

High-Level Waste Treatment Technologies

Presentation to the
Nuclear Waste Technical Review Board

June 6, 1995
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HLW Treatment Program Purpose

Develop and demonstrate safe, cost effective, and environmentally responsible methods for the conditioning, interim storage, qualification, and final disposition of INEL high-level waste.



HLW Treatment Technologies Development

- Systems Analysis
- Process Development

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Systems Analysis

- Define problem and establish program goal
- Determine functional requirements
- Identify alternatives that meet the functional requirements
- Develop and evaluate alternatives
- Recommend preferred alternatives for implementation

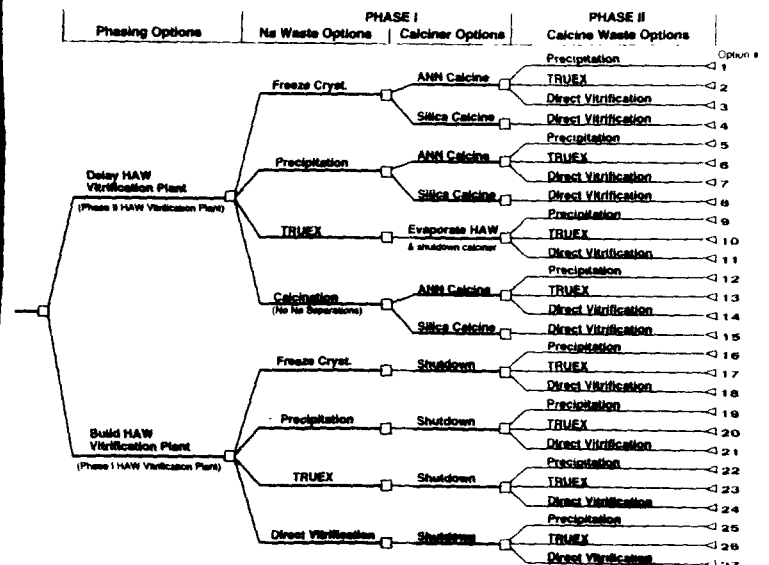
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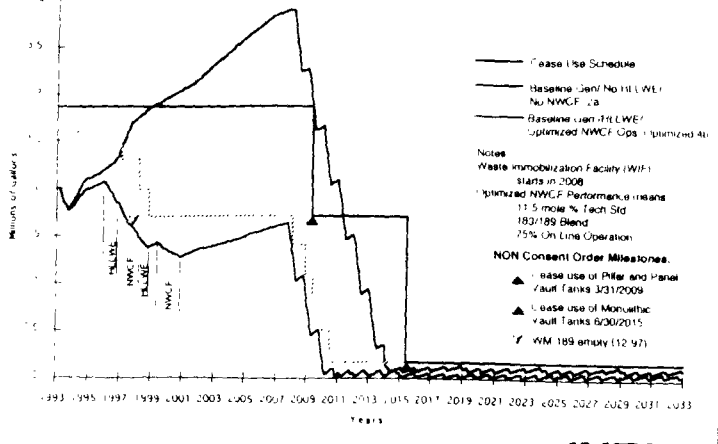


Evaluation of Alternatives

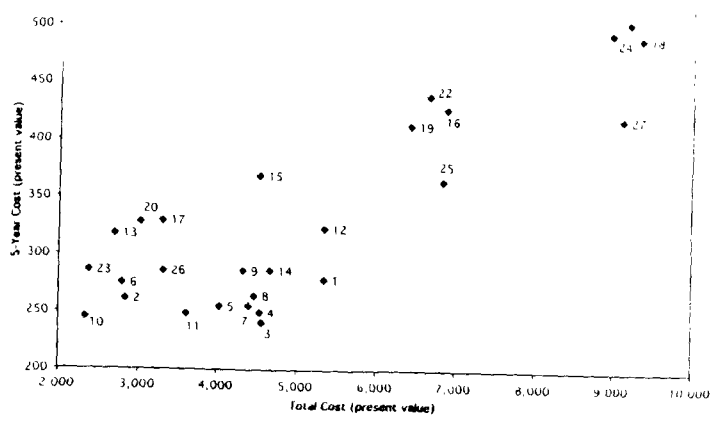
- Safety
- Life-cycle cost
- Regulatory compliance
- Waste volume
- Process flexibility

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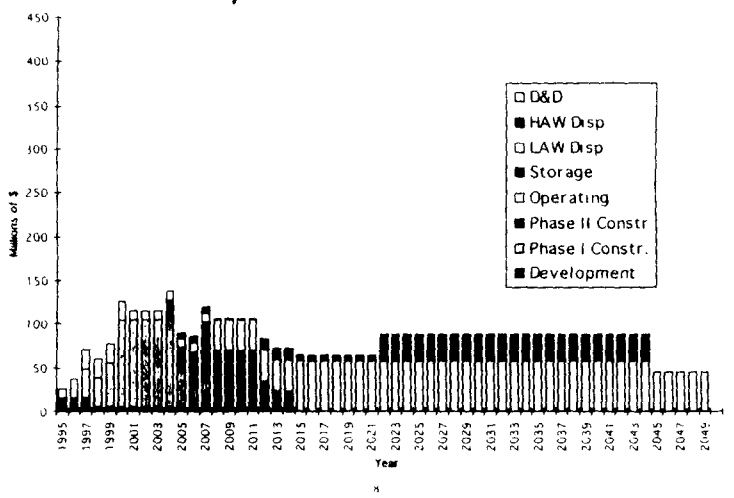




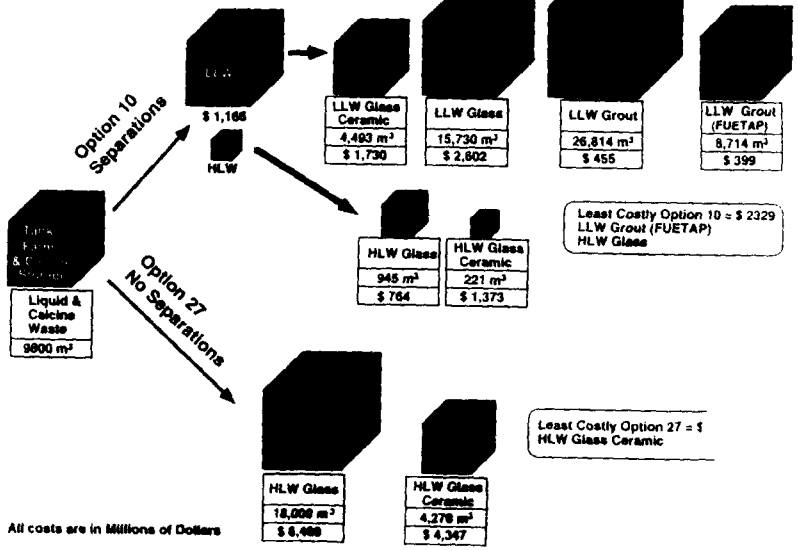
16. This chart is used as an example only and does not reflect current INEL planning.



Option 10 Cost-Time Profile



Comparison of Separations and Direct Immobilization



All costs are in Millions of Dollars

Treatment Options Selected

- Continued Calcination to meet near-term requirements
- Replacement of some liquid tankage
- Implementation of new technology to meet longer-term requirements
 - Waste separations into high- and low-activity fractions
 - Vitrification of high-activity waste (HAW)
 - Grouting of low-activity waste (LAW)



Calcination Technologies

- High-level liquid waste/sodium bearing waste (SBW) blend
- Aluminum nitrate/SBW blend
- Sugar/SBW blend
- Calcination of SBW at higher temperature



Separation Technologies Tested

- Freeze Crystallization
- Precipitation
- Radionuclide Partitioning (selected)
 - Sodium Extraction
- Pyrochemical

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Radionuclide Partitioning

- Separation of strontium using crown ether extraction
- Separation of cesium using ammonium-molybdophosphate ion exchange
- Separation of transuranics using the TRUEX extraction process

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HAW Vitrification Technologies Tested

- Glass Ceramic
- Glass (selected)

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LAW Immobilization Technologies Tested

- Glass
- Glass Ceramic
- Grout (selected)

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ICPP Proposed Waste Management Strategy: Phased Waste Immobilization Facility

