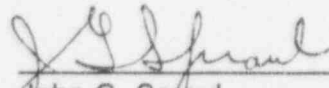
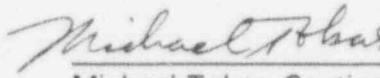


U.S. NUCLEAR REGULATORY COMMISSION  
OBSERVATION AUDIT REPORT OA-97-02  
OF THE DEPARTMENT OF ENERGY  
OFFICE OF TECHNICAL SERVICES  
AUDIT NUMBER 97VP-WV-AU-01  
OF THE WEST VALLEY DEMONSTRATION PROJECT

Prepared by:

 02/07/97  
John G. Spraul  
Tank Waste Remediation Section  
Special Projects Branch  
Division of Fuel Cycle Safety  
and Safeguards

Reviewed and approved by:

 02/11/97  
Michael Tokar, Section ~~Leader~~ *Chief*  
Tank Waste Remediation Section  
Special Projects Branch  
Division of Fuel Cycle Safety  
and Safeguards

Attachment 1

## MANAGEMENT SUMMARY

This U.S. Department of Energy (DOE), Environmental Management, Office of Waste Management, Office of Technical Services (EM-37) compliance audit of the quality assurance (QA) program of the West Valley Demonstration Project (WVDP) evaluated the adequacy and effectiveness of the WVDP QA program as applied to the WVDP activities related to high-level radioactive waste form production. The audit took place while WVDP personnel were completing the fill of the 69th of some planned 300 canisters with the high-level radioactive waste slurry at the West Valley site.

Overall, the EM-37 audit team concluded that the high-level radioactive waste form production and associated processes of the WVDP met QA program requirements and were acceptable. The NRC staff agrees with this conclusion. One deficiency was noted in that one software program was not identified as "Quality Protecting Software" as it should have been.

Based on the observation of this audit, the NRC staff has determined that EM-37 Audit 97VP-WV-AU-01 was useful and effective and that the QA program for high-level waste form production is being effectively implemented at the WVDP. The audit was organized and conducted in a thorough and professional manner. Audit team members were independent of the activities they audited, they were well qualified in their disciplines, and their assignments and checklist items were adequately described in the audit plan.

## **1.0 INTRODUCTION**

A member of the Nuclear Regulatory Commission Division of Fuel Cycle Safety and Safeguards QA staff observed the Department of Energy (DOE), Environmental Management, Office of Waste Management, Office of Technical Services (EM-37) compliance audit of the QA program of the West Valley Demonstration Project (WVDP). This audit, 97VP-WV-AU-01, was conducted on January 27-30, 1997, at the WVDP facilities in West Valley, New York. The audit evaluated the adequacy and effectiveness of the WVDP QA program as applied to the WVDP activities related to high-level radioactive waste form production. DOE's Office of Civilian Radioactive Waste Management (OCRWM) Office of Quality Assurance had an observer at this audit; the State of Nevada did not.

The principal participants in the WVDP are (1) the DOE West Valley Project Office, responsible for the project, and (2) West Valley Nuclear Services (a subsidiary of Westinghouse Electric Company), the management and operating contractor for the project. The NRC's interest in the WVDP stems primarily from the possibility that the radioactive waste may eventually be stored in an NRC-licensed facility and from the NRC's current involvement in the Hanford tank waste remediation system which may use a vitrification process similar to that being used at West Valley.

The objectives of this audit by EM-37 were to assess the processes and procedures applied by WVDP to high-level waste form production and to determine whether the WVDP QA program and its implementation met the applicable requirements of the OCRWM Quality Assurance Requirements and Description document (QARD: DOE/RW-0333P) and associated WVDP implementing procedures.

The primary objective of the NRC staff was to gain confidence that OCRWM, EM-37, WVDP, and their contractor/subcontractor personnel are properly implementing the requirements of their organizations' QA programs in accordance with the OCRWM QARD and Title 10 of the Code of Federal Regulations (10 CFR), Part 70 - Subpart 70.22(f), and Part 60 - Subpart G. (Both subparts reference Appendix B of 10 CFR Part 50). A second objective of the NRC staff was to become familiar with the WVDP processes and procedures for vitrification of high-level radioactive waste and its associated QA program.

This report addresses the effectiveness of the EM-37 audit and the adequacy of implementation of WVDP QA controls for its activities related to high-level radioactive waste form production.

## **2.0 AUDIT PARTICIPANTS**

### **2.1 NRC**

John G. Spraul Observer

### **2.2 DOE**

Jim Conway	Audit Team Leader (ATL)	EM-37
Bryan Bower	Auditor	WVDP

Jim Flaherty	Technical Specialist	BDM/Science Applications International Corporation (SAIC)
Kriss Grisham	Auditor	EM-32
Bob Hartstern	Auditor	MACTEC
Dick Lynch	Auditor	Savannah River
Ed Martinez	Auditor	WVDP
Andria Mellon	Technical Specialist	New York Energy Research and Development Authority
Norm Moreau	Auditor	MACTEC
Jim George	Observer	OCRWM Office of Quality Assurance/Quality Assurance Technical Support Services/CER

### 3.0 REVIEW OF THE AUDIT AND AUDITED ORGANIZATION

#### 3.1 Auditing Procedures

This audit of the WVDP was conducted in accordance with EM-37's Standard Practice Procedure (SPP-) 4.02, "Administration and Conduct of Quality Assurance Audits," and SPP-5.01, "Deviations and Corrective Actions."

The NRC staff observation of this audit was based on the procedure, "Conduct of Observation Audits," issued by NRC's Division of High-Level Waste Management on October 6, 1989.

#### 3.2 Scope of Audit

The audit plan identified this as an audit to examine the adequacy and effectiveness of implementation of the WVDP QA program and procedures as applied to the waste acceptance activities associated with high-level radioactive waste form production at WVDP.

The potentially applicable QA programmatic elements (from the QARD and listed below) were audited during this audit. The audit team ascertained whether the QA program elements met the requirements imposed by DOE and commitments made by WVDP. This was done by determining, for these elements, the adequacy of the WVDP QA program, its implementation, and its effectiveness as well as verifying compliance with requirements as regards to the process for vitrification of high-level radioactive waste.

<u>Reference</u>	<u>Programmatic Element</u>
1.0	Organization
2.0	Quality Assurance Program
3.0	Design Control
4.0	Procurement Document Control
5.0	Implementing Documents
6.0	Document Control
7.0	Control of Purchased Items and Services
8.0	Identification and Control of Items
9.0	Control of Special Processes



10.0	Inspection
11.0	Test Control
12.0	Control of Measuring and Test Equipment
13.0	Handling, Storage, and Shipping
14.0	Inspection, Test, and Operating Status
15.0	Nonconformances
16.0	Corrective Action
17.0	QA Records
18.0	Audits
Supplement I	Software
Supplement II	Sample Control
Supplement III	Scientific Investigations
Appendix A	High-Level Waste Form Production (The checklist for Design Control addressed Appendix A as well.)

The NRC staff found this approach to be acceptable in light of the fact that EM-37 had previously performed performance-based audits to verify product quality.

### **3.3 Conduct of Audit**

The EM-37 audit team had prepared an 81 page checklist prior to the audit. The checklist was used by the ATL and auditors as they performed their interviews, reviewed pertinent documents, and made the QA evaluations.

The EM-37 audit team and the observers caucused at the end of each day's audit. The ATL did not hold formal daily meetings with WVDP management to discuss the then-current audit status and preliminary findings of the audit team. Rather, the audit team maintained a "status board" readily available to interested WVDP personnel and discussed potential problems with WVDP personnel when such problems surfaced. This method of keeping WVDP management informed of the audit status was effective during this audit.

The audit was performed in a professional manner. The members of the audit team were well prepared and demonstrated a sound knowledge of their assigned audit areas.

### **3.4 Timing of Audit**

In lieu of an audit of WVDP in 1996, EM-37 had conducted a surveillance in May of 1996 and participated in the "Readiness Validation" during the Spring of 1996. The "Readiness Validation" investigated personnel qualification and training, whether the QA program for operations was in place, and whether the other prerequisites for start-up given in the Waste Qualification Report had been met.

The audit took place while WVDP personnel were completing the fill of the 69th of some planned 300 canisters with the high-level radioactive waste slurry at the West Valley site. The audit was timely.

### **3.5 Examination of Audited Areas**

Appropriate WVDP personnel and documents were made available to the audit team during the audit. The WVDP personnel were questioned by audit team members as they reviewed the objective evidence. The interview method of auditing, conducted simultaneously with the checking of objective evidence, was effective.

Audit team members received thorough responses to the checklist questions. The checklist contained questions regarding the programmatic elements listed in Section 3.2, above. The auditors posed numerous questions beyond the checklist during the audit as necessary to investigate further into the QA program and its implementation. This probing by the auditors indicated that they were familiar with the subject matter and were well prepared for the audit. Pertinent documents were reviewed to verify audit results. The audit team findings are presented in Section 3.8 of this report.

The audit team performed an acceptable audit.

### **3.6 Audit Team Qualifications and Independence**

The qualifications of the ATL and auditor were found to be acceptable in that each met the requirements of SPP-3.03, "Qualification and Certification Requirements for Audit Personnel."

The audit team members did not have prior responsibility for performing the activities they audited. Two of the auditors on the audit team are WVDP employees who were familiar with the activities audited. However, they had no responsibility or involvement for the activities they audited. During the audit, the nature and depth of the objectivity of the questions substantiated the independence of these auditors. The audit team members had sufficient independence to carry out their assigned functions without adverse pressure or influence. The audit team was qualified in the QA discipline, and the assignments and checklist items were adequately described in the audit plan.

### **3.7 Review of Previous DOE Audit Findings**

Earlier audits and surveillances of WVDP conducted by DOE had identified deficiencies. The corrective actions for these deficiencies were generally verified previously by DOE, but one had not been verified at the time of this audit. Therefore, this audit reviewed the status of this deficiency and determined that it could not be closed. This is shown as the fifth concern listed in Section 3.8, below, as presented by the ATL at the post-audit meeting with WVDP management.

### **3.8 EM-37 Audit Team Findings**

The EM-37 audit team's overall finding was that WVDP's QA performance was satisfactory. Specific findings reported by the audit team at the post-audit meeting are shown below.

Deficiency: The RS/1 software program was not identified as "Quality Effecting Software" as it should have been.

Concerns:

- Matrices in WVDP-074 and WVDP-212 need to be updated.
- WVDP needs to evaluate making Development Vitrification Procedure 63-57 an SOP.
- Two Analytical Chemistry Procedures (4.1 and 9.1) and one Program Requirements Document (9.0) need to be updated/revised.
- The Priority Assessment Matrix needs to address the QARD basis of product quality.
- Deviation and Corrective Action Report 96VP-WV-S-01-D01 needs to be closed.
- The Analytical and Process Chemistry conditional data release process for slurry samples and glass shard samples needs to be reviewed and evaluated.
- Sample inputs to the SPECIES RANGE program need to be clearly identified.
- Sample outliers in PCT CHECK program need to be identified.
- Software test cases need to be periodically rerun.
- Sample identification field in SAMPSTAT program output needs to show actual sample numbers.
- Comments on Production Records made April 16, 1996, need to be dispositioned.

Positive Findings:

- Analytical and Process Chemistry plans to begin trending the conditional data release process as part of its independent internal assessment program.
- Appendix F of SOP 63-28 has been by Field Change 1 to Revision 3 to identify the slurry batch glass yield.

### 3.9 NRC Staff Findings

The WVDP process for vitrification of high-level radioactive waste appears to be conducted in an effective and well documented manner. The processes and procedures are subjected to a review process by WVDP which appears to be effective in eliminating errors. The EM-37 audit team's overall finding was that WVDP's QA performance was satisfactory. NRC staff agrees with this finding.

The audit was conducted in a professional manner, and the audit team adequately evaluated activities and objective evidence. The audit was effective in determining the adequacy and degree of implementation of the WVDP QA program as applied to high-level waste form production.

The initial checklist questions provided an adequate basis to conduct a thorough audit of the WVDP QA program for vitrification of high-level radioactive waste. The auditors went into sufficient detail during the audit to examine the QA activities related to the WVDP process for vitrification of high-level radioactive waste performed by WVDP. Based on the discussions, it appeared that the WVDP personnel audited were knowledgeable in their respective fields. The method used by the audit team to perform the audit was an appropriate combination of discussions with the involved WVDP personnel, review of the data sources and production records, and reviews of project files and other reference material requested by the audit team and provided by WVDP. Previously recognized good auditing practices were followed by the ATL and the audit team, and the NRC staff did not observe any deficiencies in the audit process.

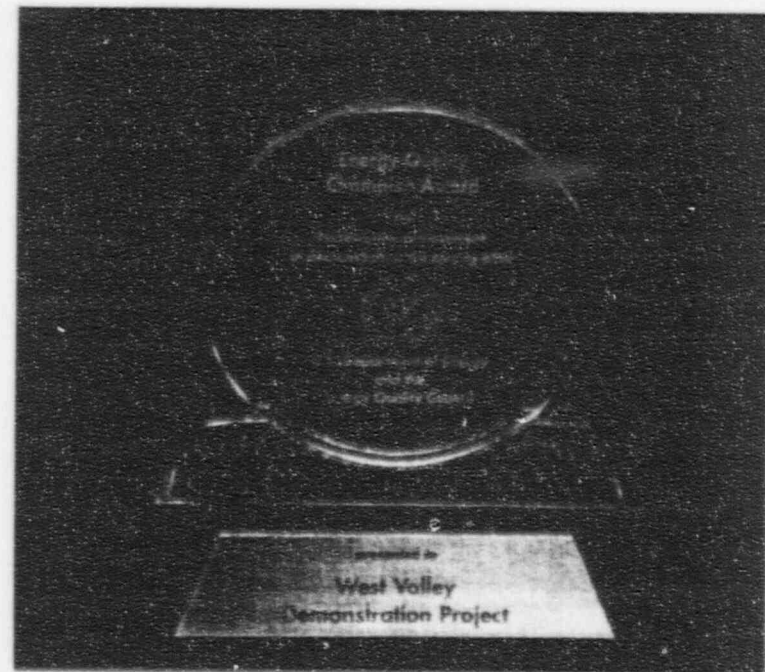
# **ATTACHMENT 2**

## **INTRODUCTION AND OVERVIEW**

## Continuing on the Total Quality Journey

*The West Valley Demonstration Project Team has been on the Total Quality Journey for almost 15 years. The central focus for Project partners has been to work closely with customers and the performance is the pinnacle of our Total Quality pyramid and ultimate metric of success. Alignment with the customers' strategic objectives and internal goals include employee performance objectives as a cornerstone of focus and communication that facilitates meeting customer requirements.*

- Safety: Proactively Caring for People and the Environment
- People: Valuing and Recognizing Employees
- Performance: Delivering Key Objectives
- Transformation: Continuing to Refine the Value Chain





## Continuing on the Total Quality Journey

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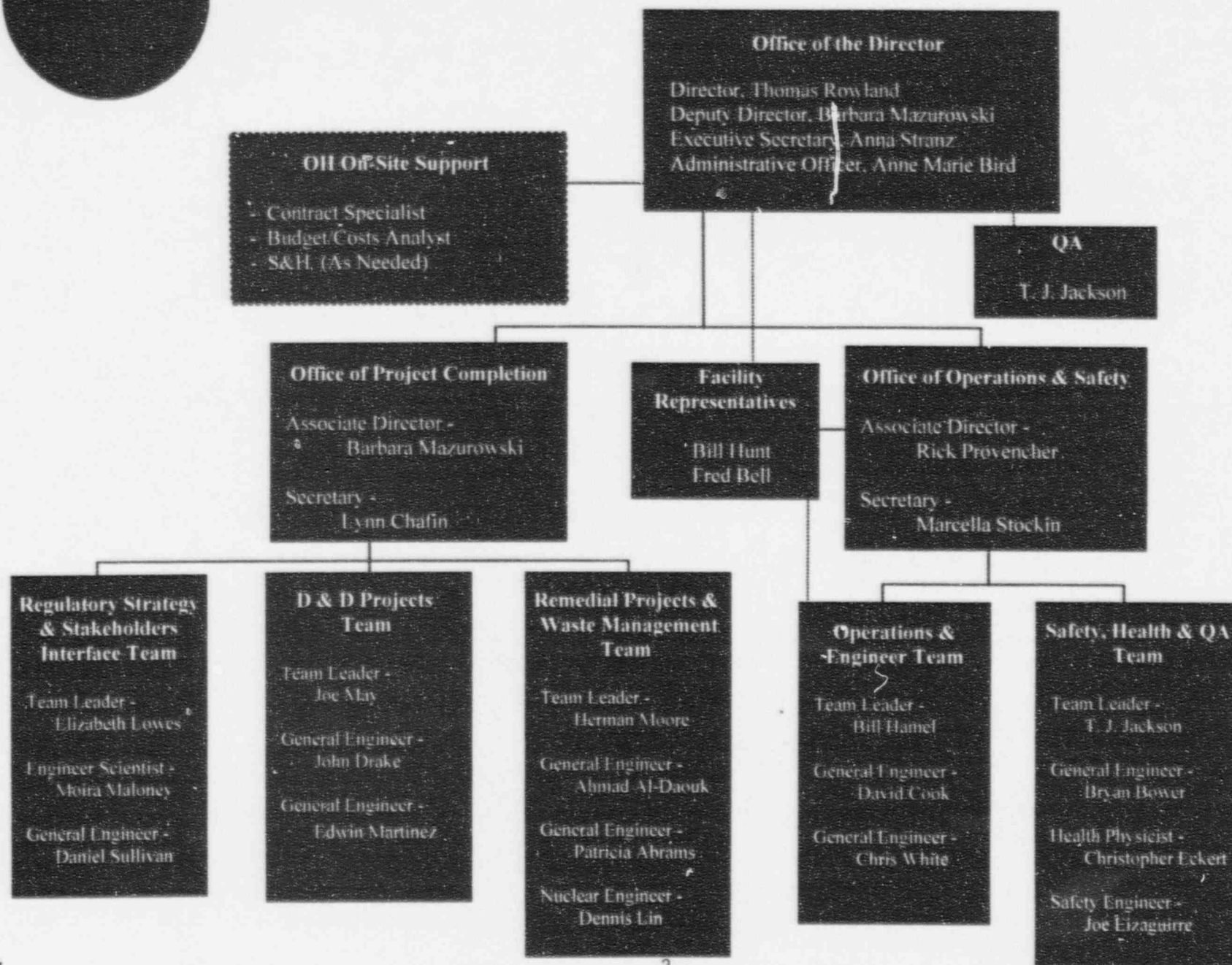
- Safety: Proactively Caring for People and the Environment
- People: Valuing and Recognizing Employees
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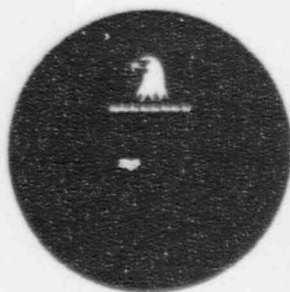




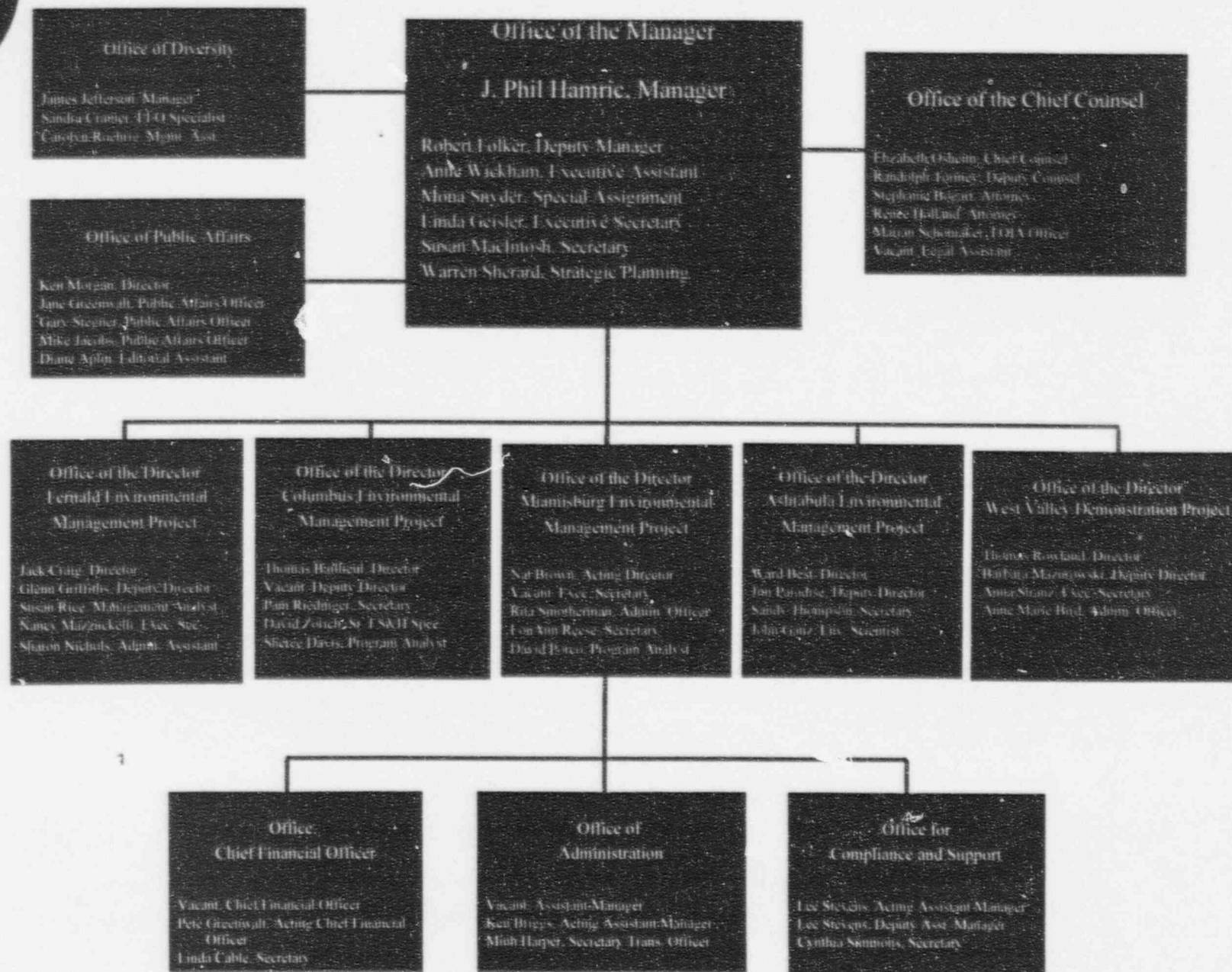


# West Valley Demonstration Project



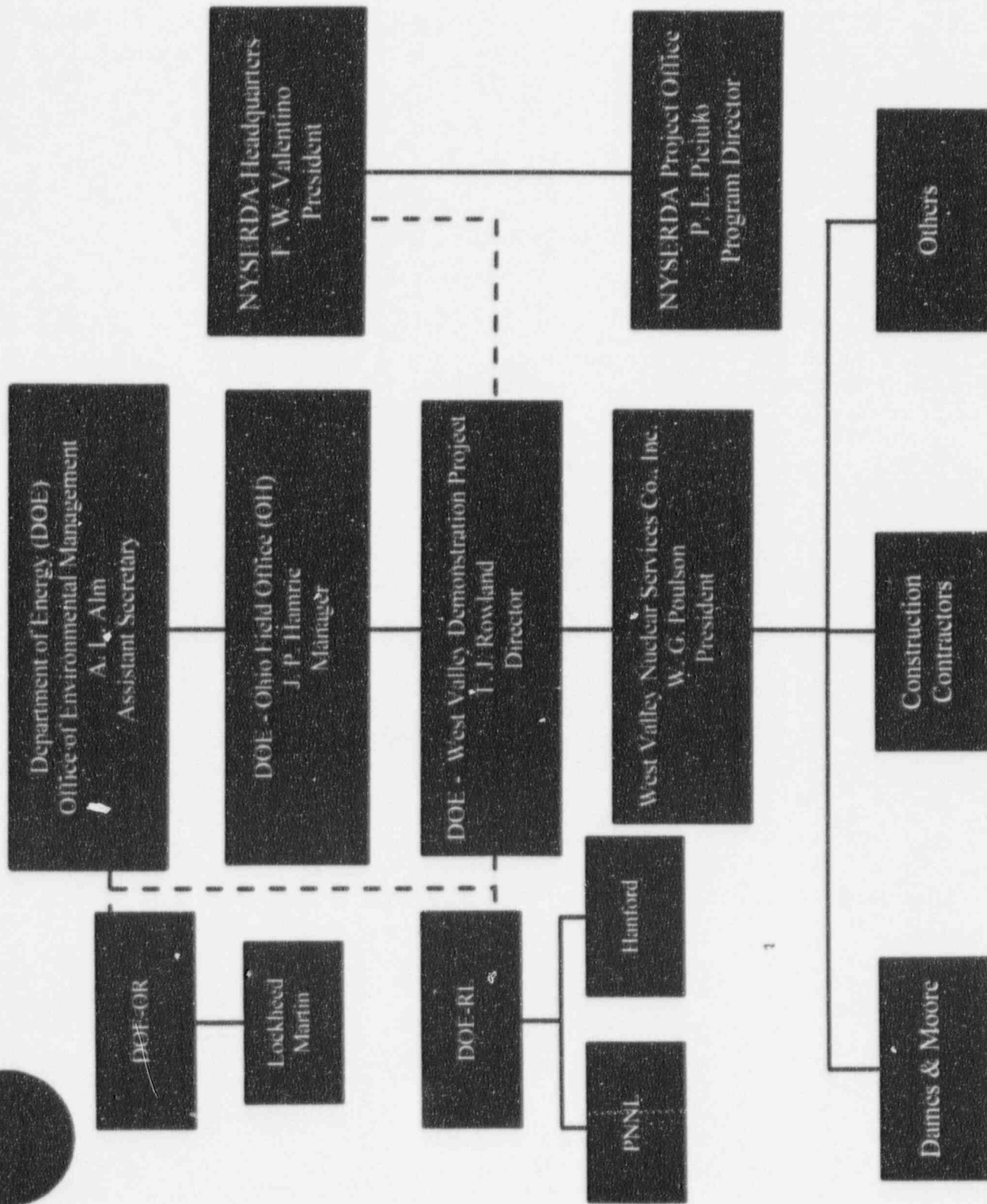


# West Valley Demonstration Project





## Project Participants



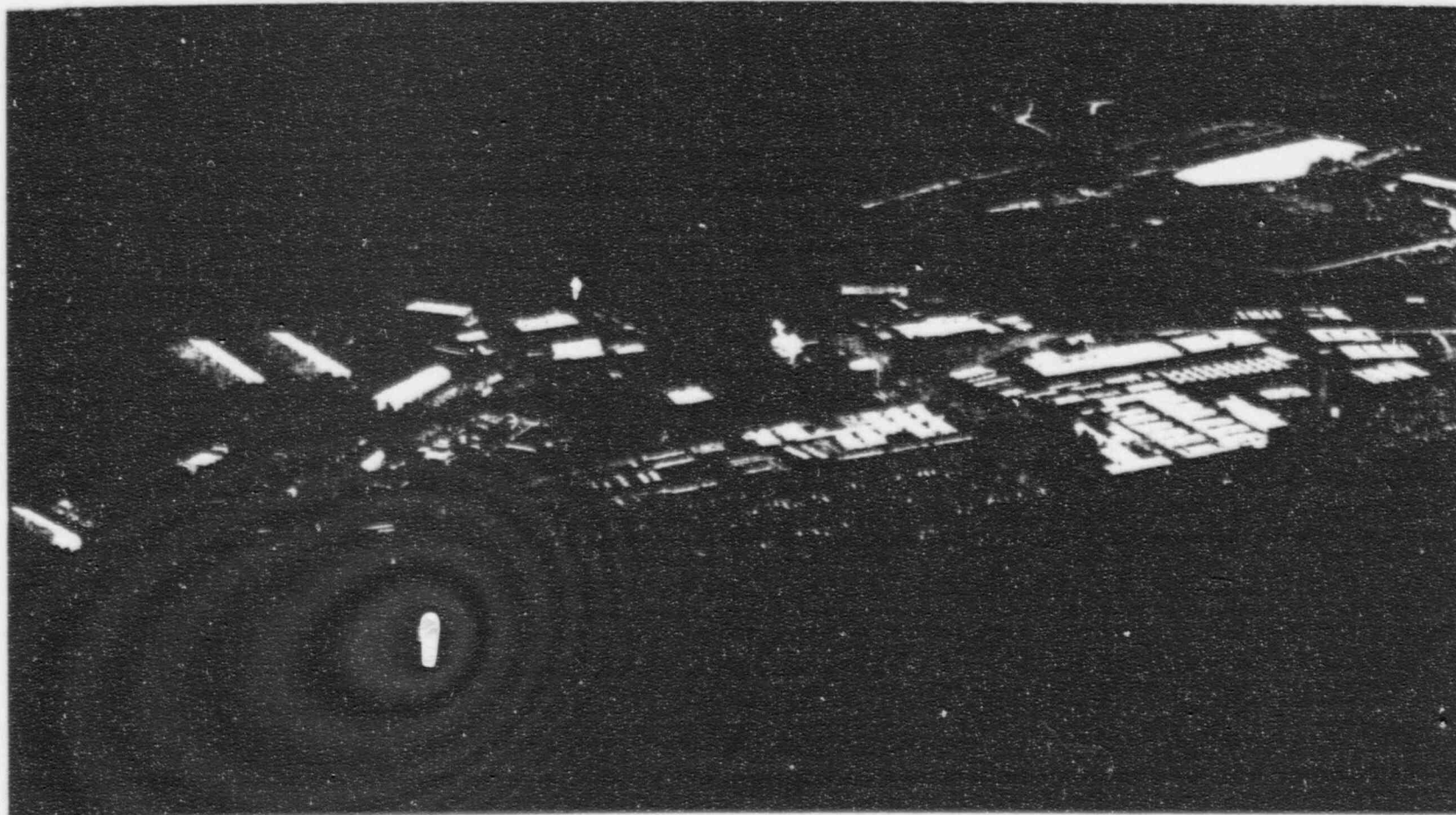
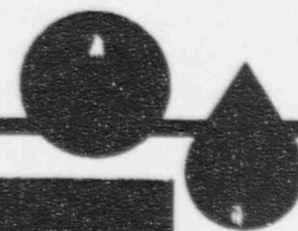
# **ATTACHMENT 3**

## **VITRIFICATION PROCESS AND STATUS**



# Vitrification Process and Status

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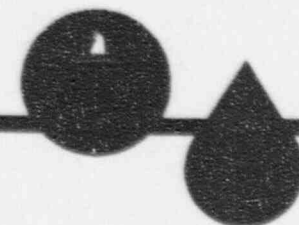


**Paul J. Valenti**  
**Manager**  
**Vitrification Operations**



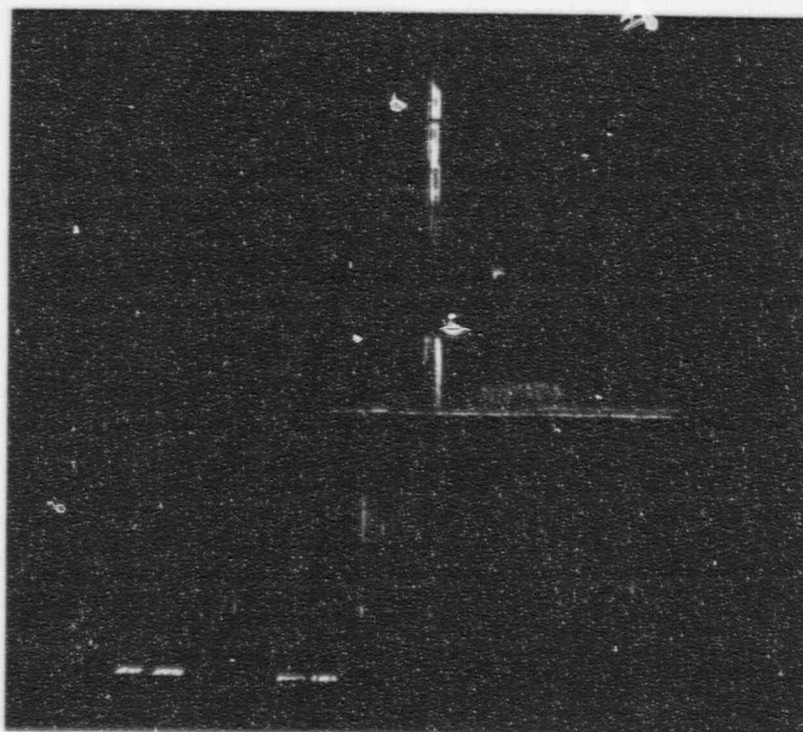
# West Valley Demonstration Project Overview

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## Project History

- 1962** Nuclear Fuel Services reached agreement with the Atomic Energy Commission and New York State to construct the first commercial nuclear fuel reprocessing plant in the United States.
- 1966-1972** During operation, approximately 640 metric tons of spent nuclear fuel were reprocessed to recover usable uranium and plutonium.
- 1972-1976** Reprocessing plant shut down for modifications to increase capacity. Nuclear Fuel Services withdrew from the reprocessing business and returned the site to New York State.
- 1980-1981** U.S. Congress passed the West Valley Demonstration Project Act. West Valley Nuclear Services Company was selected as the Management & Operating Contractor.



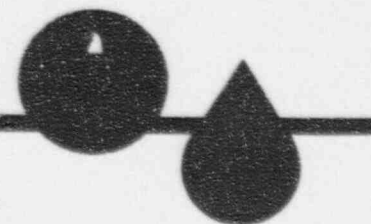
A map of the study area in New York State. The map shows the Cattaraugus River flowing from the top left towards the center. A bridge crosses the river, with an arrow pointing to it labeled "Bridge". To the left of the bridge is the label "Cattaraugus". To the right of the bridge is "Schwartz Road". A road labeled "219" runs vertically through the center. To the right of Schwartz Road is "Rock Road". Further right is "Dutch Hill Road". A road labeled "3.0 Miles" points to the left. A road labeled "5.8 Miles" points to the left. A road labeled "AOC" is shown. A road labeled "WNYNSC Boundary line" is shown. A road labeled "WVDP" is shown. A road labeled "Thornwood Road" is shown. A road labeled "Heinz Road" is shown. A road labeled "240" is shown. A road labeled "Fox Valley Dr." is shown. A road labeled "To West Valley" is shown. A road labeled "Roule Road" is shown. A road labeled "Corners Road" is shown. A road labeled "Mill Street" is shown. A road labeled "River" is shown.





# West Valley Demonstration Project Overview

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## The West Valley Demonstration Project Act

### OBJECTIVE

- Demonstrate Solidification and Preparation of High-Level Waste for Permanent Disposal

### AUTHORITY

- Public Law 96-368, West Valley Demonstration Project Act

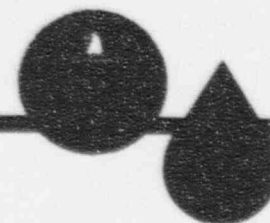
### SCOPE

- Develop Containers
- Solidify Liquid High-Level Wastes
- Decontaminate and Decommission Facilities Used
- Transport to Federal Repository
- Dispose of Low-Level and Transuranic Wastes

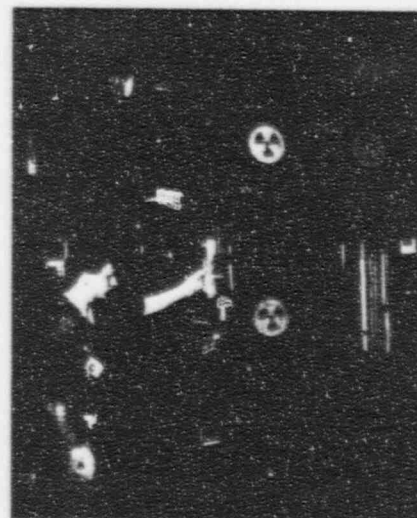
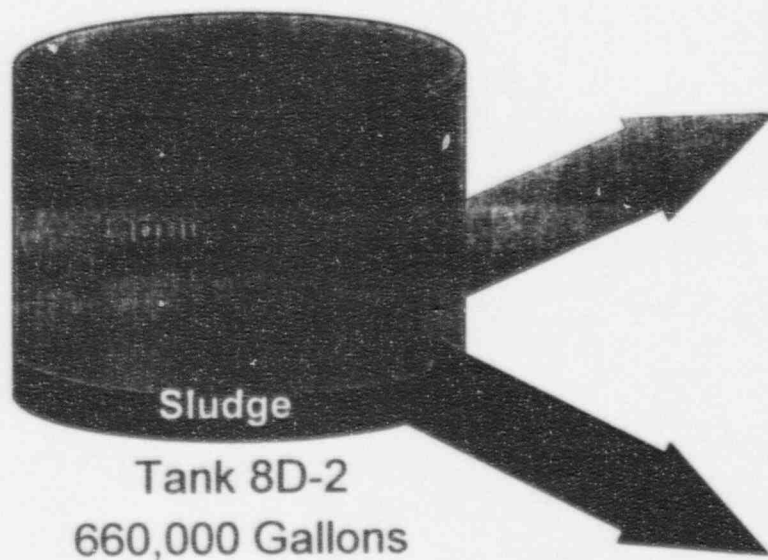


# West Valley Demonstration Project Overview

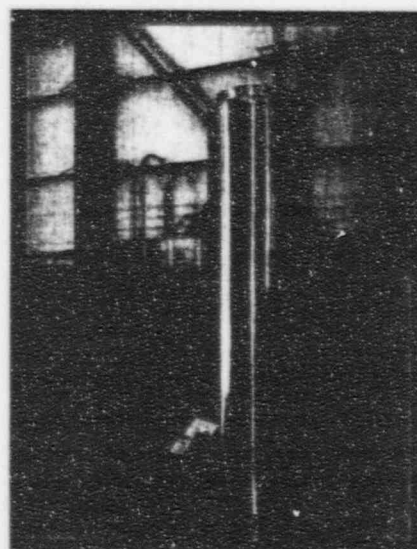
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## Nuclear Waste Management Challenge



Low-level Waste  
Cement Filled Drums

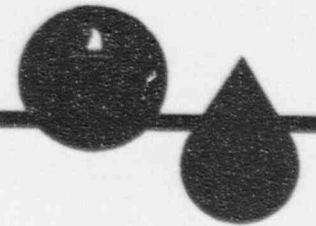


Glass Filled  
Canisters



# West Valley Demonstration Project Overview

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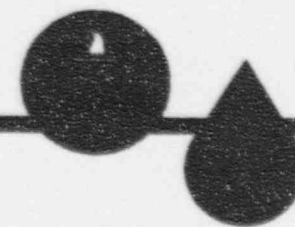


## Project History

- 1988** Construction was completed on the IRTS. System placed in operation with decontamination performance significantly better than design requirement.
- 1989** Five years of nonradioactive testing of the glass-making system was completed. This demonstrated the ability to produce glass that meets DOE requirements.

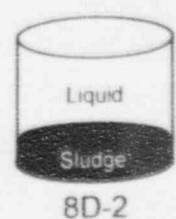
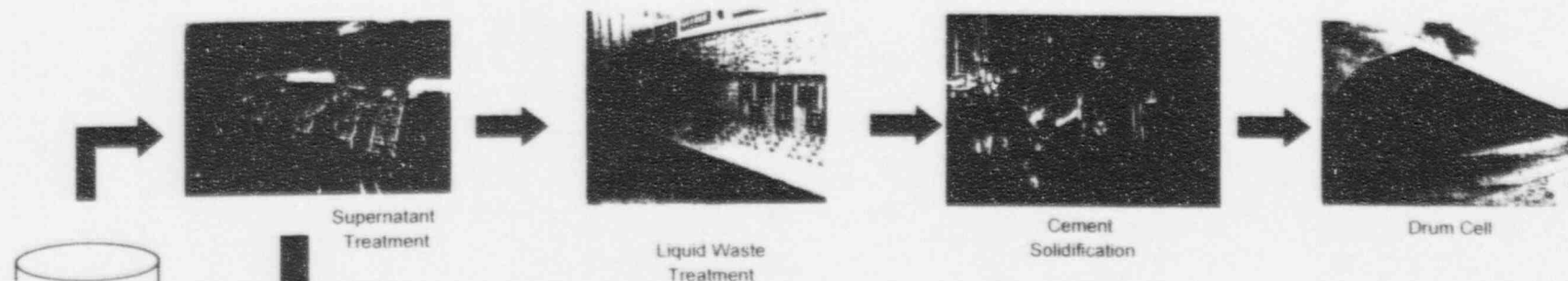


# West Valley Demonstration Project Overview

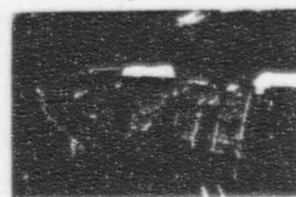


## Process Overview

### Low-level Waste Processing Cycle



Zeolite



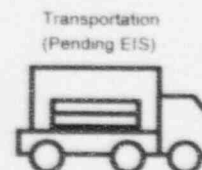
Sludge/Zeorite  
Mobilization



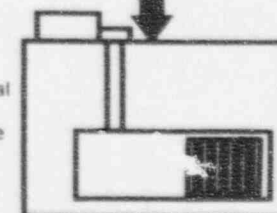
Vitrification



Interim Storage



Transportation  
(Pending EIS)

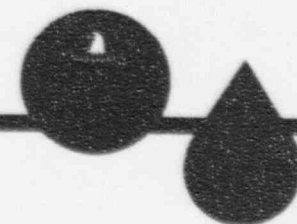


Terminal  
Waste  
Storage

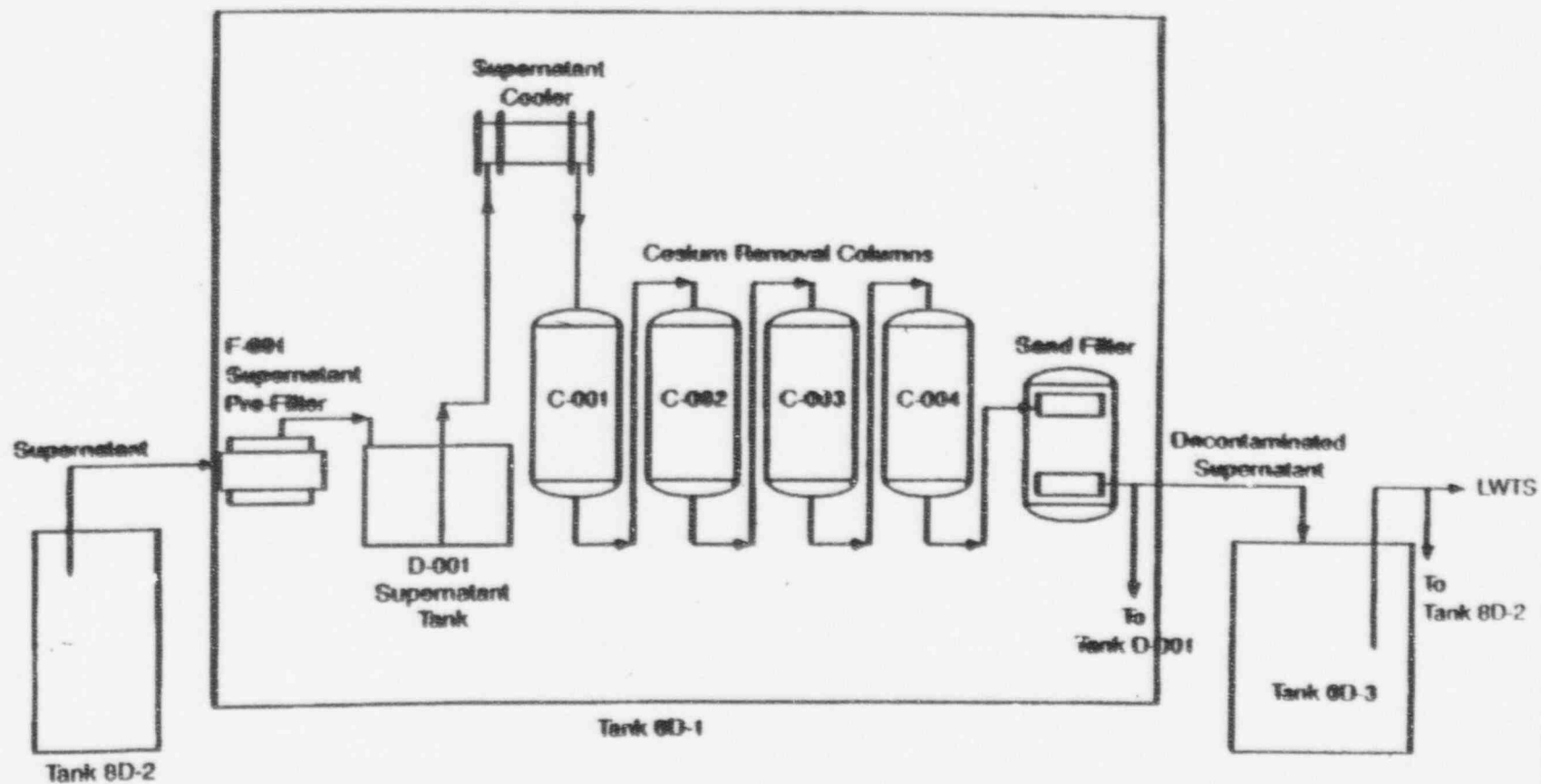
### High-level Waste Processing Cycle



# West Valley Demonstration Project Overview



## Supernatant Treatment System

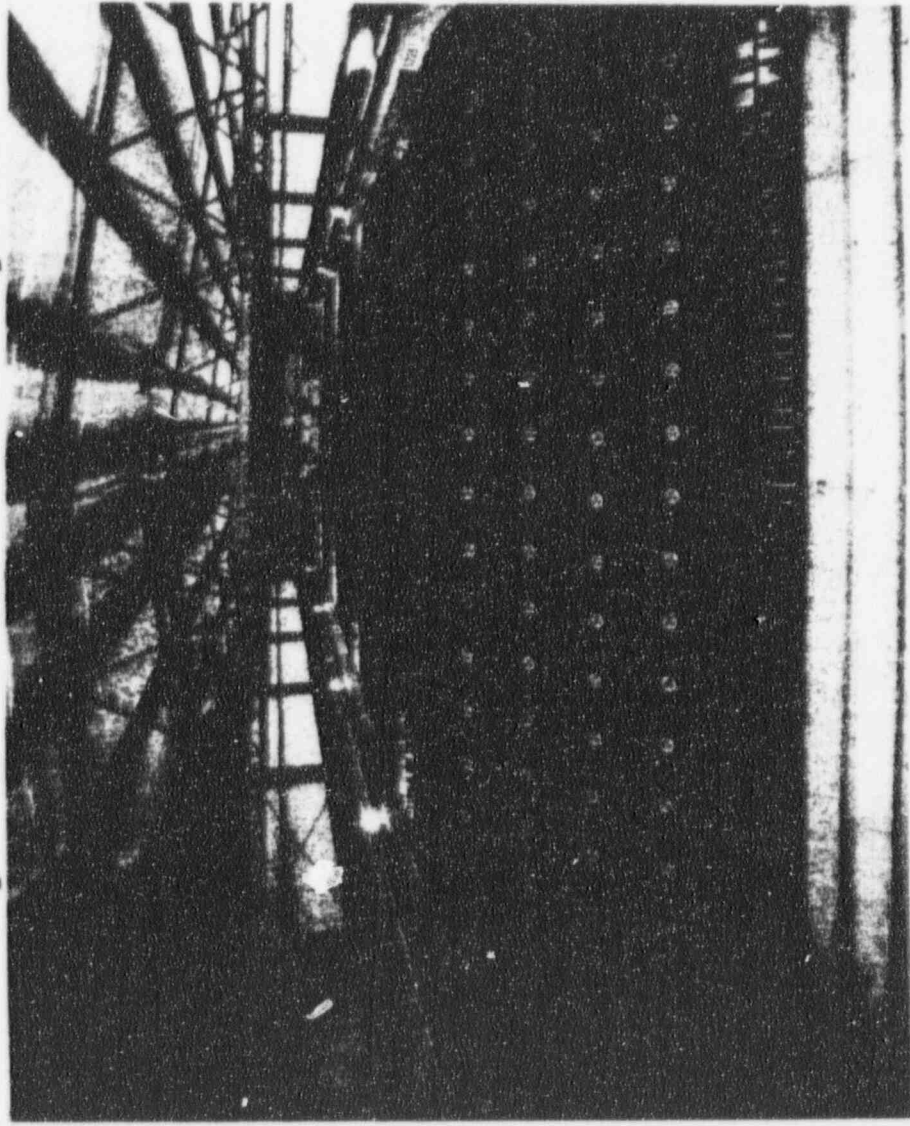


# **West Valley Demonstration Project Overview**

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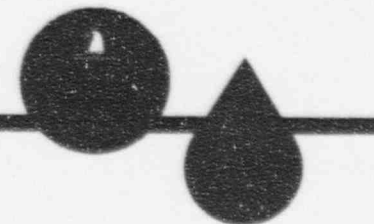
## **Cement Drums Stored in Unique Above-Ground Shielded Facility with Easy Bar Code Retrieval System**





# West Valley Demonstration Project Overview

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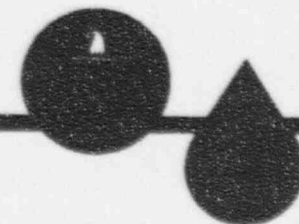
## HLW Pretreatment Chronology

	Gallons Processed	Start	Finish
PUREX Supernatant Processing	618,000	May '88	Nov '90
Sludge Wash #1 and Processing	410,000	Oct '91	May '94
Sludge Wash #2 and Processing	356,000	May '94	Aug '94
THOREX Neutralization	13,000	Dec '94	Jan '95
PUREX/THOREX Wash and Processing	316,000	Jan '95	May '95
Zeolite Mobilization, Transfer and Size Reduction	58,200 kg	Jul '95	Jan '96



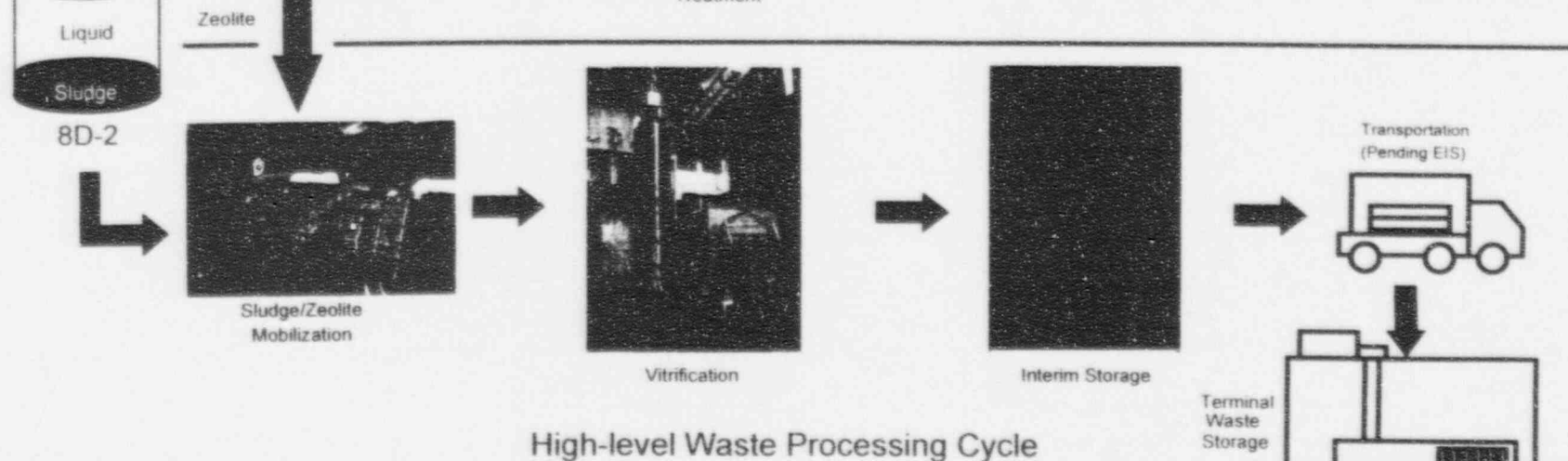
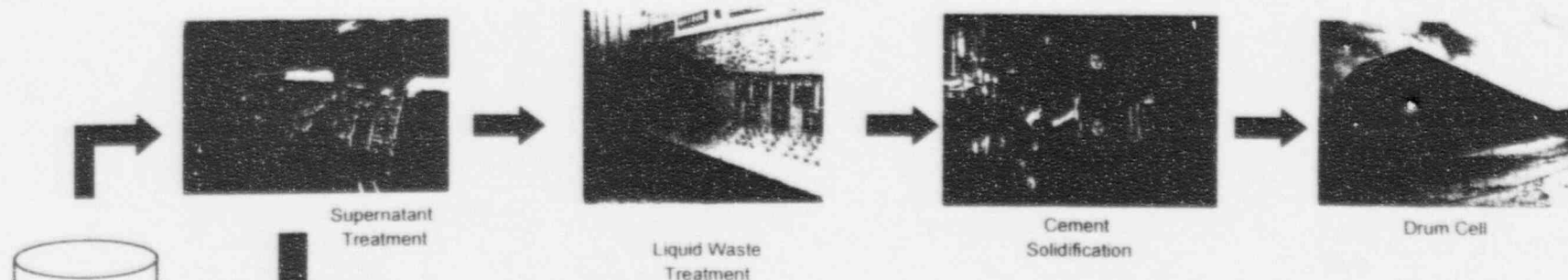


# West Valley Demonstration Project Overview



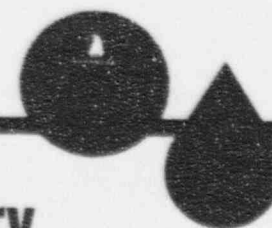
## Process Overview

### Low-level Waste Processing Cycle



# Vitrification Process and Status

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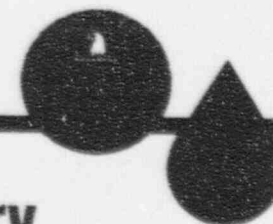
## Vitrification Testing and Startup History

Dec '89	Completed Full-Scale Test Operations; Commenced Conversion to Radioactive Facility
Mar '93	Met Permit-to-Construct Requirements
Sep '94	Completed Vitrification Facility Construction
Apr '95	Completed Shielding Analysis Verification Report
May '95	Completed Cold Chemical Facility Testing
May '95	Received NESHAPS Permit for Air Emissions
Jun '95	Completed NOx Facility Construction



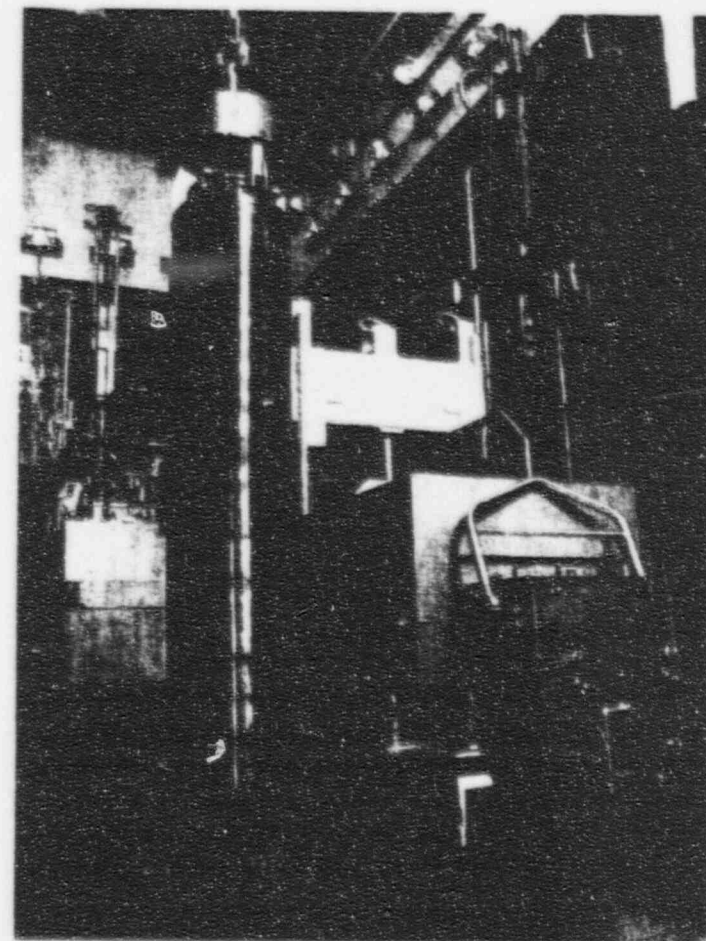
## Vitrification Process and Status

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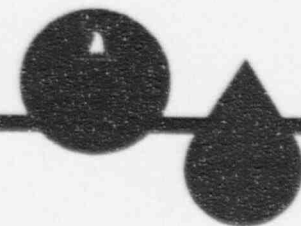


### Vitrification Testing and Startup History

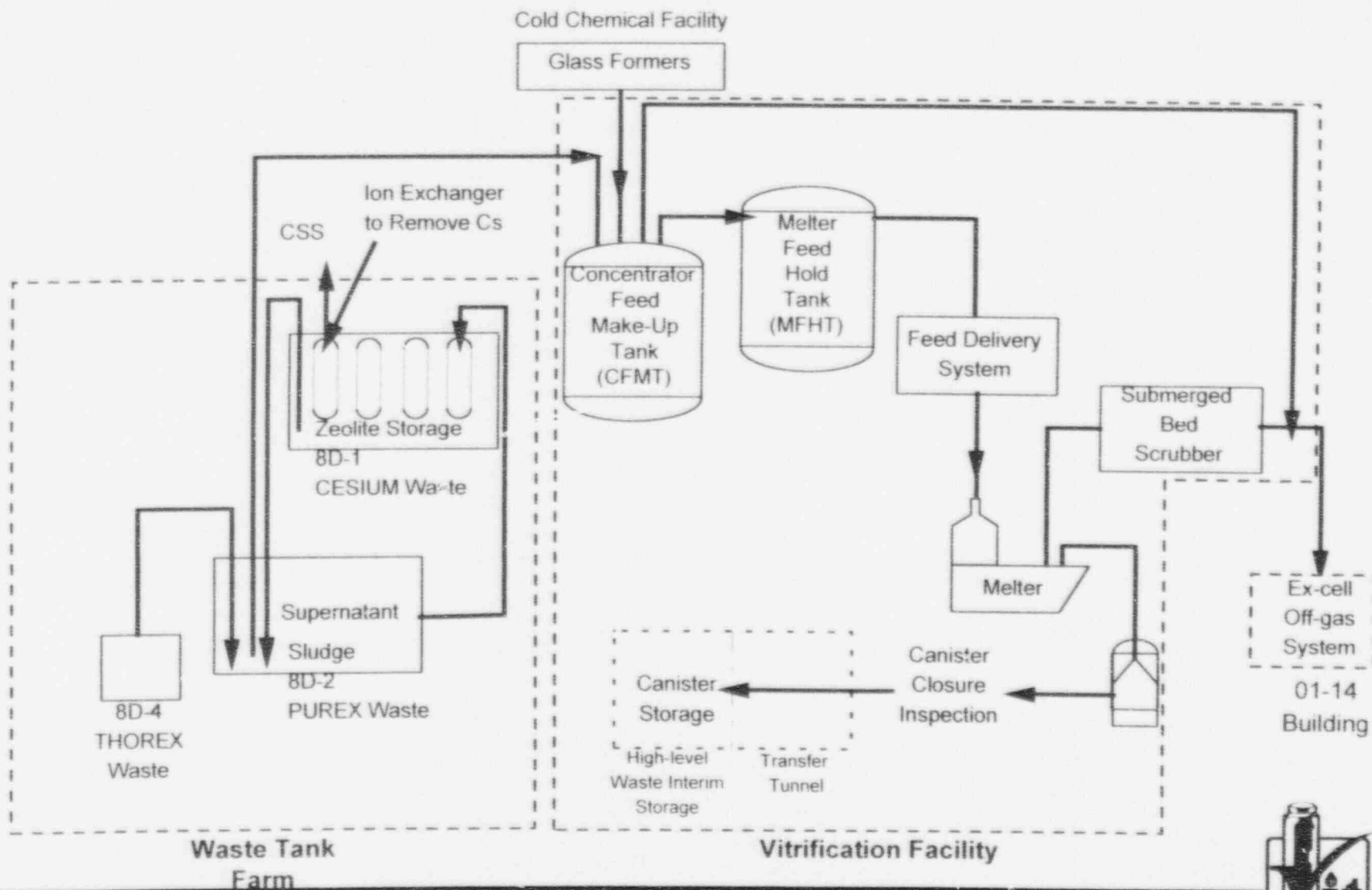
Jul '95	Powered Production Melter
Oct '95	Commenced Integrated Nonradioactive Testing
Apr '96	Received DOE Release for Radioactive Tie-Ins
May '96	Completed New York State NOx Protocols Testing
May '96	WVNS ORR Declaration of Readiness
Jun '96	Completed DOE ORR and Received Authorization to Proceed
Jul '96	Completed First Radioactive Canister



# Vitrification Process and Status



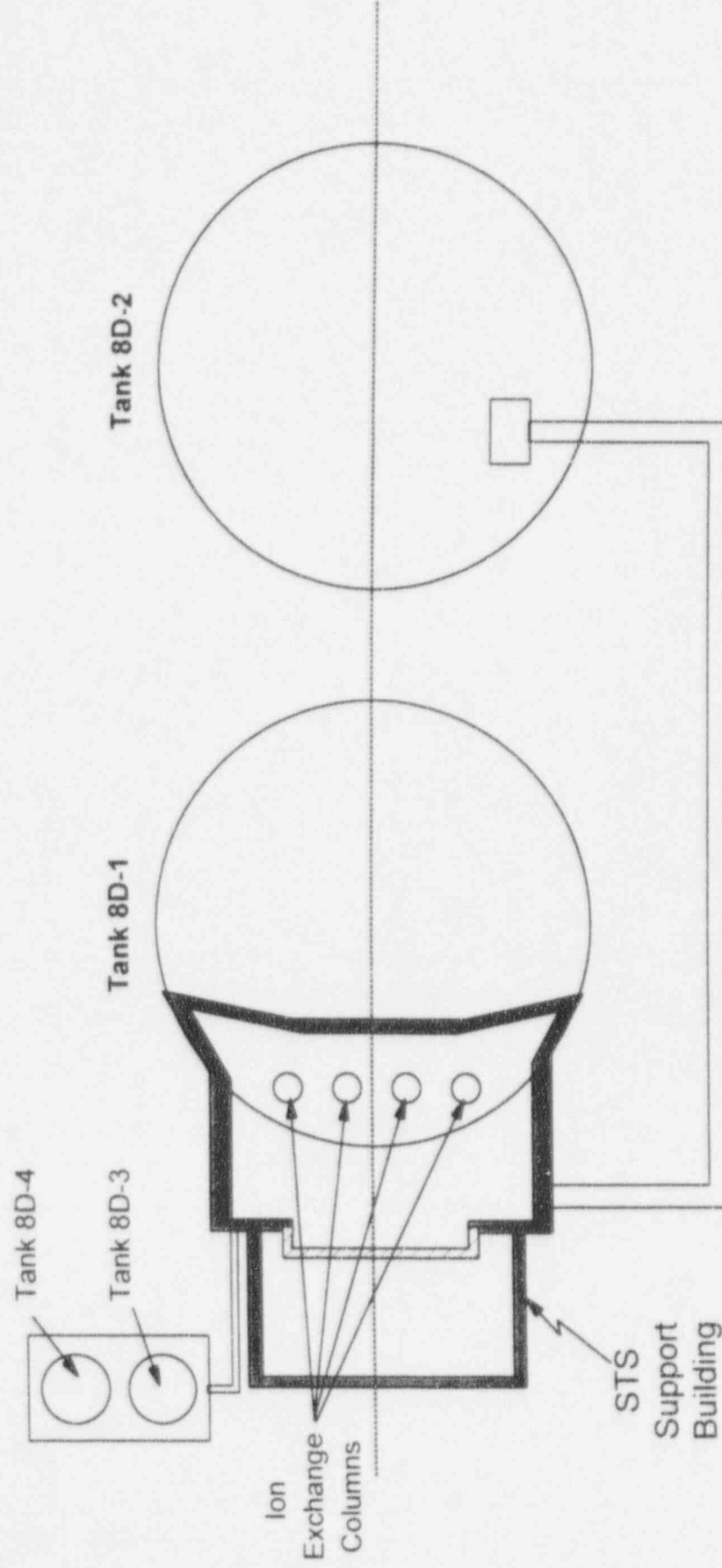
## HLW Processing Flow Sheet



# West Valley Demonstration Project Overview

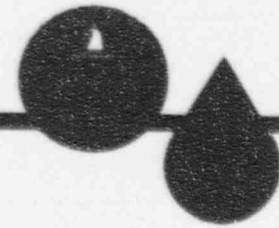


## Plan View of HLW Tanks



# Vitrification Process and Status

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## WVNS Vitrification Process Cycle

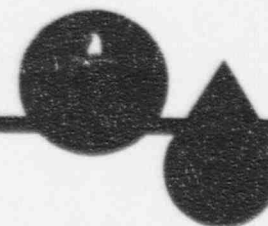
- HLW Transfer to CFMT, Agitate CFMT
- 24 HLW Samples Taken from CFMT, Samples Transferred to A&PC Lab
- Commence Concentration of Waste in CFMT
  - Glass Former Preparation in Cold Chemical Facility
  - Analysis, Concentration, and Recipe Complete
- Glass Formers Transferred to CFMT
- After Agitating, 14 Samples Taken from the CFMT and Transferred to A&PC Lab
- After Verification of the CFMT Samples, Sugar Added for Redox Control
- 14 Additional CFMT Samples for Information Only





# Vitrification Process and Status

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## WVNS Vitrification Process Cycle

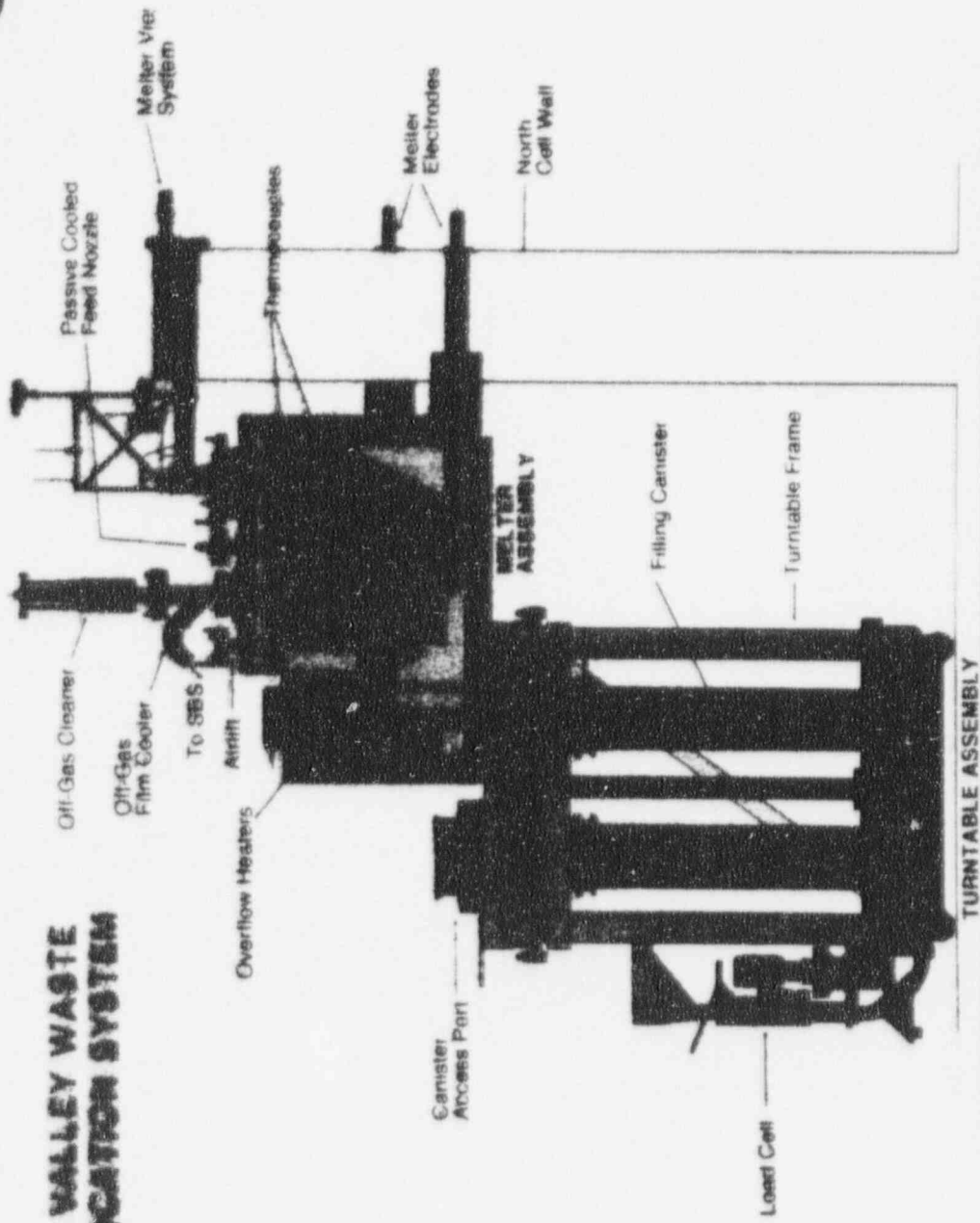
- Transfer CFMT to the MFHT
- MFHT Continuously Fed to Melter
- Melter Fills Canisters Using a Series of "Airlifts"
- After Fill, Canisters are Rotated in the Turntable
- Canisters Transferred to Weld Station
  - Shard Sampling
  - Fill Height Measurement
  - Lid Welding
- Canister then Moved to the Decon Station
- Canister Moved from Decon Station to Storage Rack then to HLW Interim Storage Using the VF Canister Transfer Cart





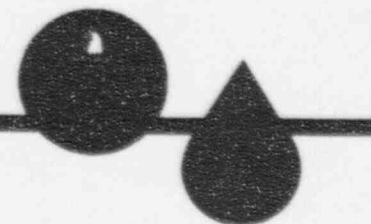
# Vitrification Process and Status

## WEST VALLEY WASTE VITRIFICATION SYSTEM



# Vitrification Process and Status

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## West Valley ALARA Performance

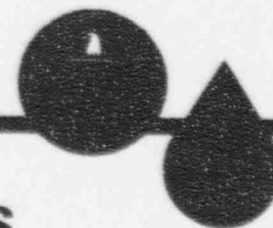
	Annual Goal Man-Rem	Performance Man-Rem	Skin Contaminations	Clothing Contaminations
1990	21.5	15.3	6	17
1991	17.7	14.5	0	21
1992	18.2	14.9	5	15
1993	18.5	13.0	0	2
1994	18.0	16.9	0	1
1995	22.0	21.8	2	3
1996	22.1	9.5	1	2

Note: In 1996, Operation of the Vitrification Facility Resulted in .047 Man-Rem Performance and 1 Clothing (Shoe) Contamination



# Vitrification Process and Status

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## Vitrification Operations Current Status

- First HLW Transfer Commenced June 24, 1996
  
- First Glass Pour Started July 2, 1996
  - 68 Canisters Filled
  - 65 Shard Sampled, Welded, Deconned
  - 64 Canisters in Storage
  
- Canister Contact Dose Rate is Approximately -- 2700 R/hr
  - Fill Height Approximately 90 to 92%
  
- 21 HLW Transfers from Tank Farm to Vitrification Facility
  - Over 2.69 Million Curies of Cs-137 and Sr-90 Transferred



# **ATTACHMENT 4**

**QUALITY ASSURANCE  
SUPPORT AND OVERSIGHT**

HLW QA Program Audit

January 27-31, 1997



*Quality Assurance Support & Oversight*  
*of the*  
*Vitrification Process*

Jack Hummel  
QA Manager



### QA Support Team

- ▶ Operations (Full Time)

4 Quality Engineers

4 Inspectors

- ▶ Procurement (Part Time)

2 Quality Engineers





### Procurement Program

- ▶ Canister
  - Fab Shop (ABW) WVNS Resident Inspection
  - On-Site Receipt Inspection
  - Canister Load In Inspection
  - Quarterly Surveillance
  - Annual Audit of ABW
  
- ▶ Glass Making (Cold) Chemicals
  - Local (Buffalo) Storage for JIT
  - Receiving Inspection for ID & Documentation
  - Quarterly Surveillance/Annual Audit as Necessary



### Hold Points Program

- ▶ Feed Batch Data Package Reviews
  - Before CFMT to MHT Transfer
  - Species Range
  - PCT Check
- ▶ Canister Load In
- ▶ Welding of Canister Lid
  - Fill Height Measurement
  - Shard Sampling
  - Welding Parameter Checks and Inspection



### Process Surveillance Program

- ▶ Surveillance Plans Contain Activities Important to WQR Items and Process Attributes
- ▶ Focused Review Based on HLW Items and Activities List
- ▶ Every item has been reviewed at least once since the start of Vit. Campaign
- ▶ All Process Travelers for Feed and CWF Data Package are reviewed
- ▶ Production Records are 100% reviewed
- ▶ Temperature Monitoring of Canister Storage Facility is being reviewed



### Audit Program

#### INTERNAL (1996)

- ▶ Vit Operations
- ▶ Vit Test Control
- ▶ Analytical and Process Chemistry Laboratory
- ▶ Training Program
- ▶ Records Management



### Audit Program

#### EXTERNAL (1996)

- ▶ Cold Chemical Vendor (Noah Technologies)
- ▶ Canister Fabricator (American Boiler Works)
- ▶ Minor Modification to Grapple (Bartholomew)



### QA Program Improvement Initiatives

- ▶ PAM - A system of quantifying issues for determining the significance and risks.
- ▶ SIMS - An improved process of managing significant issues for reducing cycle time, raising the level of significance and electronically managing issue forms.
- ▶ IOP - A streamlined process of key quality reviews in functional programs to reduce risk profiles.





### Summary

- ▶ Appropriate levels of support and oversight are being provided.
- ▶ HLW QA Program is continually being implemented.

# **ATTACHMENT 5**

**WVDP - FERNALD  
COMPARISON**

	WVDP	Fernald
Melter	Single Chamber	Three Chamber
Operating Temp	1150	1350
Penetrations	Top/side	Bottom/side
Electrodes	Inconel	Molybdenum
Penetrations	Inconel	Molydisilicide
Composition	Fe 12%	Fe 4%
Oxides	Pb 0%	Pb 4%
	S 0.2%	S 2%
	Ca 0.5%	Ca 7%
REDOX	IFO Model	NO
Conditionsn	Moderately Oxidizing	
Experience	5 years cf FACTS 3 Minimelters Cold Ops	Mini-Melter at CUA