UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Project M-32

Willis W. Bixby, Director
West Valley Project Office
U. S. Department of Energy
Idaho Operations
P. O. Box 191
West Valley, NY 14171

Dear Dr. Bixby:

The enclosure is a report from NRC's Region I office on the safety assessment conducted at the West Valley Demonstration Project during the week of September 11, 1989. The main features of the monitoring team's findings were explained to your staff and contractors before the team left the site last September. My letter to you of October 3, 1989, also stated the team's general conclusions. The enclosed report is a more detailed explanation of the team's individual observations and criticisms.

To restate the general conclusions of the safety assessment, the team did not find anything that would suggest a near-term safety problem. Some of the team's findings, however, definitely merit attention before the construction of the Vitrification Facility (VF) proceeds much further. Our biggest concern involves shortcomings in the design review process for the VF, and in associated procedures for acquisition and inspection of VF components. We ask that you inform us how you plan to address the specific points raised by the monitoring team in this area (mainly pp. 7-15 in the enclosure).

We appreciate the cooperative attitude of your staff and contractor, and found them to be very well prepared for the assessment. The team was particularly complimentary of your program for monitoring stack air flows and airborne radioactivity. We are pleased that you are taking a careful approach to such an important subject.

WF14

Should you wish to discuss any of the items in the monitoring team's report, please feel free to call me at NRC headquarters or Jerry Roth at Region I.

Sincerely,

Original Signed by

R. Davis Hurt
West Valley Project Manager
Advanced Fuel and Special
Facilities Section
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety

Enclosure: Report on Monitoring the Status of Installation and Preoperational Testing of the Vitrification Facility at the West Valley Demonstration Project September 1989

cc: T. DeBoer, NYSERDA

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Report on Monitoring the Status of Installation and Preoperational Testing of The Vitrification Facility at the West Valley Demonstration Project September 1989

1.0 Introduction

In accordance with the West Valley Demonstration Project Act of 1980, the Nuclear Regulatory Commission (NRC) is required to monitor the Project from the standpoint of the health and safety of the public. On August 3, 1989, we informed the West Valley Department of Energy Project Office (DOE or the Department) of our intention to visit the Project site on September 11-15, 1989 to monitor the status of the vitrification facility with emphasis on aspects of the vitrification facility design, construction, and operation that could have implications for offsite safety including actions being taken to dispose of low level waste from the facility and programs related to offsite monitoring of radioactive materials. Earlier monitoring visits were undertaken at the site during March 1983, August 1985, September 1985, January 1988 and October 1988.

The programs reviewed by the NRC Monitoring Team during the September 11-15, 1989 monitoring visit were established by the DOE contractor, West Valley Nuclear Services, Inc. (WVNS), a subsidiary of the Westinghouse Electric Corporation, in accordance with applicable DOE Orders. The Department provided us with the appropriate DOE Orders and WVNS Program Manuals including the "Policies and Procedures" and the "Quality Management" manuals. We evaluated the programs in accordance with good laboratory and industry practices, and the guidance provided to us by the Department.

The intent of this report is to make observations and/or recommendations, as appropriate, to the Department on possible improvements to the programs reviewed based on our direct observation of your programs and our experiences with other similar programs. In making observations during our visit, we considered the unique nature of the Project, both with respect to the technical approach taken and the fact that those systems will be operated for only a relatively short period of time prior to dismantlement. Our intent was to focus on hardware quality and programs in systems important to the safety of the public to obtain a "vertical slice" perspective of that item or program. As such, any observation or recommendation made concerning any one program or item should be reviewed for possible implications with respect to the other programs or items at the site.

2.0 Observations - Recommendations

2.1 Quality Assurance

2.1.1 Each Quality Assurance organization professional staff member should be provided with a position description (Paragraph 3.1.2).

2.1.2 Conduct more frequent formal internal audits of Project activities commensurate with the apparent need and NQA-1 standard committments (Paragraph 3.1.3).

2.1.3 Increase the number of scheduled audits to assure that all areas of the QA Program are reviewed in a timely manner. (Paragraph 3.1.3).

2.1.4 Assure that corrective actions are initiated, in a timely manner, on DOE-ID or HQ audit findings (Paragraph 3.1.6).

2.1.5 Increase QA and QC inspection activities at vendor facilities with regard to receipt inspections to assure that components have been fabricated or constructed in accordance with design drawings (Paragraph 3.1.7).

2.1.6 Reevaluate the desing of sheild door inflatable seals to resolve the inaccessibility of the seal for repair (Paragraph 3.1.7).

2.2 Procurement and Corrective Actions

2.2.1 Review procedures related to the preparation of procurement packages and correct identified weaknesses (Paragraph 3.2.1.2)

2.2.2 Review procurement practices at the Project to assure that NQA-1 Supplements are specified where necessary, that a formal design review checklist is developed, that QA conducts reviews and followup on all outstanding items and that cognizant engineers are provided with the criteria needed to disposition or initiate nonconformance reports (Paragraph 3.2.1.4).

2.2.3 The following actions should be considered and implemented, if appropriate, to improve the Project Corrective Action Program.

2.2.3.1 Provide additional QA involvement in the design review process.

2.2.3.2 Establish design review coordinator reports and more formalized action chits which include the use of outstanding item lists to assure correction of identified items.

2.2.3.3 QA should followup on design review outstanding items.

2.2.3.4 Establish an engineering procedure to assure that supplier nonconformance reports are appropriately processed, dispositioned and corrected.

2.2.3.5 Establish the use of Engineering Deficiency Reports to ensure that identified design deficiencies have been followed up.

2.2.3.6 Establish a mechanism to assure that repeat design review/engineering deficiencies have been corrected.

2.2.3.7 Ensure that receipt inspection records include the proper identification of all items supplied by WVNS (Paragraph 3.2.2.2).

2.3 Welding/Corrosion Testing/Nondestructive Examination

2.3.1 Reexamine the Project QA program to assure the adequacy of vendor audit activities at supplier facilities (Paragraph 3.3.3).

2.3.2 Establish a frequency for and conduct corrosion tests on each high level waste tank until the tanks are emptied. (Paragraph 3.3.6).

2.3.3 Reevaluate the need for additional NDE inspector certification training and assure that the appropriate engineers are certified as welding inspectors when required (Paragraph 3.3.7).

2.3.4 Revise the visual inspection procedure to address "in process" welding inspection (Paragraph 3.3.7).

2.4 Vitrification Facility Safety Systems Reviews

2.4.1 Consider the use of NRC Regulatory Guide 1.68 as a reference to develop test requirements which should be incorporated into the vitrification facility test plan. In addition, detailed guidance on the extent of testing required for all systems should also be incorporated to produce a thorough test program (Paragraph 3.4.3).

2.4.2 Streamline the test program by providing a single test procedure for each system and reduce the number of functions accomplished through the use of the "Test Exceptions" procedure (Paragraph 3.4.3).

2.4.3 Perform a second Failure Models and Effects Analysis using the final vitrification system design (Paragraph 3.4.4).

2.5 Low Level Waste Management and Storage

2.5.1 Ensure that a Quality Assurance Program for Packaging and Shipping has been prepared or incorporated into the site Quality Assurance Program prior to the start of shipment offsite (Paragraph 3.5).

2.5.2 Assure that individuals who are knowledgeable with regard to the packaging and transportation of low level waste have been assigned to the project (Paragraph 3.5).

2.6 Ventilation System Review and Environmental Monitoring

No observations or recommendations.

3.0 Monitoring Activities

3.1 Quality Assurance

Assessment of quality assurance (QA) and quality control (QC) implementation was made through a review of the vitrification (Vit) facility design, procurement, construction and installation. The assessment included visual inspection of accessible facilities and selected components located on site, interviews with cognizant personnel, reviews of quality documentation and records, reviews of QA and QC (inspection) staffing and programs, and reviews of DOE and WVNS QA audits and QC activities. Portions of the vitrification facility important to the prevention of radioactive releases from the facility were given particular attention during the assessment.

3.1.1 WVNS Quality Assurance Program

The WVNS QA program was designed to implement the 18 criteria of ANSI/ASME NQA-1(1986), its supplements and the DOE (Department of Energy) ID Order 5700.6B. The QA program utilizes a graded approach with quality levels that relate to safety and service classifications. A quality list (Q-list) provides classifications for each item. The WVNS QA program is further defined by a Quality Management Manual and WVNS policies, procedures and instructions.

During the NRC monitoring visit conducted in January 1988, the Monitoring Team determined that use of the current revision of NQA-1 was not clearly specified to all potential users of the QA program. During this monitoring visit it was determined that use of the 1986 revision of NQA-1 was clearly delineated in the WVNS QA program plan.

3.1.2 WVNS Quality Assurance Organization and Staff

The Monitoring Team determined that the WVNS QA organization consisted of the QA Manager who reports to the Vice President and Radiological and Environmental Safety Manager. Reporting to the QA Manager are three organizations: Quality Engineering, Inspection Services, and Analytical and Process Chemistry. Quality Engineering has a manager, six quality engineers, and two unfilled professional positions. Inspection Services has a manager, nine inspectors, and has three unfilled inspector positions. Staffing of the Analytical and Process Chemistry group was not reviewed during this monitoring visit. The Monitoring Team noted that all QA managers had position descriptions defining their authorities, duties and responsibilities, however, position descriptions were not issued to the quality engineers. The Monitoring Team recommended that position descriptions be provided for the quality engineers.

In addition, the Team examined the qualifications and training records for several QA lead auditors and QC technicians. These individuals were found to meet established qualification requirements.

3.1.3 WVNS Quality Engineering

The Monitoring Team interviewed the Quality Engineering Manager and five of the QA auditors to assess implementation of the Quality Engineering audit program. Based on these interviews, the Team determined that formal audits were conducted only during a fraction (estimated average 15-25%) of the available time. These auditors were also required to perform other QA duties, e.g., procurement package reviews, work order reviews, surveillances at vendors, procedure reviews and to develop and write QA/QC procedures and instructions. As a result of these interviews, the Team concluded that formal internal auditing by the WVNS QA was not given sufficient attention, commensurate with the apparent need and NQA-1 standard commitments. The Team recommended that the need for additional formal internal audits be examined and increased, if appropriate.

One of the WVNS QA internal audits was examined to assess the quality of the WVNS audits. The audit examined was conducted on March 20-23, 1989 (No. 1A-89-001). WVNS activities with regard to design of the vitrification facility were examined during this audit. The audit covered four of the 18 NQA-1 criteria and five findings concerning procedural and/or management control inadequacies were identified. The Team determined that this audit was appropriately focused on programmatic considerations and concluded that appropriate findings were identified in the areas covered. WVNS management responded to the identified items and initiated actions to correct the items as appropriate.

The Monitoring Team also examined the WVNS QA audit schedules for 1988 and 1989 to determine if all 18 criteria of NQA-1 were audited. The Team noted that during 1988 WVNS QA internal audits covered only nine of the NQA-1 18 criteria. The 1989 audit schedule was issued with an improved format which listed all of the NQA-1 criteria. However, only three WVNS internal audits were completed in 1989 to date and these audits did not verify WVNS compliance with all 18 NQA-1 criteria. Considering the 18-month period from January 1988 to September 1989 and the few WVNS audits completed (four in 1988 and three in 1989), the Team concluded that the existing level of WVNS auditing was inadequate to afford timely management corrective actions to problem areas and did not comply with the requirements of the WVNS Quality Assurance Manual or NQA-1 (1986). Both documents required that planned and scheduled audits be performed to verify compliance with all aspects of the quality assurance program and to determine its effectiveness. The Team concluded that WVNS QA audits, at the existing level of intensity, were not adequate to provide management with responsive feedback upon which to base prompt corrective actions for identified deficiencies. Therefore, the Team recommended that WVNS should increase scheduled audits to assure that all areas of the QA program are reviewed in a timely manner to provide management with feedback upon which to base prompt corrective action where required.

3.1.4 WVNS Inspection Services (Quality Control)

Since the NRC monitoring visit in January 1988, WVNS has enlarged the Inspection Services staff from a total of 7 to 10, and are attempting to fill three additional staff positions. Inspection Services covers construction work; provides coverage of operations (e.g., testing, NDE, witnessing operations, and conducting receipt inspections); and performs surveillances relating to operational safety. During an interview with the Inspection Services Manager, the Monitoring Team determined that the identified vacancies have existed since October 1988.

Through discussions with the Inspection Services Manager, the Monitoring Team also determined that several programs have been initiated to improve the capability of the inspection personnel. These programmatic improvements include, the review of radiographic films at vendors' facilities prior to shipment of components to the West Valley site, and American Concrete Institute certification of WVNS inspectors as Grade II Concrete Inspectors.

During this visit, the Team focused on the capability of the Inspection Services group to conduct receipt inspections. The Manager stated that Inspection Services has limited capability to do receipt inspections due to reduced staffing levels and that performance testing of items received was not routinely accomplished during receipt inspection. The Quality Engineering group specifies on the Inspection Instruction Data Sheet (IIDS) critical characteristics to be inspected during receipt inspections. Quality Inspection Procedure QAP 10-2, "Receiving Inspection", provides overall guidance and requirements for the inspectors. If additional guidance or clarification is needed, the inspector must complete a Quality Clarification Report in accordance with QAP 15-3. The results of a review of the receipt inspection of a shield door to be used in the vitrification facility is discussed in Paragraph 3.1.7.

3.1.5 Analytical and Process Chemistry

A review of the Analytical and Process Chemistry group was not conducted by the Monitoring Team during this site visit because this aspect of the WVNS QA Department operation was not within the scope of this assessment.

3.1.6 External Audits of WVNS

During discussions with WVNS management personnel, the Monitoring Team determined that DOE-Idaho had conducted an audit of the WVNS QA group during June 12-15, 1989. The Team requested copies of the audit report and checklist used. The Team was informed that at the time of this monitoring visit (September 12, 1989) neither the report nor the audit checklist had been issued. In addition, it was determined that since the formal report had not been received, no corrective actions had been taken on the audit findings presented by the auditors at the end of the audit. The Monitoring Team concluded that the intent of ANSI/AMSE NQA-1 Criterion 16 was not being met by WVNS personnel. Criterion 16 specifies that "Conditions adverse to quality shall be identified promptly and corrected as soon as practical". As a results the Team recommended that this DOE audit and future audit findings be promptly provided to WVNS for action and that, if necessary, corrective actions should be initiated by WVNS personnel prior to receipt of the formal, written report.

3.1.7 Vitrification Facility Shield Doors

In order to verify adequate functioning of the WVNS Quality Assurance group, the Monitoring Team examined a series of eight shield doors and associated hardware which were to be installed in the vitrification facility. In particular, the Team focused on receipt inspection of the largest door (No 63M002) for the Vitrification Facility Crane Maintenance Room. It was determined that no receipt inspections of this door were completed upon receipt at the site. It was also determined that no measurements were made on the door at the vendor's shops by WVNS inspection personnel.

The Monitoring Team visually inspected the vitrification facility shield doors that were stored out-of-doors in a lay-down yard. The Team noted during a visual inspection of the nine-inch thick carbon steel Crane Maintenance Room Shield Door that the door's lifting lug holes were eccentric, the axis of the holes were not perpendicular to the plane of the lugs, and that the inner diameter of the holes appeared to have flame cut gouges. The lifting lugs (two) are required to carry the weight of the door when installed. A review of the design drawings for the lifting lugs showed that the holes should be round, not eccentric. However, the drawing did not specify the detail or specific tolerances on the lifting lug holes. As a result, the door specification (No. WVNS-EQ-264) was reviewed. The specification required a load test at 150% of the design load and a magnetic particle nondestructive examination (NDE) to be performed on the lugs. It was verified through discussions with QC personnel that a load test had been witnessed at the vendor's shop and that NDE had been performed. The Team also examined the lug-to-door joint design, welding procedures and NDE results. This review identified that: 1) The joint was a full penetration joint, 2) the welding procedure employed was a prequalified American Welding Society (AWS) D.1.1 procedure utilizing a 225°F minimum preheat in accordance with AWS requirements, and 3) magnetic particle inspection of the weld was performed after welding. Subsequent to the Team identifying the presence of gouges in the lifting lug holes, the WVNS QC group measured the depth of the gouges and determined that they were less than 3/16" deep which appeared to be within the AWS D.1.1 allowable tolerance for a flame cut hole. Members of the Monitoring Team also performed a check of the door design calculations and determined that the calculation for the lifting lugs were made for a gross door weight of several tons less than the actual stated weight. This raised a question by the Team as to whether or not the lifting lugs were adequately designed for the actual load to be handled. If the lifting lugs failed while the door was raised or lowered, the door could fall as much as twenty feet, possibly compromising the confinement of radioactive material in the vitrification facility. As a result of this review, the Monitoring Team questioned (1) the adequacy of the lifting lugs (design and fabrication) to handle the gross door load (approximately 106 tons), (2) the adequacy of the WVNS design review of the vendor's design, and (3) the adequacy of the WVNS QA and QC coverage with regard to the design, fabrication and receipt inspection of the vitrification facility doors. As a result, the Team recommended that increased QA and QC involvement was warranted to preclude similar design and fabrication problems in other areas of the vitrification facility.

The Team also reviewed the design drawings for the Crane Maintenance Room shield door inflatable seals. The Team noted that the design specifications permitted a maximum of 4600 cfm air leakage around the door. The current door design included cutouts for cables and the crane tracks. These cutouts will not be sealed and the leakage was calculated to be within the maximum allowed. It was noted that inflatable seals were also to be used to control air leakage around the perimeter of the door. The Team determined that a failure of that seal could compromise confinement of the vitrification facility atmosphere. The Monitoring Team also noted that the inflatable seal design was such that during seal repair personnel could be exposed to radiation and airborne radioactivity from the melter side of the door. This potential for a seal failure and the inaccessibility of the seal for repair appeared to require additional design review. This review should include attention to the quality of the inflatable seals in order to reduce the possibility of seal failures. Conduct of this additional design review was recommended by the Monitoring Team.

3.2 Procurement and Corrective Action Practices

The procurement practices of West Valley Nuclear Services (WVNS) were reviewed by the Monitoring Team because of previously identified problems experienced with the Supernatant Treatment System (STS) ion exchange column dump valves which malfunctioned during preoperational testing. WVNS determined that during the design and procurement of the STS system components, these valves were incorrectly coupled with valve actuators of the wrong size and/or design. As a result, concerns were raised over how the wrong valves had been procured. During followup of these concerns, the Team found potential inadequacies in the STS design process which preceded procurement actions. In addition, inadequacies were identified in translating design information into preoperational and operational procedures for the STS in that the dump valve actuator on Column D was over-pressurized during operation which resulted in bending of the valve stem.

WVNS procurement policies were reviewed, together with the QA requirements and practices which were needed to verify that procured material, equipment, and services met procurement document specification requirements. This review also focused upon the engineering and design process involved in the development of design inputs and engineering documents which constitute the technical content of procurement packages. Specifically, the Vitrification Facility Wall Model procurement package was examined because of its size and complexity, and because of the likelihood that it afforded an overall representation of procurement practices at the West Valley facility.

3.2.1 Procurement

3.2.1.1 Requirements

Review of this area by the Monitoring Team was conducted to ascertain if WVNS had developed a QA program to control procurement activities and that those activities conformed to ANSI/ASME NQA-1 (1986) requirements and general industry standards. Accordingly, the WVDP/WVNS Procurement Program administrative documents were reviewed to ensure that the following attributes were defined for the control of procurement activities.

1. Equipment, supplies and materials procured were specifically identified in the procurement documents.

2. Inspection requirements for product acceptance were delineated by the procurement documents.

3. All technical requirements were specified or referenced in procurement documents.

4. Access to a supplier's records for audits was required.

5. Suppliers were required to have QA programs consistent with NQA-1 criteria identified in the procurement documents.

In addition, administrative controls over the procurement process were reviewed to ensure responsibilities have been assigned for:

1. Individuals initiating procurement documents,
2. The review and approval of changes to original design documents,
3. Review and approval of original procurement documents, and
4. Assuring that procured items were as stated in the procurement documents.

Additional administrative controls were reviewed to ensure that:

1. Methods existed for qualifying a vendor/supplier,
2. An approved vendors list was maintained,
3. WVNS maintained records of vendor qualification audits, and
4. Persons responsible for the above have been designated.

3.2.1.2 Program Review

The Monitoring Team determined that measures were established to ensure that procurement (and design) documents were adequate, and that controls were in place to ensure that procured items and services complied with procurement documents. However, the Monitoring Team found that weaknesses in procurement packages (e.g., design inadequacies) were not detected by the WVNS QA program in the process of verifying product design conformance (See Paragraph 3.1.7 for details).

Numerous documents indicated that it was the responsibility of the requisitioner to determine which NQA-1 basic requirements and supplements were applicable to a particular design or purchase. However, the Monitoring Team was not able to locate any administrative requirements which provided general criteria for designating the applicable NQA-1 requirements.

The Monitoring team also determined that provisions have been established to define receipt inspection requirements which verify that materials and components conform to procurement documents, specifications, etc. However, Government Furnished Equipment (GFE) material supplied to vendors and suppliers was not mentioned anywhere in the documents reviewed and materials supplied by the buyer (WVNS) were not required to be receipt inspected for material certification by WVNS or the vendor.

In addition, the Monitoring Team determined that receipt inspection practices required by NQA-1 did not specify which critical attributes should be specified in procurement documents. It was noted that WVNS receipt inspection responsibilities were not well defined in established procedures or QA documents and surveillance requirements for receipt inspection of materials were not well addressed in procurement related basic NQA-1 requirements; however, at least four of the NQA-1 supplements provided more detailed guidance. In any case, none of the supplements were specified by WVNS in the procurement documents for the wall modules discussed below.

The Monitoring Team recommended that WVNS review procedures related to the preparation of procurement packages and correct the weaknesses identified above.

3.2.1.3 Review of the Vitrification Facility Wall Modules

Purchase of the vitrification facility wall modules constituted a major procurement action by WVNS and was selected for review by the Monitoring Team because of the complexity of the design, the level of quality verification required and because the purchase order represented a broad scope test of procurement actions. The wall modules form the heavily shielded boundary surrounding the vitrification glass melter and process systems. The walls are several feet thick and must be fabricated in sections with penetrations (service leads, piping, viewing windows, etc.) welded in place to the framework prior to placement of concrete. Final concrete placement occurs after the framework is positioned in the facility.

The vitrification facility wall module design work was accomplished by Westinghouse-Hanford with the design review accomplished by WVNS. This was done to take advantage of existing standard designs for wall modules in use at other DOE facilities. This also permitted the use of material which had already been procured by WVNS (e.g., penetration pipe end nozzles).

The Monitoring Team noted that an Engineering Change Notice had been issued to change the material specification for the wall penetration end nozzles given in the original design package. These nozzles were designated as GFE to be provided to the wall module fabricator by WVNS and the nozzle design drawings had been included in the wall module design by reference for information only. The weld design for the nozzle/pipe interface was detailed in the wall designs provided by Westinghouse-Hanford and the weld procedure was developed under the assumption that the nozzle material was exactly the same as the pipe material. It was noted that the original design drawings for the nozzles listed a material specification which was obsolete and referenced a welding procedure used only at the Hanford facility. The fabricator had completed welding approximately 50% of the nozzle/pipe joints before being informed by WVNS that the materials were dissimilar and that the vendor's welding procedure may be invalid.

Additional observations on the fabrication and welding activities associated with the wall modules are provided in Paragraph 3.3.3.

The results of design review meetings and WVNS followup on Action Item Chits were examined for three of the wall modules. One design review checklist indicated that "Interface" confirmation was not conducted during one of the preliminary design reviews. This was not turned into an Action Item Chit and no apparent followup occurred.

It was also noted that the wall module fabricator was required to conduct receipt inspections on WVNS and GFE supplied equipment and components. Records of these inspections were to be supplied to WVNS within one week of receipt. However, the Monitoring Team could not locate any records that this requirement had been checked by WVNS supplier auditors. In addition, the fabricator should have receipt inspected the end nozzles and submitted a material certificate of conformance to WVNS as required by the procurement documents. This was not done since the fabricator did not receive any material certifications from WVNS which would have pointed out the outdated material specification stated in the contract.

3.2.1.4 Recommendations

As a result of this review of procurement activities, the following recommendations were made by the Monitoring Team.

--Incorporate the NQA-1 Supplements into Equipment Specifications, Procurement Documents, etc.
--Develop a more formal design review checklist and procedure.
--Require QA review and followup of all Action Item Chits.
--Formalize the overall design review process for all safety classes.
--Provide an engineering procedure (or equivalent) to specify criteria needed for the cognizant engineer to disposition and/or initiate nonconformance reports initiated by suppliers or by the engineering group.

3.2.2 Corrective Action Program

3.2.2.1 Program Review

A review of the contractor's corrective action program was conducted in order to develop confidence that programs were in place to appropriately address corrective actions when problems were identified.

A review of WVNS administrative controls was conducted to ascertain if procedures had been prepared, approved, issued and implemented which prescribe a system for control of supplier nonconformances and corrective actions which was consistent with the requirements of NQA-1 and the WVNS QA Manual. An assessment of the overall effectiveness of these administrative controls was also conducted.

The corrective action program at West Vally was designed to correct specific nonconformances. The documents reviewed indicate that corrective actions taken or disposition of nonconformances should specify what actions would be taken to prevent recurrence of a nonconformance. However, this program did not appear to be applicable to the Design Engineering group and/or to design deficiences. No mechanism was found to be in place to ensure that programmatic deficiencies, which could be responsible for nonconformances, were analyzed and corrected, and that the corrective actions were verified to be effective. This is illustrated by the following examples.

- One current civil construction project at West Valley had the same material identification problem with penetrations/nozzles 2-3 years ago on another site project. Appropriate corrective actions were not taken and no root cause analysis was performed.

- Root cause analyses are not required to be performed as part of the process for specifying corrective actions.

- There does not appear to be any instruction which specifies a procedure for generating and processing Engineering Deficiency Reports.

- NQA-1 requirements for corrective actions stipulate that actions to preclude recurrence shall be implemented. QA requirements of NQA-1 also stipulate that corrective actions must be verified effective and complete and must be documented and followed up during surveillance audits to verify continued effectiveness.

3.2.2.2 Recommendations

As a result of the above review, the Monitoring Team recommended that the following actions be considered or taken, as appropriate.

--Provide additional QA involvement in the design review process.
--Establish design review coordinator reports and more formalized action chits which include the use of outstanding item lists to assure correction/resolution of identified items.
--QA should follow up on outstanding items from design review.
--Establish an engineering procedure to assure that supplier nonconformance reports are appropriately processed, dispositioned and corrected.
--Establish the use of Engineering Deficiency Reports to ensure that identified design deficiencies have been followed up.
--Establish a mechanism to assure that repeat design review/engineering deficiencies have been corrected.
--Ensure that receipt inspection records include the proper identification of all items supplied by WVNS.

3.3 Welding/Corrosion Testing/Nondestruction Examination (NDE)

WVNS actions on several (NDE) items identified during the January, 1988 monitoring visit were reviewed. In addition, WVNS actions taken to correct internally identified corrosion problems in the vitrification facility off-gas system ductwork were also reviewed as described below.

3.3.1 Laboratory Ventilation System Ductwork

The Monitoring Team examined installation of the analytical laboratory ventilation system ductwork which was performed by a WVNS subcontractor in accordance with specification number WVNS-CS-170. WVNS records showed that the material used was 16 gauge, corrosion tested, ASTM-A240 type-304L (low carbon) stainless steel in lieu of the specified ASTM-A167 type 304. Although no engineering approval was provided by WVNS, the material substitution, in this case, was considered favorable by the Monitoring Team because of the lower carbon content and improved corrosion resistance of type 304L stainless steel. The records showed that shop welding of the stainless ducting was performed in accordance with AWS 9.1, "Specification for Welding Sheet Metal", requirements. A review of welding procedure BSM-8.1 indicated conformance to AWS 9.1 requirements. The documentation included WVNS Surveillance Report #22, dated January 15, 1989, which indicated that acceptable filler metal (type 308L - lot 3992) was used for welding. The documentation also included visual inspection records of the welds as required by AWS 9.1, and test records indicated successful air leak tests in accordance with ANSI-N510 requirements. The installed system could not be inspected by the Monitoring Team because it was covered by a wall and ceiling tile.

3.3.2 High Efficiency Particulate Air (HEPA) Filters

The Monitoring Team determined that HEPA filter frame work was being fabricated by a WVNS subcontractor in accordance with WVNS Specification EQ-290. A review of the records showed that WVNS had reviewed and properly approved two welding procedures SM-10 "GMAW-Gas Metal Arc Weld" and SM-07, "GTAW - Gas Tungsten Arc Weld", in accordance with ASME Section IX requirements. It was noted that final approval was based on comments provided by QA welding personnel in order to reflect specific application requirements. In addition, it was noted that the subcontractor had submitted two fillet weld mockups as requested by WVNS for subsequent destructive examination to verify quality and weld penetration. Visual examination of these mockups by the Monitoring Team revealed weld surfaces free of obvious defects.

3.3.3 Vitrification Facility Wall Modules

A review of WVNS Audit Report EA-89-03, dated May 24-25, 1989 of a WVNS subcontractor pertaining to the fabrication of wall modules (P.O. 19-24425) indicated that WVNS had conducted a thorough and intensive pre-production audit. The audit was conducted to verify the subcontractor's implementation of and compliance with their internal quality assurance program. During the audit, the auditors identified fourteen findings, all of which were subsequently corrected and verified.

During examination of information related to the wall modules, the Monitoring Team verified that the fabricator employed an unqualified welding procedure during the fabrication. A P-8 to P-8 procedure in lieu of a P-8 to P-10H procedure was employed during production welding of the type 304L (P-8) austenitic stainless steel penetration pipes to the type SA 351-CD4MCU (P-10H) high strength stainless steel nozzles. When this inadequacy was identified by the fabricator's QA personnel, WVNS immediately instructed the fabricator to initiate an ASME IX welding qualification procedure using the specified base materials. Subsequent to the monitoring visit, on September 20, 1989, WVNS reported that the fabricator had successfully qualified the new procedure using type 308 stainless steel filler metal, the filler metal actually used in production. The bend and tensile specimens will be subsequently sent to WVNS by the fabricator for examination.

As a result of this observation, the Monitoring Team questioned the adequacy of the WVNS QA audit procedure to identify significant problems at supplier facilities. The team recommended that this area of the WVNS QA program be reexamined and improved as appropriate.

3.3.4 Vitrification Crane Room Shield Door

Because of the questions which were previously discussed in Paragraph 3.1.7 concerning the adequacy of the shield door lifting lugs, a review of the door fabrication details was performed. This review covered joint design, welding procedures and NDE. The review indicated that: (1) the joint was a full penetration joint, (2) the welding procedure employed was a prequalified AWS D1.1 procedure utilizing a 225°F minimum preheat in accordance with AWS requirements and (3) magnetic particle inspection of the weld was performed after welding. Except as previously discussed, no significant problems other than those found by WVNS, were identified.

3.3.5 Vitrification Facility Slurry Fed Ceramic Melter (SFCM)

The Monitoring Team reviewed the corrosion problems previously experienced in the Inconel-690 off-gas nozzle of the SFCM melter. This condition was initially observed on May 26, 1988. The off-gas nozzle was located below the flange and above the melter lid. Examination of the failed nozzle by the Monitoring Team revealed general corrosion as well as through wall holes. The corrosion was attributed by corrosion experts from Pacific Northwest Laboratories (PNL) and Savannah River Laboratory (SRL) to sulfidation or hot corrosion resulting from condensation of a high concentration of sulfur and chlorine. The following changes are being considered by WVNS in the design of a replacement melter to preclude corrosion of the nozzle during production runs: (1) clad the nozzle with a higher chromium (43% vs 30%) Inconel alloy, (2) increase the original nozzle wall thickness from 1/4" to 1/2" and (3) utilize the film cooler (nozzle insert) 100% of the time as compared to 10% of the time for the failed nozzle.

The Monitoring Team determined that appropriate actions were being taken by WVNS to correct this identified problem.

3.3.6 High Level Waste Tank Corrosion

The Monitoring Team reviewed two reports on corrosion of the high level waste storage tanks. The first report on work performed by Nuclear Fuel Services, the previous operator at the site, dated August 19, 1976, concluded that the worst case corrosion in the 8D-2 high level waste tank was less than 0.6 mils/yr which would result in a service life of 400 years. A corrosion allowance of 0.25 inches was provided in construction of the tank. This conclusion was based on corrosion coupons installed in tank 8D-2 during April, 1966 and removed and evaluated in June, 1976. The report also stated that the stainless steel corrosion specimens from tank 8D-4 containing acidic thorium waste were examined in May 1976 and showed less than 0.02 mil per year weight loss. The second report issued by Rockwell International-Hanford operations in June 1983 covered the inspection of outside surfaces of two steel tanks 8D-1 and 8D-2. This work was commissioned by the Nuclear Regulatory Commission, with concurrence of the U.S. Department of Energy. The work included photography, video television, and ultrasonic inspection. The onsite tank inspections were accomplished by use of a large area scanner which accessed the annulus space between the tank and vault walls via a 30" diameter riser. The report indicated that the mean thickness for tank 8D-1 was 0.543 inches and for tank 8D-2 the wall thickness was 0.524 inches. Each was greater than 0.500 inch nominal wall thickness identified on the tank drawings. Review and evaluation of photographs and the video television images indicated that the extent of corrosion products on the outside of tank 8D-2, the active tank, was considerably less than tank 8D-1, the standby tank. This most likely was due to the active tank being at a higher temperature which reduced the moisture content of the air in the vault containing the active tank. Surface pitting was observed to have occurred in both and was estimated to be 0.040" to 0.060" deep. Although the amount of general corrosion which has been observed does not appear to encroach on the minimum design allowance or significantly reduce the 0.250" corrosion allowance, the presence of pitting strongly suggests that tank 8D-2 should be reinspected at frequent intervals.

WVNS recently removed corrosion specimens from tank 8D-2. The exposure period was nine (9) months. Corrosion was reported to be negligible on the basis of visual examination. As a result of this review, the Monitoring Team recommended that corrosion of each tank should be reexamined at frequent intervals until the tanks are emptied.

3.3.7 Non-Destructive Examination (NDE)

The Monitoring Team witnessed liquid penetrant inspection of seven welds involving three jumpers (spool pieces) intended for use in the supernatant treatment system. It was determined that the inspection was performed in accordance with the NDE-PT-1 procedure. The Team verified that the inspection did not reveal any rejectable indications.

The Monitoring Team also reviewed WVNS Quality Assurance nondestructive examination procedures and written practices for the training, qualification and certification of nondestructive examination personnel. A list of procedures and the results of the review are contained in Table 1. Also reviewed were the individual qualifications of each person qualified to perform NDE for West Valley Nuclear Services and the qualifications of the Level III individual. Except as discussed in Notes 1, 2, and 3 of Table 1 no other significant deficiencies were identified. Although, the Monitoring Team recommended resolution of the deficiencies identified in Table 1, the Team concluded that the WVNS Quality Program as it affects on site maintenance and welding was adequate.

The Monitoring Team also reviewed WVNS activities in response to a previously identified finding discussed in Paragraph 4a(2) of the DOE West Valley Monitoring Report dated March 18, 1988, which provided details of an identified problem concerning radiographs of the supernatant process line welds (8D-2 to STS piping) which did not fully conform to ANSI B31.3 or ASME Code Section V, Article 2 specifications. The Monitoring Team recommended in the March, 1988 report that radiographs be reviewed in detail such that the type and size of both real and potential radiographic indications be determined and the West Valley Nuclear Services Engineering staff evaluate these findings to determined if the piping was acceptable. The reports and memoranda documenting the review and evaluation of this radiographic problem by WVNS, including corrective actions, were provided to the NRC Region I office on April 21, 1988 and were reviewed again during this visit. In summary, the radiographs for the STS piping were reviewed by two level III radiographers from separate companies to determine variances from code requirements and to establish the maximum size indication that might not be detected by the radiographic technique used. This maximum indication size was a 0.060 inch through wall crack (29% of the wall thickness). A fracture mechanics analysis concluded that service conditions should not cause growth of the postulated defect. The NRC staff reviewed the submitted information and concluded that no safety problem existed with the 8D-2 to STS pipe welds and that the piping should perform satisfactorily in service.

Table 1

Welding and NDE Procedures Reviewed

Title	No.
"Training and Qualification of NDE Personnel"	QAP .2-2 Rev 1 N/A
"Written practice for Training, Qualification and Certification of NDE Personnel"	WP No. 001 Rev. 1 (See Note 1)
"Bubble Emission Leak Test of Process/Pressure Piping"	NDE-BT-1
"Magnetic Particle Examination of Ferromagnetic Parts and Welds"	NDE-MT-1
"Visible Dye Penetrant Examination"	NDE-PT-1
"Ultrasonic Thickness Measurement"	NDE-UT-1
"Visual Examination"	NDE-UT-1 (See Note 2 & 3)

Note 1: Procedure should reference ANSI 45.2.6

Note 2: Requirement of 4 hrs training for certification of welding inspectors on the "Visual Examination" procedure appears to be insufficient. For critical welds, the engineers who approve work packages should require a certified AWS welding inspector to be present. AWS inspectors require five years experience related to welding in addition to passing an examination.

Note 3: The visual inspection procedure is deficient in dealing with "in process" welding inspection. The procedure lacks specific requirements for fit up, weld preparation, root gap, tolerance, misalignment, weld bevel, etc. Reference specifications or checklists should also be considered. In addition, the procedure should reference ANSI 45.2.8.

3.3.8 BD-2 Tank to Melter Delivery Piping

A review of delivery piping from the HLW storage tank (8D-2) to the vitrification facility was inappropriate at this time because the design of the delivery piping has not been completed or finalized.

3.4 Vitrification Facility Safety System Reviews

Reviews were conducted of the various vitrification facility subsystems which could be related to the health and safety of the public. Emphasis was placed on the design layout and installation of these systems in an attempt to identify potential weaknesses in the design process which could lead to a failure of equipment important to safety. In addition, available procedures describing equipment operation and replacement were also examined.

3.4.1 Systems Engineering

West Valley Nuclear Services (WVNS) personnel provided a general description of the approach to systems engineering. It was determined that responsibilities have been formalized in procedures but have been compartmentalized so that no single individual was charged with monitoring a given system during all phases of design, construction and operation. Consequently, communication between engineers responsible for a system during different phases was necessary. During previous systems reviews, the Monitoring Team identified several instances of failures of design/construction interface controls. However, the Monitoring Team determined during this review that, in general, no significant problems were identified as a result of this compartmentalized approach. Most WVNS engineers involved with a system during different phases (design, construction, testing, operations) appeared to have a good knowledge of the system requirements, and appeared to communicate well with each other.

3.4.2 Vitrification Facility Test Management Procedures

WVNS provided an overview of the procedures and specific examples of charts used to follow test objectives, progress, results and open issues. Tools applied included PERT charts and checklists. The checklists for open items included the identification of the cognizant engineer, the engineer responsible for opening the issue and entries for dates of resolution. A potential weakness in this process was identified in that it was not clear that closing of an outstanding item required concurrance by the individual who initially raised the issue. Issues related to planned tests were tracked weekly with interim and final run reports documenting resolution. The test approach included testing at the component, system, integrated system and facility levels before the facility was turned over for hot operations. The procedures also allowed for WVNS participation in testing at vendor facilities prior to installation of the equipment at West Valley. Vendor test procedures were routinely reviewed by WVNS and the results were filed. A PERT chart of the present vitrification system test plan was reviewed and it appeared to provide an adequate overview of planned tests. However, it was noted that acceptance test plans had not yet been fully developed since review of the test program was not expected to be completed until the last quarter of 1990.

The Monitoring Team recommended that WVNS consider modifying the current method for closing outstanding items to include concurrence of the closeout by the initiating individual.

3.4.3 Preoperational Test Control

Through discussions with WVNS personnel, the Monitoring Team determi ed that vitrification system final testing is tentatively scheduled to begin in late 1990. Therefore, specific Test Plans (TPL) for testing of the vitrification systems have not yet been fully developed. However, administrative policies for implementation of the test program were available and were reviewed during this visit. Engineering Procedure EP-11-001, Rev. 3, "Test Control", and other referenced procedures were reviewed.

The test control program uses Test Plans (TPL) to track test requirements for each system and component to be tested. The TPL provides the purpose, method of testing, and acceptance criteria. Actual procedures used to execute system testing include Special Implementing Procedures (SIPs), Temporary Operating Procedures (TOPs), and Standard Operating Procedures (SOPs). Test results are documented in Test Results Reports (TRRs).

The Test Control Program provides concise delegation of responsibility for developing and implementing the test program. In addition, the test program will utilize SOPs during hot functional tests, which will serve as a validation process for the SOPs'.

The primary weakness identified by the Monitoring Team in the Test Control Program was that guidance on the detail of testing required was not provided. The Team recommended that WVNS should consider using NRC Regulatory Guide 1.68, Rev. 2, August 1978, "Initial Test Programs For Water Cooled Nuclear Power Plants", which provides specific guidance to Nuclear Power Plants on the requirements of Preoperational Test Programs. This document could be used as a reference to develop test requirements which should be incorporated into the TPL. It was also noted that detailed guidance on the extent of testing required for all systems should be incorporated into Test Control procedures to produce a thorough test program. The cognizant design engineer should then assure that the TPL provides comprehensive testing of all components.

It was noted that separate SIPs and TOPs for each component tested would produce a cumbersome number of procedures and make the task of test control unnecessarily difficult. Therefore, it was recommended that a single procedure should be developed which incorporates testing of all components in the system. That procedure would help ensure that each system is thoroughly tested prior to operation.

The Team also noted that WVNS should develop a method to assure positive control over systems and components that are being turned over to testing from construction. A similar method could be used when a system or component has been successfully tested prior to releasing that system for operation. WVNS should consider establishing a system of tagging those components which are ready to be released to the next phase. This method would assure that all applicable components have been tested.

WVNS uses the "Test Exceptions" procedure contained in Test Control Procedure EP-11-001 to control changes to SIPs, track and direct modifications or maintenance and document outstanding deficiencies in systems. Test Exceptions are also used in lieu of a work order to accomplish work. Use of Test Exceptions should be used only for unsatisfactory test results and test instruction deferrals. Changes to procedures and maintenance work should be tracked through the use of other methods.

In summary, EP-11-001, should be reviewed and revised to assure that all components and systems, and all modes of systems operation are included. Streamlining of the test program could be accomplished by providing a single test procedure for each system. Test document control should be revised to reduce the number of functions accomplished using the Test Exception.

3.4.4 Vitrification Facility-Failure Modes and Effects Analysis (VF-FMEA) Review

WVNS provided the Monitoring Team an overview of the Pacific Northwest Laboratory VF-FMEA with emphasis on the Concentrator Feed Make-up Tank (CFMUT) as an example. It was stated that all implementable recommendations from PNL were adopted into the design of a new melter and that a WVNS engineer was responsible for each element covered in the PNL VF-FMEA. However, it was determined that a formal method was not used to verify closure of all PNL recommendations. The Team also determined that the WVNS process technology, testing and design groups track or handle issues separately and communications/interfacing are not formalized.

An independent evaluation was performed by the Monitoring Team on the Failure Modes and Effects Analysis (FMEA) for the vitrification facility. The evaluation examined potential failures and their effects on the Concentrator Feed Makeup Tank (CFMUT). This evaluation did not identify any new failure mechanisms which were not previously identified by the facility designers. A review of the "Failure Modes and Effects Analysis of the West Valley Nuclear Services Vitrification System," July 1987, by Pacific Northwest Laboratory (PNL) was also performed. No additional failure mechanisms different from those documented in the PNL report were identified by the Team. Observations made during the review of the PNL-FMEA report are as follows.

- All systems and components important to safety, such as the vitrification cell ventilation system, were not included in the FMEA.

- The FMEA was performed prior to the time that the vitrification system design was finalized. As a result several of the failure modes and effects observations made during the FMEA are no longer valid because of changes made to the present vitrification system design.

- There was no established mechanism to assure that the recommendations documented in the FMEA on design improvements were tracked as open items.

- Communications between the various WVNS groups working on the vitrification facility were not formalized.

- The present VF-FMEA is a useful start on accident analysis but a more detailed and comprehensive study would be of value as the design nears finalization.

- The FMEA is a useful tool to identify weaknesses in the vitrification system design.

Based on observations made during the review of PNL's FMEA report, the Monitoring Team recommended that WVNS perform a second Failure Modes and Effects Analysis using the final vitrification system design. All systems which could interrupt the vitrification process or affect safety should be included in this FMEA. Any recommendations presented in the FMEA should be tracked as open items.

3.5 Low Level Waste Management and Storage

The Monitoring Team examined the status of low level waste management and storage at the West Valley site. Through discussions with WVNS personnel, the Team determined that an engineer had recently been hired to formulate the site Low Level Waste Management Program. This engineer was found to be highly qualified and was knowledgeable of the status of waste compacts and burial site requirements throughout the country.

The Monitoring Team was informed that there was approximately 230,000 cubic feet of low level waste at the site as of September 8, 1989. Of that quantity, approximately 41% was classified as Class A waste in accordance with 10 CFR Part 61 definitions. The Class A waste consisted of compacted general waste, construction debris, size reduced general waste and resins from the onsite water treatment facility. WVNS personnel are currently evaluating several low level waste disposal options which include onsite storage in drum cells, commercial offsite burial at approved burial sites or offsite burial at other appropriate DOE sites. This evaluation was subsequently completed by September 15, 1989 and is currently being evaluated by the DOE-West Valley Project Office. In the meantime, WVNS has initiated actions to ship approximately 11,000 cubic feet of Class A low level waste to a commercial burial site prior to January 1, 1990 if possible. Requests for Quotations (RFQs) have been issued and responses to the RFQs are currently being evaluated.

As a result of this review, the Monitoring Team made the following recommendations.

- Ensure that a Quality Assurance Program for Packaging and Shipping has been prepared or incorporated into the site Quality Assurance Program prior to the start of shipment offsite.

- Assure that individuals who are knowledgeable with regard to the packaging and transportation of low level waste have been assigned to the project.

3.6 Ventilation System Review and Environmental Monitoring

WVNS practices and procedures applied to the design of ventilation system were examined. In addition, the stack monitoring equipment and sampling program for the vitrification facility (VF) off-gas and ventilation system were reviewed to assure adequate monitoring of releases to the environment. There will be two specific release points from the VF for ventilation exhausts which represent possible environmental release paths for airborne radioactive substances: (1) the main plant stack for the VF process exhaust; and (2) the secondary filter room (SFR) stack for the VF cell exhaust. The main plant stack is currently operational and the monitoring/sampling equipment is on line. However, the SFR stack and its sampling/monitoring equipment is currently being designed and installed for a planned 1990 startup.

3.6.1 Ventilation System Design Practices and Procedures

WVNS provided The Monitoring Team with a detailed review of the practices and procedures used for design, installation and testing of the Contact Size Reduction Facility (CSRF) ventilation system. This system was selected as representative for review since the VF ventilation systems were not ready for this level of review. The review included examination of system pressure drop and fan sizing calculations, review of as-built drawings and completion of a checklist for verification of compliance with ANSI/ASME N509 and N510 requirements for nuclear power plant air cleaning units and components. Compliance with these standards is directed by DOE Order 6430.1A, General Design Criteria. As a result of this review the Monitoring Team concluded that proper materials were used in construction of the system, that the design calculations were properly completed and consistent with the installed system and that testing and test procedures were in accordance with requirements. Consequently, it was concluded that WVDP procedures for ventilation system design were proper and if followed, would provide adequate ventilation for the VF.

3.6.2 VF Process Exhaust Monitoring

The exhaust from the vitrification melter process passes through a Submerged Bed Scrubber (SBS), a High-Efficiency Mist Eliminator (HEME), and High-Efficiency Particulate Air (HEPA) filters before entering the main plant stack for discharge to the atmosphere. The monitor and sampling equipment for this stack are housed in an insulated building at the south side of the stack base on the ventilation exhaust cell roof. An air sample is continuously drawn from two multi-nozzle probes installed at the 80-foot level in the stack and transported approximately 70 feet down two stainless steel heat-traced sample lines to the sampling and monitoring instrumentation. The sample passes through a particulate filter and charcoal cartridge. The monitored air stream, which is split into online and standby units, is again split into the separate alpha and beta particulate monitors. One pair of alpha and beta instruments is online at any given time. These instruments were provided with alarms and logarithmic countrate indications in the main control room.

The online sampling assembly consists of a 47 mm glass fiber filter followed by an activated charcoal cartridge. The filter media are changed and screened weekly for gross radioactivity. Quarterly composites are analyzed for gamma isotopes, Sr-90 and I-129.

The stack monitoring instruments consist of an alpha-detection instrument and a beta-detection instrument operating in parallel. This pair of instruments has a backup set on "standby", which actuates upon failure of either the alpha or beta instrument.

The vacuum pump that provides suction to the sampler system has a standby pump which is activated if the flowrate drops below a preset value and alarm indication is provided in the control room.

The vacuum header for the monitor system is also shifted from the failed instrument to the backup instrument by motor-operated valves that activate when the standby instruments are started.

3.6.3 VF Cell Exhaust Monitoring

The exhaust from the vitrification facility cell atmosphere within the shield walls that contain the vitrification process will be designed to pass through a series of high efficiency particulate air (HEPA) filters before entering the secondary filter room (SFR) stack for discharge to the environment. The monitoring and sampling system requirements for this SFR stack were based upon the following assumptions: (1) any of the nuclides present in the high-level waste tanks could potentially be released through the SFR stack; (2) the location of the monitoring system will be accessible under any credible accident condition; (3) no non-radiological continuous monitoring will be required; and (4) the ventilation system will operate at a steady (±5%) flow rate.

The functional requirements of the monitoring system for the new SFR stack are based upon those for the existing main plant stack. Some of the important points considered for the new systems are: (1) an empirical determination of the stack velocity profile made prior to sample nozzle installation, (2) alarm indicators and measurement indicator panels should be located in a continually occupied space, (3) redundant alpha and beta monitors on the system will automatically switch to the standby units upon failure of the operating units, and (4) each beta unit has a dual alarm capability for indicating airborne concentrations just above normal levels in addition to concentrations at established limiting conditions. The SFR stack monitoring system is being designed and fabricated for a planned startup in 1990. Since this ventilation system has not been fabricated, the Team examined the ventilation system design practices and procedures as previously discussed in Paragraph 3.6.1, for the Contact Size Reduction Facility. No inadequacies were identified.

3.6.4 VF Process Off-gas Particulate Sampling

WVNS provided a detailed description of the methodology for process offgas particulate sampling. Sampling ports were established for developmental purposes and will not be installed on the system used for hot operations. Isokinetic sampling at four locations will facilitate calculation of decontamination factors (dfs) for various radionuclides released from the melter through the submerged bed scrubber (SBS) and the high efficiency mist eliminator (HEME). It was noted that the HEME functions as a particulate removal device rather than as a mist eliminator in the system. This methodology was determined to be a modification of EPA Method 5 for Determination of Particulate Emmissions from Stationary Sources and as such was consistent with present regulatory guidance. Each sampling system included filters for particulate capture, impingers for water condensation and removal and dry gas meters for measurement of total flow rate through the sampling system. Flow rate through the offgas system was determined using pitot tubes for air velocity measurement, with correction for temperature and pressure to standard conditions. In addition to determination of dfs, the particulate sampling system was used for measurement of particle size distribution with cascade impactors. Calibration and operation procedures for the impactors were available.

Review of this activity included a tour of the VF, examination of equipment, and review of supporting documentation. In summary, the WVDP process off-gas sampling methodologies appeared adequate and likely to provide confirmatory data on system dfs which will be useful for design, operation and accident analysis applications.

3.6.5 Testing of VF Exhaust Monitoring Systems

During this visit, a WVNS subcontractor initiated testing to evaluate the representativeness of the sampling devices in use on the VF exhaust streams. This evaluation will consist of three phases. First, helium tracer gas will be injected into the ventilation system upstream of the exhaust fans and sampled at the probe; this test will provide an assessment of exhaust stack stream-sampling representativeness. Second, velocities at the inlets to the probes will be measured and matched to the sampling flow rates and line diameters to evaluate isokinetic flow. Third, Dioctyl Phthalate (DOP) particles will be injected at the nozzle inlet of the sampling probe and measured at the location of the collection media to determine the possible loss of aerosols in the sampling line due to particulate plateout.

The startup of the first phase of tests on the main plant stack monitoring system was observed by the Monitoring Team during this visit. Testing of the existing stack monitoring system is expected to take a total of four months, not including a possible interim delay imposed by the onset of winter weather. Similar tests are planned for the new SFR ventilation system after that stack is installed. The Monitoring Team requested that copies of any interim reports on the progress and findings of these tests be submitted by the DOE Project Office to the NRC for review as they are issued, prior to completion of the overall evaluation.

3.6.6 Summary

No significant deficiencies or weaknesses were observed in the review of these activities. In particular, the off-gas sampling and ventilation system design practices were of high technical quality and in accordance with applicable standards.

4.0 Environmental NRC TLD Monitoring Program

During the September 1985 monitoring visit, the Monitoring Team established independent thermoluminescent dosimeter (TLD) stations on and around the site as an independent overcheck of the contractor's TLD monitoring program. Since that time, the TLDs have been exchanged by State of New York personnel for the NRC and analyzed in the NRC Region I TLD Laboratory. The TLDs (twelve) were placed on and around the site at the locations described in Appendix 1.

Shown in Appendices 2 through 8 are the TLD monitoring results for the TLDs placed on and around the West Valley site during each calendar quarter for the period September 18, 1987 to July 12, 1989.

The column identified as Net Exposure Rate gives the exposure in millirem per 90 day period as adjusted from the gross exposure values. Stations 10, 11 and 12 are located on site and were expected to have somewhat higher exposure rates. The values for Station 11 were higher than expected but are similar in value to the TLDs placed in the area by the DOE contractor (WVNS). According to contractor personnel, the higher values were caused by radiation from a radioactive material storage building which was located within 100 yards of the fenceline. The contractor identified the unexpectedly high values during December 1985, immediately ordered and installed additional shielding for the storage building, and reduced the measured radiation levels at Station 11 to about 50 percent of the levels measured in the general area. Levels at Station 9, were also found to be somewhat elevated. This station was located just outside the West Valley site. These elevated radiation levels were also due to the proximity to the storage building. The measured radiation levels at all off-site locations were within the regulatory limits for radiation exposure to the public.

APPENDIX 1

NRC TLD DIRECT RADIATION ENVIRONMENTAL MONITORING LOCATIONS

AT WEST VALLEY

STA.	DIST(mi)	DIR	DESCRIPTION
1	4.0	350	Springville Downtown Parking Lot
2	3.6	144	Pine Cliff Rd., West Valley (Utility Pole AAD 3)
3	1.5	92	Heinz Road at the Site Boundary
4	1.2	51	Zeffer Farm, Route 240
5	2.1	10	Emerson Farm, Thomas Corner Rd.
6	1.7	319	Rock Spring and Dutch Hill Rd.
7	1.2	262	Dutch Hill & Head Row (Utility Pole 20)
8	1.4	234	Dutch Hill & Pine (Utility Pole 28)
9	0.3	300	Rock Spring at Quarry Creek
10	On-site	43	Switch Gear Fence
11	On-site	334	BWE Fence Line (about 10 ft. from the Fence)
12	On-site	83	Utility Ditch at Security Fence

APPENDIX 2

WEST VALLEY

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date : 9/18/87
Field placement date : 10/13/87
Retrieval date : 1/13/88
Readout date : 1/26/88

Gross Monitoring Period : 131 days (9/18/87 - 1/26/88)
Field Monitoring Period : 107 days (10/13/87 - 1/13/88)

Transit Period : 24 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 131 days)	Net Exposure (mR / 90 days)
1	4.0	350	28.5 +- 0.9 ; 4.3	21.5 +- 0.8 ; 4.6
2	3.6	144	21.5 +- 0.6 ; 3.2	15.6 +- 0.6 ; 4.0
3	1.5	92	missing TLD	
4	1.2	51	21.2 +- 0.6 ; 3.2	15.4 +- 0.6 ; 4.0
5	2.1	10	25.5 +- 0.8 ; 3.8	19.0 +- 0.8 ; 4.3
6	1.7	319	24.6 +- 0.7 ; 3.7	18.3 +- 0.7 ; 4.2
7	1.2	262	23.9 +- 0.7 ; 3.6	17.7 +- 0.7 ; 4.2
8	1.4	234	22.4 +- 0.7 ; 3.4	16.4 +- 0.7 ; 4.0
9	0.3	300	45.5 +- 1.4 ; 6.8	35.8 +- 1.3 ; 6.4
10	on-site	43	36.9 +- 1.1 ; 5.5	28.6 +- 1.0 ; 5.5
11	on-site	334	1476 +- 44 ; 221	1239 +- 37 ; 186
12	on-site	83	78.0 +- 2.3 ; 11.7	63.2 +- 1.9 ;10.3

Transit Dose = 2.9 +- 0.4 ; 3.4

Results are reported as

Measurement +/- Random error ; Systematic error

APPENDIX 3

WEST VALLEY

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date	:	12/16/87
Field placement date	:	1/13/88
Retrieval date	:	4/ 4/88
Readout date	:	4/27/88

Gross Monitoring Period	:	134 days (12/16/87 - 4/27/88)
Field Monitoring Period	:	83 days (1/13/88 - 4/ 4/88)
Transit Period	:	51 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 134 days)	Net Exposure (mR / 90 days)
1	4.0	350	22.8 +- 0.7 ; 3.4	16.9 +- 0.9 ; 5.0
2	3.6	144	22.7 +- 0.7 ; 3.4	16.8 +- 0.9 ; 5.0
3	1.5	92	23.1 +- 0.7 ; 3.5	17.2 +- 0.9 ; 5.1
4	1.2	51	21.0 +- 0.6 ; 3.2	15.0 +- 0.8 ; 4.9
5	2.1	10	24.2 +- 0.7 ; 3.6	18.4 +- 0.9 ; 5.2
6	1.7	319	24.2 +- 0.7 ; 3.6	18.4 +- 0.9 ; 5.2
7	1.2	262	25.1 +- 0.8 ; 3.8	19.4 +- 1.0 ; 5.3
8	1.4	234	24.2 +- 0.7 ; 3.6	18.4 +- 0.9 ; 5.2
9	0.3	300	40.6 +- 1.2 ; 6.1	36.2 +- 1.4 ; 7.4
10	on-site	43	34.8 +- 1.0 ; 5.2	29.9 +- 1.2 ; 6.6
11	on-site	334	1350 +- 41 ; 203	1456 +- 45 ; 220
12	on-site	83	78.5 +- 2.4 ; 11.8	77.3 +- 2.6 ;13.2

Transit Dose = 7.2 +- 0.4 ; 3.1

Results are reported as

Measurement +/- Random error ; Systematic error

APPENDIX 4

WEST VALLEY

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date	:	3/24/88
Field placement date	:	4/ 6/88
Retrieval date	:	7/12/88
Readout date	:	7/26/88

Gross Monitoring Period	:	125 days (3/24/88 - 7/26/88)
Field Monitoring Period	:	92 days (4/ 6/88 - 7/12/88)
Transit Period	:	33 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 125 days)	Net Exposure (mR / 90 days)
1	4.0	350	26.1 +- 0.8 ; 3.9	23.2 +- 0.9 ; 4.6
2	3.6	144	22.2 +- 0.7 ; 3.3	19.4 +- 0.8 ; 4.3
3	1.5	92	25.5 +- 0.8 ; 3.8	22.6 +- 0.9 ; 4.7
4	1.2	51	19.5 +- 0.6 ; 2.9	16.7 +- 0.7 ; 4.0
5	2.1	10	26.1 +- 0.8 ; 3.9	23.2 +- 0.9 ; 4.8
6	1.7	319	23.2 +- 0.7 ; 3.5	20.3 +- 0.8 ; 4.4
7	1.2	262	21.9 +- 0.7 ; 3.3	19.1 +- 0.8 ; 4.3
8	1.4	234	21.2 +- 0.6 ; 3.2	18.4 +- 0.7 ; 4.2
9	0.3	300	45.7 +- 1.4 ; 6.9	42.4 +- 1.4 ; 7.3
10	on-site	43	37.7 +- 1.1 ; 6.4	34.5 +- 1.1 ; 6.3
11	on-site	334	1384 +- 41 ; 208	1352 +- 40 ; 204
12	on-site	83	114 +- 3.4 ; 17.1	110 +- 3.3 ;16.9

Transit Dose = 2.4 +- 0.3 ; 2.9

Results are reported as

Measurement +/- Random error ; Systematic error

WEST VALLEY

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date	:	6/17/88
Field placement date	:	7/13/88
Retrieval date	:	10/14/88
Readout date	:	10/21/88
Gross Monitoring Period	:	127 days (6/17/88 - 10/21/88)
Field Monitoring Period	:	94 days (7/13/88 - 10/14/88)
Transit Period	:	33 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 125 days)	Net Exposure (mR / 90 days)
1	4.0	350	23.4 +- 0.7 ; 3.5	19.5 +- 0.8 ; 4.4
2	3.6	144	20.9 +- 0.6 ; 3.1	17.1 +- 0.7 ; 4.1
3	1.5	92	23.1 +- 0.7 ; 3.5	19.2 +- 0.8 ; 4.4
4	1.2	51	19.8 +- 0.6 ; 3.0	16.1 +- 0.7 ; 4.0
5	2.1	10	23.2 +- 0.7 ; 3.5	19.3 +- 0.8 ; 4.4
6	1.7	319	23.9 +- 0.7 ; 3.6	20.0 +- 0.8 ; 4.5
7	1.2	262	23.0 +- 0.7 ; 3.4	19.1 +- 0.8 ; 4.3
8	1.4	234	23.3 +- 0.7 ; 3.5	19.4 +- 0.8 ; 4.4
9	0.3	300	41.1 +- 1.2 ; 6.2	36.5 +- 1.1 ; 6.6
10	on-site	43	37.6 +- 1.1 ; 5.6	33.1 +- 1.1 ; 6.1
11	on-site	334	1382 +- 41 ; 207	1320 +- 39 ; 198
12	on-site	83	132 +- 4.0 ; 19.9	124 +- 3.8 ;19.2

Transit Dose = 3.0 +- 0.3 ; 3.0

Results are reported as

Measurement +/- Random error ; Systematic error

APPENDIX 6

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date	:	9/15/88
Field placement date	:	10/13/88
Retrieval date	:	1/11/89
Readout date	:	1/26/89

Gross Monitoring Period	:	133 days (9/15/88 - 1/26/89)
Field Monitoring Period	:	90 days (10/13/88 - 1/11/89)
Transit Period	:	43 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 133 days)	Net Exposure (mR / 90 days)
1	4.0	350	28.7 +- 0.9 ; 4.3	23.1 +- 1.0 ; 5.4
2	3.6	144	24.2 +- 0.7 ; 3.6	18.6 +- 0.8 ; 4.8
3	1.5	92	35.9 +- 1.1 ; 5.4	30.3 +- 1.2 ; 6.3
4	1.2	51	23.6 +- 0.7 ; 3.5	18.0 +- 0.8 ; 4.7
5	2.1	10	28.0 +- 0.8 ; 4.2	22.4 +- 0.9 ; 5.3
6	1.7	319	25.3 +- 0.8 ; 3.8	19.7 +- 0.9 ; 5.0
7	1.2	262	24.9 +- 0.8 ; 3.7	19.3 +- 0.9 ; 4.9
8	1.4	234	23.9 +- 0.7 ; 3.6	18.3 +- 0.8 ; 4.8
9	0.3	300	45.5 +- 1.4 ; 6.8	39.9 +- 1.5 ; 7.5
10	on-site	43	36.4 +- 1.1 ; 5.5	30.8 +- 1.2 ; 6.4
11	on-site	334	1569 +- 47 ; 235	1563 +- 47 ; 235
12	on-site	83	83.2 +- 2.5 ; 12.5	77.6 +- 2.5 ;12.9

Transit Dose = 5.6 +- 0.4 ; 3.2

Results are reported as

Measurement +/- Random error ; Systematic error

APPENDIX 7

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date : 12/16/88
Field placement date : 1/11/88
Retrieval date : 4/06/89
Readout date : 5/10/89

Gross Monitoring Period : 146 days (12/16/88 - 5/10/89)
Field Monitoring Period : 86 days (1/11/89 - 4/06/89)

Transit Period : 60 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 146 days)	Net Exposure (mR / 90 days)
1	4.0	350	22.4 +- 0.7 ; 3.4	16.6 +- 0.8 ; 4.8
2	3.6	144	20.8 +- 0.6 ; 3.1	15.0 +- 0.7 ; 4.6
3	1.5	92	21.2 +- 0.6 ; 3.2	15.4 +- 0.7 ; 4.7
4	1.2	51	19.3 +- 0.6 ; 2.9	13.4 +- 0.7 ; 4.4
5	2.1	10	22.3 +- 0.7 ; 3.3	16.5 +- 0.8 ; 4.7
6	1.7	319	22.8 +- 0.7 ; 3.4	17.1 +- 0.8 ; 4.8
7	1.2	262	22.0 +- 0.7 ; 3.3	16.2 +- 0.8 ; 4.7
8	1.4	234	22.5 +- 0.7 ; 3.4	16.7 +- 0.8 ; 4.8
9	0.3	300	37.5 +- 1.1 ; 5.6	32.4 +- 1.3 ; 6.7
10	on-site	43	32.3 +- 1.0 ; 4.8	27.0 +- 1.2 ; 6.0
11	on-site	334	1312 +- 39 ; 197	1367 +- 41 ; 206
12	on-site	83	67.7 +- 2.0 ; 10.1	64.0 +- 2.1 ;111.1

Transit Dose = 6.5 +- 0.4 ; 3.1

Results are reported as

Measurement +/- Random error ; Systematic error

APPENDIX B

TLD DIRECT ENVIRONMENTAL RADIATION MONITORING RESULTS

Anneal date	:	3/18/89
Field placement date	:	4/06/89
Retrieval date	:	7/12/89
Readout date	:	8/03/89

Gross Monitoring Period	:	139 days (3/18/89 - 8/03/89)
Field Monitoring Period	:	96 days (4/06/89 - 7/12/89)
Transit Period	:	41 days

Station Number	Distance (miles)	Direction (degrees)	Gross Exposure (mR / 146 days)	Net Exposure (mR / 90 days)
1	4.0	350	28.2 +- 0.8 ; 4.2	22.6 +- 0.8 ; 4.9
2	3.6	144	24.1 +- 0.7 ; 3.6	18.8 +- 0.7 ; 4.4
3	1.5	92	27.9 +- 0.8 ; 4.2	22.3 +- 0.8 ; 4.9
4	1.2	51	21.6 +- 0.6 ; 3.2	16.5 +- 0.6 ; 4.1
5	2.1	10	26.6 +- 0.8 ; 4.0	21.1 +- 0.8 ; 4.7
6	1.7	319	25.7 +- 0.8 ; 3.9	20.3 +- 0.8 ; 4.6
7	1.2	262	24.3 +- 0.7 ; 3.6	19.0 +- 0.7 ; 4.4
8	1.4	234	23.6 +- 0.7 ; 3.5	18.4 +- 0.7 ; 4.3
9	0.3	300	45.5 +- 1.4 ; 6.8	38.5 +- 1.4 ; 6.9
10	on-site	43	38.3 +- 1.1 ; 5.7	31.9 +- 1.1 ; 6.0
11	on-site	334	1320 +- 40 ; 198	1209 +- 37 ; 182
12	on-site	83	98.0 +- 2.9 ; 14.7	86.7 +- 2.7 ; 13.8

Transit Dose = 3.6 +- 0.4 ; 3.2

Results are reported as

Measurement +/- Random error ; Total error (= Random + Systematic)