

# Oak Ridge National Laboratory: Recent Accomplishments and Challenges in the Environmental Management Program

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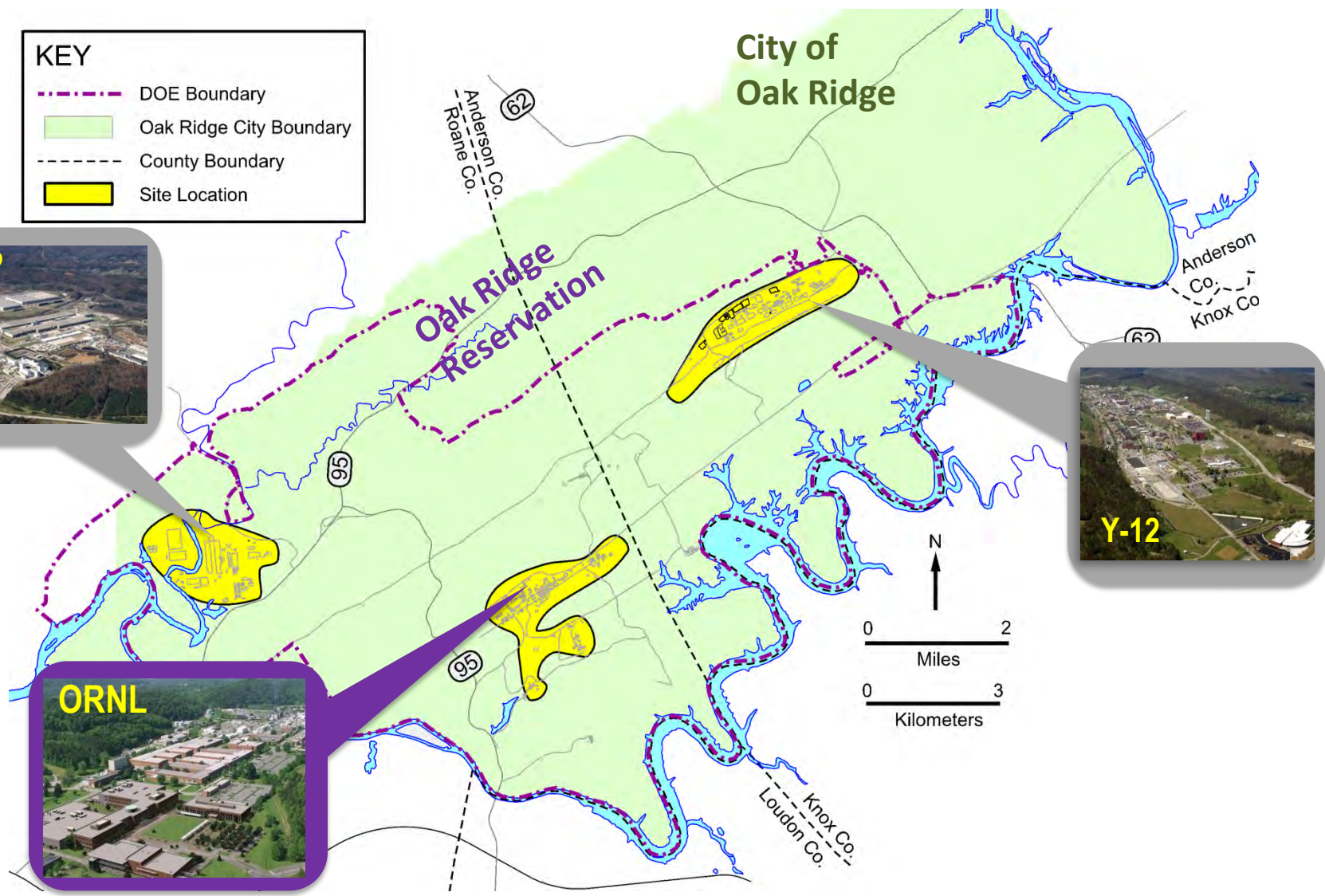
*ORNL Portfolio Federal Project Director*  
Office of Environmental Management

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# Oak Ridge National Laboratory (ORNL)

**KEY**

- DOE Boundary
- Oak Ridge City Boundary
- - - County Boundary
- Site Location



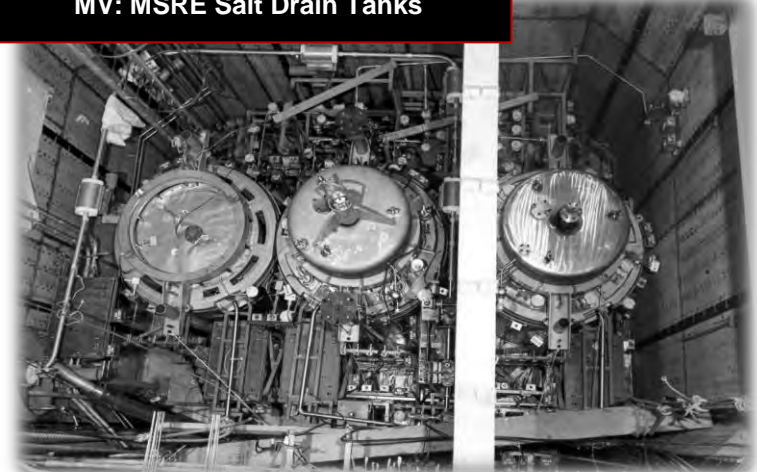


- **Facility Operations Activities**
  - Surveillance and Maintenance
  - LGWO Operations
  - U-233 Disposition
- **Bethel Valley D&D and RA scope**
  - 160 facilities
  - Isotope processing facilities with hot cells
  - Reactor facilities with reactor pools (all defueled)
  - Radioactive gas handling equipment and 250 ft stack
  - Miles of underground piping and underground tanks
  - Radioactive liquid processing equipment and facilities
  - Contaminated slabs and soils
  - BV Groundwater ROD
- **Melton Valley D&D and RA scope**
  - 108 facilities
  - Reactor facilities and associated soils
  - Molten Salt Reactor Experiment, contaminated salts removal and disposal
  - Tanks and contents, contaminated resins
  - Radioactive waste processing and storage facilities
  - Reactor & other facilities ROD
  - MV Final ROD

**BV: 3039 Stack and Gas Handling Equipment**



**MV: MSRE Salt Drain Tanks**

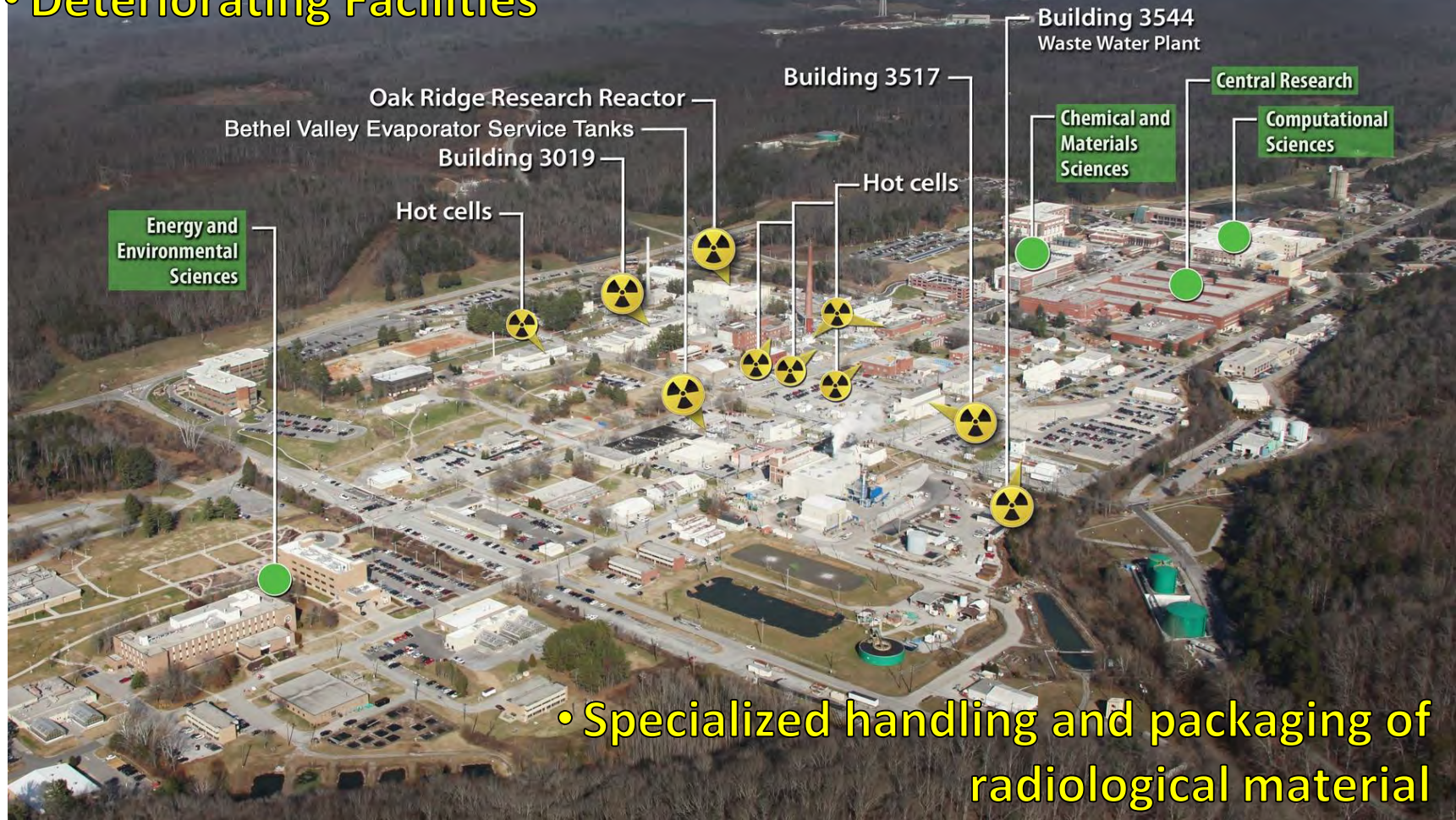


- **Near term (through FY 2020)**
  - Complete uranium-233 direct disposition campaign
  - Begin downblending operations for remainder of uranium-233 inventory
  - Conduct groundwater investigations and modeling
- **Mid term (through FY 2024)**
  - Complete uranium-233 disposition
- **Long term (beyond FY 2024)**
  - Complete all building demolition and media remediation by FY 2045
- **Ongoing: Base Operations**
  - Waste operations
  - Surveillance and maintenance
  - Infrastructure
  - Environmental monitoring





- Performing work in close proximity to ongoing missions
- Deteriorating Facilities



= Facilities/areas to be remediated    = Research Facilities/Government Investments

- Process Waste Treatment Complex
- Gaseous Waste Stack Inspections
- MSRE Maintenance
- 3026 Pad
- Waste Disposition
- Pratt & Whitney Shield
- U-233 Disposition
- Building 3042 Pool
- Groundwater Strategy



# Reconfiguration at Process Waste Treatment Complex



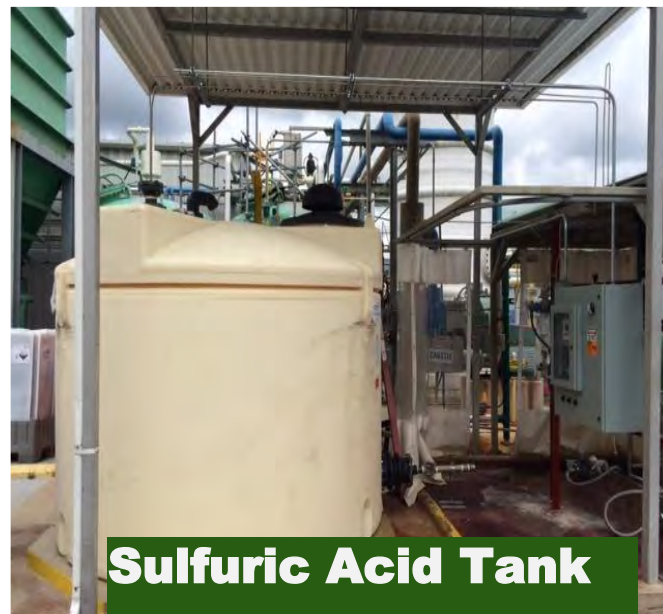
**Dual Media Filters**

- Failure of dual media filters led to evaluation of filtration alternatives. Two under-utilized carbon columns now used for filtration of solids
- Carbon media from third carbon column has been replaced with Mersorb, to more efficiently remove mercury



**Carbon Columns**

- Installed new sulfuric acid tank, concrete pad, associated piping, pumping system, and control system



**Sulfuric Acid Tank**



# 3039, 3020, and 3018 Stacks: Planned Inspections, early FY15

- Drone to be used in conducting inspection of 3039, 3018, 3020 Stacks
- Tether line for continuous power; fiber optic data link to command/receive data from three cameras
- Shutdown of stacks required to complete inspection – substantial preparations needed
- Cost ~\$191K – includes development, testing, demonstration, inspections for three stacks, report

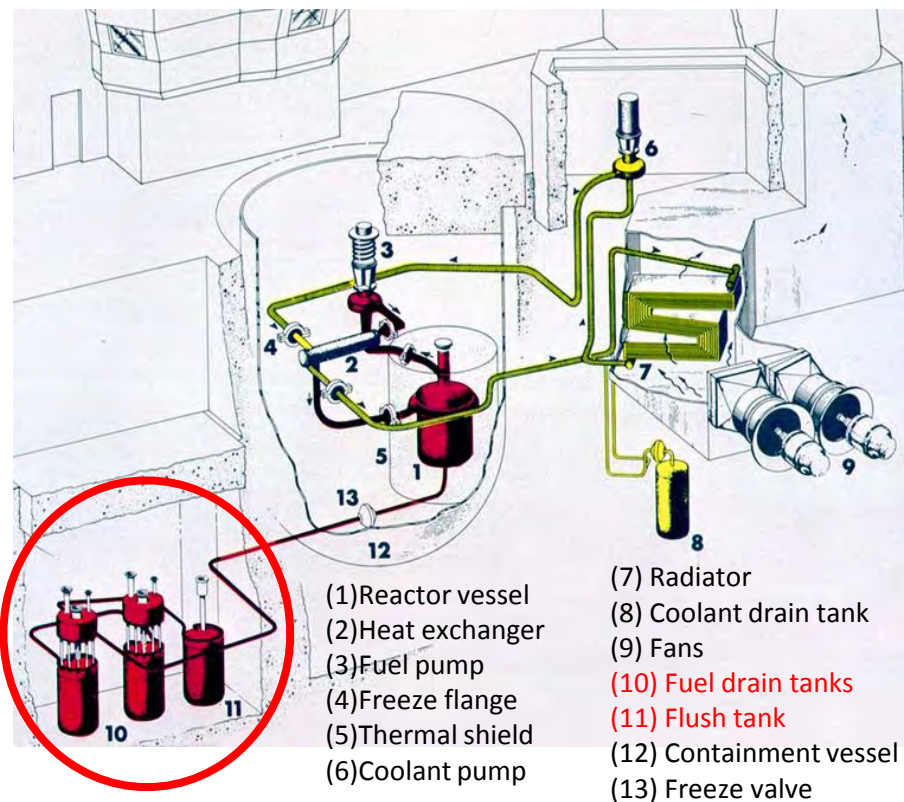




# Molten Salt Reactor Experiment (MSRE) Maintenance Activities

Aerial view of MSRE facilities

- De-fueled salt stored in fuel drain tanks and fuel flush tank at MSRE generates off-gas (radiolytic decay produces fluorine gas) that is periodically pumped out and replaced with argon to prevent corrosion in the tanks and associated piping
- Recent pumpdowns were performed in Nov, 2013 and May, 2014; next pumpdown in October
- NaF trap weighing and non-destructive assay (NDA) completed to measure uranium captured during previous de-fueling efforts; indicates that de-fueling was successful; supports plan for future de-fueled salt disposal
- Reactive Gas Removal System (RGRS) monitors and treats gases generated from de-fueled salt stored in drain and flush tanks
- Upgrades to RGRS: replaced two infrared spectrometers (FTIR); new data acquisition hardware; software updated; planning for additional improvements



# Addressing Legacy Issues

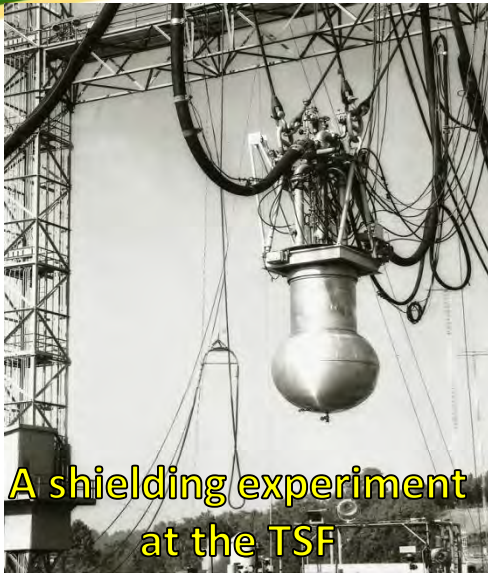
- **Building 3026 hot cells placed in safe standby; polymer fixative was applied to ramp at facility to address migration of residual contamination**



- **Characterization and disposition of legacy waste from several locations around ORNL, including MSRE, and onsite storage facilities.**



# Pratt & Whitney Shield Relocation



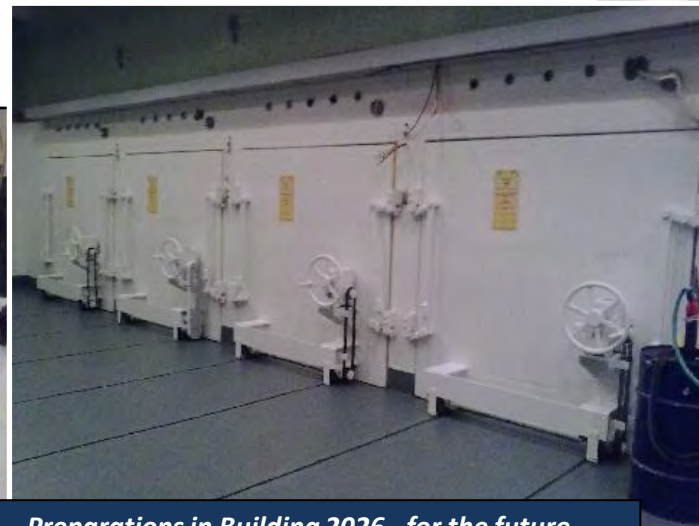
- Eight ton Pratt & Whitney shield has been stored in building 7602 since 1998
- UCOR worked with UT-B to relocate the shield to a materials storage structure in SWSA-5



- Building 3019 home to uranium-233 material; requires high security
- Shipment of Consolidated Edison Uranium Solidification Project (CEUSP) material to Nevada National Security Site is pending release from DOE-HQ.
- Transfer of 17 canisters of material for re-use at ORNL completed
- Progress continues at Building 2026 to prepare for future downblending and solidification steps



*Cask to be used  
for the  
shipment of  
CEUSP material*

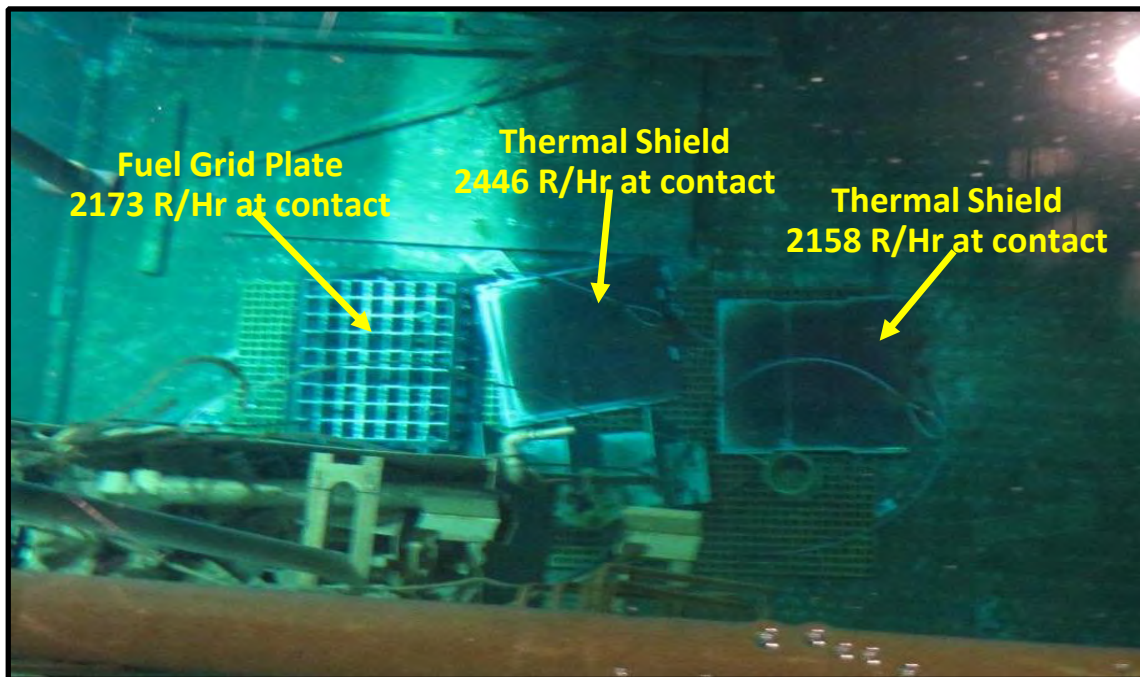


*Preparations in Building 2026, for the future  
Uranium-233 downblend processing operations*



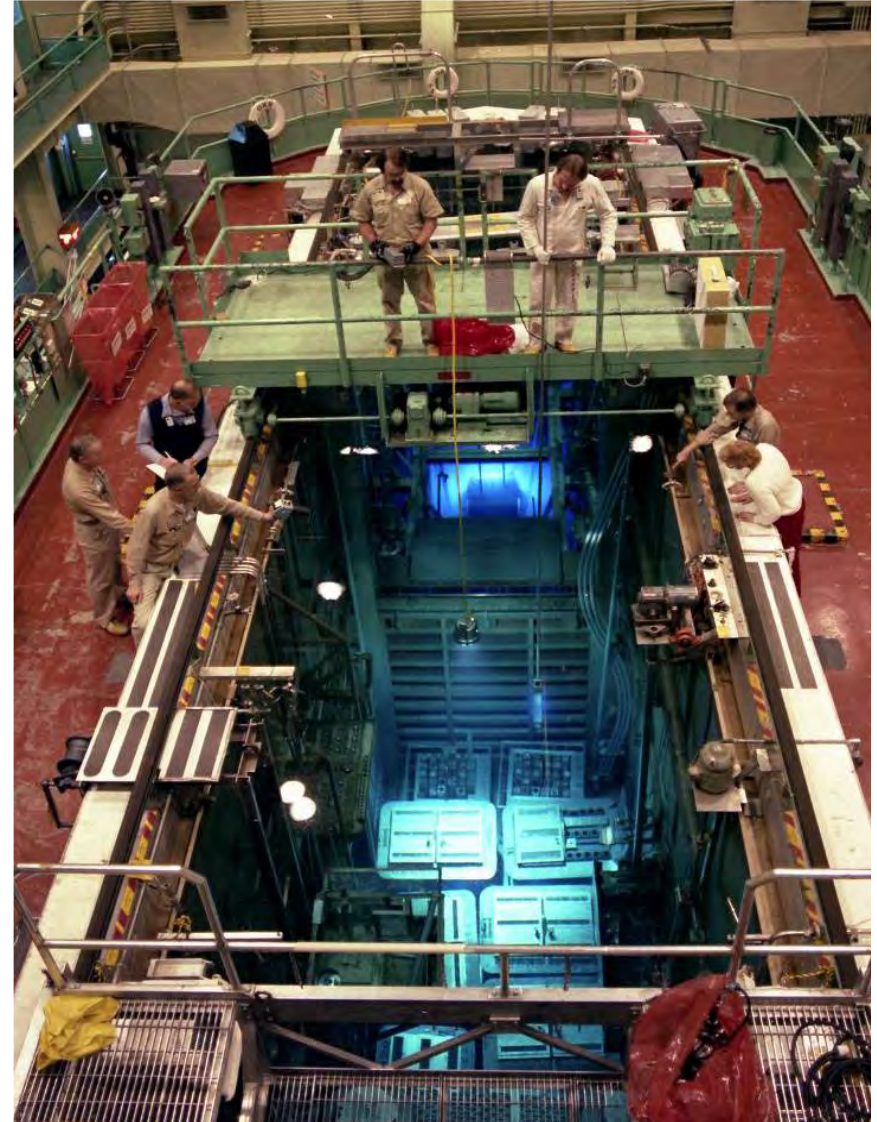
# 3042 Oak Ridge Research Reactor Pool Leak

- Initial leaks detected on 9/10/14 coming from circumference of the bottom flange (~100 drips per minute) located beneath pool in Sub-pile room; constant monitoring set up; leaking water is being collected and transferred to treatment system
- Liner of pool confirmed intact using underwater video
- Reactor pool water serves as shielding for activated components



# 3042 Reactor Pool Activities

- Lower a high dose rate meter into pool and obtain current dose rates for irradiated components and pool walls
- Use underwater cameras to visually inspect the pool contents and look for leak sources
- Evaluate potential solutions to repair the leak, such as underwater construction and self-seeking water sealant
- Determine options to remove irradiated components and allow pool to be drained and stabilized





- **Implementation of Strategy underway on two fronts:**
- **Off-site groundwater assessment**
  - Remedial Site Evaluation Plan submitted and approved by EPA and TDEC
  - Contacting residents to obtain access agreements for well sampling
  - Conducting site visits
  - Informing and working with County officials
- **Developing a model of the Oak Ridge Reservation groundwater flow paths**
  - Directed by technical advisory group
  - Includes regulator input
  - Based on small areas where more information is available; will grow to include the entire reservation and west to the Tennessee River
  - Projected completion date is end of FY 2016

