACCESS

PERFORMANCE OBJECTIVE: Authorized facility and safety support personnel should not be denied access or exit in an emergency.

FINDINGS:

- Security Department Procedure No. 12 provides direction to the WVDP security force on access for emergency equipment during an emergency. This procedure directs that security gates are to be opened for emergency vehicles and that these vehicles are then to be directed to the scene of the emergency. Reviews of the critiques of emergency exercises indicated that during these exercises no difficulties arose involving emergency vehicles entering the facility.

- An appraisal team member accompanied a security inspector on routine after-hours security rounds of all WVDP buildings and facilities. This tour confirmed that, during an emergency, all doors and gates have a crash-out capability, and that doors can be jammed open.

- Controlled entry/exit doors have crash bars to permit emergency egress. Gates have buttons which permit emergency egress. Controlled entry doors have key override of the key card available at each door behind an alarmed glass enclosure.

- A tour showed there are no security holding areas, fences or other security barriers which restrict evacuation paths.

- The Fuel Receipt and Storage (FRS) Area and computer areas of the WVDP have key card controls, which limit unescorted access to these areas to personnel with a need for routine access.

CONCERN: None.

## SS.4 FACILITY PLANNING FOR SECURITY/SAFEGUARDS EMERGENCIES

**PERFORMANCE OBJECTIVE:** Safety authorities and responsibilities for all types of security/safeguards emergencies should be clearly defined and understood by all involved parties.

FINDINGS:

- The WVNS Emergency Plan and Procedures, Chapter III, defines the responsibilities of all facility personnel in the event of a safeguards/security emergency. The responsibilities defined for security and facility personnel in this chapter are not redundant. This chapter addresses responses and interfaces among on-site and off-site organizations for each class of security/safeguards emergency.

- The WVDP Safeguards and Security Plan, Revision 13, describes the responsibilities of security personnel during security emergencies and operational emergencies.

- Chapter 1 and Appendix G-26 of the WVNS Emergency Plan and Procedures define the differences in responsibilities for security/safeguards and operations emergencies. Discussions with responsible personnel indicated that the transfer of these responsibilities between these two classifications of emergencies is adequately addressed.

- Security Post Order No. 11 addresses the conduct of monthly mini-drills to maintain the proficiency of security forces. This order addresses documentation of the scenario, objectives, critiques, and corrective actions. The results of five of these drills were reviewed and all were found to be well documented.

- Qualification Standards for initial and continuing training of security inspectors both address skills and knowledge related to the emergency plan and emergency response.

CONCERN: None.

## SS.5 SAFETY OF SECURITY ACTIVITIES

**PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous materials should be identified and understood by all involved parties.**

FINDINGS:

* DOE 5480.16, Chapter II, Section 3.j, requires that "each field element shall perform analyses to determine what weapons can be used safely in each site for which it has responsibility." This order was issued on January 12, 1988.

* DOE-ID 5480.16, Section 4.d (9) requires contractors to "develop implementing programs to assure compliance with DOE 5480.16 and this supplementing order." This order was issued October 21, 1988.

* Managers of the WVNS Security Department and responsible DOE/ID personnel recalled that informal discussions had concluded that there were no significant consequences of using weapons in any WVDP facility. On July 13, 1989, the Security Manager submitted a memo to the R&SC Chairperson requesting the committee to review a request for an exemption for the WVDP from the above analysis requirements.

CONCERN: (SS.5-1) (H2/C1) Analyses have not been performed, as required by DOE 5480.16, to determine what weapons can be used safely at the WVDP.

## I. EXPERIMENTAL ACTIVITIES

The experimental activities at WVDP involve cold testing of the vitrification system. There are no concerns involving the Experimental Activities.

The experimental program is developed internally and is reviewed by external technical and safety experts. Individual test runs are initiated by a Test Request that is prepared by a Cognizant Engineer. The request is reviewed and approved by vitrification group technical management and by QA and R&S. Experiments are conducted in accordance with a test procedure, which is similarly developed, reviewed, and approved. These test procedures incorporate requirements for technical and administrative briefing of operations personnel, special training of operators where necessary, and technical surveillance throughout the test period. Vitrification test operations are not subject to OSRs as such, but safety limits and limiting conditions of operation are incorporated in each test procedure. The R&SC has reviewed and approved the overall vitrification program, but individual test runs are evaluated for their safety considerations only by the R&S unless they involve unreviewed safety questions.

## EA.1 INTERFACE WITH EXPERIMENTERS

**PERFORMANCE OBJECTIVE: Persons conducting experiments in or with the facility should have their relationship to the operating group clearly defined.**

FINDINGS:

- The only program of experimental activities at WVDP involves the cold testing of the vitrification system. The program is described in the Safety Analysis for Cold Testing of the Vitrification System, Attachment to HG:85:0183, J. M. Peterson and L. L. Petkus, June 1985.
- The program elements for cold testing of the vitrification system are designed internally and are reviewed by internal and external experts in this field. The tests are performed in special equipment units, which are precursors of operations equipment to be installed and started in the same building over the next three years.
- A review of the organization and discussions with the Process Technology and Testing Manager, the Vitrification Process Development Manager, and the Vitrification Test Group Manager indicate the technical resources of the organization are sufficient to achieve the program's objectives.
- The Vitrification Test Engineering Manager is responsible for drafting all test procedures and for having them reviewed and approved by knowledgeable and properly authorized persons in technical, safety, and quality assurance areas.
- A review of standard practices with the Vitrification Operations Superintendent and additional discussions with test support engineers established that all staff members involved in executing tests are either present during the test or on-call to provide counsel and guidance.
- The test procedures, which are provided by the Vitrification Test Engineering group, mandate technical and administrative briefing of operations personnel and special training where required, plus technical surveillance throughout the test period. These techniques provide for appropriate communications among all personnel involved.

CONCERN: None.

## EA.2 EXPERIMENT SAFETY REVIEW COMMITTEE

**PERFORMANCE OBJECTIVE: A safety review committee should be available to review the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, DOE 5480.6, and DOE 5482.1B, Section 9.d.**

FINDINGS:

- WVNS management appointed a R&SC. The charter for the R&SC is given in WV-906 (Rev. 5), Safety Review Program, July 31, 1987. In accordance with WV-906, the President of WVNS appoints the Chairperson and all other members of the R&SC. In general, committee members are upper level managers. Actions of the R&SC are determined by a majority vote of the members (or their alternates). However, as stipulated in the charter, "Should a member also be the Cognizant or Staff Manager of an activity under review by the Committee, that member may participate in the deliberation but may not vote on any related issues."

- The R&SC has reviewed and approved the entire scope of the program for cold testing of the vitrification system. The SAR describing the program was submitted to the R&SC on June 3, 1985 (HG:85:0183, L. L. Petkus to C. J. Roberts, Chairperson R&SC). The results of the review, including approval of the SAR, are recorded in the R&SC meeting minutes for June 13, 1985 (HE:85:0132, C. J. Roberts, June 18, 1985).

- Examination of the R&SC files confirmed a permanent system to record the Committee's activity.

- Discussion with the Vitrification Process Development Manager revealed that the R&SC does not review each Test Request or subsequent Test Procedure. By virtue of their review and approval of the program scope cited above, further review of the test details by the R&SC will be required only if the experimental activity involves an unreviewed safety question. The safety review of test details is instead provided by the WVNS Radiation and Safety organization. Permanent files of all test reviews and approval are maintained by the Records Management group. Direct examination of these records indicated that formal reviews of all Test Requests and Test Procedures are conducted to support the safety, quality assurance, and technical aspects of operations. This review system complies with the requirements of DOE 5480.5, Section 9.h(2).

CONCERN: None.

## EA.3 EXPERIMENT CATEGORIES

**PERFORMANCE OBJECTIVE: All proposed experiments should be approved before they are performed.**

FINDINGS:

- The WVNS system for approving experimental activities and development tests is provided in the Engineering Procedure (EP) on Development Test Control (EP-11-003, Rev. 1, April 4, 1988). The system for final validation and release of test documents is prescribed by the EP on Review, Approval, and Engineering Release (EP-3-011, Rev. 6, March 6, 1989).

- The Appraisal Team tracked a development test from conception to published conclusions. This review indicated that the system is thorough and works satisfactorily to provide necessary development results without compromising safety.

- For each development test, EP-11-003 mandates preparation, review, and approval of a Test Request and Test Procedures. EP-11-003 also requires keeping a formal Test Log and ultimately issuing a Test Summary Report.

- Discussions with managers of the vitrification development program and actual examination of records indicated that the internal review and approval process is structured and formal.

- In addition to the internal reviews, Battelle Pacific Northwest Laboratory (PNL) reviews the Test Requests in advance of a test run, and occasionally reviews the Test Procedures. There is considerable exchange of technical information among WVNS, PNL, and Savannah River Laboratory on the respective vitrification programs. In addition, Catholic University and Alfred University provide technical advice on glass compositions and the effects of process conditions on these. Operational safety is one consideration in these technical discussions.

- Any unanticipated problems (including safety problems) that develop after approval or even after test startup can be formally addressed by preparing and approving Test Exceptions that permit deviations from the Test Procedure. The steps to follow in issuing Test Exceptions are defined in EP-11-003.

- No OSRs or Technical Requirements exist for the vitrification test program. However, appropriate operating limits are stipulated in the Test Procedures.

- After all the requirements of EP-11-003 have been satisfied for a development test, the official documents

are validated for release (see EP-3-011) by issuing an approved Engineering Release (Form WV-1802, Rev. 10), in which the "Cognizant Engineer" attests that all the requirements have been met. The final test authorization is a "Work Order" (Form WV-1206, Rev. 3, described in SOP 00-1) which has the same departmental approvals as the original Test Request. This last action certifies that the test may be carried out.

**CONCERN:** None.

## EA.4 EXPERIMENT PROPOSAL

**PERFORMANCE OBJECTIVE: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.**

FINDINGS:

- The information required to support a proposal (Test Request) for a cold test in the Vitrification Process Development Facility is specified in the Engineering Procedure for "Development Test Control," (EP-11-003, Rev. 1, dated April 4, 1988).
- A review of several typical Test Requests amplified by discussions with vitrification development program management indicated that the system in place has succeeded in training the technical staff to prepare Test Requests with sufficient information to enable meaningful review of the test proposals.
- Interviews with several process support engineers substantiated the technical proficiency of personnel who prepare the Test Requests.
- In a sense the entire cold test program of the Vitrification System is a multiphased experiment, which is reviewed in stages. A critical path network (FACTS - Level IV Schedule) for all major development activities has been prepared; a review of this schedule showed that the preparation, review, and approval of test proposals is appropriately factored into the program plan.
- As reported in Performance Objective EA.2, all test requests receive technical, safety, and quality assurance reviews. Examination of the review files showed that all issues raised during the review were resolved by modifications (agreed to by the reviewers) before the Test Request is approved.
- A Technical Review group composed of outside technical experts reviewed on a generic basis the plans for meeting the waste compliance criteria, i.e., the methods proposed in respect to both processes and glass compositions for producing a product acceptable for ultimate disposal. This group also reviewed the general test program in advance, and reviews the data resulting from the test runs.

CONCERN: None.

## EA.5 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments performed in reactors or process facilities or experiments performed with a reactor should not present undue risks.

FINDINGS:

- o The basic document for Development Test Control is Engineering Procedure EP-11-003. This document stipulates measures that must be met in carrying out the test (Section 4.3, "Test Performance") to assure safety of operation. It also specifies the records that must be kept to evaluate the technical results and the effectiveness of the safety constraints.

- o The cold vitrification test program has successfully completed 32 tests without experiencing any OSHA recordable injuries or any incident that was categorized as an Unusual Occurrence. Thus, the control program has been effective in maintaining an acceptable safety record.

- o Discussion with managers responsible for the vitrification development program established that a site-wide system is in place to respond promptly to events that could create conditions adverse to health and safety. This procedure is detailed in WV-987, Rev. 2., "Reporting of Unusual Occurrences at WVNS," May 19, 1988.

- o Extensive pretest orientation and training of the entire operating group gives confidence that:

  - All personnel understand special safety requirements for the test.

  - Test procedures are clearly interpreted and cover actions to be taken to handle abnormal conditions and process disruptions.

  - Critical parameters are monitored and properly recorded.

- o The mechanism of preparing Test Exceptions to enable mid-course corrections to the Test Procedure is articulated in EP-11-003.

- o Configuration of major equipment units is (for the test program) essentially fixed by permanent installation. Special equipment arrangements, such as that for instrumentation specific to the test, are described in the Test Procedure and are implemented by operations personnel.

- o Test conditions are analyzed to assure that they have no adverse effects on facility equipment. For example, an

operating limit on melter temperature is imposed to protect it from damage.

- o Discussions with operators revealed that WVNS management attention is intensified during tests. A formal communications and reporting system is also detailed in the Test Procedures.

- o The only serious equipment failure thus far experienced during the cold vitrification test program was a corrosion failure in the off-gas nozzle from the melter. This event was reported in the Critique Minutes for WVNS No. CM88058, June 6, 1988. The subsequent investigation (EK:89:0126, June 23, 1989) led to the "conclusion that the cause of the failure was sulfidation or hot corrosion." Discussion with the Vitrification Process Development Manager indicated that the consequences of this event have been addressed in protecting the current development melters, and are being factored into the design and construction of the production melter.

CONCERN: None.

## J. FACILITY SAFETY REVIEW

Although WVNS has established policy and procedures and is implementing a vigorous independent safety review and facility inspection program, it is not in full compliance with DOE 5480.5 requirements.

The Radiation and Safety Committee has been established as the principal mechanism for accomplishing the policy objectives for independent safety review. The Committee has been active and has a demonstrated record of rejection of the initial submission of a substantial percentage of the actions that come before it. This record overcomes concerns about objectivity that would otherwise result since almost all members are routinely involved in almost all actions that come before the Committee. Independent review of UORs and Critiques is performed by QA and by the Radiation and Safety Department. The Committee periodically overviews how the program is being implemented.

Minutes of Committee meetings and supporting material are insufficient to independently determine the depth and quality of the reviews performed. Certain administrative procedures such as meeting frequency, vote recording, and acceptance of minutes are not recorded consistent with good practices for committees of this type. The Committee is not performing in an advisory capacity to top management in that its recommendations are conveyed directly to DOE/ID and/or the line organization as directives. In addition, the Committee has on occasion established policy and organizational changes, although in these cases top management has signed off on the implementing actions.

Annual facility inspections and triennial appraisals are being performed by Westinghouse employees from other installations. The triennial appraisal is of sufficient depth and quality to meet DOE requirements. This was not the case in the 1987 and 1988 annual facility appraisals.

## FR.1 SAFETY REVIEW COMMITTEE

**PERFORMANCE OBJECTIVE: A safety committee should be available to review safety questions.**

FINDINGS:

- o WVNS Policy and Procedure WV-906, "Safety Review Program" establishes policy and procedures for the independent review and periodic appraisal of WVNS activities. It establishes the Radiation and Safety Committee as the principal vehicle for accomplishment of this policy.

- o WV-906 contains definitions, duties, authorities, responsibilities, and procedures that describe the functions of the Committee and the roles of the other participants in accomplishing WVNS' independent safety review.

- o Six members and six alternates are formally appointed by the President, WVNS and serve until formally relieved of this duty. Quorum requirements are contained in WV-906.

- o The small size of WVNS has resulted in appointment to the Committee of individuals who are senior managers with a wide range of experiences. Most are line managers, already engaged in some aspect of the work before it comes to the Committee for review. Although this could raise questions regarding conflict-of-interest, such concern does not appear warranted since a significant percentage of actions that come before the committee are initially rejected. In addition, a member directly involved in the matter at hand is not permitted to vote on an action which they advocate.

- o The Committee can, and has in the past, supplemented its expertise to provide coverage in disciplines felt necessary to accomplish an in-depth review.

- * The Committee acts with finality and in a line direction mode in that its decisions are reported directly to DOE and operating organizations for action (WV-906.6.1.E). This removes top management from its responsibility to direct the work and is contrary to DOE 5480.5, Section 9.a, which require that the standing safety committee be advisory to top management.

- * The Committee at its November 29, 1987 meeting established WVNS policy regarding how the UOR program would be implemented and directed organizational changes to carry out this policy. Although these changes were ultimately concurred on by the President, WVNS and are reflected in the appropriate documents, these activities of the Committee are inconsistent with an advisory safety committee's role.

* The Committee charter as contained in WV-906 4.3(b) gives the Chairperson a veto in that the chairperson's vote must be one of the majority votes. This is not believed to have been the intention of the authors and has never come up in an actual situation.

* Although the Committee meets frequently (at least once a month), the charter does not specify any frequency for committee meetings.

* There are some ambiguous entries regarding R&SC duties in Table 1 of WV-906 and some definitions are not consistent with DOE 5480.5.

CONCERN: (FR.1-1) (H3/C1) The charter of the Radiation and Safety Committee is inconsistent with the definitions and advisory requirements of DOE 5480.5.

## FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the safety committee should be well defined and understood by facility management.

FINDINGS:

- Table 1 and Section 6 of WVNS Policy and Procedure WV-906 address the various documents and facility inspections that are required at WVNS facilities. The responsibilities and procedures to be followed by all participants are spelled out in these sections.
- The Radiation and Safety Committee is required to review and approve the following for new or modified activities: hazard classification; SARs; design criteria; OSRs; and ALARA Plans.
- The Committee performs a managerial and oversight role in the facility annual appraisal. It selects the membership of the inspection committee, which aspects of the WVNS facility are to be included, and assures that appropriate reports of the inspection are made, transmitted, and acted upon.
- WV-906 requires the Committee to perform a periodic audit of the UOR program to determine that it is being effectively implemented. Independent review of UORs and other reports of operational difficulties are performed by QA and Safety. There are some inconsistencies between WV-906 and WV-987, Section 6, dealing with responsibilities and approvals of Critiques and UORs.

CONCERN: None.

## FR.3 OPERATION OF SAFETY COMMITTEE

**PERFORMANCE OBJECTIVE:** Review of facility activities by the safety committee should ensure achievement of a high degree of safety.

FINDINGS:

- o WVNS Policy and Procedure WV-906 is quite specific regarding the types of documents and operating situations that must be addressed by the Radiation and Safety Committee.
- o WV-906 defines the responsibilities of the Committee and the line organizations and provides procedures to follow in accomplishing the required reviews.
- o The Committee and line organizations understand these requirements and appear to be implementing them in a timely fashion.
- * Committee recommendations are not submitted to top management for action but instead are sent directly to DOE and/or the facility operating management for action. See Concern FR.1-1.
- * A review of committee minutes indicates that: it is not always possible to tell which members were present; the vote on a particular issue; that the Committee member directly involved in the issue before the committee did not vote on the matter and that a quorum was still available when a vote in this situation was taken; the committee does not indicate acceptance of the minutes of meetings.
- * Neither the minutes nor the documents supporting committee records for a number of Committee actions reviewed indicate that a rigorous, in-depth review took place.

CONCERN: (FR.3-1) (H3/C1)

Minutes of the Radiation and Safety Committee do not contain administrative information consistent with good practices for a committee of this type. In addition, they are inadequate for third party assessment of the depth and quality of the review performed as required by DOE 5480.5.

## FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management.

FINDINGS:

- o WVNS Policy and Procedure WV-906 establishes the requirement for an annual appraisal of WVDP facilities and covers all topical areas, consistent with DOE 5480.5.
- o For the past two years this requirement has been fulfilled by the appointment of a committee consisting mostly of Westinghouse employees from other DOE facilities. They are performing technical safety appraisals of WVDP as a whole rather than of individual facilities or programs.
- * The WVNS appraisal of 1987 fulfills the requirements of DOE 5480.5, section 9.c, in that all areas were treated. However, the documentation of the review is not in sufficient depth to determine the quality of the review.
- * The 1988 appraisal report was performed on the same basis as the 1987 effort; however, it did not cover all functional areas. This report is also written on an "exception" basis which does not enable a reviewer to determine the depth and quality of the review.

CONCERN: (FR.4-1) (H3/C1) Documentation of annual facility inspection is not in sufficient depth to evaluate the quality and effectiveness of the reviews as required by DOE 5480.5, Section 9.c.

## FR.5 TRIENNIAL APPRAISAL OF FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

FINDINGS:

- o WVNS Policy and Procedure WV-906, Section 6.5 describes the triennial appraisal process which uses Westinghouse personnel from outside of WVNS to perform the review. It defines the roles of the various participants, procedures to accomplish this task, and is supposed to cover all aspects of the ES&H program.

- o Triennial appraisals were performed of the WVNS site in 1986 and 1987 by employees from other Westinghouse facilities. The next appraisal is scheduled for 1990.

- o WVNS management appointed the team who then worked closely with the Radiation and Safety Committee, which provided them with documentation necessary for their review.

- o Documentation of the review performed in 1987 is sufficient to assure outside auditability of the quality and depth of the appraisal and indicates a high quality review.

CONCERN: None.

## K. NUCLEAR CRITICALITY SAFETY

Spent fuel elements (125 assemblies) remaining from the close of Nuclear Fuel Services, Inc., operations in 1972 are stored in the Fuel Receipt and Storage area. This fissile material is stored underwater and is scheduled for packaging and transport to Idaho National Engineering Laboratory in 1989. The appraisal team addressed the safety aspects of storing and handling these materials in Performance Objectives TC.6, AX.1, and TS.9.

## L. RADIOLOGICAL PROTECTION

This appraisal reviewed WVDP health protection policies, procedures, audits, appraisals and actual work practices. The review was supplemented by discussions with operating staff, management, and other support personnel.

The overall radiation protection program is well developed and managed. The WVDP R&S Department has an exceptionally high percentage of nationally qualified radiation protection personnel, one health physicist certified by the American Board of Health Physics and ten personnel registered by the National Registry of Radiation Protection Technologists (NRRPT) with an additional ten personnel sitting for the NRRPT examination this year. The staff is dedicated to achieving the highest levels of safety possible.

The procedures and practices at the facility provide radiation and contamination control consistent with most DOE and industry standards. All work in radiation and contamination areas is controlled by Radiation Work Permits except for two routine activities which are controlled by Standard Operating Procedures. The radiological status of the plant is verified routinely by daily, weekly, monthly, quarterly, semiannual, and annual radiation and contamination surveys and continuous area air monitoring and sampling. In addition, special surveillance and sampling is provided for the nonroutine activities.

WVDP has implemented an effective program to track radiation exposure and to minimize personnel doses through a radiation dose budgeting process, requirements for preplanning, ALARA reviews, and in-plant marking and posting. Radiation dose to plant personnel is reviewed at least monthly by both management and the ALARA engineer. Each radiation worker receives a letter of his radiation exposure every month so that a continuous awareness is maintained.

There have been no significant losses of contamination control or radiation overexposure. WVNS has issued a formal plan for implementation of DOE 5480.11. The schedule for full compliance is stated as December 31, 1989. There is some concern with the progress of WVNS in meeting the schedule. Two elements of the implementation plan, which were scheduled to be completed by April 30, 1989, and June 30, 1989, were not available as of July 15, 1989. These missing elements are specified as concerns.

Additional concerns address the lack of a formalized internal audit program; deficiencies in the nuclear accident dosimetry program; in complete documentation for internal dose evaluation and technical bases for air sampling line losses; lack of nonuniform skin dose assessment procedures; deficient quality assurance overview of the bioassay services vendor; and noncompliance to the record keeping requirements of ANSI N13.6.

Two noteworthy practices involved implementing a color code system on floors of the process areas to alert personnel of increasing radiation levels and using an electronic timer to assist workers in conducting a whole-body survey when exiting areas requiring such a survey.

## RP.1 ORGANIZATION AND ADMINISTRATION

**PERFORMANCE OBJECTIVE: Facility organization and administration should ensure effective implementation and control of radiological protection activities within the facility.**

FINDINGS:

- o WV-905, Radiation and Criticality Safety, from the WVDP Policy and Procedures Manual, specifies the responsibilities for radiation protection of plant organizations. The WVDP Radiological Controls Manual, WVDP-010, Rev. 2, July 1985, further defines areas of responsibility for development, implementation, and overview of radiation protection programs and procedures.

- o The Radiation and Criticality Safety policy statement specifically assigns responsibilities for the following: minimizing personnel radiation exposure, minimizing the contamination of areas, equipment, and personnel, reducing solid and liquid radioactive waste volumes, packaging of radioactive waste, personnel and nuclear accident dosimetry, surveillance of work conducted on radioactive systems and posting controlled areas, routine radiation and contamination surveys, and training of employees.

- o The Manual delegates prime responsibility for the implementation of the radiological control and nuclear safety program to line management.

- o The Manual defines the requirements for radiation protection training, Unusual Occurrence Reports and records, personnel exposure controls, handling radioactive materials, airborne radioactivity, contamination control, radioactive waste management, and criticality safety including emergency plans and procedures.

- o A Radiological Control Procedures Log, revised June 16, 1989 provided the specific procedures for the implementation of the radiation protection program by the R&S Department.

- o "Radiation and Safety Departmental Review and Inspection Program" Procedure RC-ADM-9 specifies the requirements for review of manuals, programs, training courses, procedures, and work area inspections on a 3-year cycle. Program reports for 1988 and 1989 were complete and comprehensive. The follow up for inspection findings was documented and the corrective actions taken were identified.

- o The R&S Department was staffed by 20 Radiological Control Technicians (RCT) and two Radiological Controls Operations Supervisors. In addition there are 14 personnel in the Radiological Engineering group which

includes 2 individuals performing instrument repair and calibration, 3 persons conducting the radiation dosimetry program, and two radiological engineers.

- o Radiation protection requirements and practices are provided in standard operating procedures, radiation control procedures, standard instruction procedures, and Radiation Work Permits. Procedures are routinely reviewed by R&S Department management and staff and are specifically approved for use.

- o In addition to the formal Unusual Occurrence Reporting system, unusual events or conditions are critiqued and the critique is documented. Critiques are reviewed by management and evaluated for corrective actions, common problems, and trends.

- o Position descriptions and qualification standards are written for each of the five levels of RCT and specify the responsibilities and duties for the position and requirements for promotion to higher positions.

- o An annual assessment of staff progress is made using a formal assessment guide. The supervisors for the RCTs reviews quarterly their progress to provide an interim assessment.

- o Facility staff and management are aware of radiation exposures, plant radiological conditions, and radiation and contamination control practices.

- o The staffing of the Radiological Controls Operations group is marginal to cover the work. The level of support available from the R&S Department does not appear to degrade radiation protection safety but does result in some programmatic delays.

- * WVDP has issued an implementation plan and schedule for achieving compliance to DOE 5480.11. However, two major milestones which were scheduled for completion by July 1, 1989, have not been met.

CONCERN: (RP.1-1) (H2/C1) The schedule for implementing DOE 5480.11 is not being met.

## 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:

- o Internal review of the radiation protection program at WVDP is currently accomplished through the following processes:
  - Quality Assurance audits as described in Quality Manual, QM-18, Rev. 2 of July 1, 1988.
  - Quality Assurance surveillance as described in QM-10, Rev. 3, of July 1, 1988.
  - Radiation and Safety Departmental Review and Inspection Program as described in RC-ADM-9, Rev. 1 of April 11, 1989.
- * A Management Directive specifies that a periodic audit of the radiation protection program be conducted. However, no formal requirement for an internal audit program which meets the requirement of DOE 5482.1B is in place.
- o QA initiated reviews provide scheduled formal appraisal against site QA, administrative, and operational safety requirements.
- o An internal procedure, RC-ADM-9, defines the Radiation and Safety Departmental Review and Inspection Program which provides for review of manuals, programs, training courses, procedures, and work area inspections. These are conducted, reviewed by management, and documented.
- * Neither a single independent internal audit nor a combination of independent audits that included all areas required by DOE 5480.11 has been conducted in the last three years at WVDP.
- * The Westinghouse technical safety appraisal of August 1987 identified the need for improvement of the RP internal audit program.
- o The applicable portions of DOE 5000.3 and DOE 5482.1B are addressed as part of the site-wide Critique and UOR program covered in OA.4.
- * QA review activities are not performed by personnel specializing in radiation protection.
- * Self-appraisal reviews performed as directed in RC-ADM-9 are being performed by persons with the necessary expertise but who lack the independence required by DOE 5482.1B. The manager of the R&S Department asserted that

the Westinghouse Radiological Working Group, radiation protection managers representing Westinghouse-operated government-owned (DOE) facilities, is working on a cooperative solution to this problem.

CONCERN: (RP.2-1) (H2/C1) There is not an independent internal radiation protection audit program with all of the elements, technical expertise, and independence required by DOE 5480.11 and DOE 5482.1B.

FINDINGS:

- All abnormal and unusual incidents are reviewed and critiqued and the results documented. Reports are reviewed by management for common causes and trends.
- Prejob planning is routinely conducted. The rigor of the planning and review appears to be commensurate with the complexity of the work and the potential for radiation exposure and contamination spread.
- The R&S staff, including technicians, are authorized to stop work if safety or radiation control is compromised. There is evidence that this has been exercised, but infrequently.

CONCERN: None.

## RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generation devices should provide for safe operations and for clearly identifying areas of potential hazards.

FINDINGS:

- o WV-905, "Radiation and Criticality Safety", from the WVDP Policy and Procedures Manual states the company policy related to control and minimization of radiation exposure to employees and includes the ALARA program. The policy references the DOE Orders and ANSI standards pertinent to radiation protection for employees and the public.

- * The policy is not current in that it references DOE Orders that have been revised since the September 28, 1988, issue date of the policy. The WVDP implementation plan for DOE 5480.11 states that appropriate manual revisions are scheduled for completion by the end of 1989. See Concern RP.1-1.

- o The Radiological Controls Manual, WVDP-010, (Rev. 2, July 1985) established the radiation protection standards and controls for WVNS.

- o The manager and staff of the R&S Department have been given specific authority to cease operations in the event that operations do not comply with operational safety controls or approved operating procedures. They also have the authority to remove authorization from employees to receive occupational exposure if certain specified conditions are met. In addition, the Radiation Control Technicians have been delegated authority to stop work which violates work procedures, or which in their opinion presents an eminent danger.

- o With two exceptions, all work in radiation or contamination areas and excavations in uncontrolled areas must have a Radiation Work Permit (RWP). Work requirements for the two exceptions are covered in SOPs. An RWP is initiated by the user organization and given to the R&S Department for review and completion of the radiation protection requirements.

- o Each RWP defines the radiation protection requirements for the tasks and include radiation monitoring required, protective equipment needed, radiation and contamination levels indicated at last survey, exposure permitted, dosimetry required, and special instructions. The RWP is valid for one shift only unless reapproved by the R&S Department for another shift. The maximum duration of an RWP is for three shifts.

- o There are approximately 70 procedures for conducting work within the R&S Department. Additional procedures are

being developed. All R&S procedures are approved by the manager of the R&S Department.

* The Radiation Control Procedures Log contains the implementing procedures for the radiation protection function but it is not controlled to assure availability of current procedures.

CONCERN: See Concern OA.6-1.

FINDINGS:

o Part 5 of the Radiological Control Manual specifies the criteria for identifying and posting controlled areas within WVDP, which includes radiation levels, contamination levels and airborne activity levels.

* Posting and labeling of radiological areas and radioactive materials throughout WVDP are generally adequate. The following exceptions were observed:

  - Two locations were noted in which clean empty drums were marked "radioactive" and the standard radiation symbol displayed. This dilutes the value of required markings.

  - Lagoons 4 and 5 were marked by a post on each side rather than by a rope or chain barrier as required by Article 251 of the Radiological Control Manual.

  - The location of the controlled area boundary at the exit from the Process Bldg. to the manipulator repair area was not clearly marked.

  - The survey location for the LS-2 tent storage area is approximately 200 yards from the exit of the building across an uncontrolled area.

  - Radioactive material was stored directly adjacent to the barricade in one outdoor radioactive material storage area in noncompliance to Article 335 of the Radiological Control Manual.

CONCERN: (RP.3-1) (H3/C1) Posting and labeling of radiological areas and radioactive material were not always in compliance with WVDP Procedures, requirements and good practice. See Concern AX.3-1.

FINDINGS:

o Radiation work permits are posted at the work site and removed at the expiration of the permit (a maximum of 24 hours) or the completion of the job.

o DOE occupational safety postings were noted at numerous locations in the plant.

o All personnel who are permitted to handle radioactive materials are trained as radiation workers. In addition,

special training is provided for fuel handlers and for those involved in shipping and transport.

- o Inventories of stored radioactive materials appeared to be complete and comprehensive and included locations, quantities and characteristics of the material. Some areas of the plant have not been entered and no inventories exist for these areas.

- o An inventory of radiation sources is maintained and leak checks are conducted every 6 months.

- o There are no radiation generating devices operated by WVDP personnel. However, radiation generating devices used on site for nondestructive testing are controlled by WVDP procedures and controls. Article 316 of the Radiological Control Manual describes the controls required.

CONCERN: None.

## RP.4 EXTERNAL RADIATION EXPOSURE CONTROL PROGRAM

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

FINDINGS:

- The Radiological Control Manual defines the radiation control program for identifying and monitoring radiation areas and specifies the levels at which areas are to be posted including hot spot identification and posting.
- Hot spots, those locations greater than 20 times the general area dose rates, were observed labeled at many locations throughout the plant in compliance with written procedures. High-radiation areas in the facility are either locked or appropriately barricaded to prevent entry.
- Routine and special radiation surveys are conducted of radiation areas to determine radiological conditions.
- A color coding system is used in the process building to identify low, medium, and high dose rate areas to inform personnel. See Performance Objective RP.12.
- Radiation Work Permits (RWP) are used for most radiation work. The information included on the RWP includes dose rates, exposure permitted, and stay times if applicable.
- Procedures are available and used if needed to minimize exposure to skin and extremities. Remote equipment is used as necessary to reduce dose.
- An extensive ALARA program is implemented which includes detailed dose estimates for all tasks for which the exposure may be 100 mrem total dose or greater. See Performance Objective RP.12.
- Both temporary and permanent shielding is used to reduce external radiation to personnel. Shielding considerations are included in facility modifications and design.
- Prejob briefings are conducted for radiation work and several examples of the use of mock-ups and practice training were observed.
- Each RWP covering work in which personnel received 5 millirem or more is reviewed by the ALARA engineer.
- Radiation exposures greater than 100 mrem in a day require the written approval of the Manager, Radiation and Safety.
- The radiation doses to radiation workers are determined monthly from dosimeters. A written report of monthly

dose and accumulated annual dose is transmitted to each worker monthly and to appropriate supervisory personnel.

- The ALARA engineer performs a monthly trend analysis of actual exposure compared to the "budgeted" exposure for each of 26 work groups. Results of the ALARA engineer's analysis are transmitted to the applicable supervisors and management for their review and action if needed.

**CONCERN:** None.

## RP.5 EXTERNAL DOSIMETRY (ROUTINE AND ACCIDENT USE)

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

FINDINGS:

- o External dosimetry calibration procedures are adequate to cover the range of exposures, energies, and type of radiation anticipated. Calibration dosimeters, nonblind performance testing dosimeters, and quality control dosimeters are provided by the Radiological and Environmental Sciences Laboratory (RESL) at the Idaho Nuclear Engineering Laboratory. WVDP participates in an intercomparison program with Pacific Northwest Laboratory. An internal dosimetry quality control program is employed using nonblind dosimeters irradiated by RESL.

- o WVDP is participating in the Department of Energy Laboratory Accreditation Program (DOELAP) to test its dosimeters. They have received verbal communication that they have passed the performance testing and are awaiting the site visit.

- o All radiation workers are issued a dosimetry badge. Monthly processed badges are issued to individuals whose total penetrating dose is expected to exceed 400 millirem/year. Those individuals whose total penetrating dose is expected to be less than 400 mrem/year are issued quarterly processed badges. The dose rate levels for assignment of process frequency are based on maximum missed dose considerations. Neutron dosimetry is not used at WVDP and the bases are documented in the DOELAP application.

- o Extremity and other types of special dosimetry are issued if extremity doses are expected to exceed a ratio to the whole body dose of 15:1 for feet and hands, 5:1 for forearms, and 3:1 for unlimited area of the skin of the whole body. In addition, special dosimeters are issued for entry to areas where the radiation fields are not well characterized. Dosimeters are worn in such a manner that the highest exposure should be measured. The dosimeters used are capable of accurately measuring doses up to 250 rem. Field surveys are used to determine the need for special dosimetry.

- o Correction factors are employed to ensure that exposures from the dosimeters are accurately recorded in rem. The error range of the dose measurements from the dosimeters employed at WVDP is documented.

- o By procedure, visitors to radiological control areas are issued dosimeters. Contact with RESL verified that they report visitor exposures in accordance with DOE 5484.1A.

- o Personnel radiological exposure histories are readily available to workers, supervisory personnel, and radiological control personnel when needed to assure exposure is within limits.

- o A procedure is available for estimating the dose if a dosimeter is lost or damaged.

- o External dosimetry operations and interpretations are performed by a qualified Dosimetry Health Physicist. Records of personnel exposures and methods of determining them are permanently maintained and readily retrievable.

- * DOE 5480.11, Section 9.f(2) addresses the assessment of nonuniform exposures to the skin. The WVDP implementation plan for DOE 5480.11 set the anticipated compliance date for this section as June 30, 1989. There is no procedure in place to assess subject exposure to the skin.

CONCERN: (RP.5-1) (H3/C1) The absence of a procedure regarding assessment of nonuniform exposure to the skin is not in compliance with DOE 5480.11, Section 9.f(2).

FINDINGS:

- o The WVDP dosimetry program incorporates ANSI standards N13.5-1972 and N322-1975 concerning the self-reading dosimeter program.

- * Fixed and personal nuclear accident dosimeters (NADS) are required in the Fuel Receipt and Storage (FRS) area per DOE 5480.5. However, the personal NADS are not issued to all personnel that have access to the FRS. Personal NADS are incorporated into all monthly processed dosimeters but not into quarterly processed dosimeters. Some quarterly processed dosimeter wearers have access to the FRS.

- * DOE 5480.1A, Chapter XI, Paragraph 4.C, states the NADS should be capable of determining the first collision fission neutron dose at its location within ±25 percent. The paper IDO-12094, by V. P. Gupta, et al, A New Fixed Nuclear Accident Dosimetry System for the Idaho National Engineering Laboratory, which describes the fixed NAD used at WVDP states, in part: "Based on the results of these intercomparisons, the 25 percent accuracy figure called for in the DOE 5480.1 must be regarded as a goal rather than a readily achievable figure." In addition WVDP cannot respond to the requirements concerning the personal NADS as they have no information on site concerning the capability of the units.

- * Routine verification of the integrity of the fixed nuclear accident dosimeters is not conducted.

* WVDP does not have a method for initial screening of personnel involved in nuclear accidents or methods for analysis of biological materials (including sodium-24 activity and phosphorous-32 activity in hair) as required by DOE 5480.1A, Chapter XI, Paragraph 4.C.

CONCERN: (RP.5-2) (H3/C1) The nuclear accident dosimetry program does not comply with the requirements of DOE 5480.1A, Chapter II. See Concerns ER.2-2 and TS.9-1.

## RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

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

FINDINGS:

- Internal radiation exposures at WVDP are minimized via the use of engineering controls such as primary ventilation systems; the use, as needed, of portable filtration systems; and the effective use of portable containment structures such as tents.

- Continuous air monitors and routine air samples are used along with special samples to determine the airborne radioactivity concentrations. These include approximately 60 continuous air monitor (CAM) units, in which the filters are changed twice weekly and 60 process tour air samples which are changed weekly. In addition, approximately 500 special air samples have been taken through the end of June 1989. Airborne radioactivity areas are clearly identified and posted.

- Radioactive contamination surveys are performed to determine whether contamination areas exist. Smear surveys are performed daily at approximately 50 points that include step-off pads, fume-hood lips, and areas with high potential for contamination. Contaminated areas are clearly marked and barricaded.

- Radiation Work Permit procedures are used to control entry to areas where airborne radioactivity exists or there is a potential due to high levels of contamination.

- Nasal smears are taken on all personnel after they have completed work requiring respiratory protection.

- Eating, drinking, smoking, and chewing are not permitted in airborne radioactivity or contamination areas.

CONCERN: None.

## RP.7 INTERNAL DOSIMETRY

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

FINDINGS:

- o The routine bioassay program at WVDP consists of *in vivo* counting for gamma emitting radionuclides for all workers with an active radiation worker status. In addition, all radiation workers on the monthly dosimeter schedule and respiratory protection qualified radiation workers on the quarterly dosimeter schedule participate in the *in vitro* bioassay sampling program.

- o The routine bioassay program includes a baseline bioassay prior to working in radiologically controlled areas, at least annual *in vivo* and *in vitro* bioassays and a termination bioassay when the individuals work assignment at WVDP is complete or entry into radiologically controlled areas is no longer required for the work assignment. For workers involved in both the *in vivo* and *in vitro* programs both bioassays are performed during the same month.

- o Bioassay measurements are also made whenever individuals are contaminated or suspected of receiving an intake of radioactive material.

- o *In vivo* counting instrumentation is calibrated and maintained on an established frequency based on written procedures. Calibration is accomplished using a Humanoid Systems Realistic Phantom with a set of inert lungs and a pair of Cs-137/Co-60 source lungs. The activity in the radioactive lungs is traceable to National Institute of Standards and Technology. The minimum detectable activity (MDA) for the *in vivo* counter is determined and documented monthly.

- * *In vitro* bioassays are processed by a contract vendor. There was no copy of the vendor's procedures available on site. Therefore Radiation and Safety personnel cannot determine the minimum detectable activity or procedures for prevention of sample cross contamination. Additionally the site does not provide spiked blind bioassay samples to the vendor to verify analysis results.

CONCERN: (RP.7-1) (H3/C2) The quality assurance overview of the *in vitro* bioassay contract vendor does not satisfy industry standards and good practice.

FINDINGS:

- o Individuals that indicate positive activity (equal to or greater than MDA) on two successive *in vivo* counts are further evaluated for intakes. Also individuals that receive two positive *in vitro* bioassay results are further evaluated for intakes.

* A radiation dose is calculated following a confirmed intake. However, the calculation methodology is not documented by procedure or policy.

CONCERN: (RP.7-2) (H3/C2) The procedure and technical basis for internal dose calculation have not been formalized.

FINDINGS:

- o WVDP has a documented policy on work restrictions as a result of internal exposure.
- o Procedure for *in vitro* and *in vivo* bioassay of visitors to radiation areas are established. Visitors who fulfill the site specific qualifications for radiation workers are reclassified as radiation workers and no longer classified as visitors.
- o Personnel who fail to receive a bioassay during the scheduled month have their dosimeter pulled on the following month. This prevents entry to radiological controlled areas. The dosimeter is restored following bioassay.

CONCERN: None.

## RP.8 FIXED AND PORTABLE INSTRUMENTATION (NORMAL AND EMERGENCY USE)

**PERFORMANCE OBJECTIVE: Radiological protection instrumentation used to obtain measurements of radioactivity or personnel dosimetry should be calibrated, used, and maintained so that results are accurately determined.**

FINDINGS:

- o Radiological protection normal and emergency instrumentation and instrumentation calibration activities are consistent with the appropriate ANSI standards.

- o Instrument selection is based upon the performance experience of instruments previously purchased and the desire to maintain a standard set of instruments. The complement of instruments at WVDP satisfies the needs of the radiological protection program and allows instruments to be available for calibration when scheduled. Instruments with capabilities of up to 1,000 R/hr and extendable detectors are available. The instrument inventory includes 51 semiportable personnel contamination monitoring instruments, 58 portable alpha and beta contamination monitoring instruments, 30 ion chamber beta/gamma survey instruments, and 3 high-range extendable probe gamma survey instruments.

- o All instruments, except the Process Tour Air (PTA) sample flowmeters are calibrated every 6 months. The PTA flowmeters are calibrated annually. Records of all calibrations, maintenance, and repairs are maintained by WVDP.

- o Instrument calibration sources are traceable to the National Institute of Standards and Technology. The sources available are adequate to calibrate to the dose rate ranges recommended by the instrument manufacturer. The source used to calibrate dose rate instruments is cesium 137 and the principle isotope on-site is also cesium 137.

- o Instruments have calibration stickers that indicate the most recent calibration date and the due date for the next calibration. An adequate system of recall for calibration has been established. Adequate facilities for decontamination of instruments are available.

- o A red "Do Not Use" tag system is used to identify instruments which are damaged or which fail to meet the functional check requirements.

- o Check sources are available to verify that instruments are operational prior to use in the field. The check sources on the personnel contamination monitoring and alpha and beta contamination survey instruments use thorium welding rods of predetermined activity. The

response level is indicated on the instrument by calibration personnel. The beta/gamma survey instruments are response checked on a strontium fan source that will check each scale of the instrument. Procedures and/or instrument indicators are available so that workers can determine if the instruments are operating.

- o WVDP uses several shielded and unshielded survey booths throughout the facility. A timer with a buzzer has been installed at each of the survey booths to encourage each individual to survey for the required 2.5 minutes determined to be necessary for a comprehensive personal survey. Personnel are instructed to start the timer when the survey is started and to continue the survey at least until the timer alarms. Once the timer is started, there is no way to reset it until the 2.5 minutes have passed.

- o Radiation workers used the timer at numerous locations.

- o There are fixed instruments located in the plant areas which are adequate to assess abnormal conditions. All alarm locally and those that are significant for personnel protection are alarmed in the control room.

**CONCERN:** None.

## RP.9 RESPIRATORY PROGRAM

**PERFORMANCE OBJECTIVE: The respiratory program should ensure optimum protection against internal radiation exposures to workers.**

This Performance Objective is covered under Performance Objective PP.2.

## RP.10 AIR MONITORING

**PERFORMANCE OBJECTIVE: Air monitoring systems selection, location, calibration, and maintenance should ensure reliable estimates of air activity for radiological control purposes.**

FINDINGS:

- o The Radiological Control Manual defines the WVDP controls for airborne radioactivity and includes the respiratory protection program, the air sampling program, controls for personnel exposure to airborne radioactivity, and the ventilation system requirements.
- o The location and frequency of filter exchange for general area air samples are defined in Radiological Control Procedure RC-74.
- o Continuous Air Monitors (CAMs) are used at approximately 60 locations in the facility to alert workers to changes in air concentrations.
- * Many of the CAMs use a copper tube as the inlet line from the area to be sampled to the instrument. Inlet lines were observed to be as long as 10 feet.
- * No documented study has been performed to determine the particulate loss and plate-out in the inlet lines and the effect of line loss on the measured air concentrations on CAMs.

CONCERN: (RP.10-1) (H3/C2)

The particulate losses in inlet air sampling lines and the effect on measured air concentrations on CAMs have not been determined.

FINDINGS:

- o Both alpha and beta-gamma CAMs are used for continuous air monitors. In addition, 60 general area samples, called Process Tour Air Samples (PTA), are located throughout occupied areas of the plant.
- o CAM air sample filters are changed twice weekly. The PTA samples are changed weekly. Each air sample is initially counted for gross activity, retained for one week for decay of natural radioactivity and recounted.
- o The sampling equipment used, the frequency of sampling, and the analysis performed are appropriate to the activities conducted and the radionuclides in the facility.
- o In addition to the routine air sampling, special air sampling is conducted for areas where routine sample results are unavailable. Approximately 500 special samples were taken in the first 6 months of 1989.
- o Air concentration levels at which respirators will be worn are specified in the implementing procedures.

Allowable protection factors for plant supplied respirators are specified.

- o For personnel entry into areas in which the air concentrations are above specified levels, the written approval of the R&S Manager is required.

- o Air samples are counted on Tennelec LB5100 Series II, alpha/beta gas proportional counters or a Canberra Series 40 MCA counter. Radiation Control Procedures RC-IOC-22 and RC-IOC-23 provide the operating and setup instructions for the counters.

- o Air samples are checked for gross contamination prior to placing in the counters to minimize potential contamination of the counters.

- o Counting equipment and calibration procedures are adequate and appropriate for the filters used and the radionuclides of concern.

- o Breathing zone air samples are available and are used when deemed appropriate.

**CONCERN:** None

## RP.11 RADIOLOGICAL MONITORING/CONTAMINATION CONTROL

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

FINDINGS:

- o WVDP has a documented radiological monitoring program which includes periodic routine dose rate and contamination surveys. The program includes frequency and location of surveys, procedures and criteria for completion of survey forms, acceptable survey levels, evaluation of results, and reporting of off-standard results. Surveys are conducted in such a manner that they are consistently repeatable; therefore, trendable. See Performance Objective RP.12.

- o Radiation areas are established and posted if dose rates exceed 2.5 mrem/hr and do not exceed 100 mrem/hr. High radiation areas are established and posted if dose rates exceed 100 mrem/hr. The posting signs for these areas meet the requirements of DOE 5480.11. Most high radiation areas are locked.

- o Limits are established and documented for airborne radioactivity and contamination levels that require respiratory protection. The limits, where applicable, are related to DOE guidance.

- o Area monitoring equipment has readouts and alarms adequate to inform workers of radiation levels in their areas.

- o All applicable sealed sources on the WVDP site are leak tested every 6 months by a Calibration Technician.

- o WVDP has a documented contamination control program that includes the following:

  - established contamination control limits for personnel, equipment, and surfaces;

  - identification and posting of contaminated areas;

  - daily contamination survey routines including all step-off-pads, fume hood lips, and areas with significant potential for contamination;

  - procedures for unrestricted release of personnel, materials and equipment, and areas;

  - Radiation Work Permit requirements for all contamination area entry with the exception of two areas where activities are covered by SOPs;

  - procedures for use of step-off-pads;

- procedures for the use and removal of anticontamination clothing;

- procedures requiring self-survey after exiting a contamination area;

- procedures for investigations of personnel contamination with requirements for documentation; and

- procedures for maintenance and repair work in contamination areas.

o WVDP has an adequate supply of protective anticontamination clothing and a laundry to wash contaminated clothing. Laundry procedures require specific radiological protection assessment of incoming laundry exceeding 5,000 cpm of contamination.

o A personnel decontamination area with required supplies is available. A new decontamination facility, now under construction, will enhance personnel decontamination.

o There are five proportional counters on-site capable of counting smears and air samples.

CONCERN: None.

## RP.12 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.**

**FINDINGS:**

- o WV-984 of the WVNS Policies and Procedures Manual defines the WVDP ALARA program and assigns the responsibility for the ALARA program for occupational radiation exposure to the Manager of Radiation and Safety.
- o The Manager of Radiation and Safety has delegated the responsibility to an ALARA engineer in the Radiological Engineering group.
- o The personnel of WVDP have been separated into 26 different ALARA groups, depending upon work activities, and an estimate of annual radiation dose is developed by the manager for each group. The estimated radiation exposure is transmitted to the ALARA engineer and an "ALARA budget" which considers work efficiency is negotiated and prepared. The budget is reviewed by senior management and given to the working organizations for implementation.
- o The monthly radiation dose report is reviewed by the ALARA engineer and the exposure of each group is compared to the budgeted amount, an evaluation made, and trend charts prepared.
- o All standard operating procedures and work orders issued for radiation work are reviewed by the Radiological Engineering group for ALARA concerns and exposure use.
- o All Radiological Work Permits which show a radiation dose in excess of 5 millirem are sent to the ALARA engineer for review and evaluation of exposure dose.
- o SOP 0-02, "Use of Standard Operating Procedures and Special Instruction Procedures," requires that a detailed written dose estimate be prepared for any task for which the radiation dose may exceed 100 millirem total dose.
- o SOP 0-08, "Use of Work Orders and Shop Orders," requires that a detailed dose estimate be prepared for all work orders in which the radiation dose may exceed 100 millirem total dose.
- o Discussions with maintenance personnel, operations personnel, and radiation control technicians indicated that prework meetings are routinely held for tasks that involve radiation exposure to review the potential for reducing exposure.

- o Mock-ups and practice exercises are used in preparing for potentially high exposure work.

- o Draft procedures to formalize the ALARA review process and for the preparation of the annual ALARA budget proposal and program summary were prepared and in the approval process at the time of the appraisal.

**CONCERN:** None.

## RP.13 RECORDS

**PERFORMANCE OBJECTIVE:** Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

**FINDINGS:**

- o Records related to occupational radiological exposure are adequate to demonstrate compliance with DOE 5480.1A, Chapter XI; DOE 5484.1A; and DOE 1324.2. The reporting functions required by DOE 5484.1A are performed by the Radiological and Environmental Sciences Laboratory (RESL) at Idaho National Engineering Laboratories (INEL).

- * Some records required to be retained by DOE 1324.2 are stored in the radiation protection office in a fire retardant cabinet. Others are stored in the open in the unsprinklered office. The instrument calibration records are stored in nonfire retardant cabinets in an unsprinklered office.

**CONCERN:** (RP.13-1) (H3/C1)
Some of the operational records are susceptible to loss since they are not stored in fire retardant cabinets or sprinklered areas, or duplicated and stored in two separate areas.

**FINDINGS:**

- * Records are systematically generated per procedures and meet the requirements of ANSI N13.6-1966 with two exceptions. The air sampling records do not contain information that would be required to recreate the results of the sample such as certain sampling and counting data and the source used to calibrate dose rate instruments was not identified on the calibration form.

**CONCERN:** (RP.13-2) (H3/C2)
Some radiation protection records omit information recommended by ANSI N13.6-1966.

**FINDINGS:**

- o Employees are provided with an annual report of their occupational radiological history. In addition, each employee receives a monthly report of their radiological exposure.

- o All documents requested were readily retrieved by the WVDP Records Management Group.

**CONCERN:** None.

## M. PERSONNEL PROTECTION

The Personnel Protection Program at the WVDP is generally consistent with the intent of DOE orders, WVNS policies, and general industry practices. Management policy directives, performance standards, and implementing guides have been issued; line management accountability clearly established; technical resources provided; and employee compliance observed. A positive safety attitude and commitment to health and safety objectives was observed in all levels of the WVNS organization. Six items were observed during the appraisal that warrant corrective action to enhance specific elements of the program.

The WVNS statistical safety performance is better than DOE, DOE/ID, and general industry performance averages. From 1983 through 1987 there was an undesirable upward trend in accident statistics; however, there appears to be significantly improved statistical performance in all areas since 1987. WVNS has reported no occupational illnesses associated with WVDP activities, and there is no evidence of potentially excessive chemical exposures that may result in acute or chronic disease. Review of programs provided evidence of consistent improvements in the industrial safety and hygiene programs over time and additional program emphasis are planned.

Previous appraisals by DOE/ID had rated the industrial hygiene program as "low excellent"; this rating could not be confirmed during this appraisal. Five (5) specific concerns are noted in the industrial hygiene program and a sixth concern noted in the industrial safety program area equally applies to the industrial hygiene area. Each of the concerns noted reflected deficiencies in program development and implementation. WVNS has recently added an industrial hygienist to the WVDP technical staff. The availability of this technical resource should facilitate significant enhancements to the industrial hygiene program.

The industrial safety program was judged to be generally satisfactory; however, review of work packages is of concern. This concern ranges from industrial work permits for specific tasks through major facility design reviews.

A noteworthy practice was identified with respect to the health assessment of visitor and subcontractor personnel by WVNS. This assessment allows the medical staff to be aware of physical limitations of all on-site personnel. Such a health assessment was instrumental in the medical staff promptly diagnosing and treating an unconscious subcontractor employee.

## PP.1 INDUSTRIAL HYGIENE PROGRAM CONTENT

**PERFORMANCE OBJECTIVE: The industrial hygiene program should minimize the probability of employee illness, impaired health or significant discomfort by identifying, evaluating, and controlling those stresses arising in the workplace.**

FINDINGS:

- o There is no evidence of acute or chronic disease, based on review of available records, as a result of work assignments with nonradiological chemical and/or physical agents at the WVDP.

- o The WVNS guidance policy for the industrial hygiene program is provided in WV-900, "Industrial Hygiene and Safety," WVNS Policy and Procedures Manual. Implementation directives are documented in Chapter 2, WVDP-010, Industrial Hygiene and Safety Manual, as an integral part of the plant health and safety program. The policies and directives appropriately reference DOE prescribed standards.

- o WVNS hired on July 10, 1989, a formally trained industrial hygienist to enhance development and implementation of industrial hygiene program elements. See Performance Objective PP.4.

- o Facility tours and review of incident reports indicate employees routinely observe safety and health rules and use prescribed personal protective equipment. Observed failure to wear personal protective equipment was limited to personnel not observing good work practices, rather than mandatory requirements (i.e., grounds personnel not wearing hearing protection while utilizing power tools). It was similarly evident that supervisors implement industrial hygiene recommendations.

- o WVNS policy and observed practice confirmed the hierarchy for control of hazards favors engineering control; process changes or material substitution, where possible; administrative control; and only then personal protective equipment.

- o Control measures are implemented when potential hazards are identified.

- o Other than asbestos, there are no known (nonradiological) carcinogens within the WVDP facilities. Use of asbestos is limited to building materials and thermal insulation installed in early construction eras.

- o The proficiency of the emergency preparedness/emergency response capabilities of the industrial hygiene program were not observed during the appraisal nor demonstrated in review of documented emergency exercise reports.

* The industrial hygiene activities conducted at WVDP do not reflect a program developed and implemented to meet the objectives of DOE 5480.10 (as issued in June 1985).

  - The industrial hygiene program does not include an inventory of potential chemical/physical hazards by work area, facility, or operation. Similarly, routine surveillance of potential hazards is not conducted to confirm adequate control. See Performance Objective PP.5.

  - Initial monitoring is rarely conducted to confirm the basis of potential hazards or recommended controls. See Performance Objectives PP.2 and PP.6.

  - Records are not prepared or maintained as required by DOE 5480.10, Paragraph 9,f. The lack of such records does not permit credible estimates or assessments of potential employee exposures to workplace agents of significance.

  - WVNS has previously identified the need to enhance the industrial hygiene program at WVDP (WVNS Internal Technical Safety Appraisal, October 1988.)

**CONCERN:** (PP.1-1) (H2/C1) The industrial hygiene program does not meet the intent or requirements of DOE 5480.10 in the areas of hazard assessment, surveillance, and record keeping.

## PP.2 CHEMICAL CONTAMINATION

**PERFORMANCE OBJECTIVE:** Chemicals should be controlled so as to minimize contamination of areas, equipment, and personnel.

**FINDINGS:**

- o Facility tours and review of operating policies, procedures, and directives confirmed that WVDP operations currently meet this objective.
- o Process, operating, mechanical, and/or administrative controls are commonly implemented where potential chemical/physical hazards have been identified.
- o Operator and supervisory training programs include awareness in the use, maintenance function, and expected performance of environmental/chemical contaminant control systems.
- * WVNS utilizes an Industrial Work Permit (IWP) system to identify and review proposed new or modified materials process, facilities, and operations. Note comments regarding IWP in Performance Objective PP.7.
- * Periodic inspection and maintenance programs are commonly established for mechanical engineered contaminant control systems. However, routine performance surveillance of laboratory fume hoods is not conducted. In addition, training and procedures to assure proper use of laboratory fumes at adequate hood velocities was not evident. See Performance Objective AX.4.
- * A scheduled periodic performance, inspection, or equivalent program for laboratory fume hoods and similar workplace mechanical exhaust systems has not been implemented.

**CONCERN:** (PP.2-1) (H2/C2) Physical controls to assure that laboratory hood ventilation velocities are maintained at safe levels were not in place and laboratory technicians were not effectively trained in the requirements or bases for such controls.

**FINDINGS:**

- * Review of the respiratory protection program resulted in the identification of numerous specific deviations from DOE prescribed standards. Examples include:
  - Air purifying respirators stored for emergency use were not inspected monthly [29 CFR 1910.134(b)7].

- Lack of documented surveillance of potential respiratory hazards to obtain data to confirm proper respiratory protection selected [29 CFR 1910.134(b)8; Paragraph 6.4, ANSI Z88.2-1980].

- Lack of documented inspection/evaluation to determine the continued effectiveness of the program [29 CFR 1910.134(b)9; Paragraph 10.1, ANSI Z88.2-1980].

- Lack of documentation for 1987 and 1988 that compressed air meets grade D breathing air quality standards [29 CFR 1920.134(d)1; Paragraph 5.2, ANSI Z88.2-1980].

* Common practice, in DOE facilities utilizing air purifying type respirators for protection from potential airborne radioactive particulates, is to conduct 100 percent quality assurance acceptance testing of filter canisters. This practice is normally extended to testing completely assembled respirator units. Product rejection rate experience at other DOE facilities warrants consideration of this practice by WVNS.

**CONCERN:** (PP.2-2) (H2/C1) The respiratory protection program does not assure compliance with DOE prescribed standards are industry practices.

## PP.3 HAZARD COMMUNICATION

**PERFORMANCE OBJECTIVE: Facility personnel should be adequately informed of chemical, physical, and biological stresses they may encounter in their work environment.**

**FINDINGS:**

- o WVNS has implemented a formal hazard communication program directed at meeting the intent of OSHA as noted in 29 CFR 1910.1200. The program includes the ready availability of manufacturer's Material Safety Data Sheets (MSDS) in supervisory offices, selected work areas, and central files in the industrial safety offices. Orientation training is provided to all new hires and has reportedly been completed for all plant personnel.

- o The program is documented in WV-988, "Employee Right to Know Program," issued in May 1986.

- o Interviewed personnel were knowledgeable of the availability, location, content, and use of MSDSs. They were also knowledgeable of the Safety Department's supplemental information resources. The individuals reportedly utilized the available information.

- o Prejob work packages, via the IWP system, were observed to commonly identify potentially hazardous materials and provide appropriate guidance.

- * Program deficiencies were noted by WVNS in the October 1988, internal technical safety appraisal and confirmed and reconsidered during the current appraisal. Examples include:

  - Lack of labeling on tanks and vessels indicating chemical content and/or uniform hazard ratings.

  - Lack of lists of hazardous chemicals present in various facilities and/or process areas.

  - Lack of uniform labeling/guidance for labeling secondary containers (container used after transfer from vendor packaging).

**CONCERN: (PP.3-1) (H2/C1)** The hazard communication program, as implemented, does not meet the intent of DOE Orders, prescribed standards, and industry practices for the identification and labeling of chemicals in the workplace.

## PP.4 STAFFING

**PERFORMANCE OBJECTIVE: The evaluation of chemicals and physical and biological stresses should be performed by personnel that have the knowledge and practical abilities necessary to implement personnel protection practices effectively.**

FINDINGS:

- Present staffing in the industrial safety and hygiene disciplines is adequate to meet the programmatic requirements of the WVDP. The development and enhancement of program elements in the industrial safety and hygiene areas will require similar advancement in the technical skills to support operational needs. Management is providing the support necessary to obtain technical capabilities as required. Organizational assignments may be required to provide adequate technical and inspection support to the new industrial hygienist.

- Accountability for industrial safety and hygiene in the workplace is clearly assigned as line management responsibility with guidance and technical support provided by the industrial safety section.

- On July 10, 1989, a formally trained and experienced Industrial Hygienist joined the WVNS Technical Staff. He is to report directly to the Radiological Engineering Manager. The Supervisor of the Industrial Safety section has 7 years experience at the WVDP and over 15 years experience in the health and safety field. He is supported by three nonexempt salary personnel that provide technician and inspection support to the section.

- The responsibilities of the Radiation and Safety Department are identified in Paragraph 1.5.4 of the WVNS Industrial Hygiene and Safety Manual. Industrial hygiene and safety are also included in the Department's charter. Responsibilities for the occupational medical program are described in the WVNS Occupational Health Manual. These management endorsed documents adequately describe responsibilities and authorities for program implementation.

CONCERN: None.

## PP.5 SURVEILLANCE

**PERFORMANCE OBJECTIVE: The surveillance of chemical, physical, and biological stresses should insure that potential personnel exposures are accurately determined and recorded.**

FINDINGS:

- o WVNS has the technical resources and equipment available to accurately monitor and record potential personnel exposure to chemical and physical stresses.

- * Monitoring is currently performed on a limited basis, and generally only upon specific request, by industrial safety personnel. A routine monitoring program is not in place to assure the implementation of this performance objective.

- * A record system does not exist which would permit estimates of credible exposures to (nonradiological) chemical, physical, and/or biological stresses in the workplace. This would include data from personal, co-worker, area, job-task, or operational sources.

- * Potential process related chemical exposures of significance would include, but not be limited to, sodium hydroxide, portland cement-and nitric and sulfuric acids; similarly, support operations may involve potential exposures to chlorine, ammonia, diesel fuels, solvents used for radiological decontamination, and welding fumes. Essentially, no data exists regarding potential personnel exposure levels. This is not to suggest excessive exposure to chemicals actually occur. However, the lack of objective data is inconsistent with DOE 5480.10, Paragraph 9.b(4), or the intent of this performance objective.

- * The DOE prescribed standard for occupational exposure to asbestos requires periodic monitoring at no greater than six month intervals [29 CFR 1910.1001(d)(3)]. The DOE prescribed standard for construction related tasks, including demolition or repair of pipe systems insulated with asbestos containing materials, may be interpreted to require even more frequent monitoring [29 CFR 1926.58(f)(3)]: WVNS has collected only one set of samples (in 1987) to document potential exposures to asbestos during demolition, maintenance, and/or repair operations.

- * There is no evidence that the limited monitoring data available are routinely reported to line management or employees.

* The lack of an adequate surveillance and reporting program was noted in an internal appraisal conducted by WVNS, October 1988.

CONCERN: (PP.5-1) (H2/C1) A periodic monitoring program, as required by DOE 5480.10, has not been implemented to assure the continued effectiveness of controls for nonradiological chemical and/or physical stresses.

## PP.6 HAZARD EVALUATION

**PERFORMANCE OBJECTIVE: An evaluation of potential exposures to chemical, physical, and biological agents should insure effective implementation and control of personnel protection activities within the facility.**

FINDINGS:

- o Observations during facility tours did not identify failures to effectively implement controls and/or personnel protection for potential exposures to chemical or physical agents.
- o Resources necessary for comprehensive evaluations are readily available and include the following:
  - Copies of applicable codes, standards, and regulations.
  - Industrial hygiene monitoring equipment consistent with potential hazards.
  - A recently hired and formally trained industrial hygienist (July 1989).
  - Management support to obtain additional resources as required.
- o Assessment of exposure potential may be initiated by request from employee and/or management, observations, or concerns by industrial safety personnel or supervision, operational changes, or inquiries by outside agencies.
- * Assessments of potential exposures have not been adequately or objectively documented. This is previously noted in Performance Objectives PP.1, PP.2, and PP.5.

CONCERN: See Concerns PP.1-1, PP.2-1, and PP.5-1.

## PP.7 OCCUPATIONAL SAFETY

**PERFORMANCE OBJECTIVE: All workplaces of the facility should be as free as possible from occupational safety hazards so that employees are effectively protected against accidental death or injury.**

FINDINGS:

- o WVDP facilities and processes were generally observed to be free from uncontrolled occupational safety hazards. However, several deficiencies of safe work practices were observed including tasks involving excavation and or shoring, securing compressed gas cylinders (northeast corner nitric acid/sodium hydroxide tank farm), inconsistent practices regarding wearing of safety glasses in shop areas, and open top mixing caustic slurry tanks in mini-melter area.

- o The WVNS/WVDP statistical safety performance is better than the DOE and DOE/ID averages and national safety council industry specific averages.

STATISTICAL SAFETY PERFORMANCE
(Incidents Per 200,000 Hours of Exposure)

| | WVNS[1] | DOE/ID[2] | DOE[3] | NSC[4] |
|---|---|---|---|---|
| Recordable injury incidence rate (RIIR) | 0.84 | 1.6 | 2.2 | 6.5 |
| Lost workday case incidence rate (LWDCIR) | 0.3 | 0.8 | 1.1 | 2.8 |

[1]1988 Data: 1985-88 RIIR Range 0.84-2.3 and LWCIR Range 0.15 to 0.7.
[2]1988 Data
[3]1983 - 1987 Average (Latest Available Data)
[4]1982 - 1986 Average - National Safety Council Nationwide (Latest Available Data)

- o There has been one recordable injury at WVDP to date in 1989. The statistical safety performance from 1983 to 1987 indicated an undesirable upward trend; however, first aid, recordable, and lost workday cases all appear to show a significantly improved downward trend since 1987.

- o The WVNS guidance policy for the industrial safety program is provided in WV-900, "Industrial Hygiene and Safety," WVNS Policy and Procedures Manual. Implementation directives are contained in WV 900

series policies and in Chapter 3, WVDP-010, Industrial Hygiene and Safety Manual, as an integral part of the plant health and safety program. The policies and directives appropriately reference DOE prescribed standards.

o Machine guards are in place for machines with moving and rotating parts. With rare exceptions, compressed gas cylinders are properly inspected, stored, and maintained.

o Appropriate personal protective equipment is made available to employees.

* The industrial safety program is strongly based on the IWP system. This system is intended to require reviews by the job supervisor/cognizant engineer, area supervisor, and the Radiation and Safety Department of all project/tasks involving potential safety hazards. The concept appears sound but implementation is incomplete. Examples include the following:

  - The IWP states it can be issued for a maximum of 7 days. The IWP in the VF has been approved for 30 days.

  - Operational Plant Deficiency Reports (OPDRs) requiring IWPs were completed without obtaining the IWP or safety reviews.

  - The IWP is utilized to control the work of contractors on-site. The IWP was observed to be inefficient in providing adequate shoring in an excavation project near the diesel fuel tank.

  - The review of work orders, standard operating reviews, and facility design documents were commonly limited to the comment "obtain IWP." There is evidence that this practice resulted in less than complete safety review of all work packages. A new mixing tank containing a caustic slurry was observed in operation without adequate enclosures. The required IWP did not address potential hazards involved. Enclosures for the tank should have been an initial design item.

**CONCERN:** (PP.7-1) (H2/C2) The IWP system is utilized to identify and control potential industrial safety/hygiene hazards in operating facilities; however, the system is implemented inconsistently.

## N. FIRE PROTECTION

The WVDP fire protection program has the components of a comprehensive fire inspection and preventive maintenance program. Other components of the WVDP fire protection program include verifiable documented fire safety requirements for on-site subcontractors, a monthly open action item tracking system for fire safety deficiencies, and reviews of potential fire hazards.

In practice, sustained implementation of such a program has not yet been demonstrated. WVNS does not address fire inspection and testing of fire suppression equipment and systems expeditiously nor according to a formal scheduled program. Surveys and appraisals performed as early as 1982 identified the need for a formal preventive maintenance inspection and testing program for all fire protection equipment. WVNS has issued contracts for the inspection and testing of extinguishment systems on a semiannual basis, but no testing has been performed under these contracts.

At present, the WVDP site is not in full conformance with the NFPA Life Safety Code nor does it qualify as an improved risk facility. The site lacks a prefire plan for fire suppression strategy and tactics. Reviews of design and construction do not always involve participation by fire protection staff. Fire protection improvements and systems are not always implemented in a timely manner. Several earlier surveys and appraisals of the WVDP site revealed numerous fire safety deficiencies in addition to those identified in this appraisal. This reliance on independent surveys and oversight groups to identify problems highlights the fact that deficiencies are not being identified and resolved internally by WVNS.

## FP.1 LIFE PROTECTION

**PERFORMANCE OBJECTIVE:** The facility should not present an unacceptable hazard to life from the results of accidental fire.

FINDINGS:

* In the Process Office Building, a stub corridor on the second floor was part of the stairwell but is not isolated and reinforced to conform to the National Fire Protection Association (NFPA) 101, Section 6-2.2 for enclosed stairwells.

* On the third floor of the Process Office Building, the fire door at the end of a stub corridor adjacent to the stairwell is not located at the stairwell entrance to conform to NFPA 101, Section 6-2.2.

* The back stairwell in the Process Office Building to the Process Building does not have battery-operated emergency lights to conform to NFPA 101, Section 28-2.9.1.

* In the Process Building, the lighted exit sign on the Chemical Viewing Aisle was obstructed by the personnel contamination monitor. The lighted exit sign at the other end of the aisle was obstructed by a decontamination curtain. Self-luminous directional exit signs were too small for easy viewing. These deficiencies indicate nonconformance with NFPA 101.

* The environmental laboratory had one exit sign not illuminated.

* Life Safety Code deficiencies were identified in a May 1989 survey of WVDP facilities by WVNS. Deficiencies noted included the need for additional egress from buildings, proper identification and accessibility of exits, and automatic sprinkler protection and smoke detection of specific areas to ensure egress safety. WVNS has initiated corrective actions on some, but not all, deficiencies identified by the survey.

CONCERN: (FP.1-1) (H2/C1) The WVDP site is not in conformance with NFPA 101, "Life Safety Code," nor have appropriate exemptions been requested.

## FP.2 PUBLIC PROTECTION

**PERFORMANCE OBJECTIVE: The facility should not pose an added threat to the public as the result of an on-site fire permitting the release of hazardous materials beyond the site boundary.**

FINDINGS:

- The WVDP Safety Analysis Report for the facility did not identify any off-site release of hazardous amounts of toxic materials under credible fire conditions.
- Other independent inspections and appraisals of the facility have not identified a credible off-site release of hazardous materials resulting from potential on-site fires.
- Current inventories of chemicals assure that no credible off-site release from a postulated fire would pose a threat to the public and that release of hazardous materials during a fire could be adequately controlled by the emergency response capability for the site.
- The site inspection, supervision/alarm, and maintenance procedures are sufficient to ensure that the fire protection systems would not allow a credible release of hazardous materials beyond the site boundaries.

CONCERN: None.

## FP.3 IMPAIRMENT OF OPERATIONS

**PERFORMANCE OBJECTIVE:** The facility should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

**FINDINGS:**

- Inspection of the facility indicated that a credible fire would not shut down the facility for more than 3 months, consistent with DOE 5480.7.
- The lack of credible fires with potential impairment of operations has been confirmed by:
  - WVDP Safety Analysis Report
  - independent inspections and appraisals of the site
  - 1987 and 1988 safety audits of the facilities by Westinghouse.
- Impairment of the WVDP site would not have a programmatic impact on any other DOE facility.

**CONCERN:** None.

## FP.4 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A credible fire should not result in an unacceptable property loss.

FINDINGS:

- Safety analysis reviews by WVNS for potential fire hazard scenarios at the facility did not indicate credible fire losses beyond those specified in DOE 5480.7.
- A fire brigade is available on-site 24 hours/day for incipient stage fire suppression and control.
- Backup fire fighting and control are provided by the West Valley Volunteer Fire Department. The estimated response time is 7 minutes following notification.
- Inspection of the facility indicated that no maximum property loss would exceed $1 million due to credible fire scenarios, assuming the functioning of existing automatic fire protection systems, consistent with DOE 5480.7.
- No maximum credible property loss would exceed $50 million assuming the failure of a single protection system, consistent with DOE 5480.7.

CONCERN: None.

## FP.5 IMPROVED RISK

**PERFORMANCE OBJECTIVE: The facility should qualify as an "improved risk" or "highly protected risk" as commonly defined by the property insurance associations specializing in such coverage.**

FINDINGS:

- The WVDP fire protection program is collectively documented by Chapter 5 of the Industrial Hygiene and Safety Manual (WVDP-011, June 1989); Section 333 of the Radiological Controls Manual (WVDP-010, Rev. 2, July 1985); and by the fire safety section of the WVNS Safety, Health, and Security Rules for On-Site Services (WV-19012, Rev. 6, September 1988).

- The Industrial Hygiene and Safety Manual references DOE 5480.7, Fire Protection; DOE 6430.1A, General Design Criteria; and selected DOE publications and prescribed codes and standards. However, the manual has not referenced the guidance documents DOE/EP-0108, Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems, and DOE/EV-0043, Standard on Fire Protection for Portable Structures, nor does it define the actions to be taken to implement DOE 5480.7.

- The publication for on-site services (WV-19012) requires subcontractors to establish and submit for approval a program for fire and explosion prevention and protection and includes requirements on the use and storage of flammable and combustible liquids and compressed gas cylinders. A check of two general subcontractor's safety and fire protection programs verified that this program was in place.

- The fire protection library includes the NFPA fire codes, NFPA handbooks, pertinent documents such as DOE 5480.7, Fire Protection, and DOE 6430.1A, General Design Guide. It does not include DOE/EP-0108, Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems, and DOE/EV-0043, Standard on Fire Protection for Portable Structures.

- A monthly open action item tracking system for fire safety deficiencies is in place. Safety analysis reviews are performed to analyze potential fire hazards.

- Fire loss records are maintained, analyzed, and reported in accordance with DOE 5484.1.

- The WVNS Industrial Hygiene and Safety Manual describes the components of a comprehensive fire inspection and

preventive maintenance program and stated that the WVNS facilities shall maintain adequately trained and competent personnel to conduct fire protection, prevention, and inspection functions.

- o The person responsible for inspection and testing activities served in the areas of industrial hygiene, safety, and fire protection and supervised several people. Recruitment of a health and safety specialist with a fire protection background to assist with the responsibilities is underway.

- * Scheduled inspection and testing activities were monthly visual inspections of exit signs, alarms, portable extinguishers and hoses, and daily, weekly, and periodic maintenance checks of the fire pumps. There was no scheduled annual or semiannual inspection and testing of sprinkler systems, halon extinguishment systems, fire hoses (pressure test), and fire pump flow performance as required by NFPA 13, Section 1-5.1; NFPA 12A, Section 1-11.1; NFPA 1962, Section 2-1.1; NFPA 20, and no measuring of water flow or conducting loop main tests as recommended in NFPA 291.

- * Surveys and appraisals as early as 1982 and 1986 identified the need for a formal written preventive maintenance, inspection, and testing program for all fire protection equipment.

- o As an interim measure, WVNS issued contracts in December 1988 for semiannual inspection and testing of the Halon extinguishing systems and in June 1989 for semiannual inspection and testing of the sprinkler systems. No tests have yet been performed under these contracts.

CONCERN: (FP.5-1) (H2/C1) The scheduled program for inspection and testing of fire protection systems is not in conformance with NFPA requirements and recommended practice.

FINDINGS:

- * Design, construction, and readiness reviews do not assure participation by fire protection personnel.

  - Engineering procedure EP-3-012, dated September 29, 1988, "Engineering Style Guide," defined Level "N" as structures, systems, and components which are not important to radiological safety.

  - Engineering procedure EP-3-011, dated March 6, 1989, "Review, Approval, and Engineering Release," states that a technical specialist review is not required for Quality Level "N" items. This does not recognize that fire protection may still be an important potential consideration.

- Engineering procedure EP-3-007, dated March 6, 1989, "Engineering Change Notice," does not require review of Quality Level "N" items by the Radiation and Safety Department which includes Fire Protection.

* Consistent with the above procedures, the team confirmed that design, construction, and readiness reviews for a Level "N" item (the new warehouse) did not include Fire Protection personnel, even though fire protection considerations are commonly important for facilities of this type.

* The review process has not assured compliance with the NFPA Life Safety Code and with NFPA and DOE requirements for fire protection for all construction.

**CONCERN:** See Concern TS.3-1.

**FINDINGS:**

* A fire in the portion of the Administration facility lacking automatic fire suppression could spread and result in loss of that part of the facility.

  - This part of the administrative facility did not meet DOE 5480.7, Section 9d for sprinkler protection.

  - Sprinkler protection for the unprotected portion of the facility was recommended several times since 1984.

  - Funding for the sprinkler system was requested by WVNS in May 1987, but was rejected by the West Valley Project Office in June 1987.

**CONCERN:** (FP.5-2) (H2/C1) An action plan for assuring protection of the unprotected portion of the Administrative facility has not been developed and implemented in a timely manner.

**FINDINGS:**

* Pendant sprinkler heads are installed in the upright position in the Plant Office Trailer Complex hallway. The upward spray of water from the pendant heads would not give adequate coverage of the hallway due to obstruction by the exposed ceiling trusses. Upright heads, intended for such installation, would provide better spray coverage for this situation.

  - Replacement of the pendant sprinkler heads was recommended in 1985 and 1986

  - A contract was issued in June 1989 to replace the pendant heads

* In the sprinklered Annex Complex, closets across from room 44 were filled with computer cables and combustible storage, but were not protected with

automatic sprinklers. Containers of flammable liquids were left standing in one closet instead of being stored in the safety storage cabinet inside the closet. Unsprinklered closets across from room 46 were also used for combustible storage.

* The Annex Complex telephone room had ceiling-tile size openings on the ceiling and combustible cardboard boxes stacked inside the room. The adjacent closet was filled with telephone cables and wiring with openings in the ceiling to the attic. Some cables in the room served the emergency "all page" notification system for the site. The "all page" system is used in the older facilities in lieu of pull-boxes for notification of fire. The telephone closet across from room 36 was also unsprinklered. DOE 5480.7, Section 9d, requires automatic sprinkler protection for these areas. A May 1989 survey recommended automatic sprinkler protection in the telephone room and adjacent areas.

* In the computer room of the Annex Complex, magnetic tapes and combustible materials including print-out paper, stationery supplies, and packing materials were not stored in totally enclosed metal files or cabinets as required by DOE/EP-0108, Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems.

* The underfloor of the Annex computer room had congested wiring and cables in an 8-inch high space which would likely obstruct the flow from the single Halon nozzle positioned along one side of the underfloor, and preclude proper system operation. Thus, the installation does not comply with DOE 5480.7.

* The vitrification facility control room did not have fire protection except for two portable extinguishers, improperly stored on the floor. Magnetic tapes were not stored in totally enclosed metal files or cabinets as required by DOE/EP-0108. WVNS has initiated a construction package for Halon protection of the room and underfloor space.

* Miscellaneous fire safety deficiencies are not being identified and corrected. For example:

  - The Environmental Laboratory garage had aerosol cans improperly stored on top of safety storage cabinet for flammable liquids due to lack of cabinet space.

  - In the Process Building, the overhead dry chemical extinguishing system in the Analytical Aisle Area, did not have monthly inspections as required by NFPA 17, Section 2-11.2.1. Inspection tags were not readily accessible for monitoring.

- The site fuel oil tank was not labeled. Upon notification of this deficiency, an identification sign was posted for the tank. The storage tanks, adjacent to the fuel oil tank, for sodium hydroxide and nitric acid were not properly identified with the hazard identification system required by NFPA 30, Section 2-8.2; NFPA 49; and NFPA 704, Section 6-1.

- A plastic storage tent containing cardboard boxes, wood ladders, and miscellaneous items was located 2 feet from the end of trailer R in noncompliance with the WVNS Industrial Hygiene and Safety Manual requirement that areas within 15 feet of buildings shall not be used for storage of combustible material.

* A May 1989 survey of the WVDP facilities made numerous recommendations regarding the need for providing and/or modifying automatic fire suppression and detection systems, and removal of combustible material at specific areas. WVNS has initiated corrective actions on some, but not all, deficiencies identified by the survey.

CONCERN: (FP.5-3) (H2/C1) Many fire protection deficiencies are not routinely identified and resolved.

FINDINGS:

o The site water supply consists of two 1000 gpm at 100 psi fire pumps taking suction from a 475,000 gallon aboveground holding tank; 300,000 gallons is reserved for fire protection. One pump is electric driven and one is diesel driven. Water for the holding tank is pumped from two on-site lakes. A by-pass connection has been installed to permit the lake water to be pumped, at reduced pressure, directly into the fire main system. In addition, the West Valley Volunteer Fire Department (WVVFD) has access to the Cooling Tower basin (80,000 gallons) and Lagoon 3 (more than 300,000 gallons) for backup water supplies.

o The WVNS Fire Brigade consists of the Plant Operations Shift Supervisor serving as the Fire Chief, and Operations personnel who are responsible for incipient stage fire fighting. About 60 to 70 people are qualified members of the brigade. There is a minimum of 3 to 4 members on-site during off-shift hours. Each member receives 3 hours of initial training with about 2 hours additional training every quarter. They are trained and outfitted to provide only "first aid" type fire fighting services and to support the West Valley Volunteer Fire Department (WVVFD). WVNS maintains turnout gear and self-contained breathing apparatus in

the Fire Pump House which serves as the rally point for the Fire Brigade.

The WVNS Fire Brigade assumes immediate charge of fire fighting operations until the Fire Department arrives at the scene. Brigade personnel will then be under the direct control of the West Valley Volunteer Fire Department Officer in charge but will not be directly involved in structural fire fighting. WVVFD response time is about 7 minutes following notification. In the event fires involving hazardous materials exceed the capability of the WVVFD, the Erie County HAZMAT team could respond in about 30 minutes.

* The WVNS facility did not meet the DOE 5480.7 requirement for prefire plans. The need for such plans was identified as early as November 1987 by a Westinghouse safety appraisal. These plans are required to describe the fire hazards and protection systems specific to each facility on the WVDP site and delineate fire suppression strategy and tactics. The plans also serve to provide orientation and guidance to the WVNS fire brigade, the West Valley Volunteer Fire Department, and the Erie County HAZMAT team.

**CONCERN:** (FP.5-4) (H2/C1) The WVDP site lacks prefire plans for fire suppression strategy and tactics.

## O. FACILITY ENGINEERING

The team appraised the policies, procedures, and practices associated with facility engineering, particularly as they affect safety. In its appraisal the team reviewed each of three facilities against each of three Performance Objectives. The facilities are the Supernatant Treatment System (STS), the Liquid Waste Treatment System (LWTS), and the Cement Solidification System (CSS). These review findings are organized differently from others in this report. Each part addresses a single system, including the associated findings and concerns.

The three Performance Objectives are:

### FE.1 FACILITY DESIGN CRITERIA

**PERFORMANCE OBJECTIVE: Facility design criteria are identified, including criteria associated with safety, health, natural phenomena, and environmental factors.**

### FE.2 FACILITY DESIGN CONTROL

**PERFORMANCE OBJECTIVE: The facility design process should include analysis, review, and acceptance tests intended to ensure that the design is capable of achieving the design objectives and criteria.**

### FE.3 FACILITY DESIGN PERFORMANCE

**PERFORMANCE OBJECTIVE: The as-built facility should perform to achieve or exceed all design criteria and should meet <u>current</u> environmental/ALARA/safety criteria.**

The STS, LWTS, and CSS were designed and constructed between 1984 and 1987 to provide the WVDP with an integrated system for disposal of the alkaline supernatant in the high-level waste storage tank. The STS processes diluted supernatant through a three or four column zeolite ion exchange system. Spent zeolite is discharged to the spare high-level waste tank for eventual incorporation in glass logs. Decontaminated supernatant from the STS is concentrated by evaporation in the LWTS and then sent to the CSS for incorporation into cement, which is poured into 71-gallon square drums. About 30 percent of the supernatant has been processed to date, and over 4,000 drums of cement have been produced.

Detailed design criteria were prepared for each of the facilities. These criteria incorporated many codes, standards, and DOE orders. Specific requirements for radiation exposure and ALARA principles were included.

The design process for each of these facilities was thorough, and included preparation of SARs. Extensive design review by WVDP personnel and others was performed, but concerns are expressed about the lack of review by maintenance personnel and about the assurance that all safety disciplines have participated in the reviews.

Two significant design-related problems have occurred in operation of these systems. First, the LWTS evaporator has been unable to meet the design criterion evaporative capacity of 10.5 gpm. In fact, piping and operation changes were required to achieve the needed operational evaporative capacity of 6 to 8 gpm. This deficiency may be more important in the future when the LWTS evaporator is planned for use in connection with remaining decontamination and decommissioning operations.

The other significant problem has been the failure of the zeolite discharge valve on Column D of the STS ion exchange system. This has resulted in over 71 days of down time to date, and further efforts will be required before a permanent solution is made. In addition to cost and scheduling aspects, this problem has obvious ALARA consequences.

Other modification and maintenance requirements in these three facilities have not been greater than would be expected in such facilities.

The radioactive releases to the atmosphere and to Frank's Creek have in most cases been negligible. The tritium released to Frank's Creek from water boiled off from the decontaminated supernatant is one percent of the DOE Derived Concentration Guide. All other radioactive releases are far less significant.

An ALARA program is in place which has been effective in keeping radiation exposures low in all three facilities. Only four minor injuries, two clothing contaminations, and one skin contamination have occurred in all three facilities since startup.

All three of these new facilities appear to be in compliance with all current environmental, safety, and health requirements and criteria.

## 0.1 SUPERNATANT TREATMENT SYSTEM

**PERFORMANCE OBJECTIVE FE.1: Facility design criteria are identified, including criteria associated with safety, health, natural phenomena, and environmental factors.**

FINDINGS:

- The STS was designed to remove waste supernatant from Tank 8D-2 and reduce its Cs-137 concentration to a level which would permit further processing in the LWTS and CSS. Cesium, removed from the supernatant by an ion exchange process was required to be stored on the zeolite in Tank 8D-1 awaiting eventual incorporation into a terminal glass form.

- The design criteria were based on continuous three-column ion exchange operation, while a fourth column was being unloaded and reloaded.

  Typically the first column was to be operated until cesium breakthrough. The initial second column was then to become the first column. The zeolite from the original first column was then to be discharged through a bottom ball valve; that column was then to be loaded with fresh zeolite.

- Ninety percent of the supernatant was required to be removed from Tank 8D-2.

- Cesium-137 was required to be removed from the supernatant solution with a decontamination factor (DF) of at least 1,000 (removal efficiency of 99.9 percent).

- Total diluted supernatant column throughput was required to be 6 gpm.

- The design was to include provisions to prevent contaminating otherwise nonradioactive systems.

- Operational safety and radiation as well as contamination control design were required to be in accordance with ID-12044, as were fire protection, industrial safety, and OSHA requirements.

- Shielding was required to be designed into the facility to maintain radiation exposure ALARA.

- Shielding was to be designed into the facility for a normal dose level within full-time occupancy areas of 0.25 mR/hr or less and for 2.5/t mR/hr where "t" is the hours per day average occupancy.

- System components installed in the existing high-level waste tanks or in the valve aisle (e.g., ion exchange columns) were to be designed to permit remote removal and replacement.

- Maintenance or component replacement of items was to be by direct handling after flushing out and decontaminating vessels, equipment, and pipes.

- Static seismic design criteria were provided for structural additions to Tanks 8D-1 and 8D-2, for the pipe chase between Tank 8D-1 and the valve aisle, and for the below-grade structure of the STS Building. These were required to meet UBC, Zone 3, I.F.=1.0 standards, except that the below-grade structure of the STS Building was required to meet UBC, Zone 3, IF = 1.5 standards. No dynamic seismic requirement was provided.

- Consideration of tornado-generated missile loadings was specifically excluded from the STS design criteria.

- Appropriate QA involvement was incorporated in the design process. Fabrication codes and standards were appropriately addressed. The procedure for disposition of problems encountered was made clear.

PERFORMANCE OBJECTIVE FE.2: The facility design process should include analysis, review, and acceptance tests intended to ensure that the design is capable of achieving the design objectives and criteria.

FINDINGS:

- o STS design reviews by personnel from WVNS, Ebasco, Rockwell Hanford, and Battelle Pacific Northwest Laboratory were conducted from May 1984 for preliminary design and criteria review to July 1987 for final closeout.

- o Formal minutes and action item sheets stating each problem, recommended solutions, responsible persons, and assigned completion dates, document the review meetings.

- o Design review meeting minutes provide evidence of ALARA and environmental compliance considerations.

- o Design calculations were provided by Ebasco Services, Inc., during the period September 1984 to March 1986. Design calculations were approved by WVNS in May 1986. A review of the design notebook verifies that the handwritten design calculations and results are adequate to be understood. Pages containing calculations generally noted assumptions, WVDP reference documents, WVDP correspondence and telephone conversations, and handbook references.

- o Testing and checkout of each subsystem and component within the STS was conducted with Special Instruction Procedures (SIPs). Test results were formally documented and reported in WVNS-TR-50-001 (January 1988), WVNS-TR-50-002 (March 1988), WVNS-TR-50-003 (May 1988), and WVNS-TR-50-004 (July 1988).

- o Independent review of selected design and safety documents for the STS was performed by EG&G Idaho in June 1986. Reliability analysis of the IRTS was provided by Westinghouse Hanford in December 1987. Review of operational requirements was conducted by PNL in February 1988.

- o The SAR for operation of the STS was based on the design information. Concurrently, OSRs for operating limits and conditions, administrative controls, and surveillances were prepared and subsequently imposed on the operation of the facility, specifically Building and Vessel Ventilation Systems Operability (OSR-GP-3), Depressurization of STS for Maintenance (TR-IRTS-4), and STS Process Instrument Limits (TR-IRTS-5).

- o The involvement of the Safety and Environmental Assessment Department in the design process was not readily apparent. Discussions with the managers of Plant Engineering and Safety and Environmental Assessment gave some assurance that the latter was represented during design review. The requirements contained in WV-906, Safety Review Program, and WV-986, Environmental Review Program, resulted in safety and NEPA reviews performed by the Department.

- o Readiness review, independent of operations and engineering, was conducted by the Radiation and Safety Department and the Safety and Environmental Assessment Department.

- * The design review packages for STS did not provide evidence that all safety areas were always represented in the reviews.

CONCERN: See Concerns TS.3-1 and PP.7-1.

FINDINGS:
- * There was little evidence to verify that WVDP maintenance personnel had sufficient opportunity to provide review input.

CONCERN: See Concern MA.7-1.

PERFORMANCE OBJECTIVE FE.3: The as-built facility should perform to achieve or exceed all design criteria and should meet current environmental/ALARA/safety criteria.

FINDINGS:

- o Eleven campaigns have been conducted in the STS, although Campaign 5 was aborted. In seven of these campaigns all four zeolite columns were in operation. On those campaigns, weighted average Cs decontamination factors ranged from 11,000 to 179,000 and averaged 68,000. On three campaigns, because of the ball valve problem discussed later, only three columns were in operation, and Cs decontamination factors on those campaigns ranged from 4,200 to 6,000 and averaged 5,200. In all cases the design criterion for a Cs decontamination factor of 1,000 was significantly exceeded. This benefitted operation of both the LWTS and CSS by reducing radiation dose rates and contamination levels in those two facilities.

- o The design criteria anticipated dilution of the supernatant fed to the ion exchange columns. However, the first several campaigns were made with no dilution. Later runs were made with about a two-to-one dilution of the supernatant with water, both for the purpose of improving the Cs decontamination factor and for reducing the quantity of zeolite absorbent that would have to be incorporated into the vitrified waste.

- o After Campaign 3, the discharge valve on ion exchange Column D failed, in that after recharging, the valve would not close completely. Subsequent attempts to activate the valve produced a condition in which the valve could neither be opened nor closed completely. A special maintenance operation provided a bottom plug to prevent leakage, and a method of removing most of the column zeolite through sluicing was developed. However, a permanent heel of contaminated zeolite remains in the column, which precludes use of this column in a third or fourth position, and would preclude continuous operation (with three columns) as designed. Further efforts are in the planning stage to effect a permanent repair.

- * The design criterion for the bottom discharge ball valve of successful functioning for a minimum of 20 actuations was not met for the bottom valve of Column D. Continued operation of the STS with only three columns is undesirable from an ALARA standpoint in that a substantially lower DF would be obtained than with four-column operation.

- * Operations using the STS were shut down for a total of 71 days (about 25 percent of the time) since the facility was brought on line, largely due to the

problem with the discharge valve on ion exchange Column D.

* Replacement of the D column discharge valve will be costly. Design factors that are contributing to this problem are:

  - the ball valve was faced with a developmental material;

  - provisions for valve exchange were not made; and

  - back-up schemes for normal operation were not formulated.

* The design did not anticipate ball valve failure and make adequate provisions for dealing with the consequences.

CONCERN: See Concern MA.7-1.

FINDINGS:

o The design criterion regarding radiation exposure has generally been met, with exposure rates generally being less than 0.1 mR/hr. In the STS ventilation system, which includes provisions for augmenting the ventilation of the high-level waste tanks, a small portion of the building has been roped off because dose rates are up to 2.5 mR/hr due to material deposited on the filters from tank sampling operations. This situation, however, results in very little radiation dose to the work force due to the low occupancy rate of the area and this design criterion is being met.

o Gaseous effluents from the STS ventilation stack in 1988 had a total radioactivity content of less than 8.7 nCi of alpha activity and of about 1.35 nCi of beta activity. These low levels are well within all requirements and conform to the design criteria.

o The only liquid effluents from the STS are the decontaminated supernatant solution sent to LWTS and other liquid streams returned to Tank 8D-1 or Tank 8D-2. Thus, this system has no environmental impact from liquid effluents.

o Since startup, only one skin contamination (and no clothing contamination) has occurred at STS.

o An effective ALARA program is in place at the STS. This program treats the entire IRTS, including the STS,

LWTS, CSS, and Drum Storage, as a single combined area. For this area, the total exposure for 1989 through May has been 1.4 person-rem. This is well below the prorated goal of 3.1 person-rem for this period.

- The confinement barrier integrity of the STS was reviewed by Dames and Moore during the design process and was reported in a document dated August 15, 1986 under Job No. 10805-169-023. This review included resistance to a tornado with a maximum wind speed of 160 mph and for a seismic event with a peak dynamic horizontal acceleration of 0.1 g. The review concluded that the primary STS confinement barriers have sufficient reserve capacity to survive these seismic and tornado events.

- No injuries have occurred at the STS since startup.

CONCERN: None.

## 0.2 LIQUID WASTE TREATMENT SYSTEM

**PERFORMANCE OBJECTIVE FE.1: Facility design criteria are identified, including criteria associated with safety, health, natural phenomena, and environmental factors.**

FINDINGS:

- The LWTS was designed to process various plant wastes by evaporation, filtration, and ion exchange into a minimum volume ready for cementing in the CSS and to decontaminate the water removed to allow it to be either recycled or released to the environment. The LWTS was designed to treat the decontaminated supernatant solution from the STS and to treat High-Level Waste sludge washes and various other contaminated liquid wastes from plant and decontamination/decommissioning operations.
- The LWTS evaporator system was required to have an evaporating capacity of 10.5 gallons/min and a feed capacity of 21 gallons/min.
- Decontaminated wastes from LWTS were required to have a gross beta activity of less than 50
- Eight existing tanks were to be reused in the LWTS and three new tanks were required.
- All radioactive materials were required to be shielded to provide less than 0.25 mrem/hr in continuously occupied areas.
- Existing ventilation and off-gas systems were used for the LWTS.
- Contamination control was required to prevent spread or transfer of contaminated liquids or solids at all times to noncontaminated areas or equipment.
- ALARA criteria for radiation exposure were to limit personnel exposure for maintenance to 1.0 person-rem per year for each maintenance task.
- Industrial Safety Fire Protection and radiation control were required to be in accordance with ID 12044.
- DOE 5820.2, DOE 5480.1A, and DOE 6430.1 were incorporated specifically in the design criteria.
- Numerous conventional codes and standards were required to be followed in the LWTS design.

- The LWTS was to be constructed within an existing facility. Consequently, no seismic or tornado resistance requirements were included in the design criteria for this project.

- Appropriate QA involvement was included in the LWTF design process. Fabrication codes and standards were appropriately addressed. The disposition of problems encountered was made clear.

PERFORMANCE OBJECTIVE FE.2: The facility design process should include analysis, review, and acceptance tests intended to ensure that the design is capable of achieving the design objectives and criteria.

FINDINGS:

- o LWTS design reviews by personnel from WVNS, Ebasco Services, and Westinghouse R&D were conducted from June 1985 for preliminary design and criteria review to July 1986 for final closeout.

- o Review meetings were documented by formal minutes and action item sheets stating each problem, recommended solutions, responsible persons, and assigned completion dates.

- o Design review meeting minutes provide evidence of ALARA and environmental compliance considerations.

- o Design calculations were provided by Ebasco Services, Inc., during the period February 1985 to February 1986. Design calculations were approved by WVNS in April 1986. A review of design notebooks verifies that the handwritten calculations and results were adequate to be understood. Pages containing calculations generally noted assumptions, WVDP reference documents, WVDP correspondence and telephone conversations, and handbook references.

- o Testing and checkout of each subsystem and component within the LWTS was conducted with Special Instruction Procedures (SIPs). Test results were formally documented and reported in WVNS-TR-71-004 (October 1987) through WVNS-TR-71-016 (April 1988).

- o Independent review of evaporator performance was performed by Dravo Engineers, Inc. in June 1985. Reliability analysis of the IRTS was provided by Westinghouse Hanford in December 1987.

- o A SAR based on the design information was prepared for operation of the LWTS. Within the SAR, OSRs for operating limits and conditions, administrative controls, and surveillances have been imposed on the operation of the facility, specifically Building and Vessel Ventilation Systems Operability (OSR-GP-3), Radioactivity Content of Liquid Effluents Released from WVDP (OSR-GP-2), LWTS Manifold Control (TR-IRTS-6), and Sampling and Analysis Requirements for Tank 5D-15B (TR-IRTS-7).

- o The involvement of the Safety and Environmental Assessment Department in the design process was not readily apparent. Discussions with the managers of Plant Engineering and Safety and Environmental Assessment gave some assurance that the latter was represented during design review. Also, the

requirements contained in WV-906, Safety Review Program, and WV-986, Environmental Review Program, resulted in safety and NEPA reviews performed by the Department.

- o Readiness review, independent of operations and engineering, was conducted by the Radiation and Safety Department and the Safety and Environmental Assessment Department.

- * The design review packages for the LWTS did not provide evidence that all safety areas always received adequate review.

CONCERN: See Concerns TS.3-1 and PP.7-1.

FINDINGS:
- * There was little evidence to verify that WVDP maintenance personnel had sufficient opportunity to provide review input.

CONCERN: See Concern MA.7-1.

**PERFORMANCE OBJECTIVE FE.3: The as-built facility should perform to achieve or exceed all design criteria and should meet current environmental/ALARA/safety criteria.**

FINDINGS:

- Although design criteria required the LWTS evaporator to be designed for an evaporative capacity of 10.5 gpm, the LWTS evaporator was initially unable to meet the desired production rates (6 to 8 gpm evaporative capacity) due to insufficient head in the reboiler steam condensate line; repiping of this line has at least partially corrected this problem.

- Maintenance problems since the initiation of LWTS operations have been responsible for only 17 days of down time (approximately 6 percent) of operation of the LWTS. The maintenance experience is typical of facilities such as LWTS and does not reflect adversely on the design performance.

- Occupational exposures in LWTS have generally been less than 0.1 mR/hr, well below the design criterion of 0.25 mR/hr for continuously occupied areas. This is due in part to the reduced Cs-137 concentration in the input from STS.

- Since startup, no skin contamination has occurred, and only one clothing contamination has occurred at LWTS.

- Gaseous effluents from the LWTS sent to the main plant stack through the Vessel Off-Gas System and through the main plant ventilation system have not noticeably increased the monitored radioactivity released from the main plant stack.

- Liquid effluents from the LWTS are sent to Lagoon 2 for subsequent treatment in the Low Level Waste Treatment Facility and release from Lagoon 3. For radioisotopes other than tritium, no detectable increase in release was caused in 1988 by startup of the LWTS. During 1988, about two-thirds of the tritium released from Lagoon 3 was traceable to the liquid effluent from the LWTS. However, since the total tritium release from Lagoon 3 was only about one percent of the DOE Derived Concentration Guide, this result is not an environmental concern and is what was anticipated in the design process.

- An effective ALARA program is in place at the LWTS. This program treats the entire IRTS, including the STS, LWTS, CSS, and Drum Cell, as a single combined area. For this area, the total exposure for 1989 through May has been 1.4 person-rem. This is well below the prorated goal of 3.1 person-rem for this period.

- No injuries have occurred at the LWTS since startup.

**CONCERN:** None.

## 0.3 CEMENT SOLIDIFICATION SYSTEM

**PERFORMANCE OBJECTIVE FE.1: Facility design criteria are identified, including criteria associated with safety, health, natural phenomena, and environmental factors.**

FINDINGS:

- The CSS was designedto incorporate concentrated liquid waste from the LWTS into cement and to fill lined square drums with this cement.
- The liquid waste feed and cement were to be metered into high-shear mixers which would make a proposed 122-litre batch; two batch mixes were required to fill each 269-litre square drum.
- The maximum radiation dose rate for full-time occupancy areas was required to be less than 0.25 mrem/hr. Total exposure for any single maintenance operation was required to be less than 1 man-rem per year, whether the operation was anticipated to be performed once or several times per year.
- DOE 5820.2 and DOE 5480.1A were required to be met.
- "INEL Architectural Engineering Standards," Rev. 3, June 1982 were required to be followed.
- Numerous conventional codes and standards were required to be followed in the CSS design.
- No dynamic seismic or tornado resistance requirements were incorporated in the CSS design criteria, although it was required that the shield wall satisfy UBC Zone III IF = 1.5 requirements with respect to static seismic load.
- Appropriate QA involvement was incorporated in the design process. The fabrication related codes and standard identified were appropriate.

PERFORMANCE OBJECTIVE FE.2: The facility design process should include analysis, review, and acceptance tests intended to ensure that the design is capable of achieving the design objectives and criteria.

FINDINGS:

- o CSS design reviews by personnel from WVNS, Ebasco, and Rockwell Hanford were conducted from July 1984 for preliminary design and criteria review to January 1987 for final closeout.

- o Review meetings were documented by formal minutes and action item sheets stating each problem, recommended solutions, responsible persons, and assigned completion dates.

- o Design review meeting minutes provide evidence of ALARA and environmental compliance considerations.

- o Design calculations were provided by Associated Technologies, Blaw-Knox Chemical, Peabody Tectank as well as Ebasco Services. Design calculations performed by WVNS (e.g., piping design and material balances and ventilation balancing) are documented in engineering notebooks, which are controlled. A review of the design reports verifies that the handwritten design calculations and results were adequate to be understood. Pages containing calculations generally noted assumptions, WVDP reference documents, WVDP correspondence and telephone conversations, and handbook references.

- o Testing and checkout of each subsystem and component within the CSS was conducted with Special Instruction Procedures (SIPs). Test results were formally documented and reported in WVNS-TR-70-001 (September 1987) through WVNS-TR-70-015 (December 1988).

- o Reliability analysis was performed by Westinghouse Hanford in December 1987.

- o A SAR based on the design information was prepared for operation of the CSS. Within the SAR, OSRs for operating limits and conditions, administrative controls, and surveillances have been imposed on the operation of the facility, specifically Building and Vessel Ventilation Systems Operability (OSR-GP-3) and Sampling and Analysis Requirements for Tanks 5D-15A1 and A2 (TR-IRTS-8).

- o The involvement of the Safety and Environmental Assessment Department in the design process was not readily apparent. Discussions with the managers of Plant Engineering and Safety and Environmental Assessment gave some assurance that the latter was

represented during design review. Also, the requirements contained in WV-906, Safety Review Program, and WV-986, Environmental Review Program, resulted in safety and NEPA reviews performed by the Department.

- o Readiness review, independent of operations and engineering, was conducted by the Radiation and Safety Department and Safety and Environmental Assessment Department.

- * Design review packages for the CSS did not readily indicate that all safety areas were adequately reviewed.

CONCERN: See Concerns TS.3-1 and PP.7-1.

FINDINGS:

- * There was little evidence to verify that WVDP maintenance personnel had sufficient opportunity to provide review input.

CONCERN: See Concern MA.7-1.

PERFORMANCE OBJECTIVE FE.3: The as-built facility should perform to achieve or exceed all design criteria and should meet current environmental/ALARA/safety criteria.

FINDINGS:

- The CSS has operated satisfactorily since startup in May 1988 and has produced 225 71-gallon drums of nonradioactive cement during startup testing (to be used as shielding in drum storage) and over 4,000 71-gallon drums of radioactive cement.
- The CSS is typically producing 4 to 5 drums of cement per hour. Each drum contains about 39 gallons of waste concentrate per drum.
- Although the design criterion was to have a surface radiation level of under 500 mR/hr on the drums of cement, the actual values have ranged from 5 to 90 mR/hr, largely because of better-than-expected performance of the STS. This is resulting in much lower radiation exposures than anticipated for this activity.
- Because of a pump malfunction, three of the more than 4,000 drums produced to date do not have the sodium silicate additive that is part of the qualified formula. The sodium silicate is intended for process reasons rather than to meet product requirements. One of these drums has been core drilled and was found to have satisfactory compressive strength.
- Initial operating plans contemplated using the two cement mixers in the CSS in tandem; operating experience has indicated that sequential preparation of the two batches required per drum is more efficient if conducted in one mixer.
- Mixer 2 suffered a shaft bearing failure in an early campaign; subsequently the impeller fractured and jammed the mixer. This mixer was replaced with one of two on-site spares which again serves as an installed back-up mixer.
- The drum crimper has not performed as intended; incomplete crimping of the lids has necessitated manual completion of some of the crimps. The resulting additional radiation exposure from manual crimping is not excessive, largely due to the high cesium DFs obtained in the STS.
- Crush strength of cement mixtures produced by the specification recipe have significantly exceeded the minimum values established by NRC.

- Exposure rates in occupied portions of the CSS have routinely been under 0.1 mr/hr, well below the design criterion.

- The CSS operations have been shut down for unplanned maintenance for a total of 6 days (about 2 percent) since operations began in May of 1988. This low maintenance level reflects satisfactory design performance.

- The estimated annual occupational dose in the SAR associated with operation of the CSS was 10 person-rem. This estimate is being significantly bettered. The combined occupational dose for the STS, LWTS, and CSS is only about 1.4 person-rem in 1989 through May.

- Since startup only one clothing contamination (and no skin contamination) has occurred at CSS.

- Gaseous radioactivity releases to the atmosphere from the CSS for 1988 were below 20 nCi alpha and about 470 nCi beta. These levels are far below required levels and are well within the design criteria.

- Radioactivity in the minimal quantities of liquid effluent from the CSS has been readily handled by the Low-Level Waste Treatment Facility and has not had any detectable environmental impact. In 1989, about 10,000 gallons were transferred through June having a weighted average beta activity of 1.3 nCi/mL.

- Since startup only four minor injuries have occurred at the CSS, and no lost-time injuries have occurred.

- An effective ALARA program is in place at the CSS. This program treats the entire IRTS, including the STS, LWTS, CSS, and Drum Storage, as a single combined area. For this area, the total exposure for 1989 through May has been 1.4 person-rem. This is well below the prorated goal of 3.1 person-rem for this period.

CONCERN: None.

# IV. NOTEWORTHY PRACTICES

Four Noteworthy Practices were identified during this appraisal. Noteworthy Practices are exceptionally good ways to accomplish a Performance Objective or some aspect of it and are worthy of emulation by other DOE facilities.

The Noteworthy Practices are identified on the following pages.

## MA.7 PROCEDURES AND DOCUMENTATION

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

**NOTEWORTHY PRACTICE:** Before introducing radioactive material into new equipment, WVNS characterizes the as-built facility using two different visual aids:

- A loose-leaf binder contains color photo layouts of pumps, valves, pipes, etc., and margin notations identifying the parts and locations.

- A video tape with slow panning records in detail the equipment identification tags and equipment locations, including an appreciation of depth and accessibility.

These visual aides significantly enhance efficiency in planning and performing plant maintenance.

## PP.1 INDUSTRIAL HYGIENE PROGRAM CONTENT

**PERFORMANCE OBJECTIVE:** The industrial hygiene program should minimize the probability of employee illness, impaired health or significant discomfort by identifying, evaluating, and controlling those stresses arising in the workplace.

**NOTEWORTHY PRACTICE:** WVNS requires that all visitors and subcontractor personnel complete a "Subcontractor Health Assessment" (attached) during their orientation training. This assessment allows the medical staff to be aware of any physical limitations of on-site personnel. The completed form provides information to help ensure a healthy and safe environment for all personnel on-site. For example, this health assessment was instrumental in enabling the medical staff to diagnose promptly and treat successfully a diabetic subcontractor employee who was discovered unconscious. This Health Assessment is required to be updated annually.

SUBCONTRACTOR'S HEALTH ASSESSMENT

Sex [ ] M [ ] F

| Name | Date of Birth | Social Security No. |
|---|---|---|
| | | |

| Occupation | Contractor | Cognizant Engineer |
|---|---|---|
| | | |

Blood Pressure _____ Weight _____ Pulse _____ Reg/Irreg Conversational Hearing _____

| | Limited | Unlimited |
|---|---|---|
| 1. Vision | | |
| 2. Hearing | | |
| 3. Walking | | |
| 4. Climbing Stairs | | |
| 5. Climbing Ladders/ Scaffolds | | |
| 6. Work at Elevation Over 25' | | |
| 7. Work in Cramped Position | | |
| 8. Work in Confined Spaces | | |
| 9. Work with Arms Overhead | | |
| 10. Work Requiring Repeated Bending and/or Stooping | | |
| 11. Lifting Weights | | 10# ____ 25# ____ 50# ____ |
| 12. Strenuous Exertion | | |
| 13. Pulling/Twisting/ Pushing | Light ____ | Moderate ____ Heavy ____ |
| 14. Work in Climatic Conditions: Hot | | |
| Cold | | |
| Wet | | |
| 15. Drive Heavy Equipment | | |
| 16. Drive Light Equipment | | |
| 17. Use Heavy Power Tools | | |
| 18. Use Light Power Tools | | |
| 19. Shift Work | | |
| 20. Overtime Work | | |

Do you have a current medical problem? No ____ Yes ____ Explain _____

Are you under a doctor's care? No ____ Yes ____ Explain _____

Take medications routinely? No ____ Yes ____ (Including over the counter medications)

Have any chronic health problems? No ____ Yes ____
Arthritis [ ] Diabetes [ ] Obstructive Pulmonary Disease [ ] High Blood Pressure [ ]
Tuberculosis [ ] Heart Disease [ ] Skin Problems [ ] Seizures [ ] Emphysema [ ]
Cancer [ ] Loss of Consciousness [ ] Blood Disorders [ ] Other [ ] (If yes to other please explain _____
Any past surgery? _____

| Do you: | Yes | No | | Yes | No |
|---|---|---|---|---|---|
| Use a Hearing Aid? | [ ] | [ ] | Have a history of alcohol or other drug abuse? | [ ] | [ ] |
| Wear Glasses? | [ ] | [ ] | | | |
| Contact Lenses? | [ ] | [ ] | If female, are you pregnant? | [ ] | [ ] |
| Any kind of brace support? | [ ] | [ ] | Have you been treated with x-ray radioactive materials, maser or laser? | [ ] | [ ] |

WV-1418, Rev. 0

Please indicate any other pertinent health related information:

| | |
|---|---|
| Signature of Employee | Date |
| Nurse's Signature | Date |

The purpose of this form is to provide information that will help the contractor to ensure a healthy and safe environment for the employe, as well as other employes. The information will be held as medical confidential and only that information that may affect job safety performance will be forwarded to the employer. This form will be maintained by the Health Service Office, West Valley, New York. This form is to be completed annually

Please complete the form, making sure all questions are answered. If additional space is needed, please use the space below.

WV-1418, Rev. 0

## RP.11 RADIOLOGICAL MONITORING AND CONTAMINATION CONTROL

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

**NOTEWORTHY PRACTICE:** The WVDP Radiological Control Procedure, RC-ADM-10, requires personnel to survey for 2.5 minutes when a personal survey is required to minimize the potential for missing skin and clothing contamination. WVNS uses several shielded and unshielded survey booths throughout the facility. A timer with a buzzer has been installed at each of the survey booths to encourage each individual to survey for the required 2.5 minutes determined to be necessary for a comprehensive personal survey. The proper use of the timer is described in the Personnel Frisking procedure and in the radiation worker training program. Personnel are instructed to start the timer when the survey is started and to continue the survey at least until the timer alarms. Once the timer is started, there is no way to reset it until the 2.5 minutes have passed.

## APPENDIX A

### System for Categorizing Concerns

A. Each concern contained in this report has been categorized for SERIOUSNESS using the following criteria:

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. At this point, consideration shall be given to whether a "clear and present" danger exists such that the facility shutdown authority of the Assistant Secretary (EH-1) should be exercised. If so, the Assistant Secretary or his designee is informed immediately.

CATEGORY II: Address a significant risk (but does not involve a situation for which a clear and present danger exists to workers or members of the public) or substantial noncompliance with DOE Orders. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed until the preparation of a final report and the routine development of an action plan. Any issues surrounding the concern or the suggested response should be addressed during the appraisal or immediately thereafter. Again, consideration should be given to whether facility shutdown are warranted under the circumstances.

CATEGORY III: Addresses significant non-compliance with DOE Orders, or suggests significant improvements in the margin of safety, but is not of sufficient urgency to require immediate attention.

B. Each identified concern has also been characterized by the POTENTIAL HAZARD CONSIDERATIONS of the issues addressed or by the significance of its COMPLIANCE CONSIDERATIONS. Some concerns have been characterized in more than one of these groups when applicable. The criteria used are:

POTENTIAL HAZARD CONSIDERATIONS

Level 1. Has the potential for causing a severe injury or fatality, potentially fatal occupational illness, or loss of the facility.

Level 2. Has the potential for causing minor injury, minor occupational illness, major property damage, or has the potential for resulting in or contributing to unnecessary exposure to radiation or toxic substances.

Level 3. Has little potential for threatening safety, health, or property.

COMPLIANCE CONSIDERATIONS

Level 1. Does not comply with mandatory DOE requirements (DOE Orders), prescribed policies and standards, and documented accepted practice (the latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements).

Level 2. Does not comply with recommended DOE references, standards, guidance, or with good practice (as derived from industry experience, but not based on national consensus standards).

Level 3. Has little or no compliance considerations; these concerns are based on professional judgment in pursuit of excellence in design or practice (i.e., these are improvements for their own sake -- not deficiency-driven).

# APPENDIX B

## Categorization and Tabulation of Concerns

Using the criteria in Appendix A, all sixty of the Concerns have been categorized as Category III for seriousness. The Concerns were also characterized by potential risk and compliance considerations. Attachment B-1 of this Appendix summarizes the results of the characterizations.

All Concerns are tabulated in Attachment B-2 of this Appendix without their supporting bases. To understand any Concern fully, it is necessary to read its basis in Section II.

## ATTACHMENT B-1

### Categorization of Concerns

| CONCERN NUMBER | POTENTIAL HAZARD LEVEL | COMPLIANCE LEVEL |
|---|---|---|
| OA.1-1 | 2 | 2 |
| OA.1-2 | 3 | 2 |
| OA.2-1 | 2 | 2 |
| OA.5-1 | 3 | 3 |
| OA.6-1 | 3 | 2 |
| OP.1-1 | 3 | 3 |
| OP.1-2 | 3 | 2 |
| OP.3-1 | 2 | 2 |
| OP.7-1 | 2 | 2 |
| OP.7-2 | 3 | 2 |
| MA.3-1 | 2 | 2 |
| MA.5-1 | 2 | 1 |
| MA.7-1 | 2 | 2 |
| TC.1-1 | 2 | 2 |
| TC.3-1 | 2 | 1 |
| TC.3-2 | 3 | 2 |
| TC.4-1 | 2 | 2 |
| AX.1-1 | 3 | 2 |
| AX.2-1 | 3 | 2 |
| AX.3-1 | 3 | 1 |
| AX.4-1 | 2 | 2 |
| ER.1-1 | 2 | 2 |
| ER.2-1 | 2 | 2 |
| ER.2-2 | 2 | 2 |
| ER.2-3 | 3 | 1 |
| ER.2-4 | 3 | 2 |
| ER.3-1 | 2 | 2 |
| ER.4-1 | 2 | 2 |
| ER.6-1 | 1 | 2 |
| ER.6-2 | 1 | 2 |
| TS.3-1 | 2 | 2 |
| TS.7-1 | 3 | 2 |
| TS.7-2 | 2 | 2 |
| TS.9-1 | 2 | 2 |

## ATTACHMENT B-1 (Cont'd)

## Categorization of Concerns

| CONCERN NUMBER | POTENTIAL HAZARD LEVEL | COMPLIANCE LEVEL |
|---|---|---|
| SS.1-1 | 2 | 2 |
| SS.5-1 | 2 | 1 |
| FR.1-1 | 3 | 1 |
| FR.3-1 | 3 | 1 |
| FR.4-1 | 3 | 1 |
| RP.1-1 | 2 | 1 |
| RP.2-1 | 2 | 1 |
| RP.3-1 | 3 | 1 |
| RP.5-1 | 3 | 1 |
| RP.5-2 | 3 | 1 |
| RP.7-1 | 3 | 2 |
| RP.7-2 | 3 | 2 |
| RP.10-1 | 3 | 2 |
| RP.13-1 | 3 | 1 |
| RP.13-2 | 3 | 2 |
| PP.1-1 | 2 | 1 |
| PP.2-1 | 2 | 2 |
| PP.2-2 | 2 | 1 |
| PP.3-1 | 2 | 1 |
| PP.5-1 | 2 | 1 |
| PP.7-1 | 2 | 2 |
| FP.1-1 | 2 | 1 |
| FP.5-1 | 2 | 1 |
| FP.5-2 | 2 | 1 |
| FP.5-3 | 2 | 1 |
| FP.5-4 | 2 | 1 |

## ATTACHMENT B-2

### Tabulation of Concerns

### A. ORGANIZATION AND ADMINISTRATION

| | |
|---|---|
| **CONCERN:** (OA.1-1) (H2/C2) | Self appraisal activities are not providing the assurance that non-QA requirements are fully understood and completely addressed by organizations responsible for implementation. |
| **CONCERN:** (OA.1-2) (H3/C2) | Insufficient staffing is a primary reason for the inability to meet planned objectives or implement DOE requirements in Emergency Planning, Personnel Protection, Fire Protection, and Criticality Safety. |
| **CONCERN:** (OA.2-1) (H2/C2) | Identified deficiencies have not been corrected in a timely manner. |
| **CONCERN:** (OA.5-1) (H3/C3) | The treatment of safety in job descriptions and performance evaluations is inconsistent with management's stated emphasis on safety. |
| **CONCERN:** (OA.6-1) (H3/C2) | Radiological Control Procedures are not controlled in accordance with the requirements of DOE 5700.6B. |

### B. OPERATIONS

| | |
|---|---|
| **CONCERN:** (OP.1-1) (H3/C3) | The wording of OSR/TR-IRTS-3, particularly the discussion of its technical basis, preclude a clear determination of what constitutes a violation. |
| **CONCERN:** (OP.1-2) (H3/C2) | There is no clearly applicable WVNS emergency procedure for removing low-level water from Tank 8D-1 in the event it becomes necessary to transfer liquid from Tank 8D-2. |
| **CONCERN:** (OP.3-1) (H2/C2) | Some elements of the lock and tag procedure are being violated. |
| **CONCERN:** (OP.7-1) (H2/C2) | Inconsistency between color coding of valve position lights in the CSS and STS control panels could confuse operators during operations or an emergency. |
| **CONCERN:** (OP.7-2) (H3/C2) | Some equipment valves and process lines in active service were unlabeled or inadequately labeled. Mistaken identity could adversely affect safety. |

## C. MAINTENANCE

**CONCERN:** (MA.3-1) (H2/C2) — The Maintenance Department staff does not consistently follow WVNS procedures.

**CONCERN:** (MA.5-1) (H2/C1) — The policy regarding wearing of eye protection in the maintenance shop did not cover all personnel at risk of injury.

**CONCERN:** (MA.7-1) (H2/C2) — The Maintenance Department has no defined responsibility to review or approve designs which would require maintainability after the facility is put into service.

## D. TRAINING AND CERTIFICATION

**CONCERN:** (TC.1-1) (H2/C2) — Training policies and procedures do not address written examination development, control, and administration; instructor training and qualification; training program evaluation; or methods to identify the required content of training and qualification programs.

**CONCERN:** (TC.3-1) (H2/C1) — The requirements of DOE 5480.5 with respect to annual retraining on emergency/abnormal procedures are not being met.

**CONCERN:** (TC.3-2) (H3/C2) — Training policies and procedures provide less control of trainees in the plant by qualified operators and supervisors than nuclear industry practice.

**CONCERN:** (TC.4-1) (H2/C2) — Lifting and handling training is inconsistent with both the WVNS Lifting and Handling Manual and Training and Communications Department Policies and Procedures.

## E. AUXILIARY SYSTEMS

**CONCERN:** (AX.1-1) (H3/C2) — Inadequate equipment design and procedural control in loading drums that receive sludge from the centrifuge in the Low Level Waste Treatment Facility could compromise package integrity.

**CONCERN:** (AX.2-1) (H3/C2) — A well-documented utilization plan and operating procedures do not exist for the Kerosene Building.

**CONCERN:** (AX.3-1) (H3/C1) — No indication of fissile content was included on labels on 30 stored drums of fissile material as required by DOE 5480.5.

**CONCERN:** (AX.4-1) (H2/C2) — Decisions to retain radioactive components of existing ventilation systems have not been reevaluated in light of the recent significant increase in probable project duration.

## F. EMERGENCY READINESS

**CONCERN:** (ER.1-1) (H2/C2)
The Emergency Plan and Implementing Procedures has not been reviewed and revised as required by WVNS.

**CONCERN:** (ER.2-1) (H2/C2)
Credible accidents involving chemicals have not been defined and appropriate emergency response planned.

**CONCERN:** (ER.2-2) (H2/C2)
Statements in the Emergency Plan regarding the credibility of accidental criticality are inconsistent. Planning for nuclear criticality accidents is incomplete.

**CONCERN:** (ER.2-3) (H3/C1)
DOE/ID has not fulfilled its responsibility in defining site specific emergency planning zones as required by DOE 5500.3.

**CONCERN:** (ER.2-4) (H3/C2)
Radiological air sampling and dose assessment methods for emergency use are not covered in current procedures.

**CONCERN:** (ER.3-1) (H2/C2)
There is no assurance that personnel have adequate emergency response training and current information before they are assigned emergency response duties.

**CONCERN:** (ER.4-1) (H2/C2)
Deficiencies in the emergency preparedness program are not being identified and corrected.

**CONCERN:** (ER.6-1) (H1/C2)
Use of the chlorine cylinder repair kit without additional training and appropriate protective clothing could lead to personnel injury.

**CONCERN:** (ER.6-2) (H1/C2)
Planning and preparation for a tornado does not provide specific guidance for the protection of personnel.

## G. TECHNICAL SUPPORT

**CONCERN:** (TS.3-1) (H2/C2)
The Radiation and Safety Department does not have internal procedures and documentation to ensure that all safety-related disciplines provide input to resolve safety issues at WVDP.

**CONCERN:** (TS.7-1) (H3/C2)
Some of the procedures for material packaging and transportation are complete or out of date.

CONCERN: (TS.7-2) (H2/C2) Strict adherence to procedures for some waste packaging operations does not occur and evolutions in operations are not promptly incorporated in the Standard Operating Procedures.

CONCERN: (TS.9-1) (H2/C2) WVDP does not have a fully-implemented nuclear criticality safety program.

## H. SECURITY/SAFETY INTERFACE

CONCERN: (SS.1-1) (H2/C2) Security/safeguards modifications have not been formally evaluated by appropriate safety and operations personnel for possible increased risk to safe operation of the facility.

CONCERN: (SS.5-1) (H2/C1) Analyses have not been performed, as required by DOE 5480.16, to determine what weapons can be used safely at the WVDP.

## J. FACILITY SAFETY REVIEW

CONCERN: (FR.1-1) (H3/C1) The charter of the Radiation and Safety Committee is inconsistent with the definitions and advisory requirements of DOE 5480.5.

CONCERN: (FR.3-1) (H3/C1) Minutes of the Radiation and Safety Committee do not contain administrative information consistent with good practices for a committee of this type. In addition, they are inadequate for third party assessment of the depth and quality of the review performed as required by DOE 5480.5.

CONCERN: (FR.4-1) (H3/C1) Documentation of annual facility inspection is not in sufficient depth to evaluate the quality and effectiveness of the reviews as required by DOE 5480.5, Section 9.c.

## L. RADIOLOGICAL PROTECTION

CONCERN: (RP.1-1) (H2/C1) The schedule for implementing DOE 5480.11 is not being met.

CONCERN: (RP.2-1) (H2/C1) There is not an independent internal radiation protection audit program with all of the elements, technical expertise, and independence required by DOE 5480.11 and DOE 5482.1B.

CONCERN: (RP.3-1) (H3/C1) Posting and labeling of radiological areas and radioactive material were not always in compliance with WVDP procedures, requirements and good practice.

CONCERN: (RP.5-1) (H3/C1) The absence of a procedure regarding assessment of nonuniform exposure to the skin is not in compliance with DOE 5480.11, Section 9.f(2).

CONCERN: (RP.5-2) (H3/C1) The nuclear accident dosimetry program does not comply with the requirements of DOE 5480.1A, Chapter II.

CONCERN: (RP.7-1) (H3/C2) The quality assurance overview of the@in vitro@bioassay contract vendor does not satisfy industry standards and good practice.

CONCERN: (RP.7-2) (H3/C2) The procedure and technical basis for internal dose calculation have not been formalized.

CONCERN: (RP.10-1) (H3/C2) The particulate losses in inlet air sampling lines and the effect on measured air concentrations on CAMs have not been determined.

CONCERN: (RP.13-1) (H3/C1) Some of the operational records are susceptible to loss since they are not stored in fire retardant cabinets or sprinklered areas, or duplicated and stored in two separate areas.

CONCERN: (RP.13-2) (H3/C2) Some radiation protection records omit information recommended by ANSI N13.6-1966.

## M. PERSONNEL PROTECTION

CONCERN: (PP.1-1) (H2/C1) The industrial hygiene program does not meet the intent or requirements of DOE 5480.10 in the areas of hazard assessment, surveillance, and record keeping.

CONCERN: (PP.2-1) (H2/C2) Physical controls to assure that laboratory hood ventilation velocities are maintained at safe levels were not in place and laboratory technicians were not effectively trained in the requirements or bases for such controls.

CONCERN: (PP.2-2) (H2/C1) The respiratory protection program does not assure compliance with DOE prescribed standards and industry practices.

CONCERN: (PP.3-1) (H2/C1) The hazard communication program, as implemented, does not meet the intent of DOE Orders, prescribed standards,and industry practices for the identification and labeling of chemicals in the workplace.

CONCERN: (PP.5-1) (H2/C1) A periodic monitoring program, as required by DOE 5480.10,has not been implemented to assure the continued effectiveness of controls for nonradiological chemical and/or physical stresses.

CONCERN: (PP.7-1) (H2/C2) The IWP system is utilized to identify and control potential industrial safety/hygiene hazards in operating facilities; however, the system is implemented inconsistently.

## N. FIRE PROTECTION

CONCERN: (FP.1-1) (H2/C1) The WVDP site is not in conformance with NFPA 101, "Life Safety Code," nor have appropriate exemptions been requested.

CONCERN: (FP.5-1) (H2/C1) The scheduled program for inspection and testing of fire protection systems is not in conformance with NFPA requirements and recommended practice.

CONCERN: (FP.5-2) (H2/C1) An action plan for assuring protection of the unprotected portion of the Administrative facility has not been developed and implemented in a timely manner.

CONCERN: (FP.5-3) (H2/C1) Many fire protection deficiencies are not routinely identified and resolved.

CONCERN: (FP.5-4) (H2/C1) The WVDP site lacks prefire plans for fire suppression strategy and tactics.

## APPENDIX C

### Team Composition and Areas of Responsibility

### Technical Safety Appraisal
### West Valley Demonstration Project

| Area of Responsibility | Name/Organization |
|---|---|
| EH Senior Manager | Oliver D. T. Lynch, Jr.<br>Office of Safety Appraisals |
| Team Leader | Blake P. Brown<br>Office of Safety Appraisals |
| Assistant Team Leader | Albert D. Morrongiello<br>Office of Safety Appraisals |
| Appraisal Coordinators | Mary E. Meadows<br>Office of Safety Appraisals |
| | Nancy L. Sanderson<br>Rockwell International |
| Report Manager | Raymond DiSalvo<br>Battelle Memorial Institute<br>Columbus Division |
| Liaison with Team | Henry Walter<br>Office of Nuclear Energy |
| | J. Alan Yeazel<br>DOE-ID<br>West Valley Project Office |
| Organization and Administration and Facility Safety Review | David Schweller<br>DBS Associates, Inc. |
| Operations and Experimental Activities | Leon H. Meyer<br>The LHM Corporation |
| | John A. McBride<br>E.R. Johnson Assoc., Inc. |
| Maintenance and Facility Engineering | Ernest W. Johnson<br>Private Consultant |

| Area of Responsibility | Name/Organization |
|---|---|
| Training and Certification and Security/Safety Interface | Thomas J. Mazour<br>Private Consultant |
| Auxiliary Systems and Facility Engineering | James A. Buckham<br>Private Consultant |
| Emergency Readiness | Linda F. Munson<br>Evergreen Innovations, Inc. |
| Technical Support and Facility Engineering | Glenn A. Whan<br>Professor Emeritus<br>University of New Mexico |
| Technical Support/Packaging and Transportation | Dennis E. Owen<br>ENCORE Technical Resources, Inc. |
| Radiological Protection | Leo H. Munson<br>Pacific Northwest Laboratory |
| | Matthew Lyon<br>Pacific Northwest Laboratory |
| Personnel Protection | Robert D. Gilmore<br>Environmental Health Sciences, Inc. |
| Fire Protection | Billy Lee<br>Office of Quality Programs |
| Quality Assurance Support | Rex N. Lutz<br>ARINC Research Corporation |

# APPENDIX D

## Biographical Sketches of Team Members

## Technical Safety Appraisal
## West Valley Demonstration Project

NAME: Blake P. Brown (Team Leader)

ASSOCIATION: DOE/Headquarters - Office of Safety Appraisals

EXPERIENCE: 31 years

- o Team Leader of 14 previous Technical Safety Appraisals and follow-up reviews
- o Department of Energy
  - Team Leader, Technical Safety Appraisals
  - Program Manager, Nuclear Criticality Safety
  - Nuclear Safety Engineer, Appraisals and Safety Reviews
- o Atomic Power Development Associates, Detroit, Michigan,
  - Systems Engineer
- o Phillips Petroleum Company, Idaho National Engineering Laboratory
  - Chemical Research Engineer

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

NAME: Albert D. Morrongiello (Assistant Team Leader)

ASSOCIATION: DOE Headquarters, Office of Safety Appraisals

EXPERIENCE: 10 years

- Nuclear Engineer: Assigned as an Assistant Team Leader in Safety Inspection Division
- U.S. Nuclear Regulatory Commission: Assigned as Resident Inspector
- Environmental Protection Agency

EDUCATION: B.A. Chemistry, University of Rhode Island
M.S. Biology, University of Richmond
M.S. Professional Management, Florida Institute of Technology

Additional studies at Rutgers University - Department of Radiation Science

NAME: James A. Buckham (Auxiliary Systems and Facility Engineering)

ASSOCIATION: Private Consultant

EXPERIENCE: 36 years

- Idaho National Engineering Laboratory: Research and Development, Operations, and Management at the Idaho Chemical Processing Plant
- Allied-General Nuclear Services: Executive VP and President with overall responsibilities for the Barnwell Nuclear Fuels Plant
- Oversight Team Leader to assure safe, effective restart of Sequoyah Facility

EDUCATION: B.S. Chemical Engineering, University of Washington
M.S. Chemical Engineering, University of Washington
Ph.D. Chemical Engineering, University of Washington

OTHER: Member, Sigma Xi, Tau Beta Pi
Member, American Institute of Chemical Engineers
Member, American Nuclear Society
Member, American Chemical Society
Instructor, University of Washington
Adjunct Professor, University of Idaho

NAME: Raymond DiSalvo (Report Manager)

ASSOCIATION: Battelle - Columbus Division

EXPERIENCE: 16 Years

- o Battelle Memorial Institute - Columbus Division
  - Vice President, Systems Safety and Security: Responsible for the technical and administrative management of 70 professional safety and security engineers.
  - Personally participated in security and safety evaluations at DOE facilities/sites including Savannah River Plant, Brookhaven National Laboratory, Nevada Test Site, Pantex, and Bonneville Power Administration.

- o U.S. Nuclear Regulatory Commission
  - Program Manager: Responsible for developing and conducting research programs essential to the technical basis for the regulation of commercial nuclear facilities.

EDUCATION: A.B. Chemistry, Rutgers University
Ph.D. Solid State Science, Pennsylvania State University

OTHER: Member, American Nuclear Society
Chair, ANS Nuclear Reactor Safety Division 1989-1990
Member, Systems Safety Society
Member, American Management Association

NAME: Robert D. Gilmore (Personnel Protection)

ASSOCIATION: Environmental Health Sciences, Inc. (EHS)

EXPERIENCE: 15 years

- o Participated in Technical Safety Appraisals for the FMPC, Y-12, Pantex, LLNL, SNLL, ATR, RFP, and Hanford Tank Farms
- o President, EHS
  - Engineering and technical services firm specializing in environmental and safety sciences
- o Hanford Environmental Health Foundation
  - Director of Operations and Planning: Firm provides comprehensive occupational and environmental health services including programs in occupational medicine, nursing, psychology, research, and environmental sciences
  - Department Manager for industrial hygiene services, environmental monitoring, and analytical chemistry
- o Union Carbide Corporation
  - Corporate Headquarters Staff providing technical direction and program guidance in health, safety, and environmental affairs to multi-national operating components.
  - Manager of Industrial Hygiene Department, Oak Ridge Gaseous Diffusion Plant
- o U.S. Atomic Energy Commission/U.S. ERDA
  - Safety and Industrial Hygiene Engineer, Richland Operations Office

EDUCATION: M.S. Industrial Hygiene, University of Washington
B.S. Environmental Health, Chemistry; University of Washington

OTHER: Certified in Comprehensive Practice of Industrial Hygiene by the American Board of Industrial Hygiene

NAME: Ernest W. Johnson (Maintenance and Facility Engineering)

ASSOCIATION: Technical Consultant, EG&G Idaho, Inc.

EXPERIENCE: 24 years

- o Participant on seven earlier Technical Safety Appraisals, Rocky Flats Plant (707, 771, and 776/777), PANTEX, LANL TA-55, LLNL-332, and FMPC.
- o Consultant to DOE in Aerospace and Facility Nuclear Safety
- o Consultant to EG&G-MAT in numerous technical and programmatic areas
- o Part-time Instructor, University of Dayton
- o Monsanto Research Corporation - Mound Facility
  - Aerospace and Terrestrial Heat Source Design, Testing, and Safety Areas
  - Plutonium-238 and -239 technical studies for NRC and DOE
  - SAR and SARP generation for various plutonium-238 systems
  - Project Manager for numerous heat source projects
  - Building Manager for plutonium facilities at Mound

EDUCATION: B.S. Chemistry/Mathematics, Wisconsin State College
M.S. Physical Chemistry, Iowa State University
Ph.D. Physical Chemistry, State University of Iowa

OTHER: Member, American Chemical Society
Member, American Society for Metals [ASM International]
Member, Phi Lambda Upsilon
Member, Alpha Chi Sigma

NAME: Billy T. Lee (Fire Protection)

ASSOCIATION: DOE/HQ, Office of Quality Programs

EXPERIENCE: 26 years

- o DOE/HQ, Office of Quality Programs
  - Fire Prevention Engineer: Fire Safety review, inspection, and appraisal activities. Review and monitor fire research.
- o National Institute of Standards and Technology (formerly National Bureau of Standards)
  - Research Fire Prevention Engineer: Project leader for studies in fire test method development, fire performance, validation and testing.
- o Naval Facilities Engineering Command
  - Fire Prevention Engineer: Inspection of Naval facilities. Review of facility plans, design, and construction
- o SRI International and Naval Radiological Defense Laboratory
  - Chemical Engineer
- o Aerojet General and UTC
  - Aerothermal Engineer

EDUCATION: B.S. Chemical Engineering, University of California (Berkeley)
M.S. Mechanical Engineering, University of Santa Clara

OTHER: Registered Fire Protection Engineer

NAME: Rex N. Lutz (Quality Assurance Support)

ASSOCIATION: ARINC Research Corporation, Annapolis, Maryland

EXPERIENCE: 14 years

- o ARINC Research Corporation, Nuclear Quality Assurance Consultant
- o Pennsylvania State University, Research and Faculty Assistant
- o U.S. Department of Energy, Savannah River Operations, Nuclear QA Auditor
- o Baltimore Gas and Electric Company, Nuclear Engineer
- o 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 - Certified Quality Engineer
Member, ASQC Quality Audit Technical Committee

NAME: Matthew Lyon (Radiological Protection)

ASSOCIATION: Battelle Pacific Northwest Laboratory

EXPERIENCE: 28 years

- o PNL, Technical Leader, Radiological Records Program
- o WPPSS, Principal Health Physicist
- o ANI, Staff Health Physicist
- o WPPSS, Manager, Health Physics/Chemistry
- o Puget Sound Power and Light Company, Health Physicist Operations
- o Tennessee Valley Authority, Health Physics Manager, Browns Ferry
- o Wisconsin Electric Power Company, Health Physics Supervisor, Point Beach Nuclear Plant
- o Controls for Radiation, Inc., Shift Health Physicist, Plum Brook Test Reactor
- o General Electric Company, Health Physics Technician

EDUCATION: A.A. Chabot College
B.A. Physical Science, San Jose State College

NAME: Thomas J. Mazour (Training and Certification and Security/Safety Interface)

ASSOCIATION: Private Consultant

EXPERIENCE: 18 years

- o Private Consultant
  - Participated in 14 Technical Safety Appraisals
  - Developed and presented training program for DOE site-surveillance personnel
  - Supported development of reactor training programs to meet DOE Training Accreditation Program
  - Evaluated operations organization and administration, and training areas for NRC inspections of commercial nuclear power plants
- o Analysis & Technology, Inc.
  - Supported the NRC in evaluating utility training programs and developing training review criteria and regulations
  - Supported INPO development of a performance-based training accreditation program
- o Burns & Roe, Inc.
  - Design engineer and licensing engineer
- o U.S. Navy
  - Nuclear training officer: Nuclear reactor operations, nuclear weapons officer

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

OTHER:
Registered Professional Engineer (Nuclear/Mechanical)
Adjunct faculty, instructs university courses in industrial engineering and operations research

NAME: John A. McBride (Operations and Experimental Activities)

ASSOCIATION: E. R. Johnson Associates, Inc.

EXPERIENCE: 45 years

- o Johnson Associates
  - Technical services related to mining and milling of uranium, transportation of radioactive materials, irradiated fuel processing and radioactive waste management, and quality assurance
- o AEC
  - Division of Materials Licensing Director: Licensing and regulation of nuclear materials, packaging, and transportation
- o Phillips Petroleum Company, Atomic Energy Division
  - Director, Chemical Technology: Technical services to Idaho Chemical Processing Plant operations in fuel reprocessing and high-level waste management; process development in irradiated fuel processing and high-level waste treatment and solidification; technical publications, analytical chemistry laboratories
- o Phillips Rocket Fuel Division
  - Manager of Development: Process and product development in solid rocket propellants, technical services to Manufacturing Department, pilot-scale production of propellants
- o Phillips Chemical Engineering Division
  - Assistant Superintendent, Philtex Experiment Station: Process and product development and small-scale commercial manufacture of petrochemicals
- o Phillips Product Development Division

EDUCATION: A.B. Chemistry, Miami University (Ohio)
M.Sc. Chemistry, Ohio State University
Ph.D. Organic Chemistry, University of Illinois

NAME: Leon H. Meyer (Operations and Experimental Activities)

ASSOCIATION: The LHM Corporation - President

EXPERIENCE: 36 years

- o Technical Expert under contract to Oak Ridge Associated Universities and EG&G Idaho. Served on 19 Technical Safety Appraisals for DOE/EH.
- o Savannah River Plant, E.I. Du Pont de Nemours & Company, Aiken SC
  - Program Manager: Responsibility for Safeguards and Security, Long-Range Planning, Budget Coordination, Quality Assurance, Environmental Control, Energy Conservation, and Away-From-Reactor Spent Fuel Storage
- o Atomic Energy Division, E.I. Du Pont de Nemours & Company
  - Program Manager, Technial Division: Responsibility for the Defense Waste Processing Facility and the LWR Fuel Reprocessing Design Project
- o Savannah River Laboratory, E.I. Du Pont de Nemours & Company, Aiken, SC, Assistant Director
- o Savannah River Laboratory, E.I. Du Pont de Nemours & Company, Aiken, SC, Director, Separations Chemistry and Engineering Section
- o Savannah River Laboratory, E.I. Du Pont de Nemours & Company, Research Manager, Separations Chemistry Division
- o Savannah River Laboratory, E.I. Du Pont de Nemours and Company, Aiken, SC,
  - Research Supervisor, Separations Engineering Division: Responsibilities in areas of chemical separations; plutonium, uranium, and thorium processing; and tritium technology
- o Savannah River Laboratory, E.I. Du Pont de Nemours and Company, Research Engineer, Separations Engineering Division

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

NAME: Leo H. Munson (Radiological Protection)

ASSOCIATION: Battelle Pacific Northwest Laboratory

EXPERIENCE: 35 years

- o Battelle Pacific Northwest Laboratory
  - Provide Project Management
  - Evaluation and Assessment of Programs, Equipment, Systems and Criteria
  - Develop Upgrade Programs and Corrective Actions in the Health Physics and Radiation Protection Field
- o UNC Nuclear Industries, Richland, Washington
  - Manager of Reactor Quality Assurance at a Dual Purpose Reactor
  - Responsible for Implementation of the Company's Industrial Safety Program and Overview of the Radiological Safety Program
- o Donald W. Douglas Laboratories
  - Primarily Responsible for Health Physics in the Radioisotope Laboratory Including Dosimetry, Waste Handling, Shipping, and Radiological Control

EDUCATION: A.A. Radiation Technology, Columbia Basin College (Pasco, WA) Additional course work at Joint Center for Graduate Study, Richland, Washington

OTHER: Certified by the American Board of Health Physics in 1970 and recertified in 1981, 1984, 1989

NAME: Linda F. Munson (Emergency Readiness)

ASSOCIATION: Evergreen Innovations, Inc.

EXPERIENCE: 15 years

- o Evergreen Innovation, Inc., President
  - Project manager to assist EPRI in preparation of a radwaste desk reference
  - Consultant to Battelle on cleanup of Three Mile Island
  - Participant through ORAU, Battelle, and EG&G on Technical Safety Appraisals for DOE-HQ

- o Battelle Pacific Northwest Laboratory, Associate Section Manager, Dosimetry Technology Section
  - Project Manager for various programs including technical assistance to the NRC on the cleanup of Three Mile Island and upgrade of the Health Physics Program at RMI, Ashtabula, Ohio
  - Participated in the team appraisal of six uranium mills for and with the NRC
  - Conducted, with DOE-HQ, an appraisal of Emergency Preparedness of the Rocky Flats Plant
  - Served as an observer at about six Emergency Preparedness exercises at commercial power plants
  - Participated in previous Technical Safety Appraisals for DOE-HQ

- o UNC Nuclear Industries, Manager, Industrial Safety
  - Responsible for industrial hygiene at N-Reactor and the associated fuel fabrication facilities
  - Responsible for industrial safety and fire protection at N-Reactor and associated fuel fabrication facilities
  - Instituted the safety control program for facilities being sold and disassembled by the purchasers

- o UNC Nuclear Industries, Senior Environmental Engineer
  - Managed the preparation of Environmental Information Reports and license application for various nuclear facilities, primarily uranium mills, and fuel fabrication plants
  - Evaluated decontaminating alternatives for the West Valley Reprocessing Plant

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

NAME: Dennis E. Owen (Technical Support/Packaging and Transportation)

ASSOCIATION: ENCORE Technical Resources, Inc.

EXPERIENCE: 19 years

- o President, ENCORE Technical Resources, Inc.
  - Transportation of LWR fuel assemblies for post-irradiation examination
  - Analyses of TRU waste transportation to the Waste Isolation Pilot Plant
  - R&D on ceramic TRU waste forms
  - Acquisition, shipment, and analysis of TMI-2 fuel debris
  - Revisions to shipping cask Certificates of Compliance
  - Development of techniques for shipping highly embrittled Zircaloy cladding without damage.
- o Private nuclear engineering consultant
- o EG&G Idaho, Inc.
- o General Electric Company

EDUCATION: B.S. Chemistry, California State University
Graduate Courses California State University and University of Idaho

NAME: David Schweller (Organization and Administration and Facility Safety Review)

ASSOCIATION: DBS Associates, Inc.

EXPERIENCE: 34 years

- o DBS Associates
  - Reactor safety, critical facility design, operation, experimentation, health, safety, and environment
  - Organization and management of large complex enterprises
  - Safeguards and security

- o U.S. Department of Energy
  - Contracting Office for a major DOE National Laboratory; reactor safety and analysis, nuclear engineering, and critical facility design, operation, and experimentation

- o U.S. Atomic Energy Commission
  - Administered and/or established programs for the safe and secure design, construction, operation, and maintenance of the diverse and forefront research devices from Bubble Chambers to nuclear reactors
  - Established policies and procedures for the AEC's reactor safety program
  - Performed numerous inspections of AEC reactors and reactor safety programs at field offices and contractor sites

- o Martin Nuclear Division
  - Chief of the Experimental Reactor Physics Program: Responsible for experimental physics verification of the design of Martin military reactors for the U.S. Army and Air Force

- o Combustion Engineering
  - Designed and performed critical experiments and performed reactor analysis of nuclear power plants for Navy submarines.

EDUCATION: B.S. Engineering Physics, New York University, College of Engineering

OTHER: Who's Who in Atoms; Who's Who in Engineering; Who's Who in the East

NAME: Glenn A. Whan (Technical Support and Facility Engineering)

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

EXPERIENCE: 32 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, and Rocky Flats Plant

- Professor and Department Chairman, Chemical and Nuclear Engineering Department, University of New Mexico, 1957-85
  - Nuclear reactor licensing and operation
  - Gamma irradiation cell design, licensing, and operation
  - Nuclear criticality safety analysis
  - Radiation measurement and safety

- 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, Rockwell Hanford Operations, PUREX and PFP, Richland, Washington, 1986-88
  - Nuclear criticality safety analysis, Oak Ridge K-25 Gaseous Diffusion Plant Decommissioning Project, 1987-88
  - EDS 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 of American Nuclear Society
Professional Engineer, Nuclear Engineering, State of New Mexico