

# Russian Plutonium Disposition Program

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# Mission and Status

- **In parallel, the United States and Russia are to dispose of 34 MT of weapons plutonium as “spent fuel”**
- **The United States currently provides “gratuitous technical assistance” to Russia via national laboratory contracts under the 2000 Agreement between the United States and Russia**
- **In the future, international funding for project completion is envisioned to be managed by the European Bank of Reconstruction and Development or, possibly, through an integrating contractor**

# Current Focus

- **Replicate U.S. MOX plant to be built at SRS for construction in Russia at Siberian Chemical Combine**
- **Irradiate MOX in VVER-1000s, BN-600 hybrid core, and possibly in certain European PWRs (to be determined)**
- **Replace radial breeding blanket in BN-600 to eliminate Pu production**

# ORNL Is NNSA Lead Lab for Reactor-Based Pu Disposition

- **Lead Roles**

- **Russianization of the U.S. MOX plant design developed by Duke Cogema Stone & Webster, LLC (DCS)**
- **Modifications of the VVER-1000 Plants at Balakovo NPP to accept MOX**
- **Elimination of Pu production in the radial breeding blanket at the BN-600 fast reactor at Beloyarsk NPP**
- **Implementation of BN-600 hybrid core**

# ORNL Also Has Key Supporting Roles

- **Supporting roles**
  - **Coordinate/manage CANDU MOX test at Chalk River**
  - **Provide technical expertise (with GA) for Pu-burning GT-MHR development**
  - **Provide licensing expertise to develop a Russian regulatory framework for MOX usage**
  - **Provide facilities expertise for developing a monitoring and inspection (M&I) regime**

# ORNL Oversees the TVEL Contract to “Russianize” the DCS Design of the MOX Fuel Fabrication Facility

- **TVEL reviews the DCS (Duke Cogema Stone & Webster, LLC) basis-of-design documents against Russian standards—initial effort completed**
- **Comprehensive engineering survey of the Seversk site—majority of work completed; Phase III to be performed as soon as possible after authorization.**
- **TVEL adapts DCS’s detailed design documents to address Russian regulations, standards, products, and processes**
  - to be performed in the preparation of the Justification of Investment (JI) and subsequent documents
  - JI contract in final negotiation

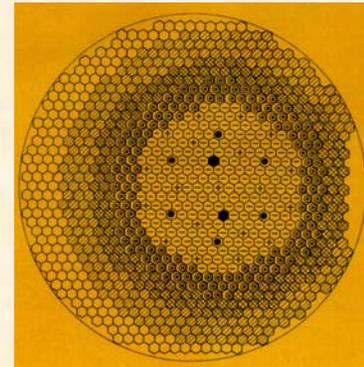
# Clearing and Comprehensive Engineering Survey of MOX Facility Site in Seversk





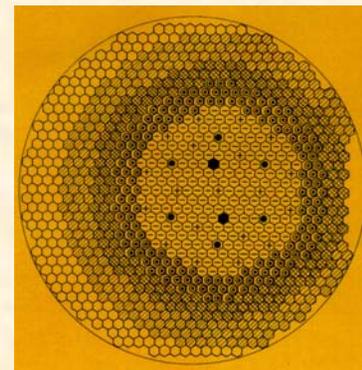
# ORNL is Working with Russia to Eliminate Plutonium Production in BN-600 Radial Breeding Blanket (~115 kilograms discharged per year in non-self-protecting assemblies)

- **Completed blanket replacement plan**
- **Started plant modifications**
  - **Reactivity computer**
  - **Upgrade core reload code**
  - **Hot cell upgrades**
- **Preparing to buy equipment for fabrication of blanket replacement**
  - **ELEMASH for subassemblies**
- **Adapting design features from previous hybrid MOX core design**
- **Coordinating with Lawrence Livermore National Laboratory on off-site shipment and secure storage options for irradiated blanket**



# ORNL is Working with Russia to Implement BN-600 Hybrid Core

- Hybrid-core fuel fabrication facility modification (under JNC funding) nearing completion
- Funding for fuel-facility operations and for reactor modifications likely to come from DOE through ORNL
- Cooperative effort with JAEA has been recently reinvigorated



# Summary

- **ORNL manages and provides technical oversight of key contracts to implement Russian plutonium disposition**
  - **Adaptation of U.S. MOX plant design for VVER-1000 fuel supply in Russia**
  - **Site characterization for Russian MOX plant**
  - **Preparation of VVER-1000 reactors at Balakovo nuclear plant to burn MOX**
  - **Elimination of plutonium production in the BN-600 radial breeding blanket**