



WIPP Site Incident Independent Review (WSIIR) Overview of Scope and Progress



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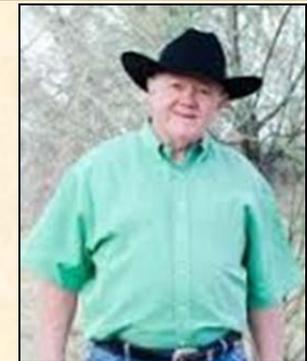
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WIPP Site Incident Independent Review (WSIIR) Team Background

Tasked with: examining the TAT and LANL reviews of the circumstances that led to Feb. 2014 waste containment barrel rupture at WIPP

Focus:

- 1) to determine if the conditions that led to the original rupture of drum #68680 were understood
- 2) to review the conclusions that were drawn by the DOE investigation teams.

Our mission: to conduct a completely transparent review. All work is documented and available to the public via website:
<http://www.nmt.edu/WSIIR>



WSIIR Team Timeline

December 2014-May 2015

December

- TAT presents preliminary findings to WSIIR

February

- Meeting w/ Southwest Research and Information Center Director Don Hancock

March/April

- In-depth review of TAT report

May

- Our questions forwarded to TAT

August-October 2015

August

- LANL presents detailed findings of their analysis and ongoing drum tests
- TAT presents responses to our questions

September

- WSIIR team Interim Report

October

- LANL presents results of drum tests and remediation plans
- Former EEG members respond to our interim report
- WSIIR team issues updated Interim Report (minor corrections)

November 2015-February 2016

November/December

- WSIIR team meets and begins follow-up research to respond to EEG

January

- Response to EEG issued

February

- WSIIR team conducting further reviews relative to WIPP facility

Technical Assessment Team (TAT) Investigation

Key findings

- Published report by TAT (pdf available in Reports section of our website)
- Presentation (by TAT) to WSIIR team in August meeting (in response to our questions in categories below)
 - Methods
 - Software Codes
 - Modeling
 - Results

WSIIR Team Assessment of TAT Review

- The TAT worked closely with LANL but produced an independent report. The TAT used generally accepted methods.
- Conclusions provided by the TAT are reasonable/consistent with the physical evidence and with other studies.
- The TAT's charter was extremely focused.
 - Positive: Narrow focus helps minimize extraneous activity
 - Negative: Narrow focus could lead to overlooking important events that were not considered
- TAT's conclusion that the organic kitty litter mixed with the nitrate salts ultimately resulted in the rupture of drum #68660 is supported by the physical evidence and modeling.
- The WSIIR team agrees with TAT's conclusion that radiation in the drum did not play a significant role in the runaway reaction.

Feb. 5, 2014 Truck Fire

No evidence of a relationship between the truck fire and the rupture of barrel #68660 was found.



Key Findings by LANL Investigation

- Nitrate salts and organic kitty litter (Swheat) created potential for an exothermic chemical reaction.
- A chemical model of a drum with contents similar to drum #68660 confirm the drum should have breached. The model is descriptive, not predictive.
- Nitrates + Swheat+ water can generate heat which can result in an initial temperature rise of 60° C. This initial temperature rise is high enough to trigger further exothermic reactions and result in exponential increase in pressure and temperature within the drum.
- The environmental signature in Panel 7 at WIPP is consistent with the tests on smears from the breached drum, suggesting that the drum #68660 was the only drum that breached.
- No two drums are the same due to heterogeneity. This could be the reason that one drum breached but not the rest.
- Modeling shows that runaway time is highly dependent upon the variables involved.

LANL's Drum Tests

Variables tested

- ratio of Swheat to nitrate salt
- salt composition
- role of neutralizers added
- influence of radioactive elements

LANL's Conclusions

- The waste had the highest reaction potential right after processing. The drum contents and reaction conditions change significantly over time and become more stable.
- Pressurization is needed for the drums to experience a runaway reaction; when pressure was relieved in their drum tests, runaway did not occur.
- Breach of the drum containing Swheat is possible even at ambient temperature.

LANL is performing additional headspace gas testing on secondary container gas (from 60 drums containing Swheat remaining onsite)

LANL's Plans for Further Testing (communicated to us in Fall '15):

- Prepare 12 or more salt/Swheat mixtures in Nalgene bottles equipped with drum vent filters
- Test a bottle once a week (over 12 week period) with the APTAC (an instrument measuring thermodynamic potential and changes in pressure) to evaluate whether they observe increasing or decreasing thermal behavior
- Shake them and retest a subset (at end of 12 week period) to observe what effect, if any, there is from agitation

LANL Path Forward

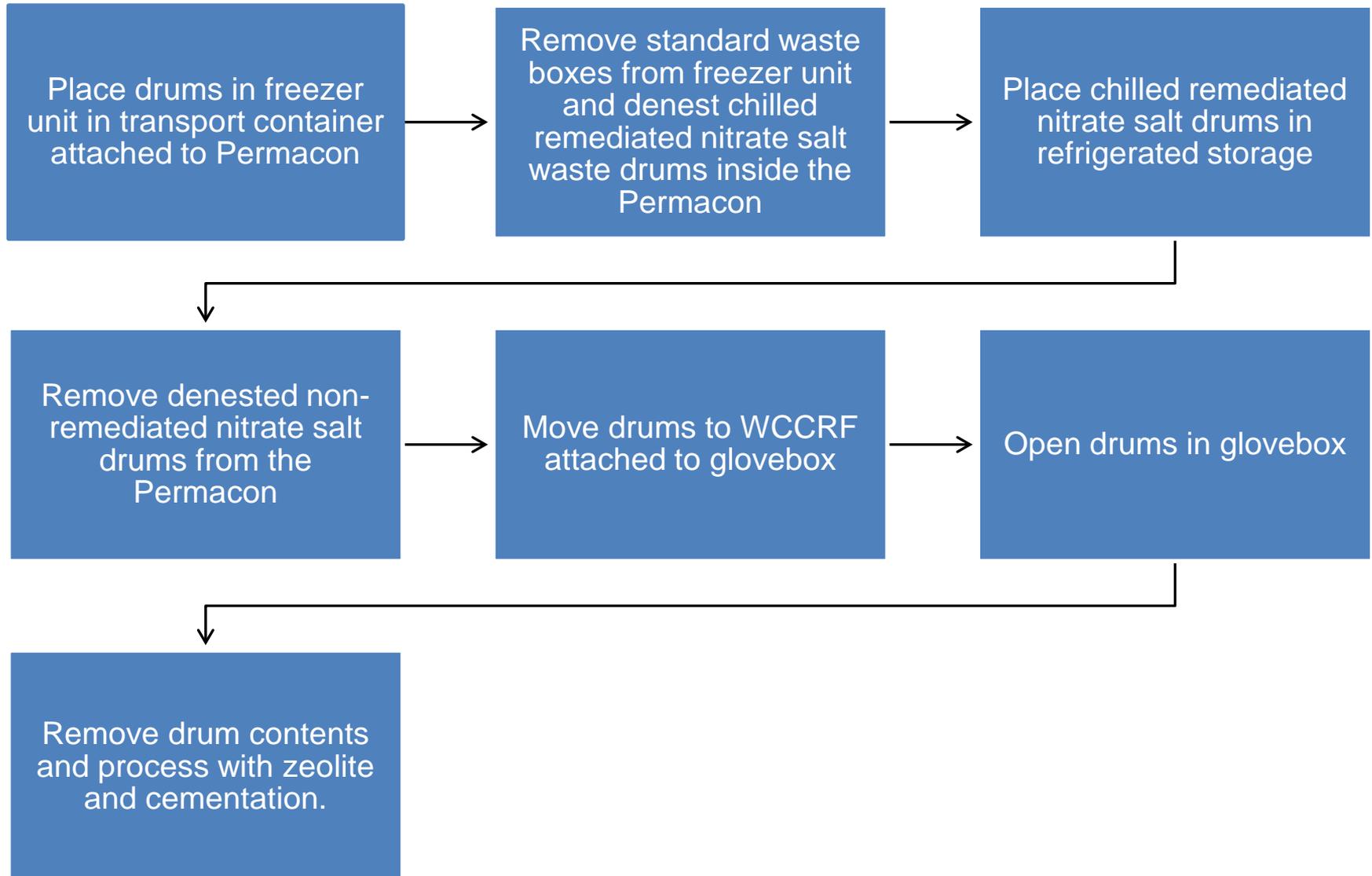
Pursued 5 treatment options

- zeolite addition with cementation
- zeolite addition without cementation
- dry-process cementation
- wet-process cementation
- salt dissolution with cementation



- Zeolite option used before (EMRTC, 2010) (LANL Carlsbad Office, 2012)
- All options require a change to LANL's current permit for processing waste

LANL's Strategy to Resume Waste Treatment Operations



LANL's Corrective Action Plan



WSIIR Team Assessment to Date

- Mixing organic kitty litter into the processing of waste being prepared for shipment to WIPP ultimately led to the runaway chemical reaction and subsequent rupture of drum #68660. Nuclear processes were unimportant.
- Potential triggering mechanisms were examined, but the exact mechanism is unknowable and not necessary to know proceeding forward.
- All drums containing the organic kitty litter have been accounted for. In order to react, these drums would need a significant heat source.
- If drums are kept cool enough, runaway reaction potential is very low.
- WIPP drums already in the repository should remain.
- If organic material is removed from the waste stream, the potential for a similar drum rupture will be eliminated.

WSIIR Team Conclusions to Date

- Radionuclides did not play a significant role in the runaway reaction that happened Feb. 14, 2014
- We found no evidence of a relationship between the truck fire and the breach of drum #68660
- While safety procedures are already in place, safety must be made a higher concern at WIPP going forward
- We are confident that the risk has been mitigated by eliminating the organic materials for underground drums stored at WIPP
- Drums aboveground need to be addressed