Nuclear Waste Technical Review Board
Engineered Barrier System Panel Meeting

Hanford Spent Nuclear Fuel Project

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Hanford Spent Nuclear Fuel Project

Agenda

- DOE / WHC lines of authority
- Status
- Strategic objective for K Basin fuel
- Key milestones
Westinghouse Hanford Company
Lines of Authority

President
Westinghouse
Hanford Company

Tank Waste Remediation System
Spent Nuclear Fuel Project
Transition Projects
Waste, Analytical & Environmental Services

K Basins
Project Baseline Control
Engineering & Systems Integration
Reg. Integration & Public Involvement
Applied Technology

Support Projects
Procurement
Safety
Quality Control
Human Resources
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Number one priority is protecting the Columbia River

- No discharge is acceptable
- Isolate fuel from the environment
- Put in safe storage away from the river
Defense Nuclear Facilities Safety Board
Recommendation 94-1

(7) “That the program be accelerated to place the deteriorating reactor fuel in the K-East Basin at the Hanford site in a stable configuration for interim storage until an option for ultimate disposition is chosen. This program needs to be directed towards storage methods that will minimize further deterioration.”
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Action needed to solve urgent problems

• Leak response plans
  - Earthquake vulnerability
• Aging facilities / worker safety
• Sludge/fuel characterization
• Sludge/fuel packaging
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Many pieces to the puzzle

- Nowhere to put the fuel
- Don’t know how to store it safely
- Don’t want to trade today’s problems for a future one
- Long-term solutions have to withstand the test of time — 30 to 50 year storage
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Crucial decisions must be made

- Fuel and sludge encapsulation
- Expedited removal
- Fuel stabilization facility
  - Location
  - Cost and schedule
- Long-term storage
  - Programmatic EIS
  - Hanford EIS
Hanford Spent Nuclear Fuel Project Status
Location of Hanford Spent Nuclear Fuels

100-KW & KE

100-D & DR

100-H

100-N

100-B & C

Spent Nuclear Areas

200 Areas

T Plant

Low-Level Burial Grounds

PUREX

Columbia River

Yakima River

FFTFT

300 Area

Richland

Pasco

Kennewick

0 4 8 kilometers

0 2 4 6 8 miles
### Irradiated Fuel Inventory at Hanford

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Amount</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>N Reactor</td>
<td>2095.8 MTU</td>
<td>K Basins, PUREX</td>
</tr>
<tr>
<td>Single-pass reactor</td>
<td>3.4 MTU</td>
<td>PUREX, K Basins</td>
</tr>
<tr>
<td>PWR Core II</td>
<td>15.7 MTU</td>
<td>T Plant</td>
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<tr>
<td>FFTF</td>
<td>11.0 MTU</td>
<td>400 Area</td>
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<tr>
<td>Miscellaneous</td>
<td>&lt; 0.4 MTU</td>
<td>Low-level burial grounds</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>2.2 MTU</td>
<td>300 Area</td>
</tr>
</tbody>
</table>
Inventory
Stored Irradiated N Reactor Fuel

- Total
- 105-KE Basin
- 105-KW Basin

Irradiated Fuel Inventory (MTU)

OPERATING
N Reactor Operation

NOT OPERATING
PUREX Operation
Two Basins, Two Histories

K-East Basin
- Reactivated to store irradiated N Reactor fuel in 1975
- Superficial cleaning of basin surfaces, not drained, concrete surfaces not coated
- Received N Reactor fuel in open canisters

K-West Basin
- Reactivated to store irradiated N Reactor fuel in 1981
- Drained, completely decontaminated, concrete surfaces coated with epoxy resin
- Received N Reactor fuel in sealed, encapsulated canisters

Both basins have systems for heat, particulate and dissolved radionuclide removal
Tri-Party Agreement Milestones

- Issue Notice of Intent for N Reactor Fuel EIS
  - June 1994
- Begin K-East Basin fuel encapsulation
  - June 1994
- Submit engineering study on moving K-East fuel to K-West Basin
  - Sept. 1994
- Submit schedule for disposing of contaminated K-East Basin water
  - Oct. 1994
- Provide a schedule for fuel / sludge encapsulation and contaminated water removal / replacement to regulators
  - March 1995
- Begin K-East Basin sludge encapsulation
  - June 1996
- Negotiate long-term fuel storage and disposition with regulators
  - *June 30, 1996
- Complete K-East fuel and sludge encapsulation
  - Dec. 1998
- Remove encapsulated fuel and sludge from K Basins
  - Dec. 2002
- Remove, replace, or treat contaminated K-East Basin water
  - *TBD

*Enforceable milestones
Spent Nuclear Fuel Project
*primary objective:*

Eliminate urgent risk
- Remove fuel, sludge and contaminated water from the K Basins as soon as possible
Current Path for Removing K Basin Fuel

K Basins
- Contain fuel (East Basin)
- Contain sludge (East Basin)
- Remove fuel & sludge by 2002?

New facilities
- Construct process facility
- Construct storage complex
- Needs to operate by 1998 to meet 2002
Current Schedule Dilemma


K Basins
- Contain Fuel
- Contain Sludge
- Store

Fuel Stabilization
- Develop Process
- Design and Construct
- Process
- Regulatory Criteria?

Fuel Storage
- Design and Construct
- Store
Potential Strategies

- Expedited fuel removal
- Foreign alternatives
Expedited Fuel Removal

- Modify an existing facility for near-term storage of K Basin fuel
  - Ideally use facility as feed storage for stabilization process
- Fuel and sludge removed much earlier
- Doesn’t affect fuel stabilization, storage, and disposition options
- Stabilization and long-term storage are off critical path for K Basin closure
- Near-term construction budgets are reduced
Expedited Fuel and Sludge Removal

Phase I Facility
- Construct storage facility in existing alternate facility (FMEF / Canyon facility / Spray Ponds)
- Operate by 1997 (target)
- Store for up to 10 years

K Basins
- Contain fuel (East Basin)
- Contain sludge (East Basin)
- Remove fuel & sludge before 2002

Phase II Facility
- Construct process (preferably in same or adjacent facility)
- Construct storage complex
- Operate when ready (> 2000)
Achieving Expedited Strategy Requires...

- NEPA review concurrent with facility design and modification
- Issue NOI for Interim Action
- Capital funding plan for FY 1995 modification
- Early definition of regulatory criteria for near-term storage
- Development of acceptable retrieval/storage methodology
Foreign Alternatives

Year 2002 (Target)

Resolve issues → Prepare to ship → Ship

- Advantages
  - Lower investment in new facilities
  - Potentially lower life-cycle costs
  - No additional facilities to clean up

- Issues
  - Public involvement
  - Shipping
  - Institutional barriers
  - Challenge to meet 2002 target date
Key Milestones
### Key Project Milestones

<table>
<thead>
<tr>
<th>Milestone</th>
<th>FY 1994</th>
<th>FY 1995</th>
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<tbody>
<tr>
<td><strong>Seismic USQ</strong></td>
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<tr>
<td>Pilot Run Plan</td>
<td>Apr</td>
<td>Jan</td>
</tr>
<tr>
<td>Sludge Resolution Plan</td>
<td>May</td>
<td>Feb</td>
</tr>
<tr>
<td>Analysis Complete</td>
<td>Jun</td>
<td>Mar</td>
</tr>
<tr>
<td>Seismic Leak Isolated</td>
<td>Jul</td>
<td>Apr</td>
</tr>
<tr>
<td>K Basins Source Term Mitigation</td>
<td></td>
<td></td>
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<tr>
<td>Initiate Project Engineering</td>
<td>Apr</td>
<td>Jan</td>
</tr>
<tr>
<td>Project Validation</td>
<td>May</td>
<td>Feb</td>
</tr>
<tr>
<td>Decision point: Capital funding</td>
<td>Jun</td>
<td>Mar</td>
</tr>
<tr>
<td>Sludge Packaging Demonstration</td>
<td>Jul</td>
<td>Apr</td>
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<tr>
<td>Tritiated Water Plan</td>
<td>Aug</td>
<td>Natl. Program Support</td>
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<tr>
<td>Expanded Fuel/Sludge Plan</td>
<td>Sep</td>
<td>Apr</td>
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<tr>
<td>Fire Protection Contract Awarded</td>
<td>Oct</td>
<td>Apr</td>
</tr>
<tr>
<td>Water Distribution Upgrade Contract Awarded</td>
<td>Nov</td>
<td>Apr</td>
</tr>
<tr>
<td>National Program Support</td>
<td>Dec</td>
<td>Apr</td>
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<tr>
<td>DOE Approves USQ Resolution</td>
<td>Jan</td>
<td>Apr</td>
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<tr>
<td>K Basin Fuel Handling</td>
<td>Feb</td>
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<tr>
<td>ORR</td>
<td>Mar</td>
<td></td>
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<tr>
<td>ORR Baseline Pilot Run</td>
<td>Apr</td>
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</tbody>
</table>

- **HQ action required**
- **Milestone complete**
To Achieve Milestones We Must...

Reprogram capital funding

- Accelerate fuel removal to interim facility
- K Basins essential systems

Reprioritize expense funding

- FY 1994: Reprioritize budgets to accommodate 60% increase in scope
- FY 1995: Anticipate additional budget review and reprioritization

Streamline review and approval process

- Delegation of approval authority to field
- Design/construction in parallel with NEPA review process

Define regulatory policy for future facilities

- DOE / NRC / EPA / RCRA

Assure public involvement in the SNFP decision process

- Strategic planning
- Fuel disposition alternatives
Spent Nuclear Fuel Project Logic

N Reactor and Single-Pass Reactor Fuel

Near-term Storage → Processing for Interim Storage

Storage Complex

Final Disposition

Other Hanford Fuel

Near-term Storage and Processing

Other Nuclear Materials
Hanford Spent Nuclear Fuel

General storage concepts

- Separate fuel storage
- Fuel storage complex
- Multi-purpose storage complex

Storage options

- Dry cask or caisson
- Wet pool
- Dry vault
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Stabilization options

- Drying
- Oxidation
- Separations