

# Managing Legacy Materials at WETF

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## Tritium Focus Group

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# The “T Buck” Stopped at WETF

- Experimental items and process equipment were generated at WETF, or sent to WETF from other LANL facilities and offsite locations, for testing or unloading, and tritium processing:
  - Bulk gas or hydride storage containers,
  - Used weapons-related components,
  - Unused weapons-related items beyond useful life,
  - Non-weapons-program items.
- Items accumulated due to lack of priority for testing, unloading, and processing.



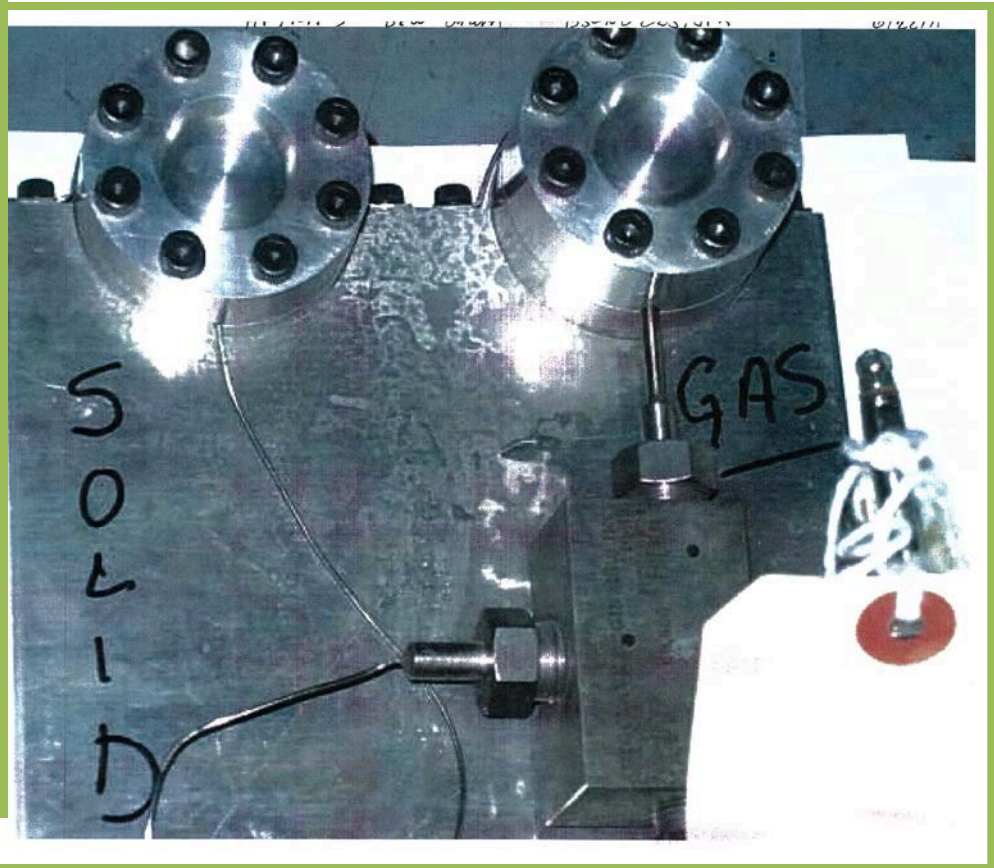
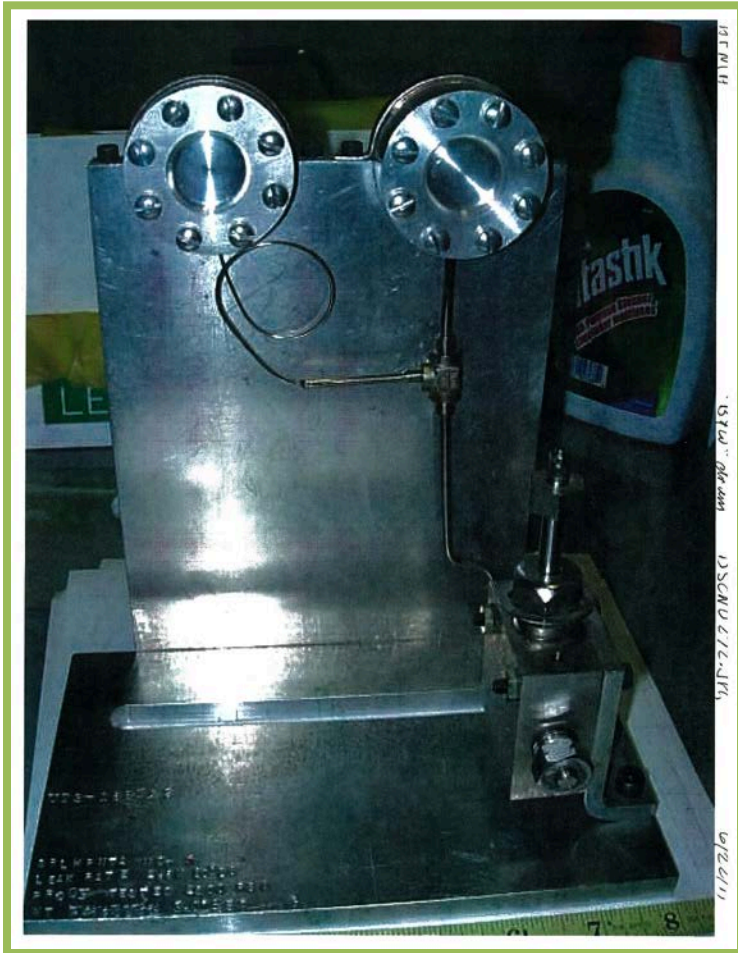
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# Legacy Items in WETF

- There are an estimated 800 Legacy Items.
  - Most items (~600), are tracked as accountable or classified in an MC&A database.
  - Items not tracked (~200) are primarily sub-accountable and unclassified.
  - Some descriptions are incomplete.
  - There is no complete inventory of items not tracked through MC&A.
  - There are one-of-a-kind items, and “families” of, items.



# HPNTAs



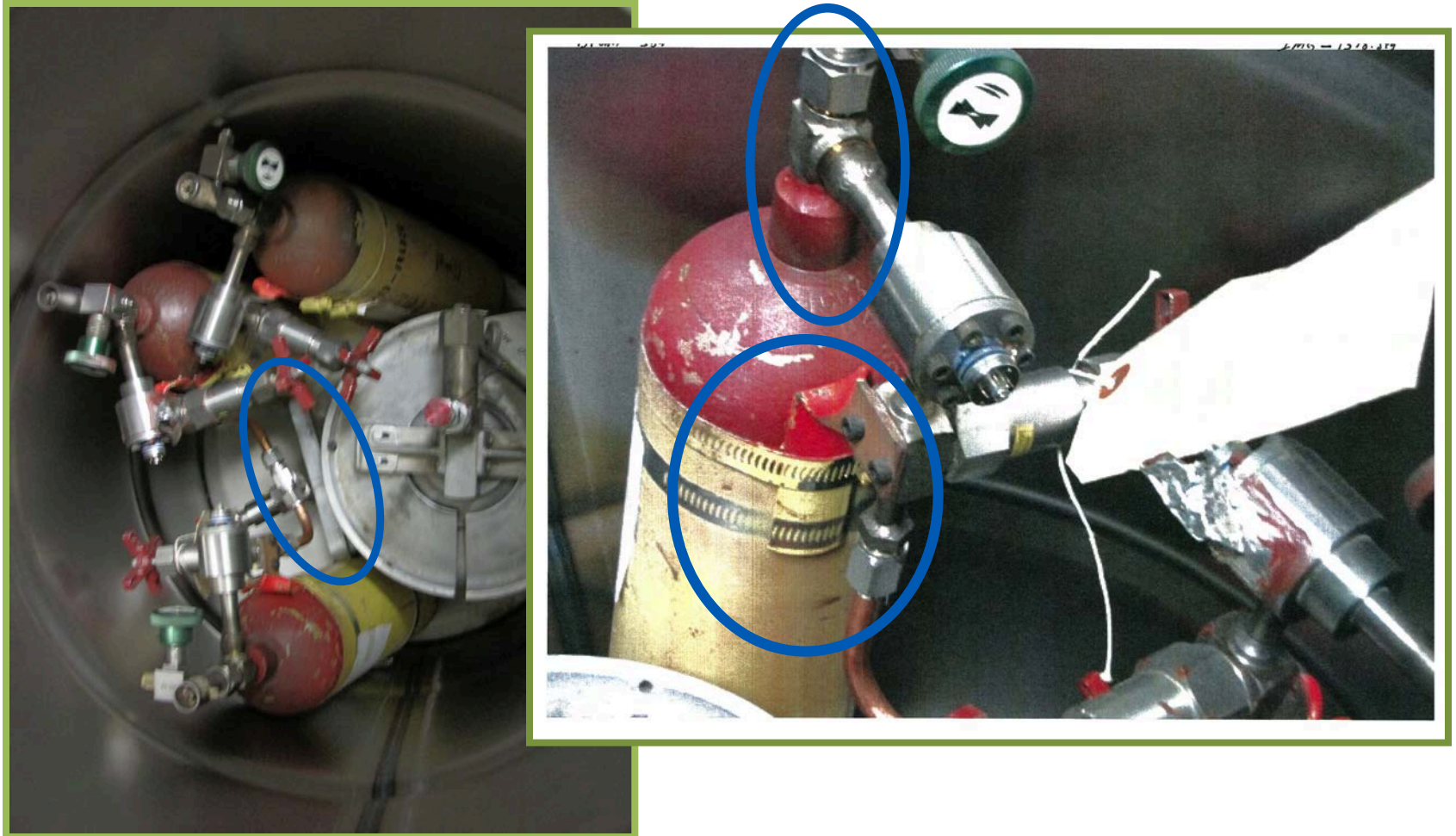
# Legacy Items Beget Waste

- Determinations must be made regarding:
  - Programmatic utility,
  - Safety Basis compliance,
  - Quantity and value of tritium,
  - Processing,
  - Potential RCRA characteristics.



UNCLASSIFIED

# Some Disassembly Required



# Multiple Challenges Managing WETF Wastes

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- Disposal of Type A, < 1080 Ci, Low Level Waste (LLW) is relatively straightforward.
- Transportation of Type B, > 1080 Ci, LLW is a challenge due to shipping cask prohibitions of  $H_2 > 5\%$  and powdered metal hydrides (Except for UC-609 or BTSP).
- Mixed LLW (MLLW) (Type A or B) is expensive and complicated to manage and dispose. Determination of RCRA hazardous characteristics and point-of-generation are subject to interpretation.
- DOE O 435.1, Radioactive Waste Management, impacts disposition of some waste streams.

# RCRA Challenges: Hg

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- WETF inventory is potentially Hg contaminated due to use of LP-50s that may have been contaminated by Sprengle/Toepler pumps at SRS.
- Hg traps will be installed before processing LP-50 gas, and gas in smaller containers, for loading onto HTVs.
- After processing, LP-50s and other containers potentially contaminated with Hg, become waste.
  - Are Hg contaminated containers MLLW?
  - Are Hg contaminated containers “RCRA empty containers?”



# LP-50s



# RCRA Challenges: metal hydride

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- Uranium hydride, or tritide, is AEA exempt because U is considered byproduct and hydrogen isotopes are tightly held and do not exhibit a hazardous characteristic.
  - Powdered U-hydrides or tritides are LLW.
- Palladium hydride, or tritide, is not AEA exempt. Hydrogen isotopes are tightly held and do not exhibit a hazardous characteristic; but Pd, if in powdered form, may be exhibit a RCRA reactive (D-003) characteristic.
  - Powdered Pd-hydrides or tritides may be MLLW.

# RCRA Challenges: metal hydride (continued)

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- Zirconium-alloy (getters) hydride, or tritide, are not AEA exempt. Hydrogen isotopes are tightly held and do not exhibit a hazardous characteristic.
  - Zr getter material is a DOT hazardous material, which does not equate to a RCRA hazardous characteristic.
  - Used, sealed, Zr getters may exhibit a RCRA reactive (D-003) characteristic.
  - Zr getters used with T, and left open to air, do not exhibit a RCRA reactive (D-003) characteristic and can be disposed as LLW.

# Disposal Challenges: HTO

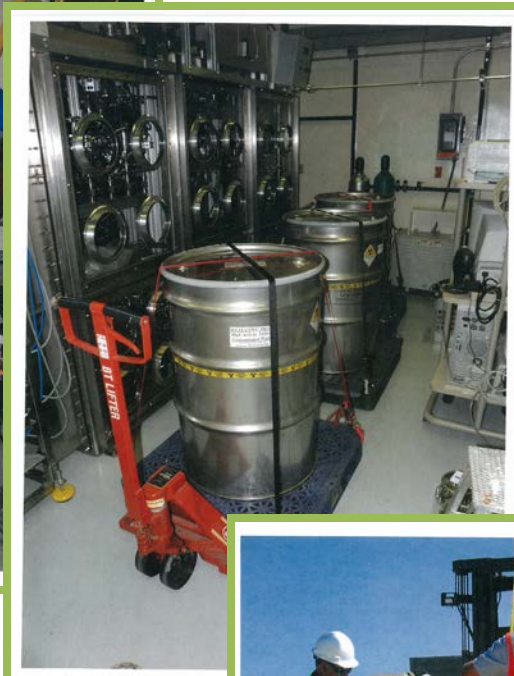
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- WETF Tritium Waste Treatment System (TWTS) produces HTO on molecular sieve (MS) in AL-M1s.
  - Radiolysis generates H<sub>2</sub> pressure, measured up to 90 psia.
- H<sub>2</sub> produced by radiolysis is exempt from RCRA as AEA\* byproduct material per §261.4 (a) (4).
- DOE O 435.1 prohibits containers greater than 1.5 atm (22 psia).
  - Addition of Pd-on-alumina catalyst inside AL-M1s (consistent with *Tritium Waste Package* patent 5,464,988, November 1995), or hydrogen getter (as used inside H1616 shipping package) are being considered to reduce radiolysis generated pressure.

# AL-M1s in WETF



# Type B Disposal at LANL Flanged Tritium Waste Container (FTWC)



FTWCs are ASME B&PV Code Stamped, 300 psig rated, with all-metal seals.



# Offsite Type B Shipment of FTWCs

- 10-160B Cask has been evaluated.
- CoC requires modification to enable transport of  $H_2 > 5\%$ , and powdered metal hydrides.



# Major WETF Waste Streams

	DOT	Complications
Metal Hydrides and Contaminated metals	< 1080 Ci > 1080 Ci	Classified RCRA D-003 RCRA: Pb, Hg DOE O 435.1 > 1.5 atm Transportation if > 1080 Ci
HTO on Molecular Sieve	> 1080 Ci	RCRA D-001 DOE O 435.1 > 1.5 atm Transportation if > 1080 Ci



# Backup

## Tritium Waste Package w Pd Catalyst



US005464988A

**United States Patent** [19]  
**Rossmassler et al.**

[11] **Patent Number:** 5,464,988  
 [45] **Date of Patent:** Nov. 7, 1995

[54] **TRITIUM WASTE PACKAGE**

[75] **Inventors:** Rich Rossmassler, Cranbury; Lloyd Ciebiera, Titusville; Francis J. Tulipano, Teaneck; Sylvester Vinson, Ewing; R. Thomas Walters, Lawrenceville, all of N.J.

[73] **Assignee:** The United States of America as represented by the Department of Energy, Washington, D.C.

[21] **Appl. No.:** 347,134

[22] **Filed:** Nov. 23, 1994

[51] **Int. Cl.<sup>6</sup>** ..... G21F 9/30; G21F 5/00

[52] **U.S. Cl.** ..... 250/507.1; 250/506.1; 588/16

[58] **Field of Search** ..... 250/506.1, 507.1; 588/16

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

4,950,426 8/1990 Markowitz et al. .... 250/507.1

**FOREIGN PATENT DOCUMENTS**

1148671 6/1983 Canada ..... 588/16  
 61-18718 5/1986 Japan ..... 250/506.1

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[57] **ABSTRACT**

A containment and waste package system for processing and shipping tritium oxide waste received from a process gas includes an outer drum and an inner drum containing a disposable molecular sieve bed (DMSB) seated within outer drum. The DMSB includes an inlet diffuser assembly, an outlet diffuser assembly, and a hydrogen catalytic recombiner. The DMSB absorbs tritium oxide from the process gas and converts it to a solid form so that the tritium is contained during shipment to a disposal site. The DMSB is filled with type 4A molecular sieve pellets capable of adsorbing up to 1000 curies of tritium. The recombiner contains a sufficient amount of catalyst to cause any hydrogen add oxygen present in the process gas to recombine to form water vapor, which is then adsorbed onto the DMSB.

**7 Claims, 1 Drawing Sheet**

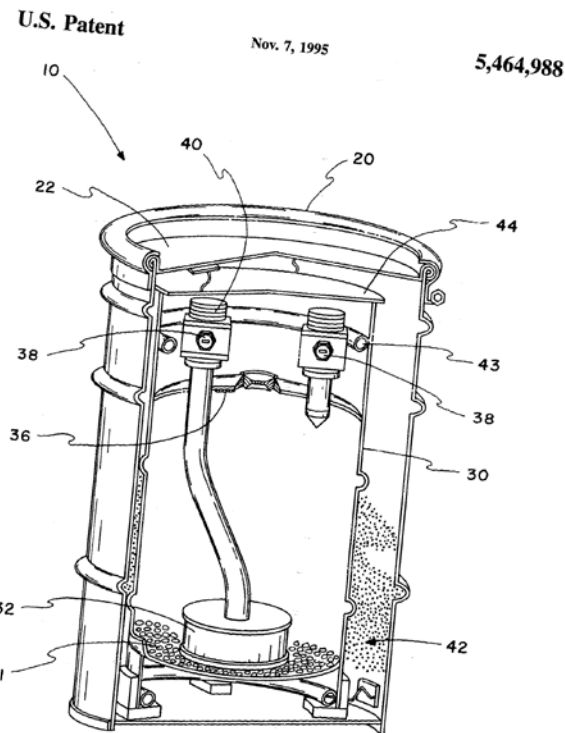


FIG. 1