



Foreign Research Reactor Spent Nuclear Fuel Acceptance Program

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Program Origin

- **In the 1950's, the United States started the Atoms for Peace Program**
- **As part of the program, the US provided enriched uranium to 41 countries in exchange for agreement not to develop bomb-making technologies**
- **Spent fuel shipment to US was part of Atoms for Peace program vision.**
- **Other return programs were previously used up to the early 90's**

Foreign Research Reactor Spent Nuclear Fuel Acceptance Program

- In May 1996, the US Department of Energy, in consultation with the US Department of State, initiated a program under which eligible spent nuclear fuel from research reactors containing US - enriched uranium could be shipped to the US for management and disposition.
- This program supports US nonproliferation objectives in that reactor operators still using HEU must commit to convert in order to participate in the program.
- Reactor operators that plan to shut down by May 2006 may also participate.
- Reactor operators who have already converted to LEU fuel or who operate on LEU fuel may also ship their eligible fuel to the US under this program.

US Provided Enriched Uranium to 41 Countries



Research Reactor Spent Nuclear Fuel Program

- **About 20 metric tons will be shipped back to the US**
 - 1 ton of non-aluminum-based (TRIGA) spent fuel to Idaho
 - 19 tons of aluminum-based spent fuel to Savannah River Site, South Carolina
- **10-year program (until May 2006) plus a 3-year final shipping period (until May 2009)**
 - Fuel must not be irradiated after May 2006
- **Beyond 2009**
 - Majority of high enriched uranium will have been shipped to US by that time
 - Reactor operators must develop their own solutions

Shipments to Date



5 shipments to INEEL (*Triga*)

- 1 South Korea (West Coast)
- 2 Romania, Slovenia, Italy and Germany
- 3 United Kingdom
- 4 Germany
- 5 Japan

23 shipments to SRS

- 1 Sweden, Switzerland, Germany, Colombia, and Chile
- 2 Canada
- 3 Germany, Switzerland, Spain, and Spain and Italy
- 4 Japan, Sweden, Germany, and Spain
- 5 Denmark, Italy, Germany, Sweden, and Greece
- 6 Australia
- 7 Venezuela, Uruguay, Japan, Sweden, and Spain
- 8 Germany, Denmark, and Sweden
- 9 Thailand, Philippines, Indonesia, and Taiwan
- 10 Portugal and Denmark (*Triga-2*)
- 11 Japan (via Europe), Brazil, Venezuela
- 12 Canada
- 13 UK (*Triga only - 3*)
- 14 Italy and Germany
- 15 Japan
- 16 Chile and Argentina
- 17 Austria, Germany, and Netherlands (*Triga - 4*)
- 18 Germany, Sweden, and Japan
- 19 Denmark
- 20 Denmark, Germany, and Sweden
- 21 Japan
- 22 Japan (*Triga only - 5*)
- 23 Japan

Shipments Completed

- **28 Shipments completed**
 - **21 Shipments via the Charleston Naval Weapons Station to SRS**
 - **2 Shipments from Canada to SRS**
 - **1 West coast shipment to Idaho National Engineering and Environmental Laboratory (INEEL)**
 - **4 Cross-country shipments from SRS to INEEL**

IMPLEMENTING A SHIPPING PROGRAM

- **DOE plays a direct role in implementation - not just oversight**
- **Open Forum**
- **Involve all Stakeholders**
 - **Initiation and regularly after start**
- **Going “Beyond” in Some Cases**

FRR PROGRAM ATTRIBUTES

- **High income (HI) economy country reactor operators are responsible to ship to the receiving site except as noted.**
- **DOE is responsible for shipping reactor operators in other-than-high income economy countries.**
- **Volunteer program**

FRR PROGRAM ATTRIBUTES (Cont'd)

- **The FRR Program:**
 - **Shipment segment in the US starts upon importation at a US port or border crossing**
 - **Primarily uses a single point as the starting location - - the Naval Weapons Station-Charleston (NWSC)**
 - **Conducts about 2 - 4 shipments and up to 30 casks per year to SRS**

FRR PROGRAM ATTRIBUTES (Cont'd)

- Shipments destined for INEEL are shipped to SRS first, then proceed to INEEL (Counted as separate shipments).
- Follows NRC regulations and DOE orders
- Program coordinates with and provides a grant to the South Carolina SLED and DHEC
- The Program funds all unloading and security operations at the Naval port and provides a prorated share of maintenance cost of equipment used at the NWSC.

FRR PROGRAM ATTRIBUTES (Cont'd)

- **Provides a security railcar (caboose) - new feature**
- **Provides radiological personnel at the port to conduct radiological surveys during vessel off-loading**
- **Previously provided a radiological team to shadow the shipment. SC DHEC now performs this function**
- **Implemented CVSA Level VI truck inspections**

LESSONS LEARNED FOR US OPERATIONS AND TRANSPORTATION

- **Implement a Lessons Learned Program and follow through as issues are identified. Accept comments from all Stakeholders.**
- **Early involvement by all involved parties invokes ownership.**
- **Followup, Followup, Followup**

FRR LESSONS LEARNED (Cont'd)

Operations

1. A Pre-Shipment Conference Call is held about one month prior to the shipment.
 - Gives notice to all major shipment participants
 - Addresses all pre-shipment activities
 - Identifies any known issues or needed coordinating activities
 - Reviews the “Shipment Timeline”

FRR LESSONS LEARNED - OPS (Cont'd)

- Conference Call and Shipment Participants:
 - DOE:
 - Field Program Manager,
 - Transportation Manager,
 - Security Manager,
 - Radiological Controls,
 - Emergency Preparedness,
 - Public Relations,
 - Headquarters Program Manager
 - Site Contractors
 - Westinghouse
 - Wachenhut
 - Other:
 - CSX Railroad or Trucking Co.
 - Shipper
 - Ship's Agent
 - Navy personnel
 - US NRC
 - US DOT-FRA
 - US Coast Guard
 - US Customs, Immigration, & Agriculture
 - SC Emerg. Mgt.
 - SC DHEC
 - SC SLED, DNR, Trans. Police

FRR LESSONS LEARNED - OPS (Cont'd)

2. A Pre-Shipment Meeting is held the day prior to the shipment to:
 - Ensure all organizations are ready
 - Ensure all prerequisites are completed
 - Ensure the shipment is on schedule
 - Ensure all Stakeholders know and understand the Shipment Timeline and when their actions are required.
 - Announce any changes to plans.
 - Verify and issue 24-hour POC lists.

FRR LESSONS LEARNED - OPS (Cont'd)

3. Key organizational representatives present at the beginning of the operations to address any issues in their area
4. Press releases coordinated in advance and any inquiries directed to appropriate POC
5. Lots of opportunities for miscommunications
 - Continuous attention to communications in all areas
6. Leasing security railcars not reliable
7. Rail priority can be problematic

FRR LESSONS LEARNED - OPS (Cont'd)

8. Stage spare railcars and trailers
9. Pre-inspect and operate all moving parts before use
10. Label ISO front/back for orientation at receipt site
11. Ensure distribution of the Transportation Plan and Security Plan includes the state working level
12. Contingency plans for opening containers if requested by State escorts (Seals . Locks, RadCon)
13. Clearly communicate and reinforce to need to safeguard information

FRR LESSONS LEARNED

Transportation

1. Pre-inspect equipment prior to actual shipment (Allow time for unplanned repairs)
2. Communication with the Carrier
3. Shipping papers and placarding must be complete and accurate
4. Keep up with regulation changes (49 CFR 172.101 - ID No.s)
5. Consider rail crew changeover in planning
6. May need to survey railcars/trailers prior to release

FRR LESSONS LEARNED - TRANS (Cont'd)

7. Early route approval
8. States and law enforcement agencies did not receive notifications (official notification vs. support group)
9. Plan around rush hours with extra time
10. Define rush hour
11. Ensure supporting escorts know when and where
12. Contingency plans for transport monitoring (TRANSCOM)

FRR LESSONS LEARNED

Security

1. Use of various state law enforcement representatives during rail shipments to ensure jurisdictional authority is maintained over all areas
2. Reduce visibility along the route (standard ISO containers, shipment shadows)
3. Designate safe parking areas on both sides of State lines for Security escort function
4. Contingency plans for late escorts
5. Good coordination between security and the carrier

FRR SNF Acceptance Program POCs

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