EM Program and Waste Disposition Update

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Office of Environmental Management

ECA Peer Exchange – July 31, 2014
Las Vegas, Nevada
Discussion Topics

• EM Program and Budget Overview
• Waste Disposition Update
  • WIPP Incidents and Recovery Plans
  • Site Summaries
  • LLW/MLLW Forecasts
  • Other waste and materials disposition topics
• Discussion
EM is an operational federal program, performing a wide variety of tasks to clean up the environmental legacy of the U.S. nuclear weapons complex:
EM Has Made Significant Progress Cleaning Up the Environmental Legacy of the Cold War

EM Historical Cleanup Sites (107)

Sites Remaining Today (16)

K-25 Pre-Cleanup

K-25 Post-Cleanup

EM Historical Cleanup Sites (107)

AK

EM Historical Cleanup Sites (107)

HI

EM Historical Cleanup Sites (107)

K-25 Pre-Cleanup

K-25 Post-Cleanup

Safety  Performance  Cleanup  Closure

www.energy.gov/EM
Where Did $144B Go?
EM funds from 1989-2013

- **Tank Waste**: $35B / 24%
- **Waste Management**: $24B / 17%
- **Soil & Groundwater**: $19B / 13%
- **D&D**: $24B / 17%
- **Spent Nuclear Fuel / Special Nuclear Materials**: $20B / 14%
- **Infrastructure**: $22B / 15%
FY 2015 Request

EM’s FY 2015 Budget Request - $5.622 Billion Total

- Radioactive Tank Waste: $2,042M / 36%
- Special Nuclear Materials and Used Nuclear Fuel**: $971M / 17%
- Soil and Groundwater: $466M / 8%
- Facility D&D: $992M / 18%
- Transuranic & Solid Waste: $758M / 13%
- Site Services*: $392M / 7%

*Includes Program Direction, Program Support, Technology Development & Deployment, Post Closure Administration and Community and Regulatory Support

**Includes Safeguards and Security
WIPP Incidents and Recovery Plans
Recap of the Incidents at WIPP

February 5th Truck Fire:

- All operations at the repository ceased following salt haul truck fire in the WIPP underground
- An investigation team was deployed to determine the cause of the fire
  - Report released March 13th

February 14th Radiological Incident:

- A continuous air monitor detected airborne radiation in the underground
- WIPP’s ventilation system automatically switched to high-efficiency particulate air (HEPA) filtration mode when air borne radiation was detected underground and the WIPP mine remains in filtration mode at this time
- Extensive sampling and monitoring conducted by DOE, New Mexico, and Carlsbad Environmental Monitoring Research Center Monitoring
  - EPA and the NMED also performed sampling
- Efforts by the Department of Energy and Nuclear Waste Partnership are ensuring workers are fully protected during recovery and restart
- Phase 1 Report by investigation team issued April 24th
- Semi-monthly town hall meetings are utilized to keep the community informed; to stay apprised go to: http://www.wipp.energy.gov
  - Live streaming of the meetings can be viewed at: http://new.livestream.com/rrv/
Recap of the Incidents: Layout of the WIPP Underground

Event locations more than 2,300 feet apart

Salt Haul Truck Fire Location (North part of mine)

Continuous Air Monitor Alarm Location (Panel 7 Exhaust Drift)

www.wipp.energy.gov
Salt Truck Fire in WIPP Underground

Breached Drum in WIPP Underground
Accident Investigation Board Corrective Action Plan Status

- Vehicle Fire Corrective Action Plan
  - Incorporated DOE comments and resubmitted on June 20, 2014
  - 206 corrective action with completion dates to March 31, 2015
- Radiation Release (phase I) Corrective Action Plan
  - Submitted on June 30, 2014
  - 212 corrective actions with completion dates to April 30, 2015
- Radiation Release (phase II) corrective action plan pending release of final accident investigation report
- The Accident Investigation Reports cited significant weaknesses in the WIPP Safety Management Programs that exacerbated the effects of the fire and radiological release events
- CBFO is conducting Safety Management Program Improvements, e.g., conduct independent performances based assessments using outside subject matter experts, safety management program health assessments will be performed and reviewed by the Executive Safety and Quality Safety Board
WIPP Recovery Plan Overview: Mitigate Rad Release

1. Terminate the low-level radiological release—Complete
2. Unmanned instrument entry to establish safe habitability for manned entry—Complete
3. Manned entry to characterize mine stability and attempt to identify the source of the release
4. Isolate the source of the radiological release
5. Replace contaminated filters—Complete
6. Mitigate the contamination hazard in the underground
7. Incorporate corrective actions to restore operations

Surface

2150 ft

Underground

Approximately 2000 ft
Phase 1: Air Intake and Salt Shaft Unmanned Entries – Complete
• Monitor for air and radiological hazards
• Establishes the shafts safe to transport people
• No hazards were identified

Phase 2: Perform Mine Safety Compliance Inspections - Complete
• Personnel ride on top of the conveyance to inspect the shaft
• Monitor for air and radiological hazards
• No hazards were identified

Phase 3: Establish Operating Base in the Underground - Complete
• Establish egress capability between the Salt and Air Intake Shafts
• Survey area near salt shaft for habitability
• Protective equipment – Two pairs of protective clothing and a respirator
• Establish operating base where personnel transition from contamination area to a “clean” area

Phase 4: Identify Scene of the Event (in progress)
• Survey from the operating base to panel 7 or panel 6
• Protective equipment – two pairs of protective clothing or plastic suit and breathing air system (BG-4) or equivalent
Update on WIPP Recovery Efforts

• Through most of June, re-entries were on hold until filter replacement activities in the underground were completed.
  o Re-entries scheduled for July are focusing on mine recovery activities

• A team, entitled REACH, at WIPP was created to develop video imaging approach to view all the drums in Panel 7, Room 7
  o A selection for technical support for video imaging was made on July 2. The procurement is for a 90 foot carbon fiber adjustable boom with a base that rides on a rail system that will span the waste face from rib to rib in Panel 7, Room 7

• Due to temperature concerns, WCS moved the modular concrete casks (MCCs) containing the LANL waste of concern to their disposal cell for temporary storage as a precautionary measure. MCCs have been covered with sand to provide insulation from the seasonal heat

• A Team has been established to look at options for nitrate waste stored at WCS

Photos from the May 10th Re-Entry
Technical Assessment Team (TAT)

• On May 27, 2014, DOE established the TAT to aid in a comprehensive independent technical review of the radiological release at WIPP
  o The TAT will be working closely with the Accident Investigation Board

• The TAT’s membership draws upon the technical and scientific expertise of the Department’s national laboratories: Savannah River, Pacific Northwest, Sandia, Oak Ridge, and Lawrence Livermore

• Using a National Laboratory team approach provides the level of rigor and credibility that the Department requires to properly assess the radiological release event and will provide the solid technical basis needed as input to the WIPP recovery plan

• Schedule will be dynamic based on scientific and investigative efforts; current planned activities continue through the end of FY 2014
TRU Waste Impacts at DOE Sites

- The TRU waste-generating sites continue to characterize and certify TRU waste for eventual shipment to WIPP.

- EM is carefully evaluating the impacts to other DOE TRU waste-generating sites including impacts on commitments with state regulators.
  - Any impact to the TRU waste-generator sites will depend on the length of the shutdown and available funding.

- We are working closely with these sites to identify storage requirements and funding needs beyond those provided in the DOE FY 2015 budget request. These efforts will ensure that adequate storage is available for certified waste until such time shipments to WIPP resume.
Office of River Protection: Construction Continues at the Waste Treatment Plant

Will treat the bulk of 56 million gallons of radioactive waste

- FY2014 Planned work includes continuation of full construction of the Low Activity Waste Facility, Balance of Plant Facilities and Laboratory
- Resolution of technical issues
• Disposed 15.6 million tons of contaminated material at the Environmental Restoration Disposal Facility since 1996, including recent disposal of the Plutonium Recycle Test Reactor

• Plutonium Finishing Plant glove box removal nearing completion

• Continuing construction activities for system to retrieve, package, and transport highly radioactive sludge from the K-West Basin for interim storage away from the Columbia River

1,082-ton packaged PRTR being transported to ERDF for disposal

Construction of K-West Basin Annex for sludge retrieval project
Savannah River

• Reduced legacy CH-TRU stored down to 600 cubic meters from over 12,000 cubic meters

• Planning for transfer of lessons learned and equipment for use of TRUPACT-III at other sites

• Closed Tanks 5 and 6, which are the 5th and 6th tanks to be closed

• Continuing production of HLW canisters at the Defense Waste Processing Facility (over 3,700 since 1996)

• Continuing construction of the Salt Waste Processing Facility
Idaho

- Completed targeted exhumation at Accelerated Retrieval Project (ARP) VII and III
  - Exhumations now complete at 7 of 9 ARPs (3.28 out of a total of 5.69 acres)
  - Exhumations ongoing at ARP VIII
- Completed two-year project to treat, characterize, and repackage of 6,000 drums of legacy TRU and MLLW sludge from AMWTP
- Started sodium distillation system to treat challenging reactive sodium remote-handled wastes
- Completed Readiness Assessments for Integrated Waste Treatment Unit
  - Simulant testing will soon begin to support start of radioactive waste treatment
Los Alamos

- Following WIPP incidents, DOE made great effort to complete removal of 3706 cubic meters of TRU waste by June 30, 2014, in accord with Framework Agreement
- April 1, initiated shipments to Waste Control Specialists for temporary staging.
- DOE removed nearly 90% of the volume and 93% of the material at risk
- Over 38,000 curies removed from LANL
- Campaign paused in early May following discovery of concerns with LANL nitrate salts
- LANL TRU program paused to allow thorough review of issues and required actions
• K-25 final phase demolition and waste disposal completed

• Increased focus on mercury cleanup at Y-12; completed conceptual design for new treatment facility

• CH TRU processing activities continue at TRU Waste Processing Center

• Evaluating options to mitigate impacts from inability to ship TRU offsite
Portsmouth
Cut & Cap at X-326 Process Building: More than 80 cell equivalents removed; more than 1,100 converters shipped

Paducah
C-410 Feed Plant building demolition began in May and will be completed this fall

DUF6
13,579 metric tons DUF6 processed (>double FY2012 total) and 2,279,000 gallons hydrofluoric acid safely shipped in FY 2013
West Valley

- Following completion of waste incidental to reprocessing (WIR) determination, planning work is underway to ship WIR wastes to disposal site. Target plan is to initiate campaign before the end of CY14; extensive coordination underway with DOT and NRC

- Construction of HLW Storage Pad essentially complete

- Assembly of eight vertical storage casks completed and expect delivery of eight Multi-Purpose Canister Overpacks this Summer

- Deactivation of Main Plant continues: asbestos abatement, contaminated pipes, and vacuuming fine debris
• Completed processing of tank sludge generated 28 liners of stabilized LLW for disposal at the Waste Control Specialists’ Federal Waste Facility

• Resumed decommissioning activities in Building H2 and Building G2 enclosures
Moab

• To date in 2014, shipped over 686,000 tons of uranium residual radioactive material (cumulative 6.95 million tons) from Moab to our engineered disposal cell near Crescent Junction, Utah

• To date in FY 2014, extracted 7.5 million gallons of contaminated ground water and cumulatively 209.5 million gallons to date
Continued soil and groundwater remediation activities -- including characterization and monitoring of underground nuclear test contamination, cleanup of above-ground industrial sites and surface soil contamination

Nevada National Security Site continues to serve an important cleanup mission as regional disposal facility for DOE LLW/MLLW:

- FY13 Disposal: 1,099,000 cubic feet
- FY2014 Forecast: 1,441,000 cubic feet
- FY2014 to date: 78 percent of forecast (818,205 cubic feet through mid-July)

Continuing working group discussions with state of Nevada on unique waste streams
## Disposal Forecast at NNSS FY 2014 (cubic feet)

<table>
<thead>
<tr>
<th>Generator Site</th>
<th>FY 2014 Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portsmouth GDP (OH)</td>
<td>532,000</td>
</tr>
<tr>
<td>Oak Ridge Reservation (TN)</td>
<td>239,000</td>
</tr>
<tr>
<td>Oak Ridge NNSA/Y-12 (TN)</td>
<td>151,000</td>
</tr>
<tr>
<td>Los Alamos National Lab (NM)</td>
<td>156,000</td>
</tr>
<tr>
<td>Idaho Site (ID)</td>
<td>72,000</td>
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<tr>
<td>Livermore Nat'l Lab (CA)</td>
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<tr>
<td>Paducah GDP (KY)</td>
<td>46,000</td>
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<tr>
<td>NNSA/Nuclear Fuel Services (TN)</td>
<td>79,000</td>
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<tr>
<td>Onsite NNSS (NV)</td>
<td>19,000</td>
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<tr>
<td>Savannah River (SC)</td>
<td>2,000</td>
</tr>
<tr>
<td>West Valley (NY)</td>
<td>12,000</td>
</tr>
<tr>
<td>All other sites</td>
<td>96,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,441,000</strong></td>
</tr>
</tbody>
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- This forecast supports operational planning
- Some of the volume included within this forecasts may be dispositioned at other facilities
Commercial Disposal Options

• DOE policy supports consideration of commercial disposition options in addition to DOE options, when compliant, cost effective, and in the best interest of the U.S. government

• **EnergySolutions (Clive, Utah)**
  
  • Accept Class A LLW and MLLW; 11e(2); NORM
  
  • Offers rail access, onsite treatment, and favorable bulk waste handling and disposal

• **Waste Control Specialists LLC (Andrews County, Texas)**
  
  • Multiple disposal facilities/licenses
    
    • Hazardous/exempt; 11e(2); NORM
    
    • Texas Compact Class A, B and C LLW – non-DOE waste
    
    • Federal Waste Facility Class A, B, and C LLW/MLLW – DOE waste
  
  • Offers onsite rail access, onsite treatment and storage capabilities
Complex-wide LLW/MLLW Disposal

- OnSite
- Commercial
- NNSS
- TBD

FY11 Actual | FY12 Actual | FY13 Actual | FY14 | FY15 | FY16
---|---|---|---|---|---
18.38
• Efforts to complete the update of the DOE Order 435.1 continue

• EM has taken steps to strengthen the Low Level Waste Disposal Facility Federal Review Group (LFRG)

• DOE continues to work with the NRC on their on going rulemaking efforts (related to site-specific performance assessments and disposal of depleted uranium and blended wastes)

• DOE conducting NEPA evaluation regarding potential program to receive and process “German spheres”
EM has made considerable progress, but significant programmatic challenges and scope remain.

Safe and urgent recovery of the WIPP facility is a significant priority for DOE.

Experience has proven that an optimized waste management system is vital to ensure environmental cleanup can continue.

- Continued integration and flexibility are critical
- Financial and economic factors present real constraints
- Pending and contemplated regulatory changes will also have impact

Through partnership with regulators, tribes, stakeholders and industry, we have the ability to mitigate many of the impacts associated with upset conditions.
Let’s Discuss!
Supporting Information
Legend

- CERCLA Disposal Facility
- LLW Operations Disposal Facility
- MLLW Operations Disposal Facility
- Regional LLW/MLLW Facility
- Commercial LLW/MLLW Operations Disposal Facility
- Closed CERCLA Site
- Byproduct Material Disposal

LLW/MLLW Disposition Complex

- Hanford Site
- Idaho National Laboratory
- Energy Solutions
- Crescent Junction
- Nevada Test Site
- Fernald
- Savannah River Site
- Oak Ridge National Laboratory
- Waste Control Specialists
- Los Alamos National Laboratory
Hanford – 176M curies

Idaho – 37M curies

Savannah River Site – 379M curies
DOE SNF Sites

Hanford ~ 2130 mthm
Idaho ~280 mthm
Fort St. Vrain, CO ~15 mthm
Savannah River Site ~30 mthm
- Complete retrieval and treatment of sodium bearing waste from all 4 remaining tanks at Idaho.
- Package 120 - 130 canisters of high level waste at Savannah River, achieving over 50% overall completion of the site’s high level waste mission.
- Consistent with the Department’s revised option for the Waste Treatment and Immobilization Plant (WTP), which is designed to move the WTP toward immobilization of waste as soon as practicable while resolution of technical issues continues, the FY 2015 budget includes support for analysis and preliminary design of a Low Activity Waste (LAW) Pretreatment System.
Key Activities and Accomplishments in FY 2015 (Total Funding: $992 Million)

- Finish up major facility cleanout and demolition projects:
  - Complete bulk of cleanup of Richland’s River Corridor, which contained over 500 facilities. The 324 Facility will be the primary River Corridor facility remaining to be completed after 2015.
  - Proceed with cleanout and demolition of the last two major facilities in Oak Ridge’s East Tennessee Technology Park (K-27 and K-31). The area previously contained nearly 600 facilities.
  - Complete demolition of the C-410 Complex at Paducah, which contained 15 facilities.

- Prepare to move out on a new round of facility cleanout and demolition:
  - Complete transition of the massive Paducah Gaseous Diffusion Plant to DOE and initiate critical facility cleanout actions.
  - Complete equipment removal from one of the three main facilities of the Portsmouth Gaseous Diffusion Plant, which was transferred to DOE in 2011.

Cleanup Progress

- D&D bulk of Richland’s River Corridor
- D&D legacy, excess Idaho facilities
- D&D all Fernald facilities
- D&D all Rocky Flats facilities
Nuclear Materials and Fuel: Moving From Interim Safe Storage to Final Disposition in 2015

Key Activities and Accomplishments in FY 2015 (Total Funding: $971 Million)

- At the Savannah River Site, plutonium disposition via preparation for conversion to oxide to provide feed for NNSA’s surplus plutonium disposition program.
- Also at the Savannah River Site, continue campaign to process certain used nuclear fuel from the High Flux Isotope and Material Test Reactors.
- Continue disposition of uranium-233 currently stored at Oak Ridge.
- At Richland, continue work required to retrieve and package spent (used) nuclear fuel sludge from the K-West Basin.
- At Paducah and Portsmouth, convert and package over 30,000 tons of depleted uranium for final disposition, reaching over 10% overall completion of the mission.
Key Activities and Accomplishments in FY 2015 (Total Funding: $466 Million)

- Complete remediation of the bulk of the roughly 1,200 contaminated release sites in Richland’s River Corridor. After 2015, 618-10 and 618-11 Burial Grounds and the waste site beneath 324 Building will be the only major remaining release sites.
- Operate groundwater remediation systems at multiple sites, including 39 systems at the Savannah River Site alone.
- At Oak Ridge, complete preliminary design of a new facility to treat mercury contamination in surface water.
- At Los Alamos, conduct design on a proposed new facility to treat chromium contamination in groundwater.
- At the Nevada National Security Site, complete closure activities for over 20 contaminated soil sites.
Transuranic (TRU) Waste: Approaching Completion of Multiple Sites in 2015

Key Activities and Accomplishments in FY 2015 (Total Funding: $758 Million)

- Neither incident has led to a risk to public or workers at the site based on our current understanding. DOE is addressing management issues. DOE is still committed to meeting its obligations.
- Despite interruption in normal WIPP operations, transuranic characterization, processing and packaging progress continues.
- Idaho’s Advanced Mixed Waste Treatment Plant will continue to process transuranic waste through the plant.
- The Department continues to evaluate potential alternatives for the disposition and storage of transuranic waste located at generator sites.
Perform technology development and deployment to resolve critical gaps in EM’s capabilities ($13 million)

Support a federal workforce of 1,500 FTEs to oversee the cleanup effort ($281 million)

Provide other services, including strategic bulk purchasing of commodities, proactive safety analysis and support for Minority-Serving Institutions.