U. S. DEPARTMENT OF ENERGY
RICHLAND FIELD OFFICE

Overview of the Planned
Hanford Waste Vitrification Plant Project

Presented To:

NUCLEAR WASTE TECHNICAL REVIEW BOARD
PANEL ON THE ENGINEERED BARRIER SYSTEM

Robert W. Brown, Director
Treatment Projects Division

May 11, 1992
Hanford Waste Vitrification Plant Project

Mission

Incorporate pretreated high-level and transuranic wastes into a borosilicate glass contained in sealed canisters for disposal in a geologic repository
Hanford Site Radioactive Waste Tanks and Capsule Disposal Plan

Sr and Cs Capsules → Packaging → Geologic Repository

Double-Shell Tanks

Single-Shell Tanks

Pretreatment

HWVP

In-Place Disposal

Grout Treatment

Near-Surface Vaults
Hanford Waste Vitrification Plant Project

HWVP Project Summary Schedule

Hanford Waste Vitrification Plant
Project Summary Schedule

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**Legend:**
- Key Decisions
- DOE HL Controlled Milestone
- DOE HQ Controlled Milestone

**ACRONYMS:**
- ATP: Acceptance Test Procedure
- CAA: Clean Air Act
- CG: Complex Acid Concentrate
- EIS: Environmental Impact Statement
- PSAI: Preliminary Safety Analysis Report
- ROD: Record of Decision
- WFO: Waste Form Qualification
- GTP: Operations Test Procedure
- PFP: Plutonium Filling Plant
- PSAI: Preliminary Safety Analysis Report
- RCRA: Resource Conservation & Recovery Act
- NCAW: Neutralized Caused Add Waste

**Key Decisions:**
1. Approval of New Start
2. Approval to Commence Detailed Design
3. Approval to Commence Site Preparation
4. Approval to Commence Construction

NWTIB.HWV/bch/050692
Hanford Waste Vitrification Plant Project

Status of HWVP

- Completed preliminary design
- 37% detailed design
- Received Interim Status Expansion from Washington State Department of Ecology
- Site preparation construction started in April 1992
- Preliminary Safety Analysis Report completed and the Safety Evaluation Report issued
## Tri-Party Agreement Milestone Status

<table>
<thead>
<tr>
<th>Milestone Number</th>
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<th>Baseline Date</th>
<th>Actual/forecast Date</th>
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<td>M-03-00</td>
<td>Initiate HWVP operations</td>
<td>12/99</td>
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<td>M-03-01</td>
<td>Initiate HWVP construction</td>
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<td>Establish date for HWVP design completion</td>
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<td>Issue preliminary design technical description report HWVP</td>
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<td>09/90A</td>
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<td>M-03-02</td>
<td>Complete HWVP Construction</td>
<td>06/98</td>
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<td>M-03-03</td>
<td>Complete Vitrification Building and HWVP Detailed Design</td>
<td>06/94</td>
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<td>Initiate construction of the CSB or Multi-Purpose Storage Complex</td>
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<td>Initiate installation of Vitrification Building mechanical equipment and piping</td>
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## Tri-Party Agreement Milestone Status

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<td>Initiate installation of Vitrification Building electrical and instrumentation</td>
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<td>M-20-01</td>
<td>Submit HWVP RCRA Part B permit application to Ecology and EPA</td>
<td>06/98</td>
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Hanford Waste Vitrification Plant Project

HWVP Process Requirements

- Receive pretreated high-level and transuranic waste slurries
- Incorporate radioactive waste components into a vitrified borosilicate glass
- Seal vitrified waste in canisters for shipment to repository
- Provide storage for filled canisters until shipment
- Capacity for 100 Kg/h glass production
Hanford Waste Vitrification Plant Project

Simplified HWVP Process Flow Diagram

HWVP Liquid Waste Handling System

To Near-Surface Disposal (Grout Form)

Low-Level Waste

Filter

Solids (Cs + TRU)

RWCT Concentrate

Recycle Waste Collection Tank

Decon. Waste Treatment Tank (Evaporator)

Evaporator Condensates

Formic Acid

SRAT Fresh Frit

Slurry Receipt and Adjustment Tank
- Evaporation
- Formic Acid Digestion

SME

Slurry Mix Evaporator

MFT

Melter Feed Tank

Melter

Product Canister

Decon. Waste

NaOH

Ollgas Scrubbing and Treatment System

Melter Offgas

Glass

Pretreated Feed (Alkaline Waste Solids Slurry)
Feed Preparation Process Description

Condensate Off-Gas
- \( H_2O \)
- \( CO_x \)
- \( NO_x \)
- \( H_2 \) (minor)
- etc.

From RLST (Analyzed)

SRAT
- Concentrate
- Formate
- Analyze

SME
- Add Waste Recycle
- Add Fresh Frit
- Concentrate
- Analyze
- Chemical Adjustment

Process Waste/Frit Recycle

Fresh Frit

Chemical Adjustment

Formic Acid

Condensate

Formated Feed

Melter Feed

To Melter

MFT
- Feed Melter
- Analyze (WFQ)

Composition Verification

WFQ/PC

NWTRB.HWV/bch/050692
Hanford Waste Vitrification Plant
Melter/Turntable

- Shield Wall
- Shield Window
- Canisters
- Canister Load Cell
- Pour Turntable
- Feed from Melter Feed Tank
- Melter Offgas
- Melter
- Pour Spout
HWVP Canister

Canister

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<th>Material:</th>
<th>Type 304L stainless steel (Schedule 20 pipe)</th>
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<td>Heat Load:</td>
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<td>Surface Temperature:</td>
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<td>Lid Temperature:</td>
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<td>Glass Density:</td>
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<td>Waste Loading:</td>
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<td>Activity:</td>
<td>(-4 \times 10^5) Ci</td>
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<td>Exposure Rate:</td>
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Summary

- HWVP is proceeding on baseline schedule for 1999 hot start
- Major plant systems and features incorporate DWPF lessons learned
- Test programs support design and process verification
- Processing implications of TWR expanded waste tank feed sources will be assessed