



# IDAHO CLEANUP PROJECT

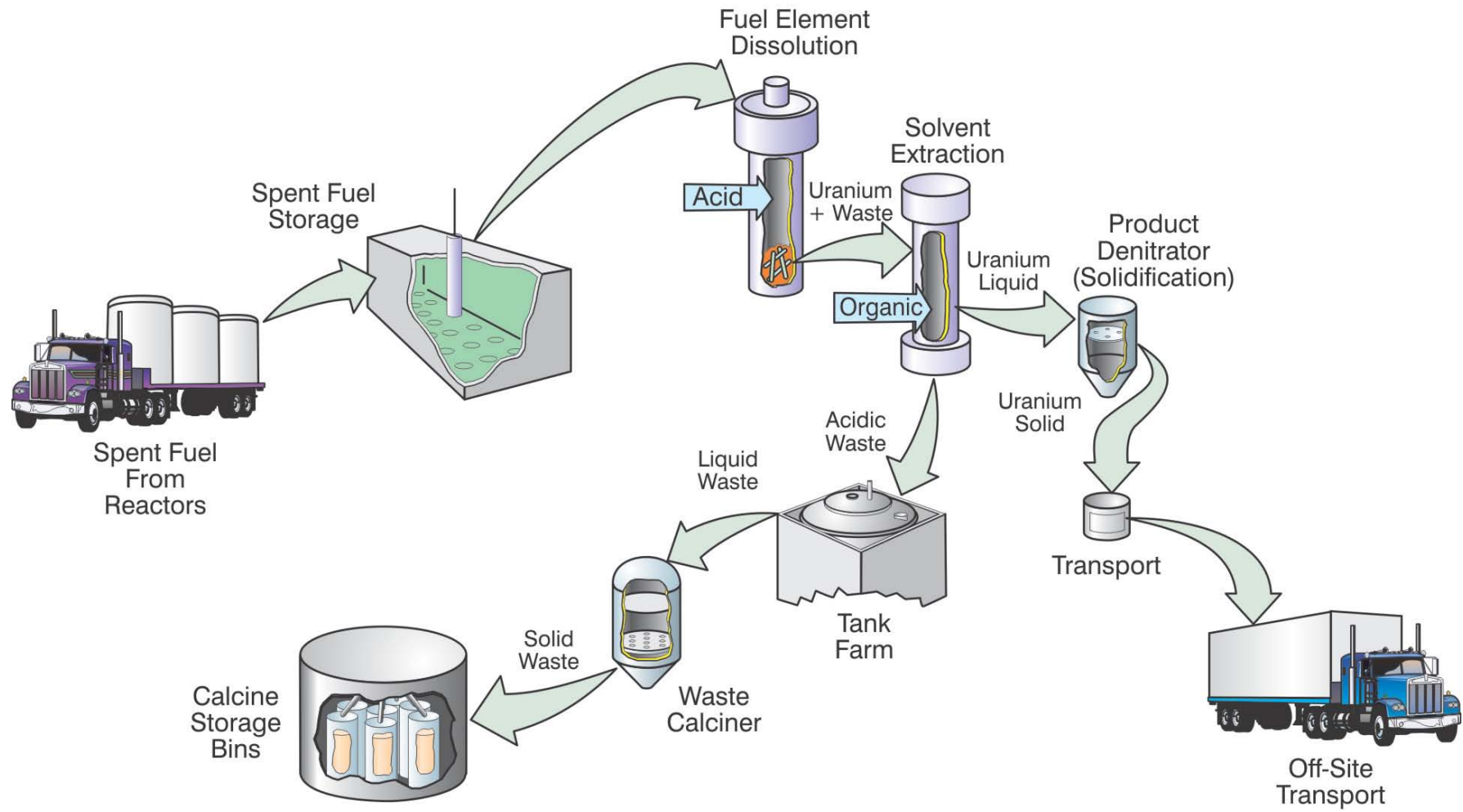
Idaho Nuclear Technology and Engineering  
Center Spent Nuclear Fuel and Calcine

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SAFELY PLAN • MOTIVATE • DELIVER

# Historical INTEC Fuel Reprocessing Mission



G10-2497-43

# Spent Nuclear Fuel Background

- ◆ Approximately 285 metric tons of heavy metal (MTHM) spent nuclear fuel is stored at the INL
- ◆ Spent fuel originated from
  - INL research reactors
  - U.S. and foreign research reactors
  - Commercial nuclear reactors
  - Naval reactors
- ◆ “Wet” and “Dry” spent fuel storage
  - Water filled basin (CPP-666)
  - Shielded above ground rack storage
  - Below grade storage
  - Bolted lid cask storage





# Spent Fuel Workscope

## ◆ Contractual Milestone

- Completed transfer 3,186 fuel units of EM-owned fuel from wet to dry storage June 2010

## ◆ Current B5

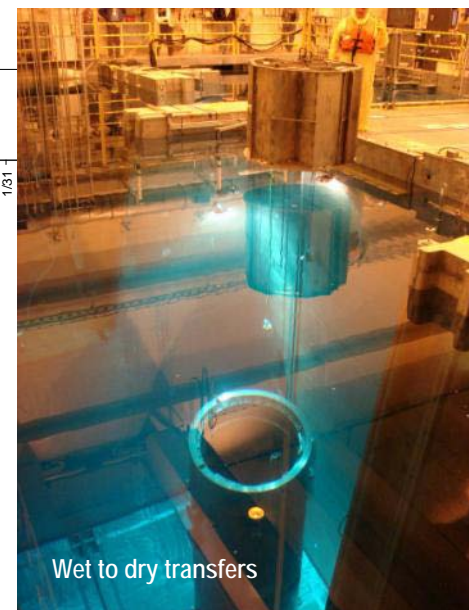
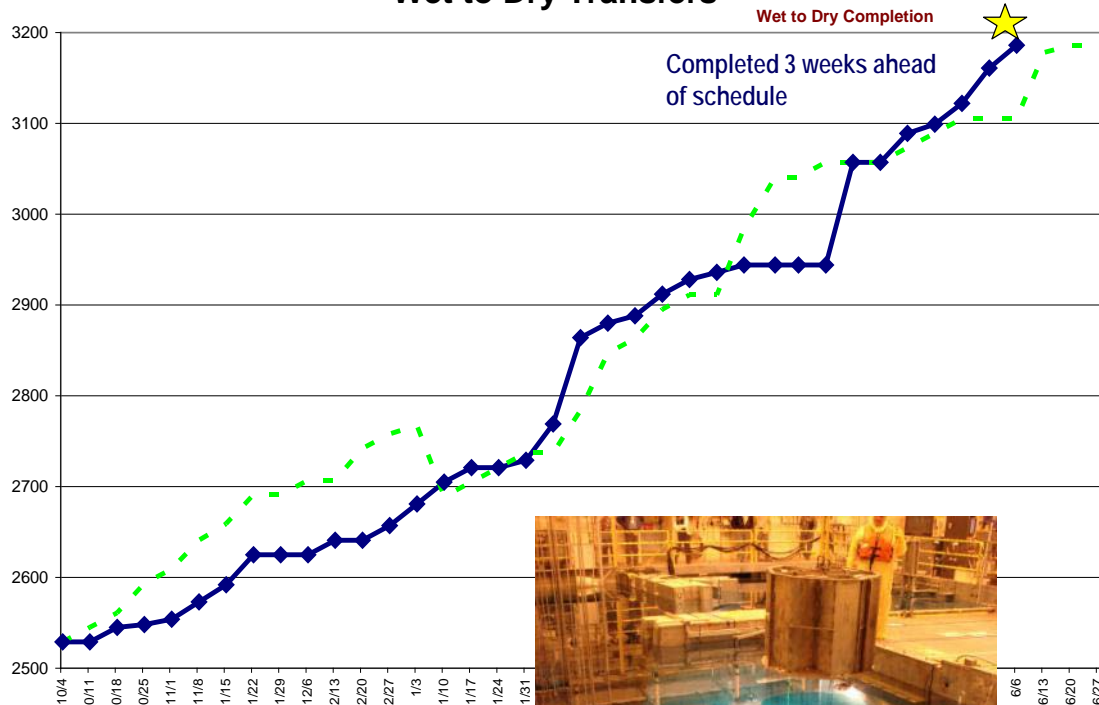
- Navy fuel returns to NRF
- Foreign Research Reactor / Domestic Research Reactor fuel receipts
- Three Mile Island NRC facility management
- EBR II fuel transfers

## ◆ Potential Future B5

- Navy can transfers

## ◆ Facility production capacity at 100% through FY15

### Wet to Dry Transfers

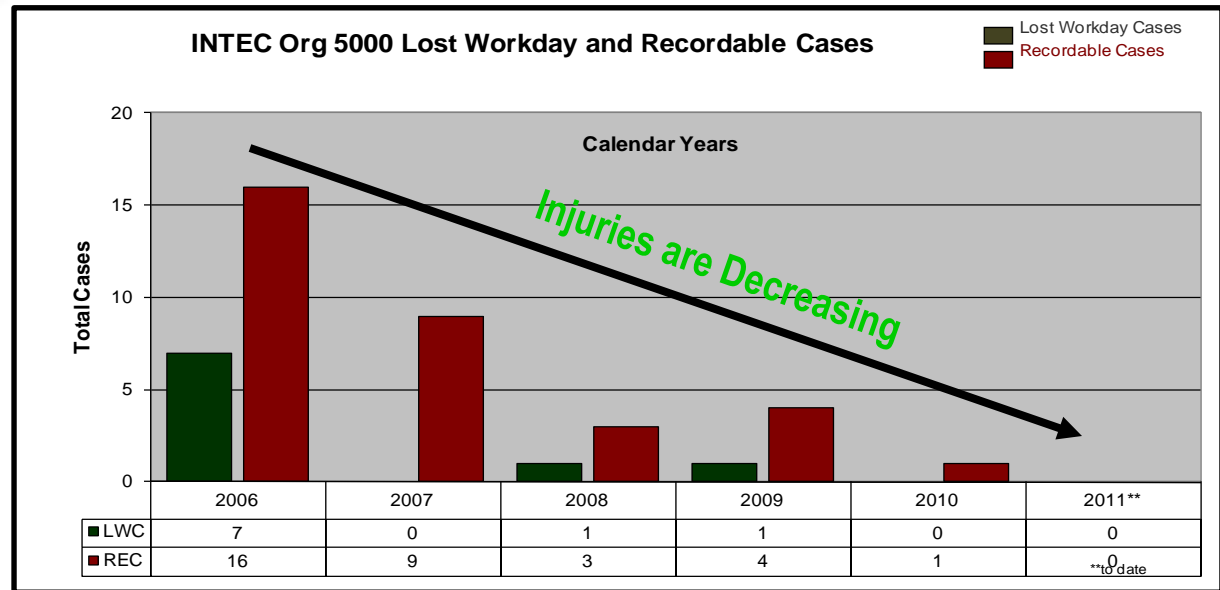


Wet to dry transfers

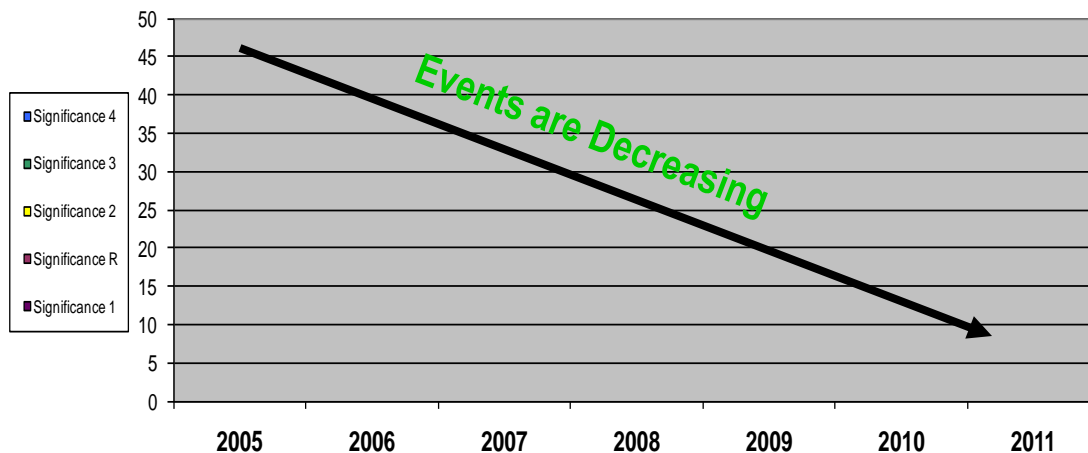
# Safety Performance



- 416 days since last Recordable



**INTEC Org 5000 Reportable Occurrences - 2005 through Current**



# Spent Fuel FY11 Accomplishments

- Accelerating Navy fuel shipments
  - Completed 9 Large Cell Cask shipments to Naval Reactors Facility (FY11 to date)
  - Prepped 415 Phase I fuel units (FY11 to date)
- Unloaded Neutron Radiography Reactor (NRAD) Domestic Research Reactor cask (1 total in FY11)



# Spent Fuel FY11 Look Ahead

- ◆ Complete 15 Navy Large Cell Cask shipments in FY11
- ◆ Complete prepping of 714 Navy Phase I fuel units in FY11
- ◆ Transfer initial EBR II spent fuel cask from INTEC to MFC
- ◆ Receive Reed College Domestic Research Reactor fuel cask
- ◆ Support start up activities for IWTU

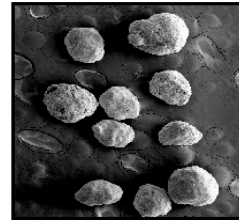




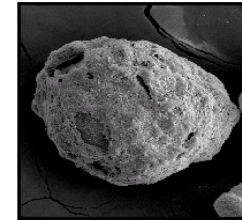
# Calcine Background

- ◆ **Calcine is HLW by source-based definition**
  - Byproduct of reprocessing (ended in 1992)
  - Also classified as mixed waste due to listed and characteristic hazardous constituents
    - ◆ Regulated under the Resource Conservation and Recovery Act (RCRA)
- ◆ **Accomplished 7 to 1 volume reduction**
  - 8-9M gallons liquid to 1.15M gallons of granular solid
- ◆ **Calcine is acidic, abrasive, and hydroscopic**
  - Particulate size similar to laundry detergent
- ◆ **Currently stored in 43 bins in 6 bin-sets**

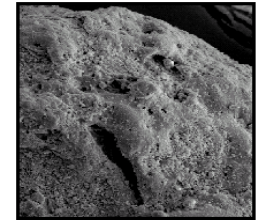
Calcine Bed Material 40x



Calcine Bed Material 150x



Calcine Bed Material 500x





# HLW Calcine-Related Facility Locations at INTEC

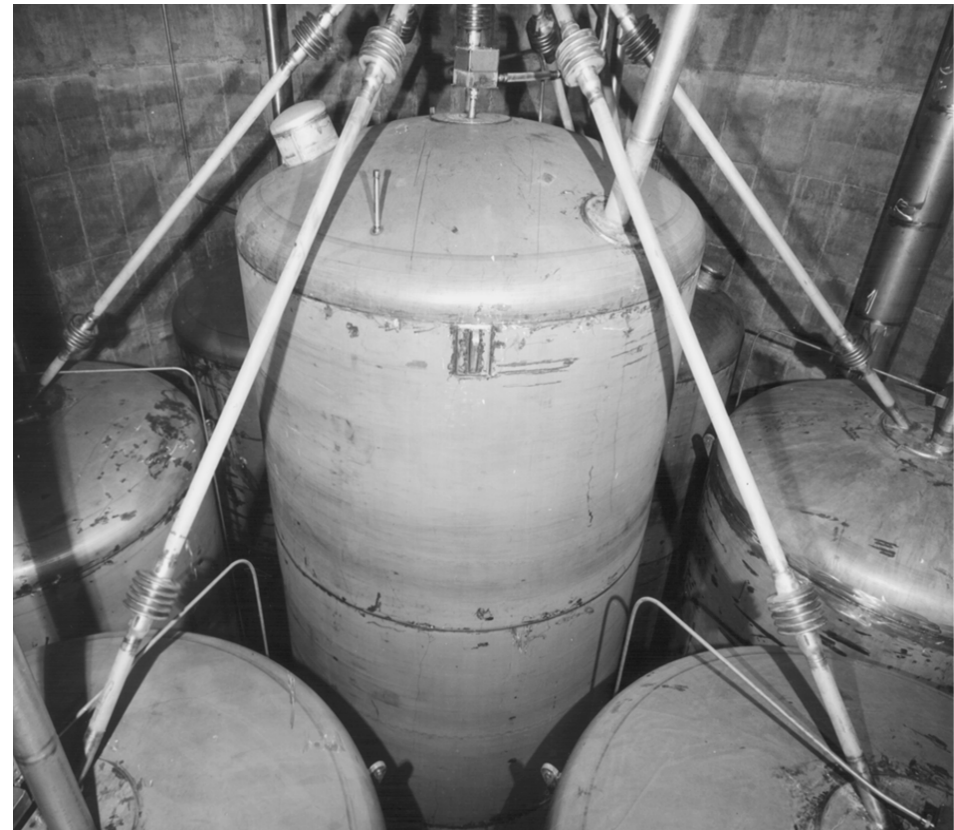


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# Calcine Solids Storage Facility Bins



CSSF 1 nested bin



CSSF 3 cylindrical bins



# Project Mission and Scope


- ◆ Design and construct processing facility using the Integrated Waste Treatment Unit (IWTU)
- ◆ Retrieve and transport 4,400 cubic meters of calcine from current storage to the IWTU for treatment
- ◆ Treat calcine using the hot isostatic pressing (HIP) technology
- ◆ Package resultant treated waste form in canisters
- ◆ Ship offsite or store/stage resultant canisters pending off-site shipment for disposition
- ◆ Perform RCRA closure on existing and new retrieval/treatment/storage facilities





# Calcine Disposition Project (CDP) Drivers



## ◆ Idaho Settlement Agreement (SA) milestones

- Issue a Record of Decision (ROD) by December 31, 2009, to identify method to treat calcine
  - ◆ Issued December 23, 2009 
- Submit two RCRA Part B Permit Modification Requests (PMRs) by December 1, 2012, to State of Idaho
- Have all calcine ready for transport out of Idaho by a target date of December 31, 2035

## ◆ Idaho Site Treatment Plan milestones

- Approval of CD-0 by June 30, 2007
  - ◆ Approved June 29, 2007, by Deputy Secretary Clay Sell 
- Identify funding requirements by December 31, 2010
  - ◆ Completed December 15, 2010 
- Submit a milestone letter addressing schedule for ROD implementation by December 31, 2012



# HIP Technology

- ◆ Converts calcine waste (solid, granular high-level waste) into a monolithic, glass ceramic waste form
- ◆ Utilizes heat (~1,250 C / 2,282 F) and pressure (~7,200 psi) for treatment
- ◆ Cans designed to contain ~1,000 kg (calcine + additives)
- ◆ Results in 40 to 70% volume reduction



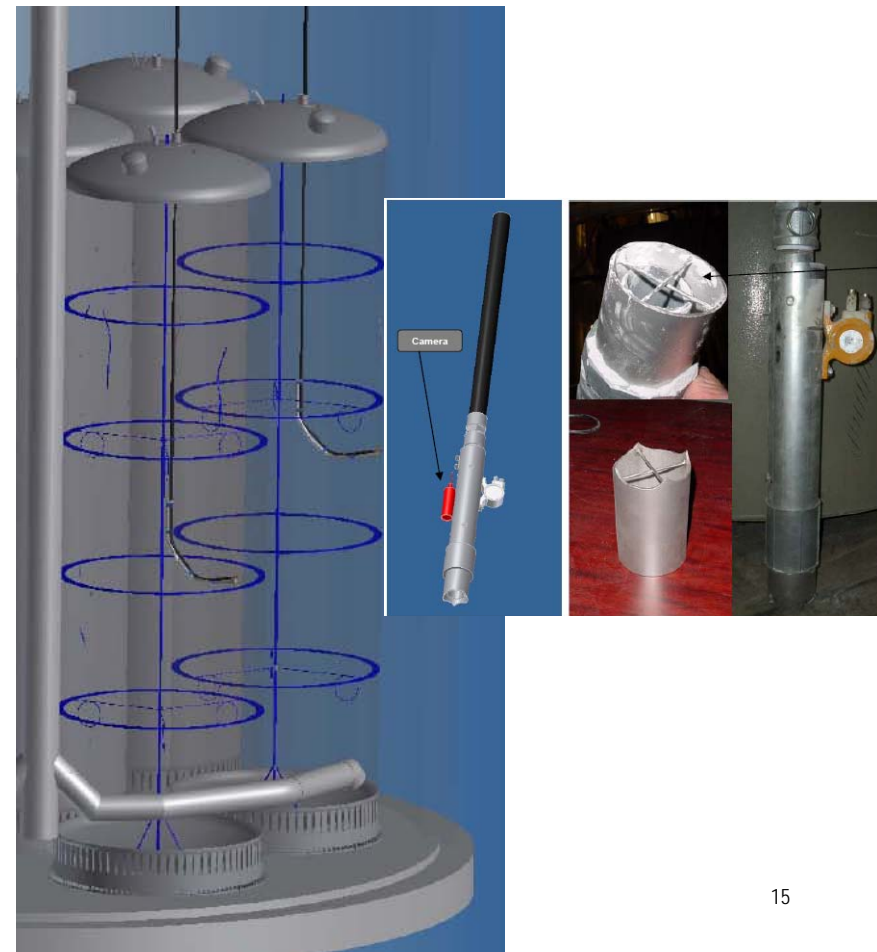
- ◆ Complete calcine-related technologies to TRL-4 by end of March 2012
  - HCC and HIP Can by December 2011
  - Waste-Form (ceramic additive/simulant formulation) by March 2012
  - Advance technology toward achieving TRL-6
- ◆ CD-1 package completed and submitted to DOE-HQ by end of June 2012
- ◆ RCRA Part B Permit Modification Requests to be completed and submitted to DOE-ID by September 30, 2012

## ◆ Design

- Issued *Use of Existing IWTU Hot Cells for CDP HIP Treatment of HLW Calcine White Paper* (RPT-785) proposing consideration of the Naval canister for use by the CDP
  - ◆ DOE concurrence received
  - ◆ HIP system fits within cells
- Modeling and design software investment paying dividends
- Avure technical support in place
- Failure Modes & Effects Analysis (FMEA) approach improving design reliability

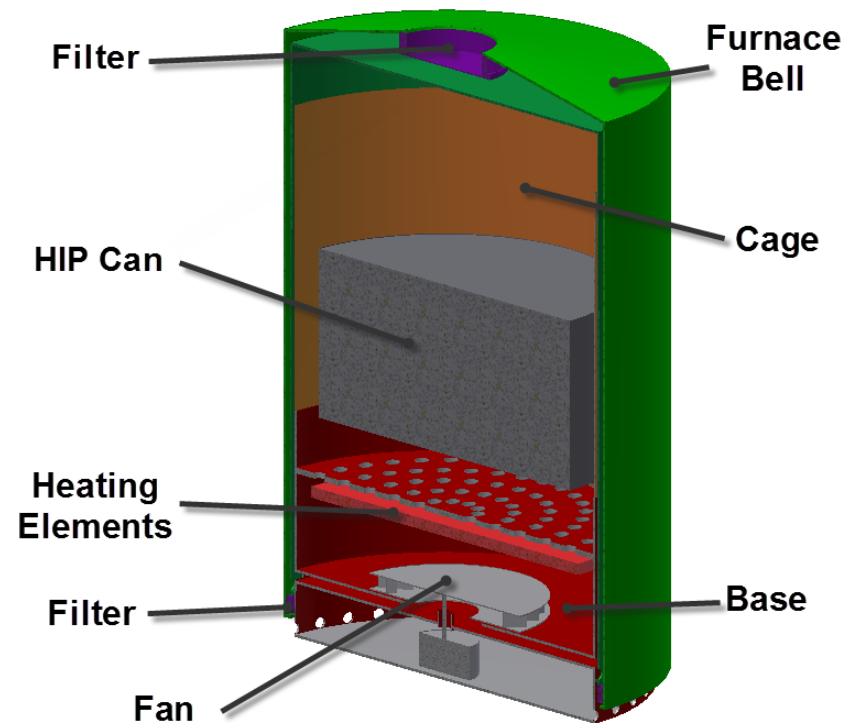
## ◆ Technology Development

- ANSTO waste form testing initiated
  - ◆ Successful QA audit; placed on Qualified Suppliers list
- SOW issued for the Half Height/Full Height Can Testing
- Furnace Filter test in process (Avure)



## ◆ RCRA Part B Permit

- Completed drafts Vol 22 and 14 RCRA Closure Plans
- GAP Analysis activities in process
- Interface with regulators ongoing



HIP Furnace/HCC



- ◆ Incorporate facility design changes, per DOE concurrence of Naval canister recommendation (May)
- ◆ Commence HIP can modeling tests (May)
- ◆ Commence Test Series 1 waste formulation tests (May)
- ◆ Initiate HIP can containment filter testing (May)
- ◆ Initiate HIP half height can testing (July)
- ◆ Support external reviews
  - EM Technical Expert Group (TEG)
  - EM Project Peer Review

