



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
**ENVIRONMENTAL
MANAGEMENT**

Nuclear Waste Technical Review Board Overview: Office of Environmental Management

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April 16, 2013

- Overview of DOE-EM.
- Office of Nuclear Energy and Office of Environmental Management collaboration.
- Types of Radioactive Wastes derived from Tank Wastes: High Level Waste, Low Activity Waste, Transuranic Waste, Sr/Cs capsules.
- Impact of delay in the opening of a geologic repository— continued storage and DOE agreements with States and other agencies.

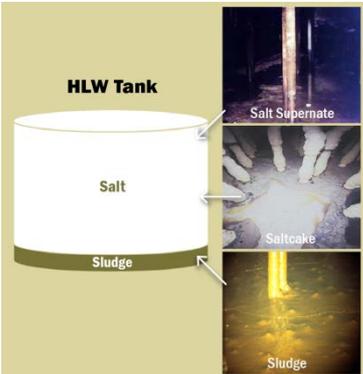
EM Has Significantly Reduced Risks to the Environment and Public

Completed cleanup on 90 of 107 former nuclear weapons and research sites

AK • **EM Historical Cleanup Sites**



Sites Remaining in 2012



Immobilized over 5 million gallons of radioactive liquid tank waste (enough to fill over seven Olympic-sized swimming pools)



Former plutonium storage vaults

Packaged 100% of EM's plutonium inventories for storage and permanent disposition (over 5,000 containers)

Waste Processing: Treatment and Disposal of Radioactive Waste : Treat 92 million gallons/505 million curies

Hanford

- 177 Tanks
- 176M curies
- 55M gallons
- ~ 9,700 canisters (projected)

Idaho

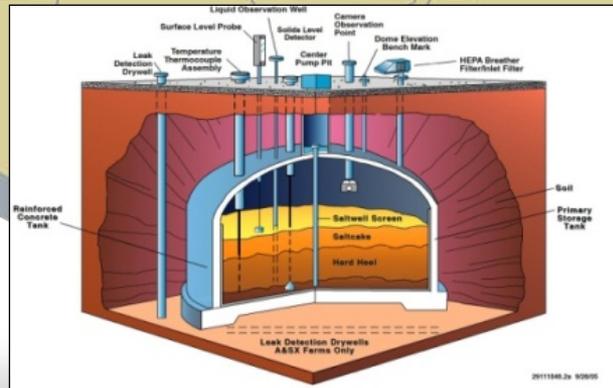
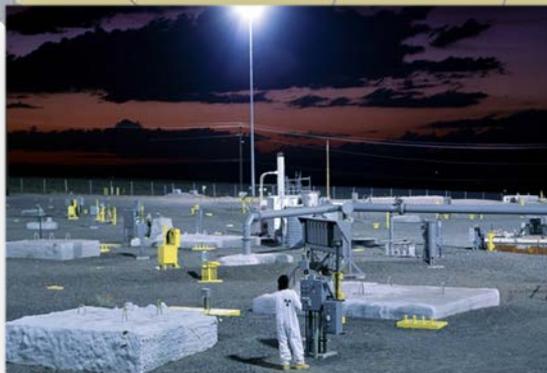
- 15 tanks (11 closed);
- 37M curies
- 900K gallons
- ~3,590-5,090 canisters (projected)

Savannah River Site

- 51 Tanks (4 closed)
- 37M gallons
- 292M curies;
- ~3,600 canisters (2013); ~7,580 (total projected)

West Valley Demonstration Project

- 4 tanks
- ~ 25M curies
- 275 canisters



- Safely store waste in form of liquids, sludges, saltcake and calcine
- Retrieve waste for purposes of pretreatment, treatment, and disposal
- Pretreat alkaline waste (SRS, Hanford and WVDP), typically through a separations process to separate waste into:
 - Low-activity waste stream treated and disposed as low-level waste (LLW) onsite [except offsite disposal at WVDP] (most of volume);
 - High-activity waste stream treated and disposed as high-level waste (HLW) at a geologic repository (most of activity);
- Treat high-activity alkaline waste (SRS, Hanford and WVDP) using vitrification
- Retrieve, treat and dispose remaining acidic liquid wastes at INL for disposal in a geologic repository.
- Retrieve and dispose calcine (INL) directly in its existing form or following alternative preparations for disposal.
- Stabilize tank waste residues intended for in-place closure.

The Radioactive Liquid Waste Challenge: How EM is Making Progress Today



Began
operations in
1996

Converts waste to solid glass form suitable for
long-term storage and disposal

Largest operating
radioactive waste
glassification plant
in the world

Defense Waste Processing Facility – Aiken, SC



Construction
completed in 2012

Will treat Idaho's inventory of liquid tank waste –
approximately 900,000 gallons

Integrated Waste Treatment Unit – Idaho Falls, ID

Overview: DOE Radioactive Waste Authorities

- Atomic Energy Act of 1954
 - DOE Order 435.1 Radioactive Waste Management
 - Low Level Waste
 - High Level Waste
 - Transuranic Waste
- Energy Reorganization Act of 1974
- Department of Energy Organization Act (1977)
- Uranium Mill Tailings and Radiation Control Act of 1978
- Low-Level Radioactive Waste Policy Act of 1980 and the Low-Level Radioactive Waste Policy and Amendments Act of 1985
- West Valley Demonstration Project Act of 1980
- Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987
- Waste Isolation Pilot Plant Land Withdrawal Act of 1992, as amended
- Missions are further defined in:
 - Energy Policy Act of 1992
 - Energy Policy Act of 2005

Current Tank Inventories

- SRS
 - 37 million gallons
 - 292 million curies
- Hanford
 - 55 million gallons
 - 176 million curies
- Idaho
 - 900,000 gallons
 - 37 million curies
- Other Wastes
 - Cesium/Strontium Capsules at Hanford
 - 1900 capsules
 - 66M curies (2002)

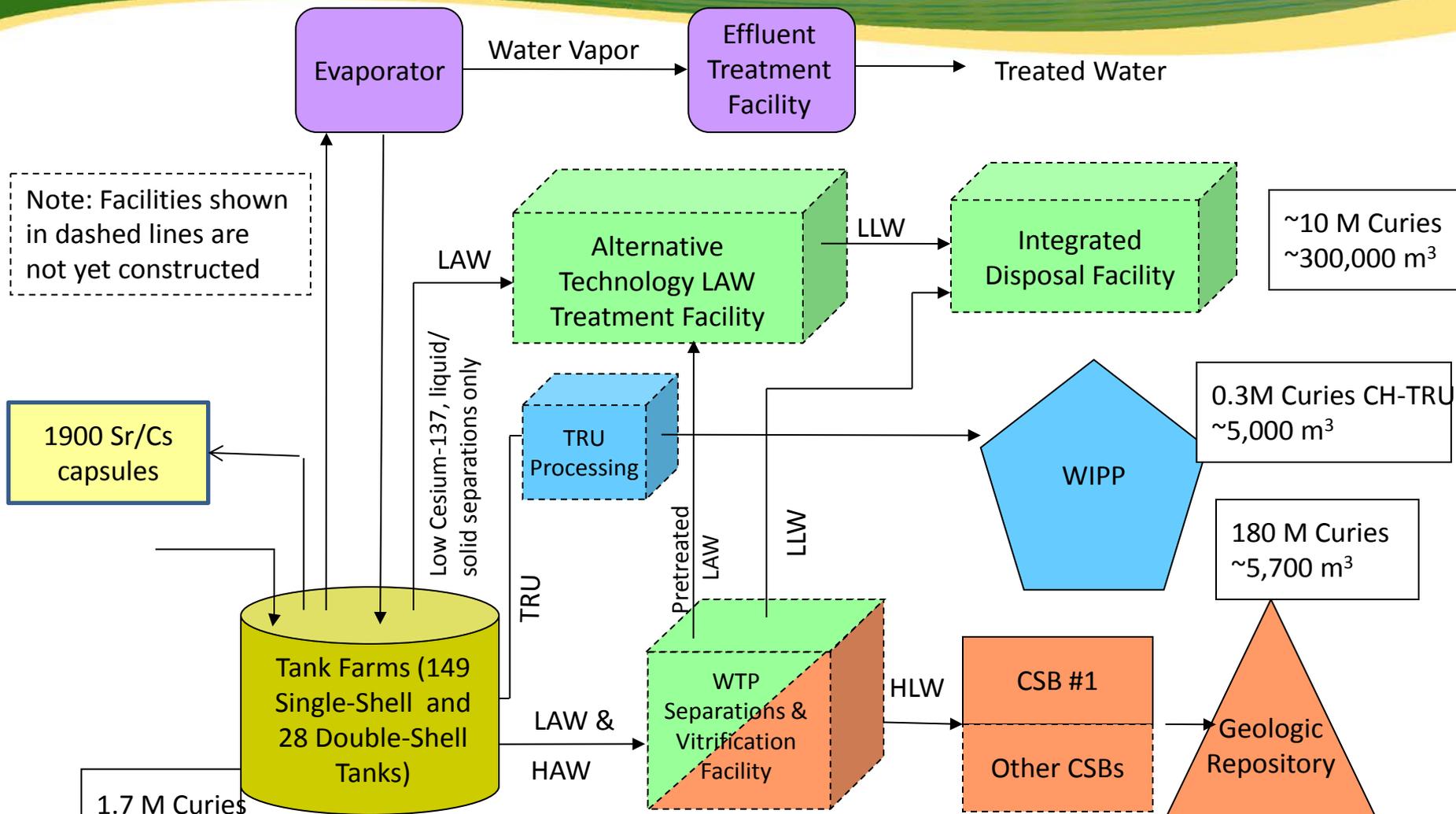
Treated HLW (existing)

- SRS
 - 3,600 vitrified canisters
 - 50 million curies
- West Valley
 - 275 canisters in 25 million curies
- Idaho
 - 37 million curies
 - 4,400 m³ in 7 bin sets

Treated LAW (Projected totals)

- SRS
 - <1 million curies
 - ~700,000 m³
- Hanford
 - 10 million curies
 - ~160,000 m³
- WVDP (complete)
 - <500,000 curies
 - ~ 5,400 m³

Hanford Tank Waste



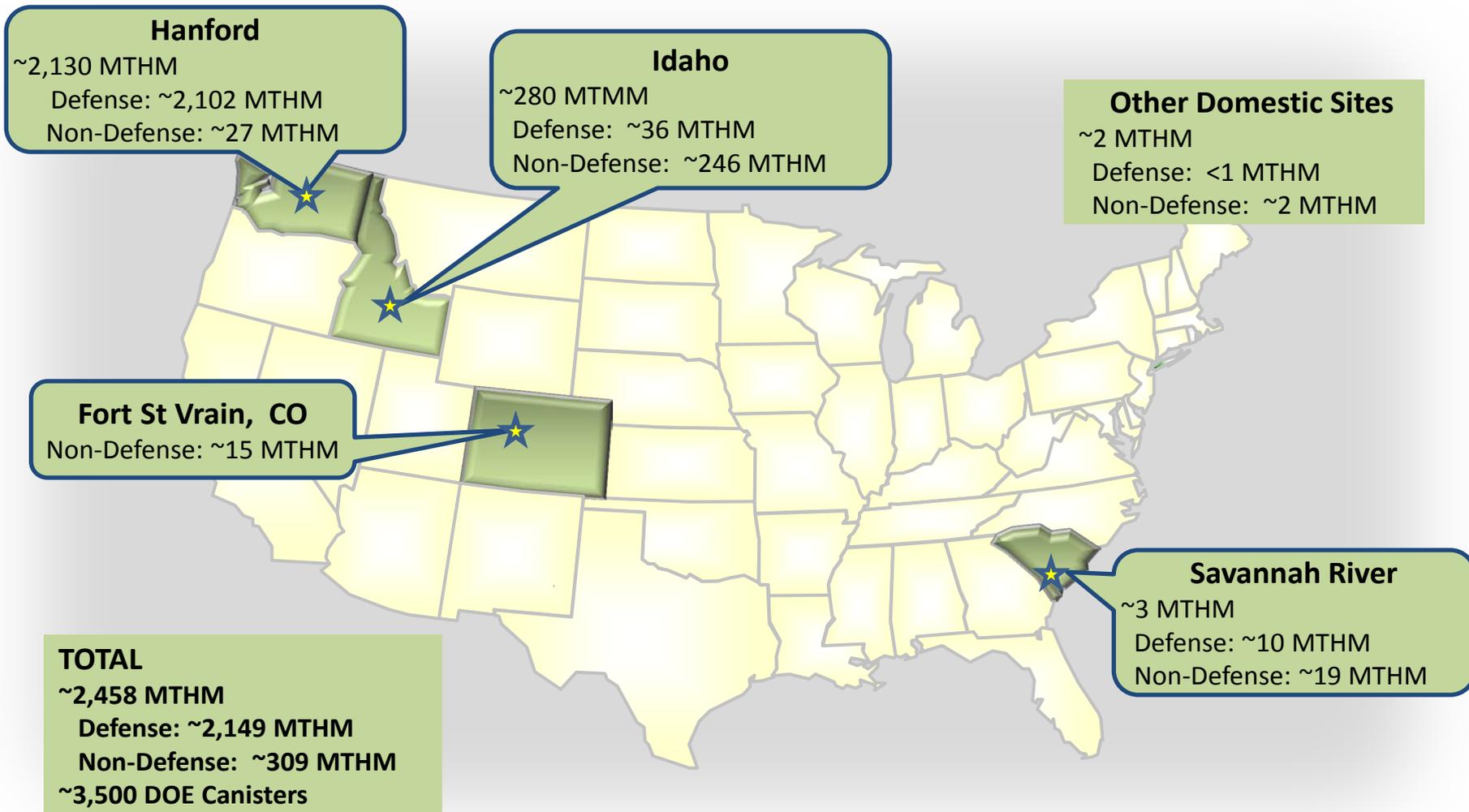
~10 M Curies
~300,000 m³

0.3M Curies CH-TRU
~5,000 m³

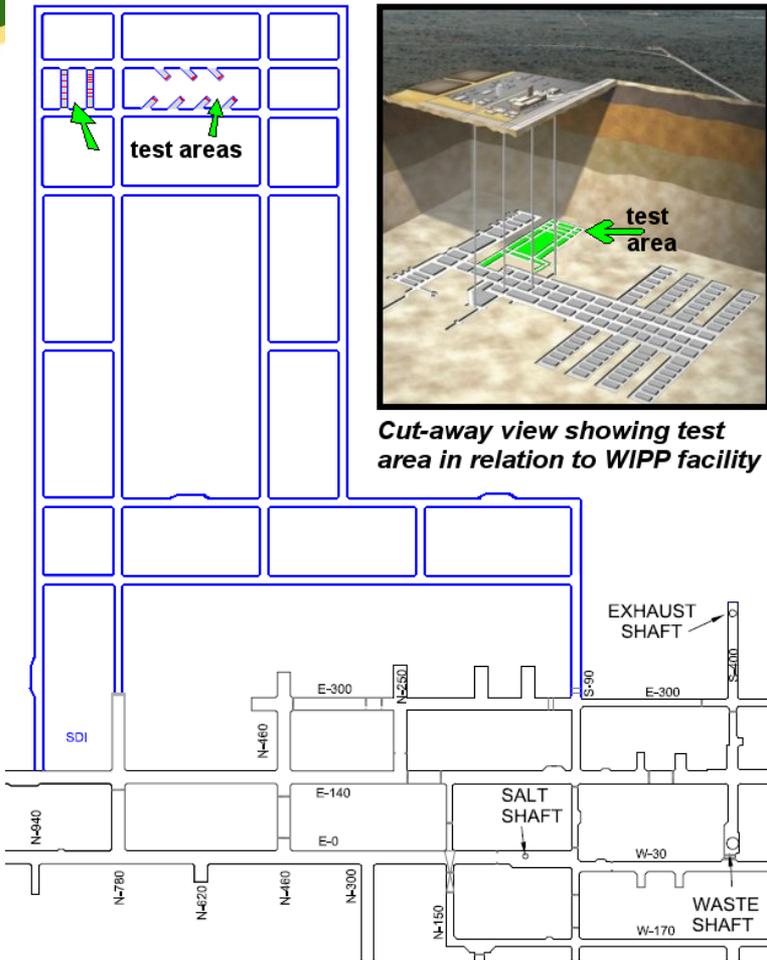
180 M Curies
~5,700 m³

LAW = Low-Activity Radioactive Waste HAW = High-Activity Radioactive Waste
 LLW = Low-Level Radioactive Waste HLW = High-Level Radioactive Waste
 DWPF = Defense Waste Processing Facility SNF = Spent Nuclear Fuel
 WTP = Waste Treatment Plant CSB = Canister Storage Building
 WIPP = Waste Isolation Pilot Plant TRU = Transuranic
 SNF = Spent Nuclear Fuel

Current SNF Inventory (2013)



MTHM – Metric Tons Heavy Metal



Cut-away view showing test area in relation to WIPP facility

- Jointly sponsored March 2012 workshop that created the Salt R&D Study Plan
 - NE funded science-based scope of work: laboratory and modeling
 - EM supported mining of underground research laboratory
- Held follow-on technical workshop in March 2013
 - Focus on identifying additional R&D, modeling and field activities for a generic salt repository
 - Draft integrated path forward available late April 2013
- NE and EM will continue to meet regularly and coordinate activities

NE-EM Collaboration (cont'd)

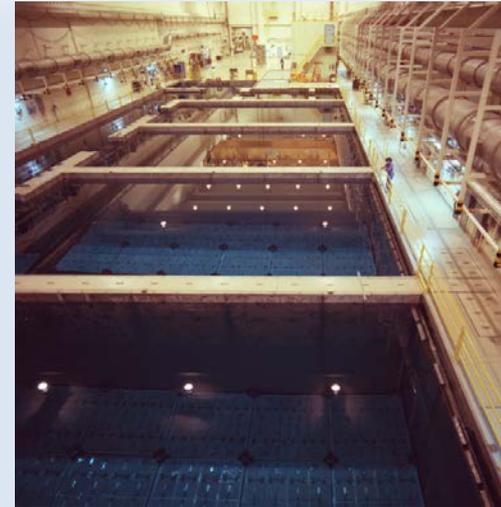
- EM is supporting NE's disposal-related research and development (R&D) work, including:
 - Support the feasibility of a generic salt repository, in accordance with a consent-based, step-wise approach that is informed by sound science and an adequate regulatory framework.
 - Demonstration of effectiveness of salt as a repository for heat-generating radioactive waste.
 - Review of past studies and data related to potential disposal of heat-generating wastes in salt.
 - New coupled models (thermo, mechanical, hydro).
 - Mining access drifts and install infrastructure using existing resources, to prepare for planned heater test which can inform future disposition plans.

- 2012 Department's Environmental Liability Report :
 - A 20-year delay in the opening of a geologic repository may result in a \$1.1 billion liability (in constant 2012 dollars).
 - Includes additional costs above current baselined estimates to safely store HLW and SNF at four DOE sites (Idaho National Laboratory, Hanford, Savannah River Site, and the West Valley Demonstration Project).
- EM continues safe management/storage of HLW and SNF.
 - *DOE's Strategy for Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* (January 2013) estimates a repository in 2048
- Continue to develop improved techniques to reduce treatment costs and schedules.

- Agreements with States in forms of Site Treatment Plans (SRS), Federal Facility Agreements (SRS), Hanford Federal Facility Agreement and Consent Order (Hanford), Consent Decrees (Hanford), Settlement Agreement (Idaho)
- These agreements primarily are directed at activities such as:
 - Tank waste retrieval/tank cease use dates
 - Tank waste cease use dates
 - Tank waste pretreatment/treatment facility construction completion dates
 - Tank waste treatment completion dates
 - Tank closure dates
- DOE is continuing to review the impacts on agreements with the States and regulators.
- DOE will work with the States and regulators to evaluate options necessary to meet DOE's commitments.

Additional detail on EM site inventories & plans

- **Diverse Inventory of SNF**
 - Includes both DOE-origin and commercial SNF
- **Diverse Storage Facilities**
 - Numerous dry storage methods
 - Wet storage pool in use
- **Na-Bonded SNF Stored and May Require Treatment**
- **Continue to Receive Foreign Research Reactor (until 2019) and Domestic Research Reactor Fuel**



- 15 Metric tons Dry Storage Facility managed by DOE
- Nuclear Regulatory Commission (NRC) Licensed Facility
- First Commercial Scale High Temperature Gas Cooled Reactor Plant in the United States



Status of Foreign Research Reactor/ Domestic Research Reactor Receipts

- FRR Reactor Program Supports U.S. Non-proliferation Policy
 - Over 9,500 assemblies from 32 countries received (as of March 2013)
 - Aluminum-clad at Savannah River Site; non-Aluminum-clad at Idaho National Laboratory
 - Current plans are to receive FRR until 2019
- DRR Program Accepts Spent Fuel from U.S. Universities and Other Government Research