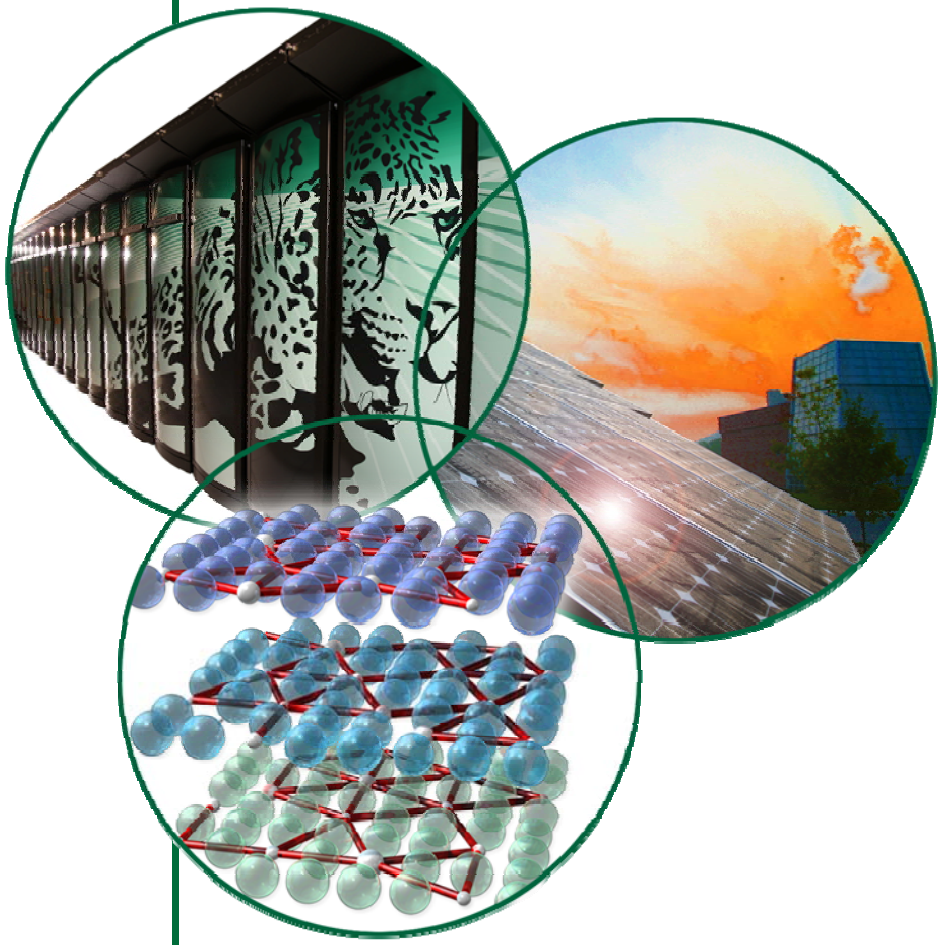
MERIT Equipment Disposal



Van Graves

MERIT Video Conference

September 1, 2010

U.S. DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

MERIT Equipment Chronology

Description	Date(s)
MERIT Experiment at CERN	Oct/Nov 2007
Equipment removal from TT2/TT2A	8-Feb-2008
Shipment of mercury equipment from CERN	7-Oct-2009
Receipt of mercury equipment at ORNL	19-Oct-2009
Syringe pump dismantlement & Hg draining	May/June 2010
Syringe pump packed for disposal	4-Aug-2010
Syringe pump leaves ORNL for final disposal	Sept 2010 (estimated)

Dismantlement

- Syringe pump dismantled & removed from secondary containment
- Hydraulic fluid drained & cylinders removed

Mercury Draining

- Mercury located in jet return piping (corrugated) and sump tank / drain
- All visible liquid removed and stored for reuse in SNS cavitation erosion experiments

Equipment Packing

- All syringe pump components placed back into MERIT secondary containment box
- Box placed into B-25 overpack container for shipping

Mercury Cylinder & Sump

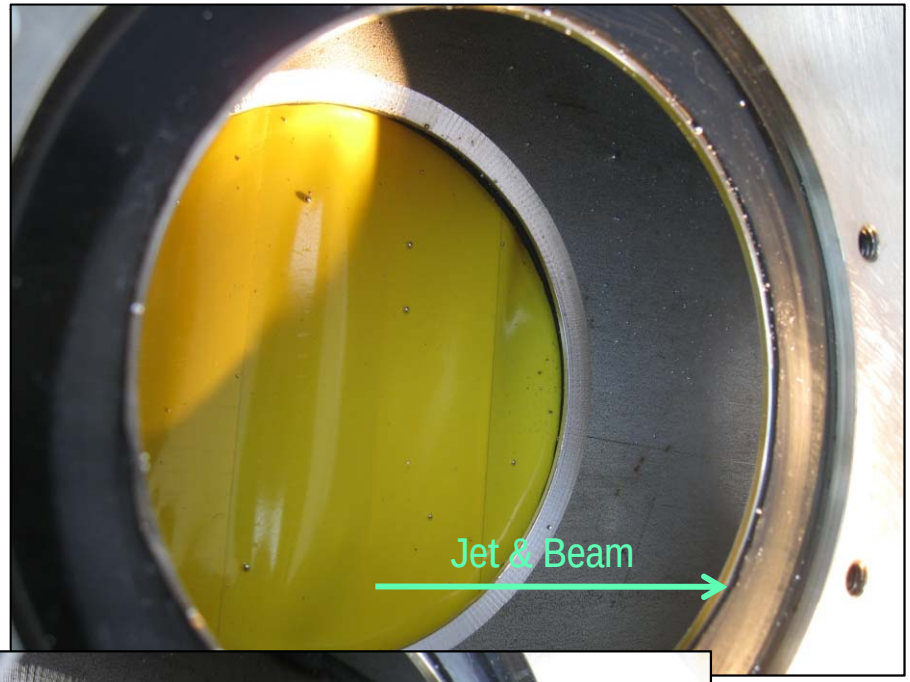
Hydraulic Cylinder

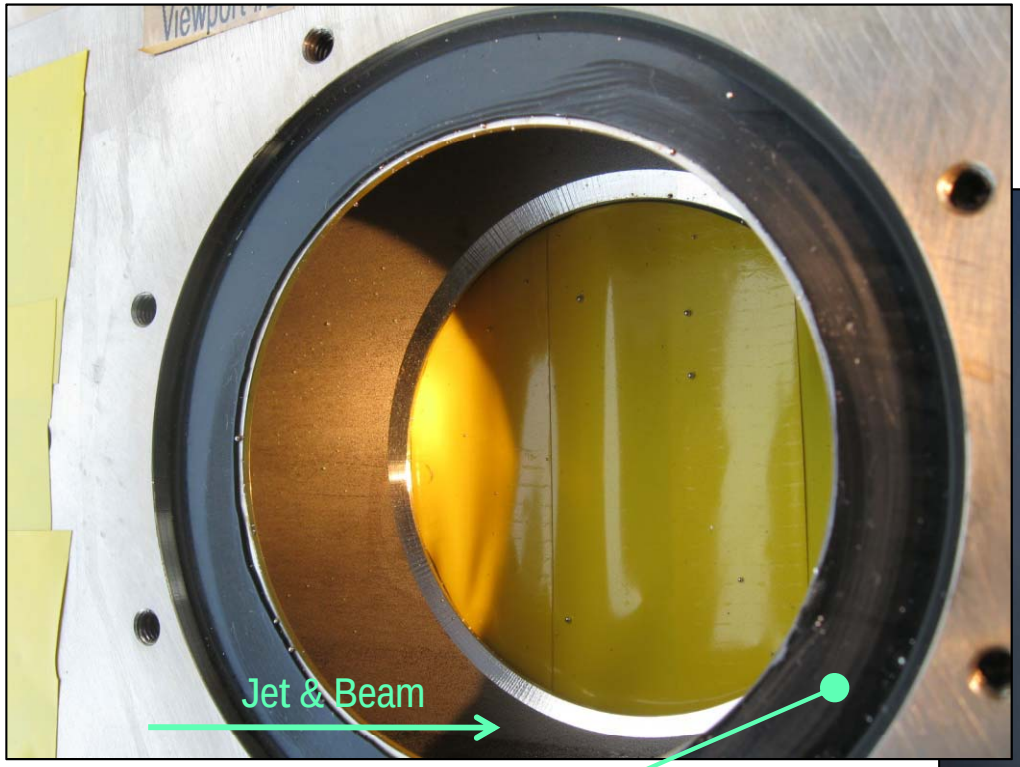
Filled Secondary Containment

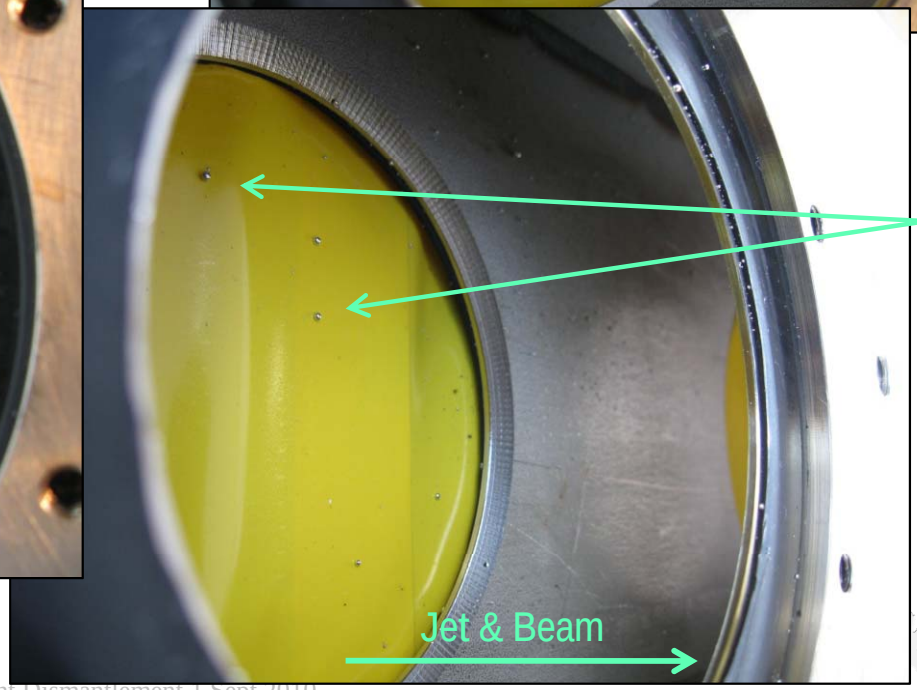
Secondary Containment

Mercury Primary Containment Inspection – Viewport 2

- Sapphire windows removed
- No obvious surface damage noted
- Higher quality photographs to be obtained







Final Disposition

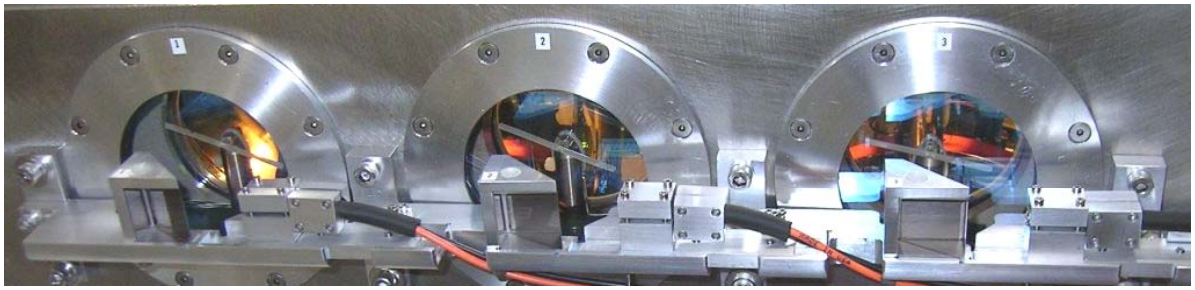
- Equipment will be shipped to EnviroCare (Clive, UT)
  - Probably in Sept, but possibly in October
- Only commercial facility in US licensed by NRC to accept low-level mixed waste
- Disposal method: macroencapsulation
  - Developed by BNL
  - Molten polyethylene poured into container, then solidifies
  - Solidified box to be buried

Disposal Costs

- Through FY10, ORNL paying for actual disposal costs
  - FY11, that cost burden transfers to projects
  - MERIT funds paid for waste preparation paperwork, RCT support, dismantlement, surveying & sampling, packing, shipping container, etc.
- Per ORNL Waste Services, disposal cost is based on burial volume (154 ft^3 for B25 overpack)
  - \$141 / ft^3 -> ~\$22k paid by ORNL

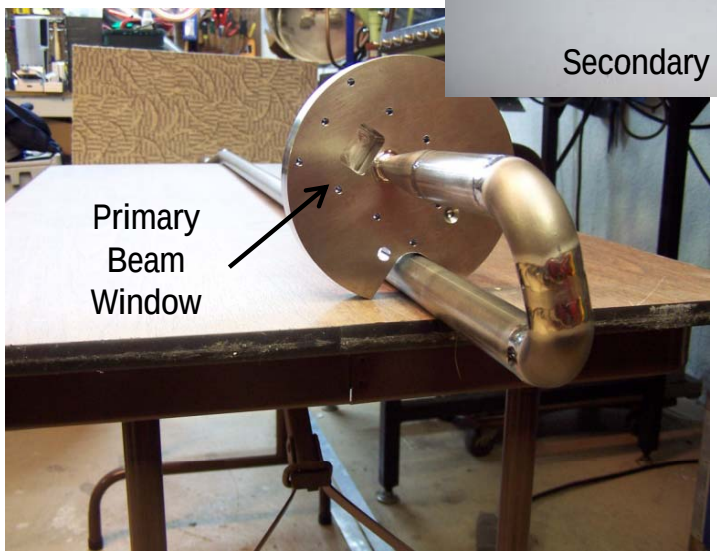
What's Left

- Hydraulic Power Unit (HPU)
- Optics – fiber cables, mirrors, sapphire windows, optical shelf with prisms
- Titanium beam windows (upstream secondary, downstream primary & secondary)
- Nozzle piping & "pie plate" beam window



Optics Shelf

Secondary Beam Windows



Hydraulic Power Unit (HPU)

- HPU fluid sampled by ORNL – determination was No Radiation Added
- Fluid sent to local oil recycler for reuse
- HPU surface contamination check completed (negative), HPU is available for salvage or shipment

Equipment Radiation Levels

Equipment	Surface Contamination (max fixed + removable alpha, dpm/100cm^2)	External Dose Rate (beta/gamma, mrem/hr contact)	Sodium-Iodide Detector Reading (dpm alpha)
Sapphire #1 L/R*	<100	<0.1	35,214 / 32,714
Sapphire #2 L/R		0.1	91,640 / 71,928
Sapphire #3 L/R		<0.1	51,037 / 53,240
Sapphire #4 L/R		<0.1	16,035 / 20,420
Mirror #1		0.1	858,740
Mirror #2		<0.1	1,138,440
Mirror #3		<0.1	330,570
Mirror #4		0.1	485,390
Optical fibers	Green-tagged, available for release		

* Left/Right as seen by traveling along beam

Equipment Radiation Levels (cont.)

Equipment	Surface Contamination (max fixed + removable alpha, dpm/100cm^2)	External Dose Rate (beta/gamma, mrem/hr contact)	Sodium-Iodide Detector Reading (dpm alpha)
Optics bench	<100	<0.1	700,000
Jet snout (primary containment)	<100	0.5	Not all areas accessible for survey
Upstream secondary beam window	<100	<0.1	150,240
Downstream secondary beam window	<100	<0.1	124,630
Downstream primary beam window	<100	<0.1	44,338

What to Keep?

- Activated components will have to be shipped as radioactive
  - Only optical fibers can be shipped using normal channels
- HPU available but no particular need defined for its future use
  - Short-term storage available at ORNL, but not long-term