Idaho Cleanup Project

Introduction to the Remote – Handled Waste Disposition Project (RWDP)

Presentation to the National Academy of Sciences

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Remote-Handled Waste Disposition Project (RWDP)

- ***A project in the formative stages designed to accept remote handled wastes stored at the INL that currently lack a treatment and disposition plan.***
- ***Primary waste streams are 317 cubic meters of RH waste stored at the Materials and Fuels complex and the Radioactive Waste Management Complex.***
- ***NE funded, EM managed***

RWDP Scope

- ***Transport***
  - ***Accept waste for transport and move from Materials and Fuels Complex (MFC) and the Radioactive Waste Management Facility to the Idaho Nuclear Technologies and Engineering Complex (INTEC)***
  - ***Utilize road closures and transport plan***
- ***Open, segregate and characterize***
  - ***Utilize exiting, upgraded Flourinel Dissolution Process (FDP) hot cell located in building CPP-666***
- ***Treat as necessary***
  - ***Sodium bearing waste***
  - ***Sodium treatment process has been proven lab-scale (Oak Ridge)***
- ***Repackage and ship for final disposal.***
- ***Approximately 1,000 canisters will be processed over a 10 year period; total project spans 16 years***

Radioactive Scrap and Waste Facility at MFC

- *Liners will be retrieved, staged and shipped to INTEC from the Radioactive Scrap Waste Facility (RSWF)*

Radioactive Waste Management Complex

- *30 Hot Fuel Examination Facility (HFEF-5) Cans will be removed from RWMC's Interim Long Term Storage Facility for shipment to INTEC*

Waste to be processed

- *Remote-handled waste has been generated by MFC (Formerly ANL-W) since the 1960s*
  - *Mainly from fuel/reactor assembly examination in the Hot Fuel Examination Facility (HFEF)*
  - *Mainly EBR I and EBR II*
  - *Some other fuels through ANL-E*
- *Types of waste*
  - *TRU and Mixed TRU*
  - *GTCC*
  - *Low Level & Mixed Low Level*
  - *Spent Fuel*
  - *Un-irradiated Fuel*
- *Since the 1960s, MFC has stored this waste in an underground configuration*
  - *Referred to as "Liners"*

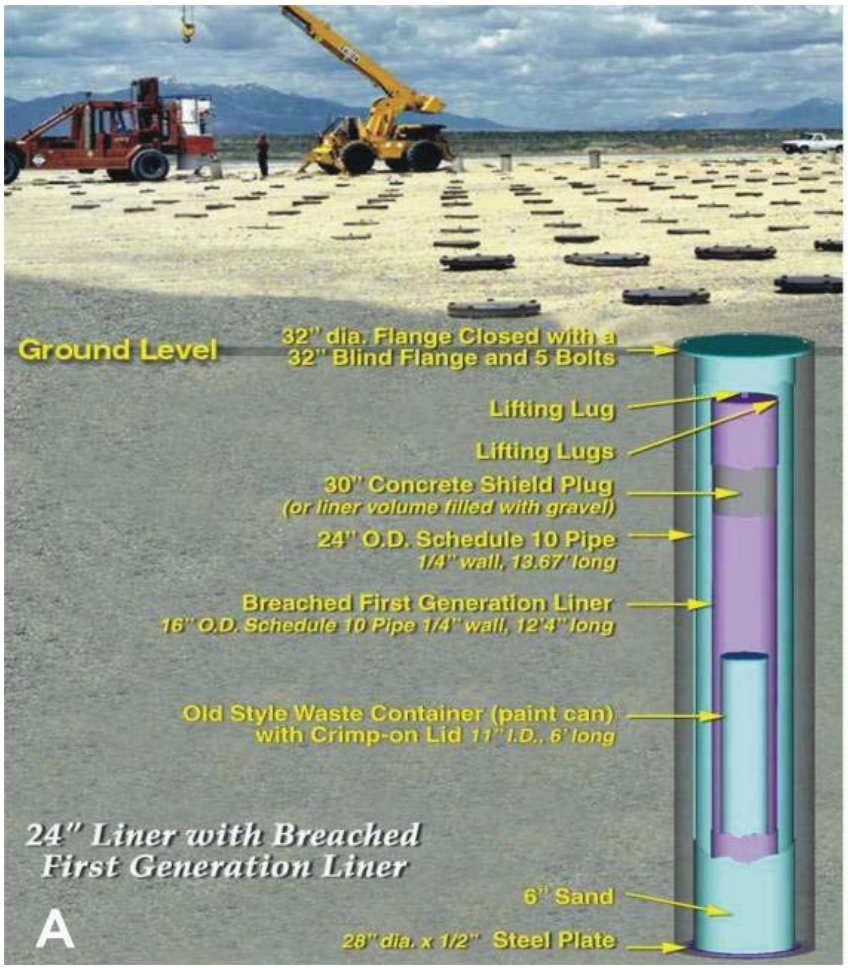
Waste to be processed (cont)

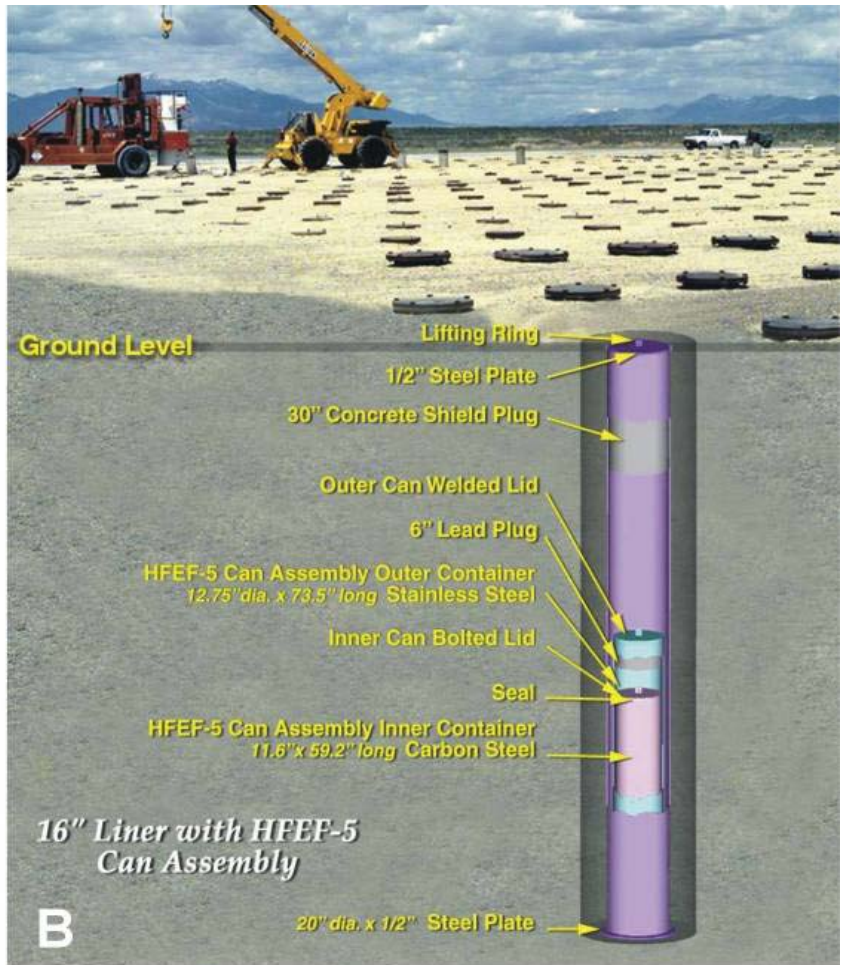
- ***Quantities***
  - *Materials and Fuels Complex (MFC) RH-TRU: ~14 m^3 including HEPA filters and ALHC waste*
  - *MFC 317 m^3 RH waste (LLW, SNF) stored at Radioactive Scrap Waste Facility (RSWF). (need picture here)*
  - *Incidental amounts of newly-generated RH-TRU at Reactor Technologies Complex and , Naval Reactors Facility.*

LINERS TO BE PROCESSED

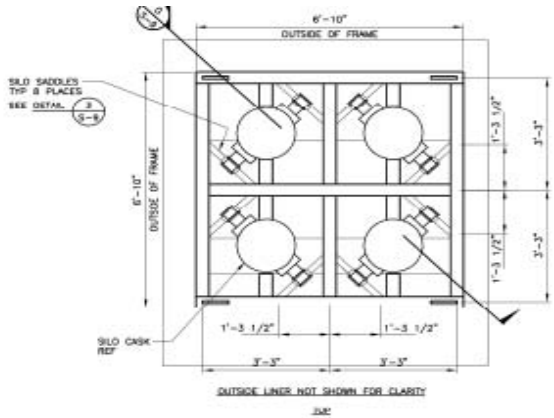
- *Total Number of Liners = 983*
  MFC = 953
  RWMC = 30
- *538 (24”) Liners Contain Over-packed 16” Liners*
- *367 (16”) Liners Contain HFEF-5 Cans*

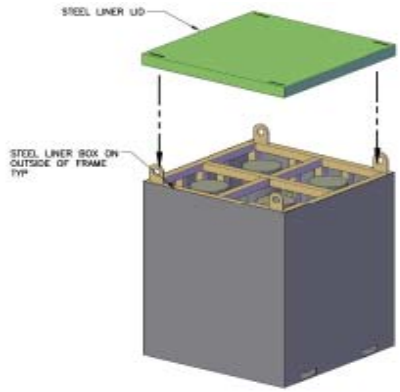
24” & 16” Diameter Liners at MFC

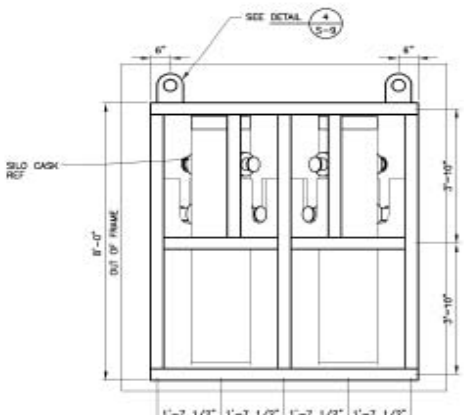


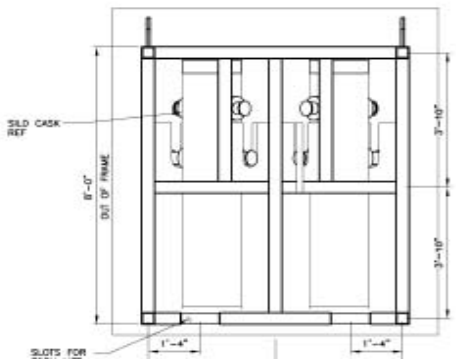


The Four Pack





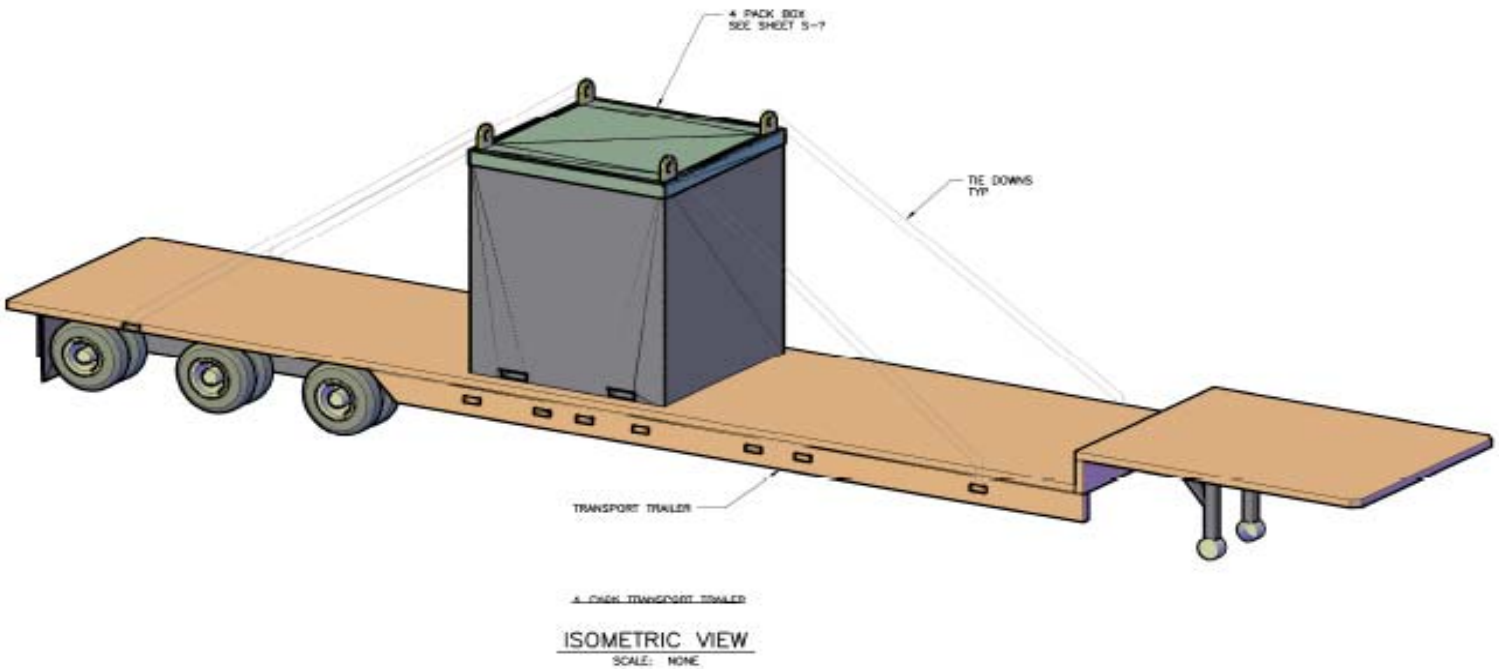




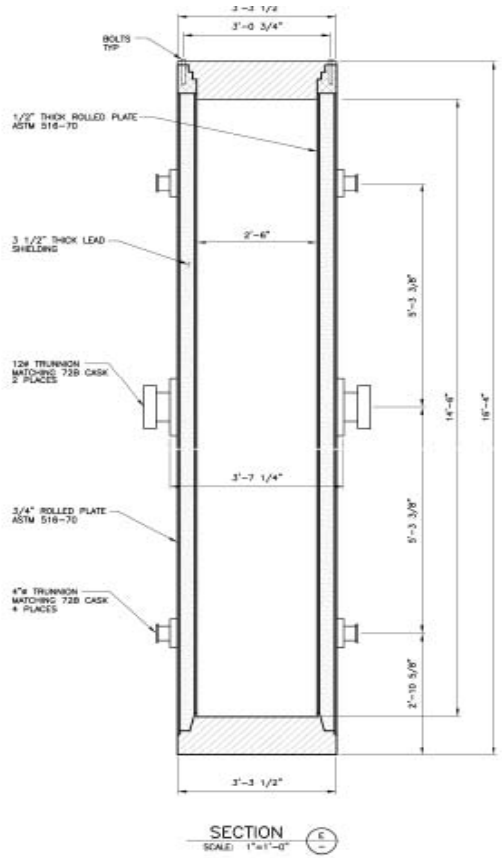
NOTES

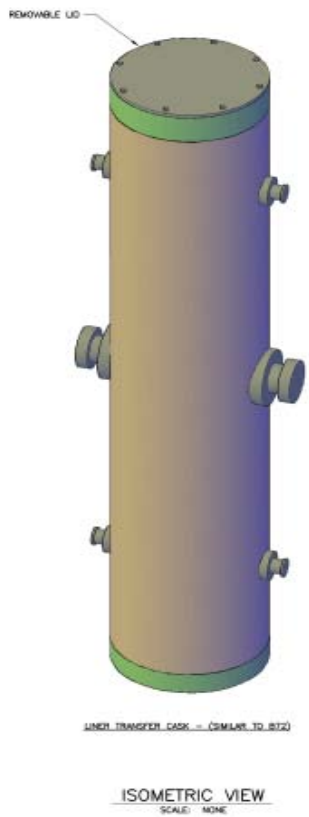
1. ALL FRAME CONSTRUCTION IS HSS EXCEPT FOR HSS 12X4X1/4 FOR TONGUES.

Four Pack Transport Trailer

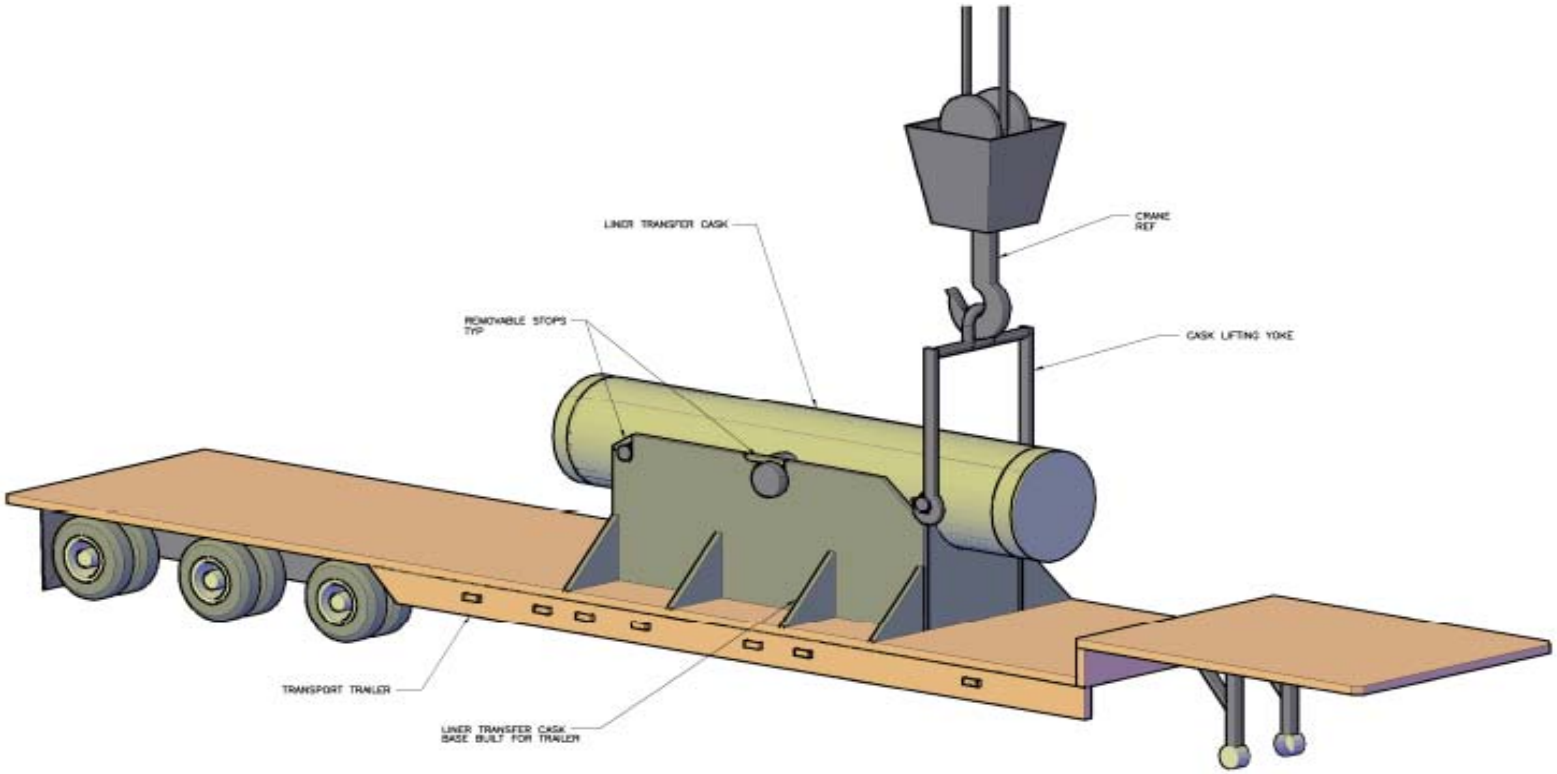


Liner Cask


BOLTS
THP
1/2" THICK ROLLED PLATE
ASTM 516-70
3 1/2" THICK LEAD
SHIELDING
12# TRUNNION
MATCHING 72B CASK
2 PLACES
3/4" ROLLED PLATE
ASTM 516-70
4"ø TRUNNION
MATCHING 72B CASK
4 PLACES
3'-0 3/4"
2'-6"
3'-7 1/4"
5'-3 3/8"
14'-4"
16'-4"
5'-3 3/8"
2'-10 5/8"
3'-3 1/2"
SECTION
SCALE: 1"=1'-0"


REMOVABLE LID
LINER TRANSFER CASK - (SIMILAR TO 8172)
ISOMETRIC VIEW
SCALE: NONE

Liner Cask Transport Trailer



Shipment Receipt at INTEC

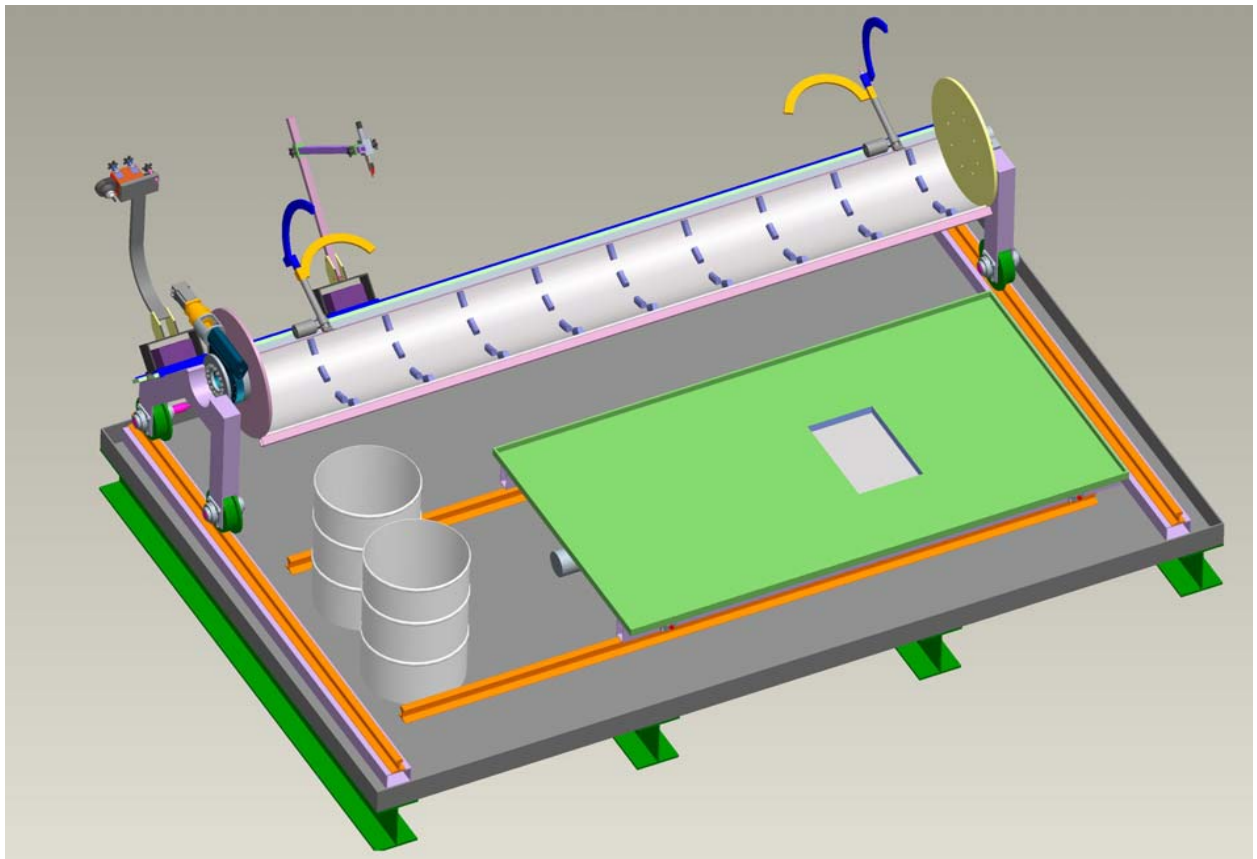
- *4 – Packs can be:*
  - *Off loaded directly to designated Lag Storage area.*
  - *Placed in Flourinel and Storage Facility (FAST) Highbay for individual HFEF-5 Can Transfer to:*
    - *CPP-749 Silos*
    - *The FDP Cell*
- *Liner Casks can be:*
  - *Off loaded directly to designated Lag Storage area.*
  - *Placed in FAST Highbay for individual Liner Transfer to:*
    - *CPP-749 Silos*
    - *The FDP Cell*

View of FDP Cell at 0.0 Elev – North to South

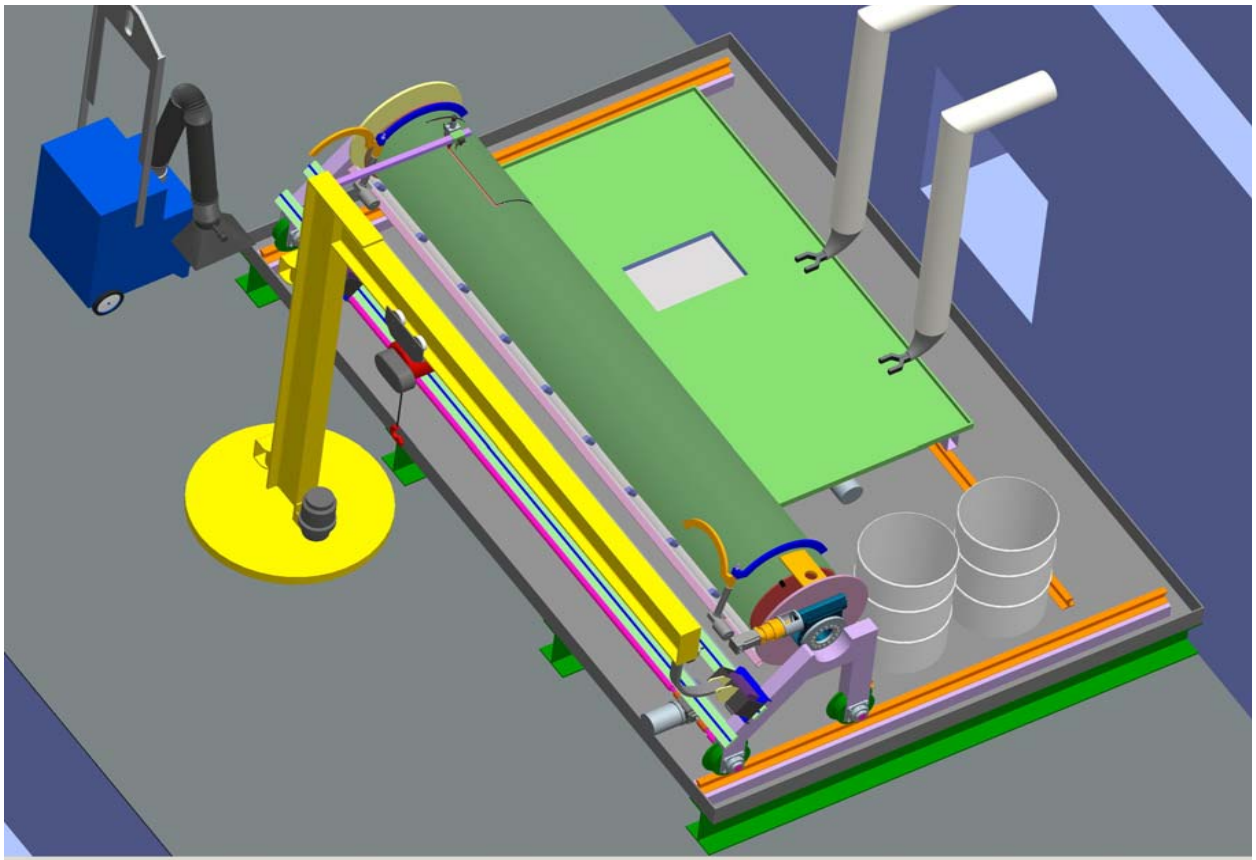
Sorting Table

- *Accommodate all liner sizes*
- *Jib Crane*
- *Plasma torch cutting (outer liners)*
- *Mill cutting (inner liners)*
- *Tools*
  - *Chop Saw*
  - *Shears*
  - *Electromagnet*
  - *Miscellaneous sorting tools*

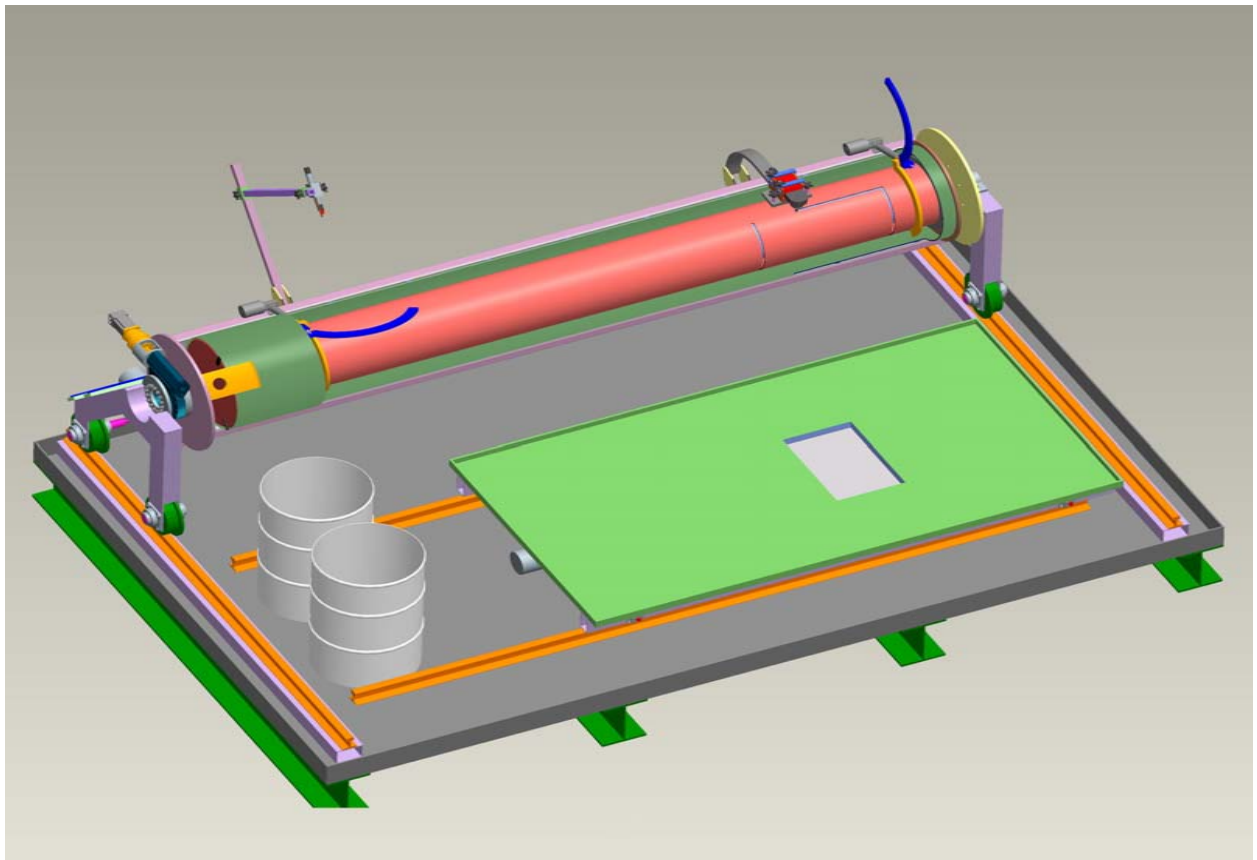
Sorting Table



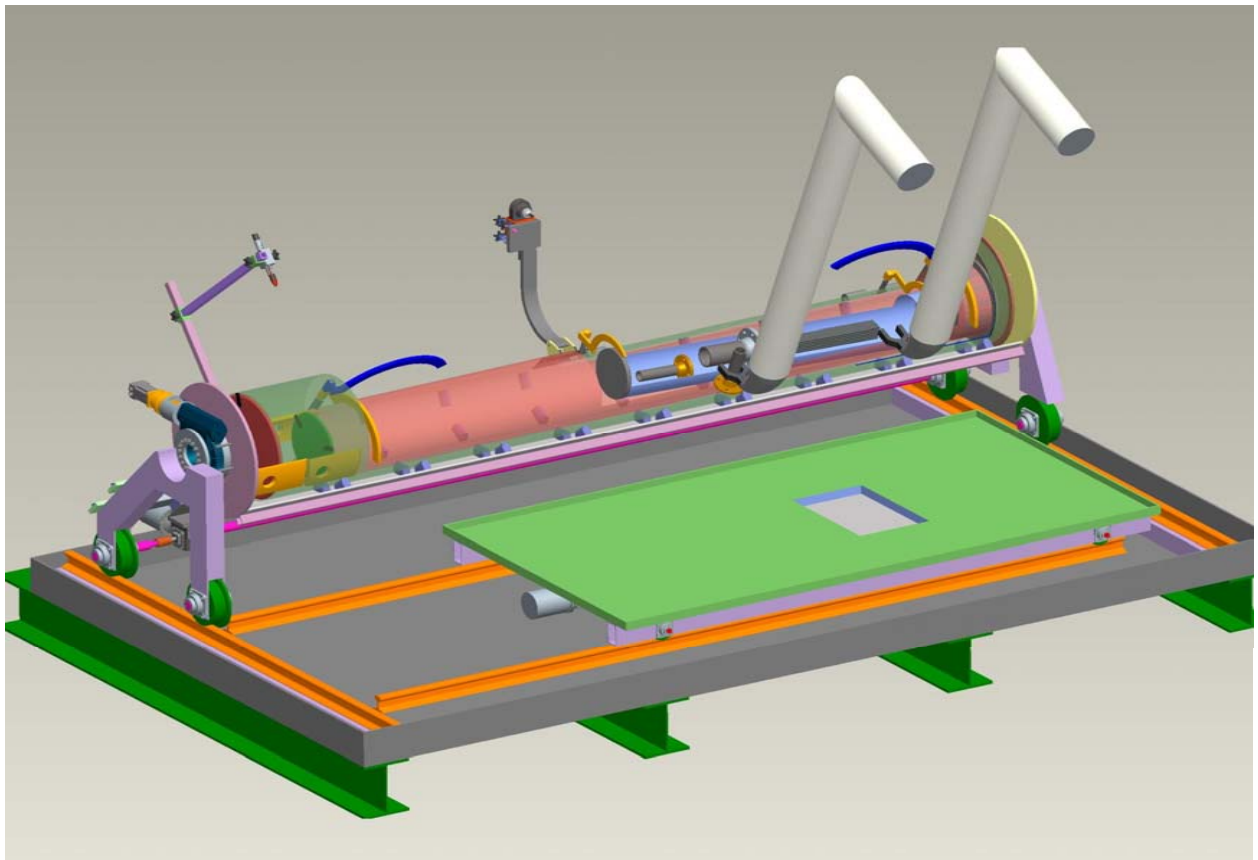
Plasma Cutting of 24” Liner



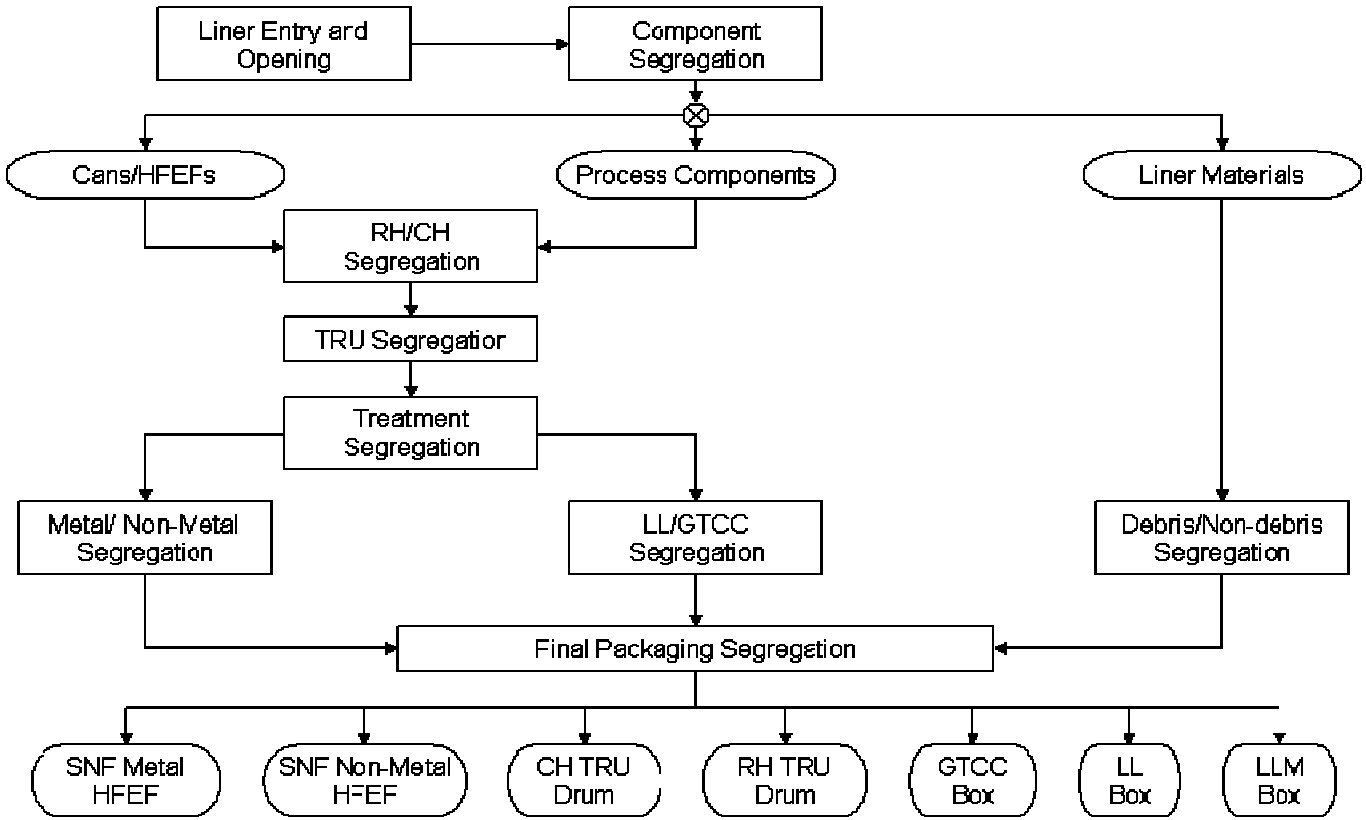
Mill Cutting of 16” Liner



Extraction of Waste



RWDP Characterization System Provides for Required Waste Segregation



Sodium/NaK Contamination

- *RSWF Sodium Inventory (~ 1500 kg)*
  - *45% of RSWF containers have residual or larger quantities of sodium*
    - *74% of the sodium containers have less than 1 kg sodium*
- *Additional 5 cold traps*
  - *3,275 kg sodium and 197 kg NaK*
- *Total Inventory – 1300 gal Na, 63 gal NaK*
- *Treatment will be by MEDE process – Melt-Drain-Evaporate*

Waste Disposition Pathways

- *TRU and Mixed TRU → WIPP*
  - *Package into 55-gal drum, ship via RH72B*
- *Low Level Waste*
  - *Low activity waste - off site commercial disposal facility*
  - *Higher activity materials to Nevada Test Site or alternate*
  - *Package into 3x3x3 boxes for in-cell handling, loadout*
- *Mixed Low Level*
  - *Treat all sodium onsite (except sodium-bonded fuel)*
  - *Very small volume of other MLLW*
    - *RCRA Toxic Metals*
    - *Macro-encapsulation would be treatment standard*
  - *Would likely rely on commercial treatment to match eventual disposal facility requirement*

Waste Disposition Pathways

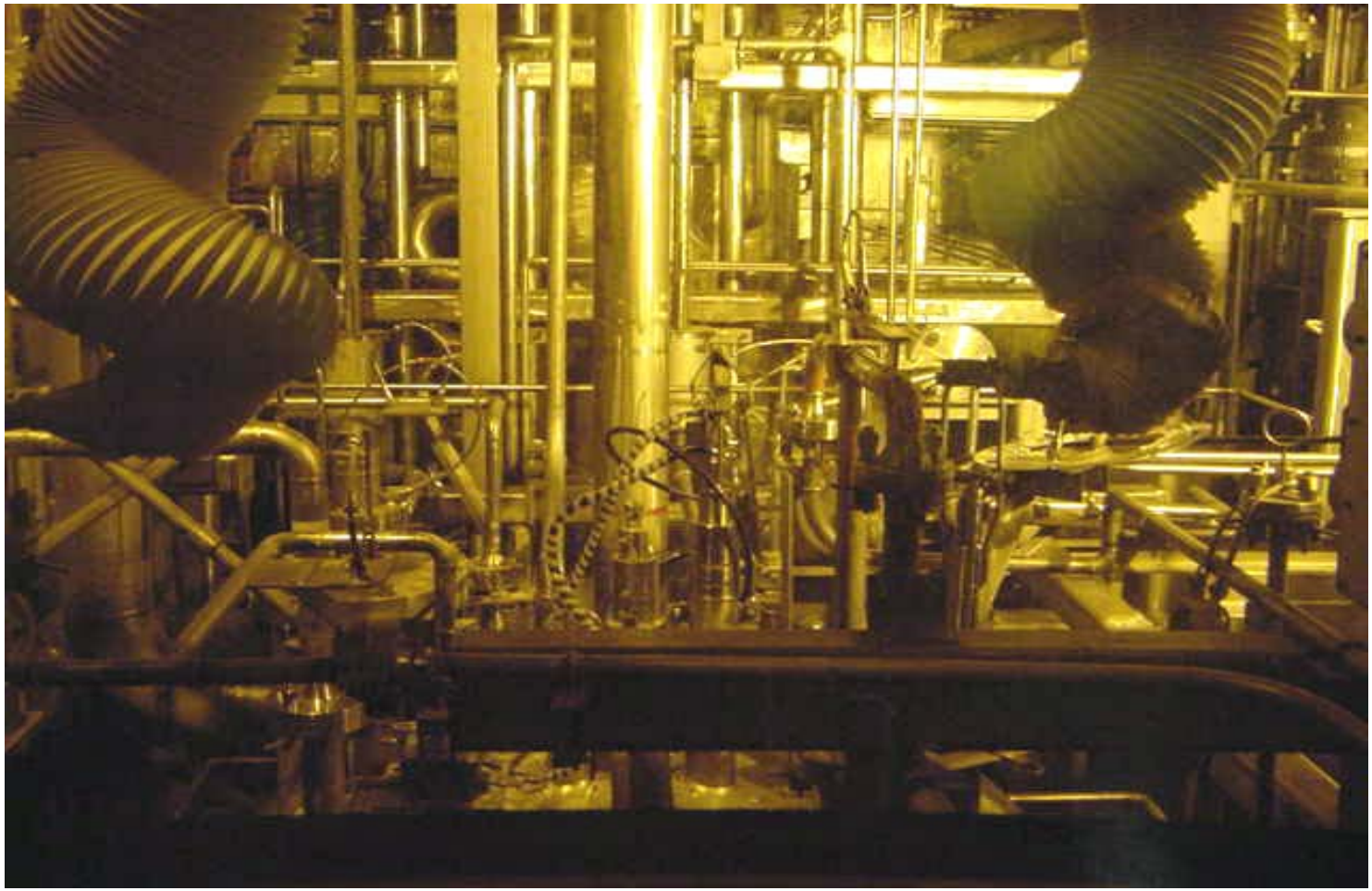
- *Sodium Bonded Spent Fuel and Scrap*
  - *Return to MFC*
  - *Packaged in HFEF-5 cans*
- *Other wastes with disposal paths yet to be determined*
  - *Spent Fuel (prior to YUCCA opening)*
  - *Un-irradiated Fuel*
  - *Greater Than Class C waste*
  - *Baseline assumption is to repackage into HFEF-5 Cans for return to MFC*

D&D To support Hot Cell Work

- ***Extensive D&D of the Hot Cell will be required to support RWDP use.s of D&D***
  - *Reduces radiation fields*
  - *Provides space for new processes.*
  - *Sampling required*

FDP Hot Cell – Top level

Hot Cell -13 ft Level Looking East



Preliminary Life Cycle Cost Estimate

• *Facilities modification and equipment*	*$80M*
• *Operations*	*$160M*
• *Secondary Waste Disposition*	*$20M*
• *Transportation*	*$10M*
• *Total*	*$270M*

Schedule

• *Critical Decision 0 – Concept approval*	*14 Dec 00*
• *Critical Decision 1 – Approve preliminary baseline range*	*21 Dec 04*
• *Critical Decision 1a – Alternative concept approval*	*1st QTR FY08*
• *Critical Decision 2 – Approve performance baseline, complete preliminary design*	*3rd QTR FY08*
• *Critical Decision 3 – Approve start of construction*	*2nd QTR FY 09*
• *Critical Decision 4 – Approve start of operations*	*1st QTR FY12*
• *Complete processing MFC RH TRU Waste*	*4th QTRFY18*
• *Complete Waste processing operations*	*4th QTR FY21*