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Event Presentation

DOE Office of Nuclear Safety Enforcement

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Agenda

- Background on nitrate salt waste
- Drum 68660
- Scientific investigations of the Breach
- OIG Report
- NMED Administrative Compliance Order
- Accident Investigation Board
- Preliminary Corrective Action Plan
- Summary

Waste Generation TA-55

- 1979: TA-55 begins operations
- A wide variety of actinide research and development is performed at the plutonium facility at TA-55
- Operations at TA-55 can generate transuranic waste from activities in the glovebox lines throughout the facility; some produce nitrate salt waste

Waste Generation TA-55 (continued)

- Evaporator salts and evaporator bottoms generated continuously from nitrate recovery operations at TA-55, Plutonium Facility 4 between 1979 and 1991
- When evaporator bottoms cooled to room temperature, they were filtered and nitrate solution would crystallize or “salt” out
- Salts then washed, vacuum dried to reduce moisture content, double (or triple) bagged and placed in lead and polyethylene-lined 55-gallon drums
- Drums placed in storage for decades

Nitrate Salt Issue

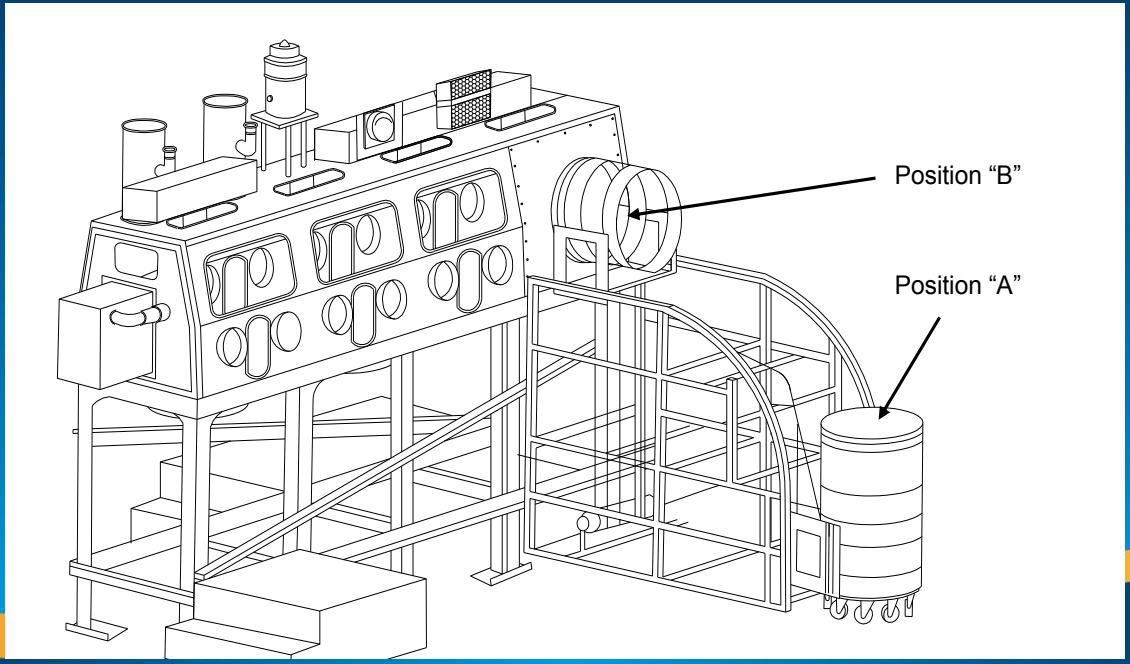
- Unexpected nitrate salts encountered during Pit 9 retrievals at Idaho National Engineering and Environmental Laboratory
- NCR-LANL-0509-09
  - New AK information from the generator identified a number of drums as potentially non-cemented evaporator salts
- Report FR 10-13 Results of Oxidizing Solids Testing issued by New Mexico Tech Energetic Materials Research and Testing Center
  - Determined amount of inert material that must be mixed into the most reactive sodium nitrate-potassium nitrate ratio in order to classify the mixture as a non-oxidizer
  - LANL-Carlsbad Office Difficult Waste Team white paper, Amount of Zeolite Required to Meet the Constraints Established by the EMRTC Report RF 10-13: Application to LANL Evaporator Nitrate Salts
  - For every liter of nitrate salt present at least 1.2 liters of zeolite/kitty litter must be added

Waste Remediation at WCRRF

- Drums were remediated at the Waste Characterization, Reduction and Repackaging Facility (WCRRF)
- Remediation required to meet Waste Isolation Pilot Plant's (WIPP) waste acceptance criteria
- Remediation included:
  - Testing for pH and neutralization as necessary;
  - Absorption of liquids; and
  - Mixing the waste with kitty litter

Waste Remediation at WCRRF

- Repackaging operation is a single glovebox train
  - First station is drum lift. Operators open drum, collect free liquids, then remove all items using hand tools.
  - Salts are processed and transferred to daughter drum at center stations.
  - Supplies are introduced via clean drum.
  - Tools are stored in a permanent drum at the far end.



Waste Remediation at WCRRF (continued)

- Remediation Process
  - Remove parent drum lid
  - Drain liquids – 0 to 15 gallons experienced
  - Test pH of liquids – 0 to 8 experienced
  - Neutralize liquids – both solid and liquid based neutralizers used
  - Absorb liquids – primarily used Swheat Scoop®
  - Place absorbed liquids into daughter drum

Waste Remediation at WCRRF (continued)

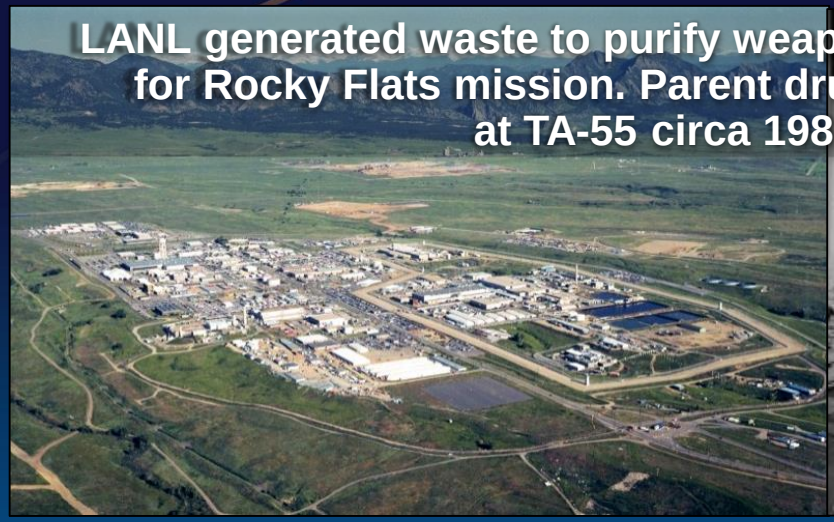
- Remediation Process (continued)
  - Remove solid waste
  - Remove/disposition items prohibited by the WIPP waste acceptance criteria (sealed containers, liquids)
  - Mix kitty litter into waste in 3 to 1 ratio
  - Place mixture into daughter drum
  - Place available job waste into void space of daughter drum

Waste Remediation at WCRRF (continued)

- Normally the drum is emptied (but residual materials remain). Exceptions would be if lead shielding was wedged in and could not be manually removed.
- Free and (rarely) bagged liquids would be combined, then neutralized and absorbed.
- Secondary items (e.g., used gloves, neutralizer bottles, wipes) are permitted in daughter drums.

The History of Drum 68660

Los Alamos NATIONAL LABORATORY EST. 1943

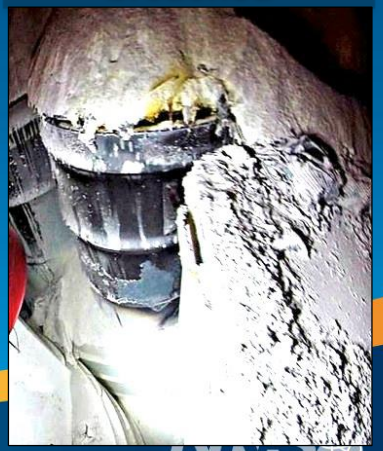


LANL generated waste to purify weapons-grade plutonium for Rocky Flats mission. Parent drum initially packed at TA-55 circa 1985.

12/04/2013
Parent drum remediated & packaged at WCRR, creating drum 68660 and a sibling

1/31/2014
Drum 68660 placed in WIPP's Panel 7, Room 7

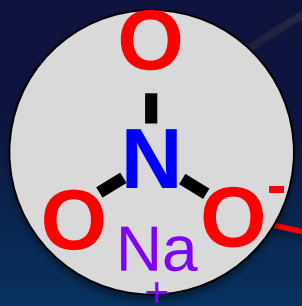
2/14/2014
Drum 68660 breached



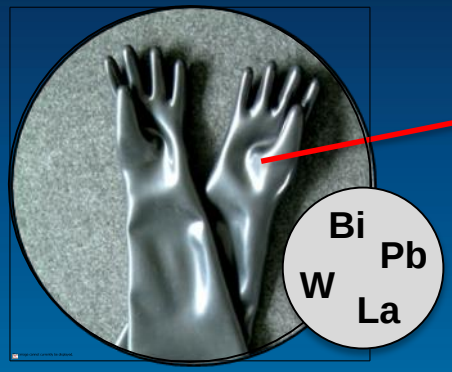
National Nuclear Security Administration

LANL's analysis of potential chemical reactions with nitrate salt wastes

Los Alamos NATIONAL LABORATORY EST. 1943



Nitric Acid (pH)



We can explain energetic reactions, but not initiation

a matrix of organic kitty litter (fuel) with sodium nitrate (oxidizer) [reaction temperature: 300 °C]

unique combination of acids, salts, metals, and organics [reaction temperature: ~60 °C]

Note: Independent analysis by DOE Technical Assistance Team pending

LANL Technical, Causal and Systems Analyses: Looked at processes, procedures, management systems

LANL did not consider the chemical reactions that unique combinations of radionuclides, acids, salts, metals, liquids, and organics might create

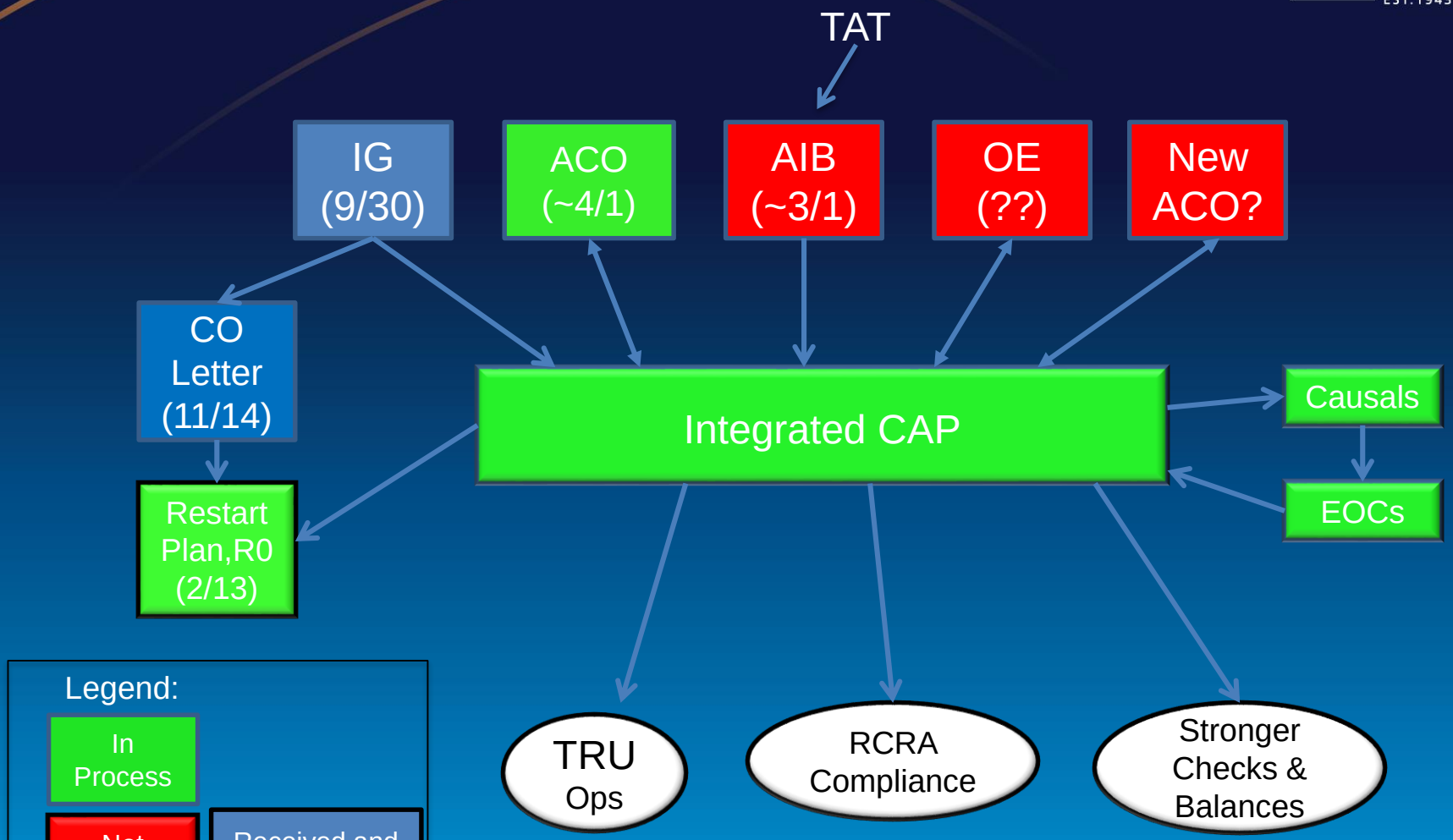
LANL did not comply with our RCRA permit for TRU waste characterization and treatment

- Neutralization & absorption
- Acceptable Knowledge

Synopsis of Investigations

- OIG – focus on procedural weaknesses
  - SMEs, key references, level of detail, WIPP reviews, communicate reasons for changes
- AIB (pending)
  - Procedures, Safety Basis reviews, material controls, secondary wastes

Context for Corrective Actions



Summary

- Nitrate salts are a complex waste stream
- LANL took immediate action upon discovery of breached drum
- LANL cooperated fully with the DOE investigation, and conducted a significant scientific inquiry into the breach
- We will rely primarily on external investigations for our corrective actions – OIG, NMED ACO, and AIB are significant inputs
- Issues primarily in TRU Program
- Significant preliminary corrective action activity underway