Activities and Capabilities at the LANL Weapons Engineering Tritium Facility (WETF)

40th Tritium Focus Group Meeting
Albuquerque, NM
October 23, 2018

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Gas Transfer Systems Group (Q-7)

Los Alamos NATIONAL LABORATORY EST. 1943

National Nuclear Security Administration
Operated by Los Alamos National Security, LLC for the U.S. Department of Energy's NNSA

WETF Mission and Programmatic Activities

We perform tritium R&D to support the Weapons Program and other programs of national importance.

> *"The gas transfer system is the only accessible key to increased margins, which are a major part of assuring long-term reliability of the stockpile."*
>
> - Seymour Sack, LLNL, E. O. Lawrence award winner.

- Stewardship of existing stockpile GTS
- Development of new stockpile GTS
- Support for Weapons Science campaigns
- Support other weapons tritium issues
- Support tritium R&D for U.S. allies
- Material Recycling & Recovery
- Legacy item treatment/disposal

Facility Overview

- 11,000 ft^2, Hazard Category 2 nuclear facility
- In operation since 1989, first tritium operations in 1992
- Integrated operations with Q-7 hydrogen lab (Radiological facility)
- Unique capability to rapidly design, fill, and test experimental items

WETF is a Flexible and Responsive Tritium R&D Facility

WETF Tritium Operations

Recycling
(HTV, AL-M1)

Receiving
(BTSP)

Shipping
(BTSP, FTWC)

Disposal

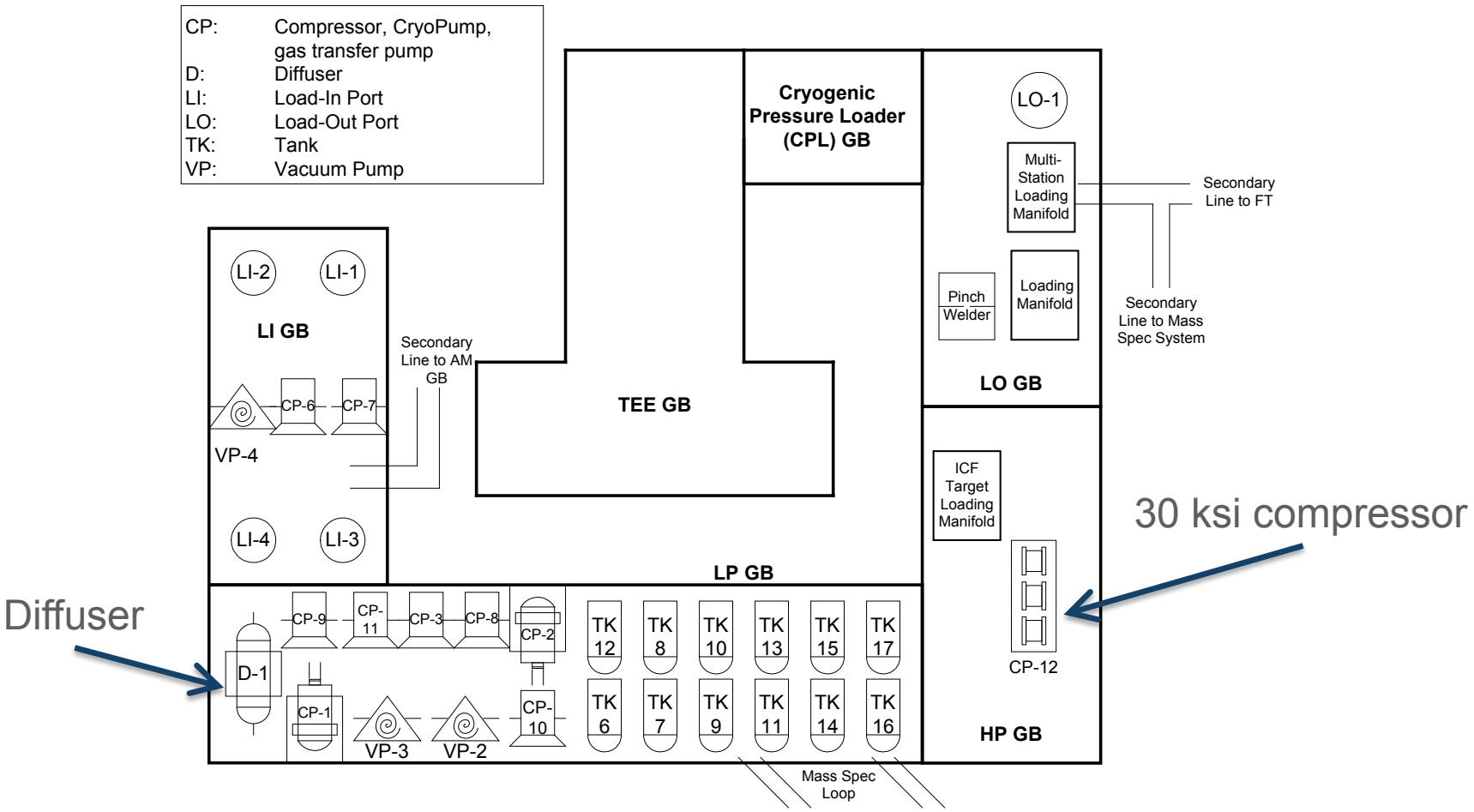
Temporary Storage (LP-50, QSS)

In-room activities
(calorimetry, hood work, etc.)

Long-term Storage
(R&D units to be tested, legacy items)

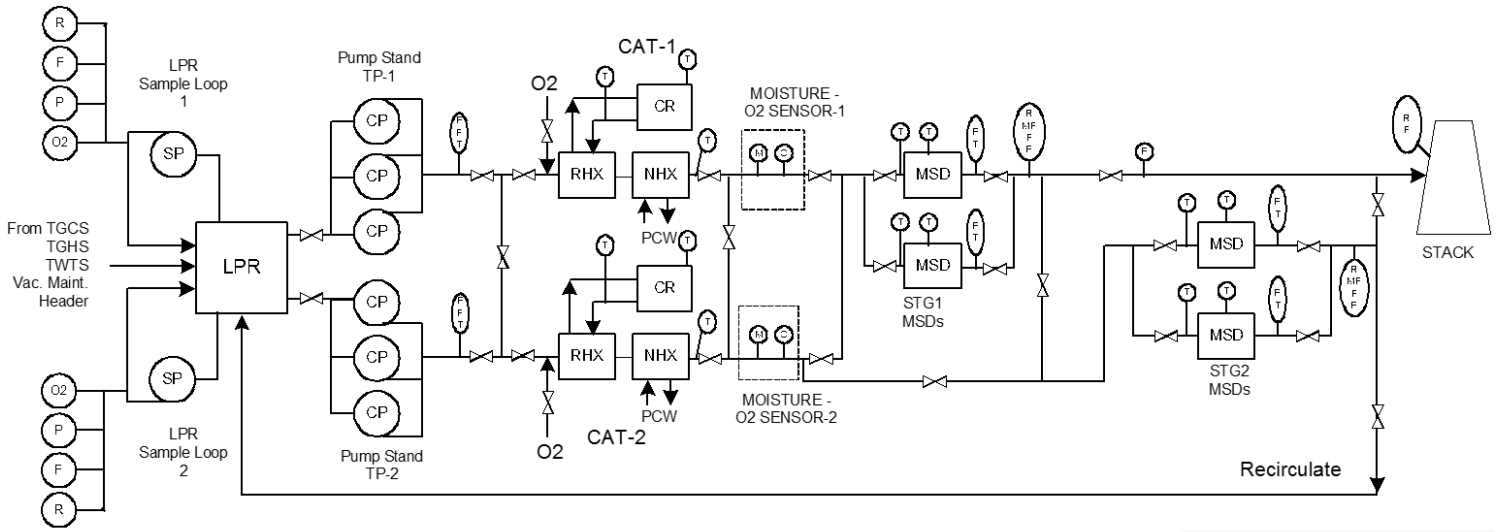
Gas Handling System
(tritium loading/unloading,
^{3}He removal, gas analysis)

WETF Tritium Gas Handling System (TGHS)



TGHS provides the core tritium processing and filling capabilities

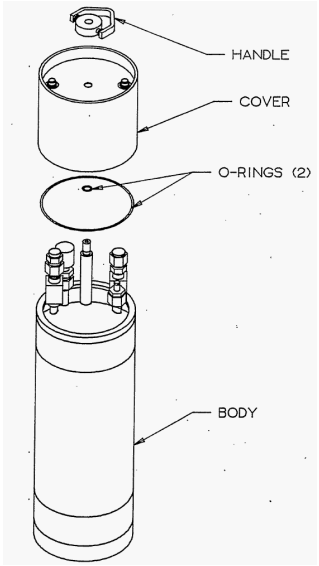
Tritium Waste Treatment System (TWTS)



Legend:

CP - transfer pumps	F - flow sensor
CR - catalytic reactor	M - moisture sensor
LPR - low pressure receiver	MF - moisture flow sensor
MSD - molecular sieve dryer	T - temperature sensor
NHX - nonregenerative heat exchanger	P - pressure sensor
O - oxygen sensor	R - radiation sensor
RHX - regenerative heat exchanger	TGCS - tritium gas containment system
STG - MSD stage	TGHS - tritium gas handling system
PCW- process chilled water	TWTS - tritium gas treatment system
⋈ - generic valve	

Generates AL-M1 containers filled



WETF Analytical Capabilities

- High-resolution gas analysis by VG Micromass 3001 mass spectrometer
- Tritium assay of bulk gas by beta scintillation
- Tritium assay of discrete items by ANTECH calorimeters
- Finnigan MAT 271 mass spectrometer supports cold analyses, valve surveillance work, and materials analysis
- Finnigan MAT 251 being restored to operability


Finnigan MAT271


VG Micromass 3001

Antech Calorimeters

Finnigan MAT251

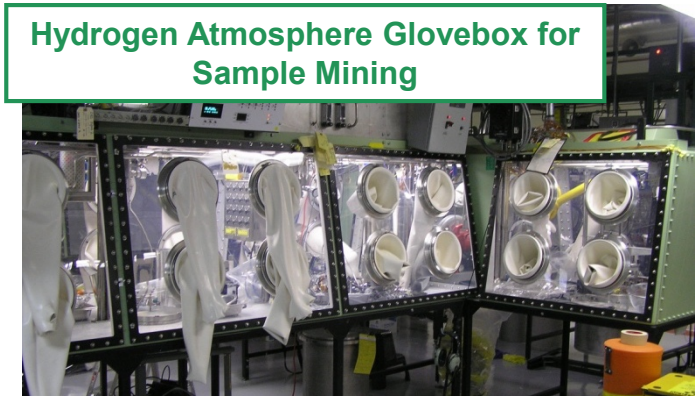
Major Programmatic Activities at WETF

- R&D item filling and testing
- Environmental conditioning and storage
- Sample mining
- Hydrogen embrittlement studies
- Legacy item processing/disposal

Multistation Loading Manifold

Environmental conditioning

Hydrogen Atmosphere Glovebox for Sample Mining

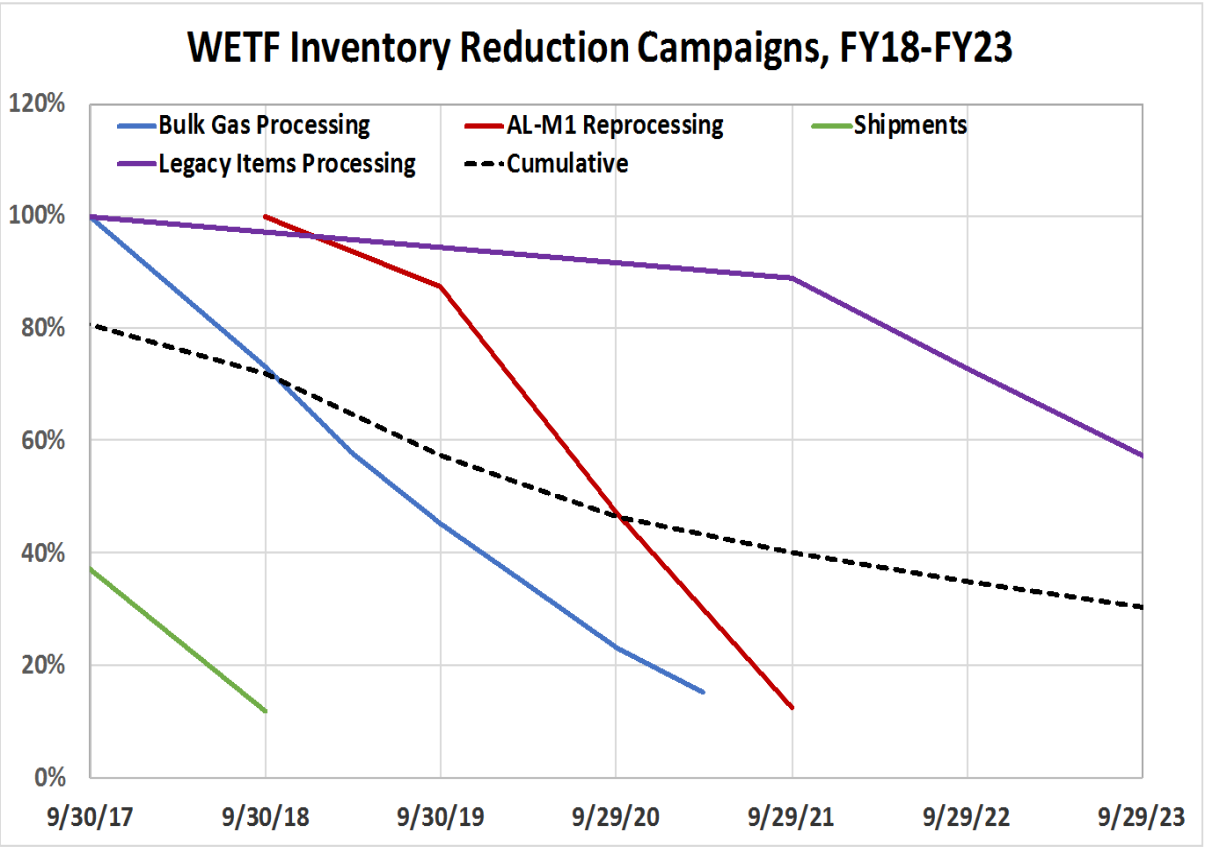


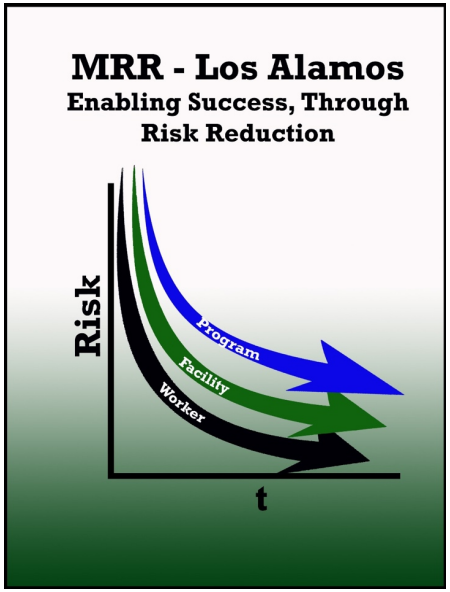
Function Tester Glovebox

Room temperature storage

Material Recycle and Recovery Program

- Package and ship bulk H/D/T gas to SRTE on HTVs
- AL-M1 recycling through SRTE
- Tritium recovery from legacy items

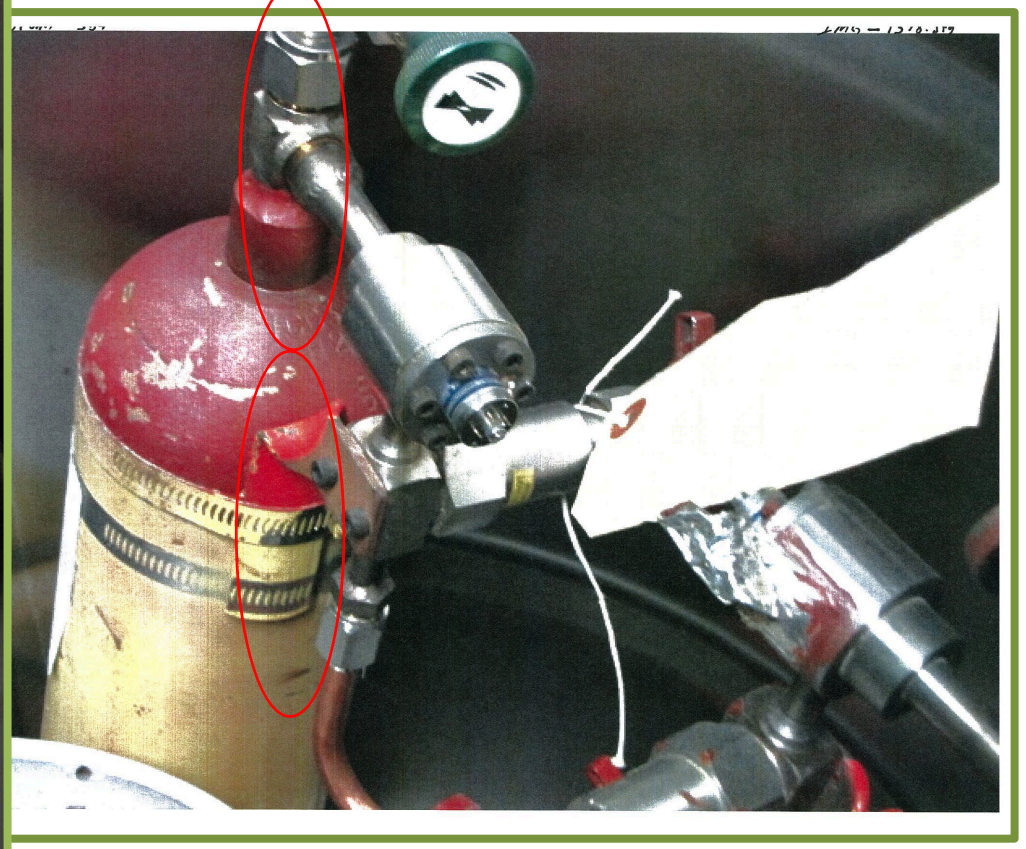




WETF Legacy Disposal Project

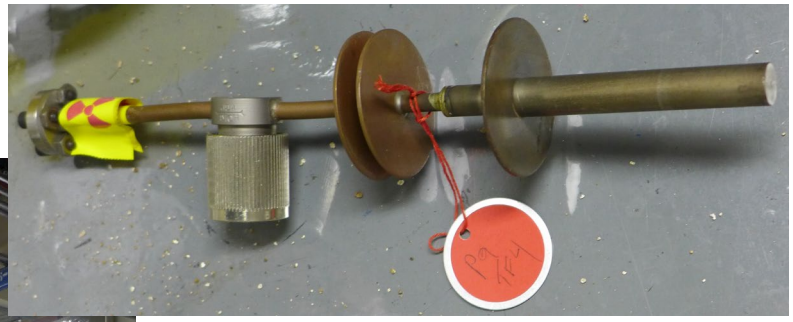
- Experimental items and process equipment generated at WETF, or sent to WETF from other LANL and DOE facilities
  - Bulk gas or hydride storage containers
  - Weapons-related components
  - Other tritium-related research items
- Items have accumulated due to lack of priority given to unloading and processing
- Wall-to-wall inventory completed in 2014, ~ 1200 items identified for disposal
- Tritium recovered from legacy items will be recycled through SRS using existing processes (HTVs, AL-M1s)
- Contaminated metal and metal hydrides present disposal problems
- One item sent to NSSI in 2018, more in the future?
- Awaiting NNSS approval for disposal of classified items in FTWCs

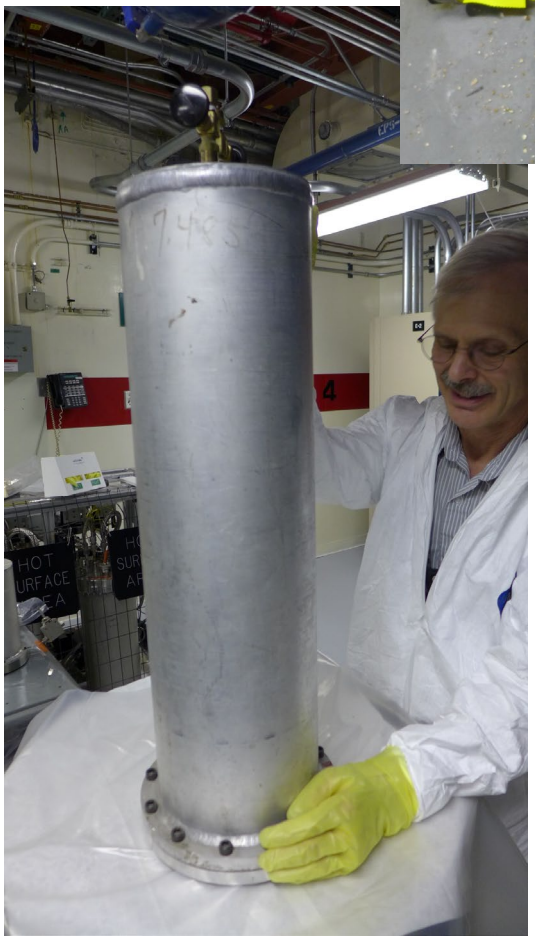
Some Disassembly Required

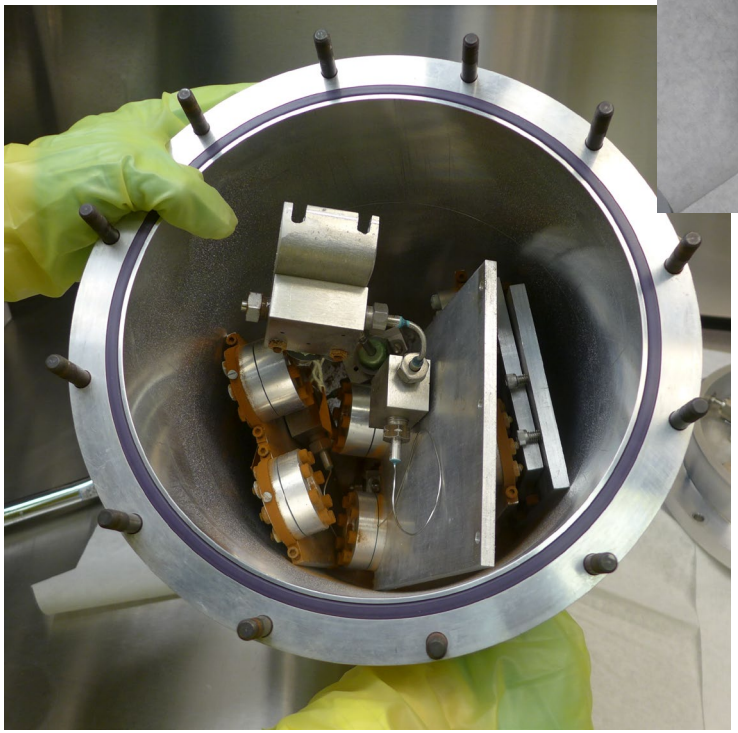


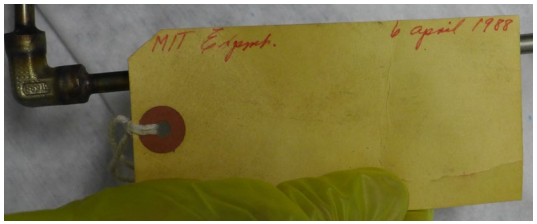
Container Pedigree?

More Interesting Items









Current WETF Status

- Recovering from a series of shutdowns starting in 2008
- Resumed tritium processing in December 2015
- Resumed programmatic activities in May 2016
- First BTSP-1 tritium shipment in May 2017
- Two HTVs loaded in 2018
- BTSP shipping on hold pending NA-531 approval
- Testing new calorimeter, will go into service in late 2018
- Legacy item processing to begin in 2019 – priority-dependent
- High-pressure tritium filling and pinch welding will be restored in 2019

Different Teams, Same Mission

Gas Transfer Systems Group (Q-7)

- **Brad Meyer – Chief Engineer**
- **Joe Sanchez – Group Leader**
- **Tritium Research Team**
  - **Chandra Marsden – Team Leader**
  - **Mark Bibeault**
  - **Drew Geller**
  - **John Gill**
  - **Morgan Kelley**
  - **Brian Price**
  - **Bob Quintana**
  - **Heidi Reichert**
  - **Mike Rogers**

WETF Operations Team

- **Pete Rice – Deputy FOD**
- **Don Hyatt – Operations Manager**
  - **Byron Denny**
  - **Rick Hawes**
  - **Mel Ortiz**
  - **Heather Peebles**
  - **Cipriano Vigil**
  - **Jamie Vongphachan**

WETF Engineering

- **Rob Swickley – Engineering Manager**
  - **Stuart Bloom**
  - **Jose Gonzalez**
  - **Rob Sanchez**
  - **Dallas Smith**
  - **Rob Wilde**