



Providing Additional Pressure Relief to the Remediated Nitrate Salt Drums

Background

After the radiological event on February 14, 2014 at the Waste Isolation Pilot Plant (WIPP), Department of Energy (DOE) scientists from several national laboratories conducted extensive experiments and modeling studies to determine what caused the drum to breach. These investigations indicated that an incompatible mixture of nitrate salts and an organic absorbent created the conditions that resulted in an exothermic reaction that led to a drum breach and radiological release. As part of this research, two additional parameters were determined to be critical to control an unwanted reaction: temperature and pressure.

The information gained from the scientific experiments and associated research have helped DOE and Los Alamos National Security, LLC (LANS) to develop robust measures for the safe storage of the remediated nitrate salt (RNS) drums located at Los Alamos National Laboratory.

In the time since the WIPP event, comprehensive measures have been employed to ensure the RNS drums remain at a safe temperature. Additionally, in the summer of 2015, LANS installed a supplemental cooling system in the contamination control structure where the RNS drums are stored. The temperature of the RNS drums are monitored and inspections are conducted daily.

Additional Pressure Relief

To reduce the possibility of a build up of pressure, each of the RNS drums is equipped with a filtered drum vent. To further reduce the potential for pressure to contribute to an exothermic chemical reaction, in the spring of 2016 the Laboratory will install High Efficiency Particulate Air (HEPA) filtration systems to the RNS drums.

The HEPA filter will eliminate any pressure build-up within the drum. In the unlikely event that the filter becomes clogged, a pressure relief disc will operate to release the pressure.

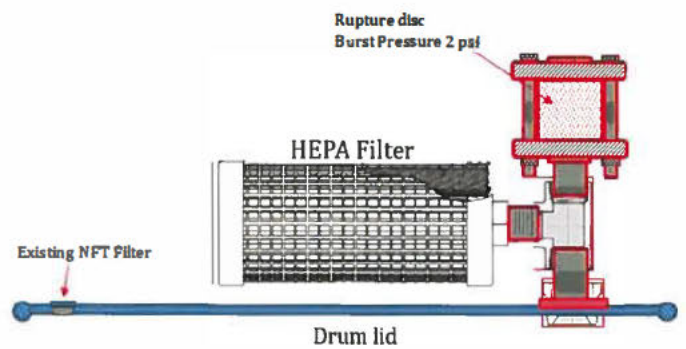
By eliminating the potential for pressure build up, the possibility of a runaway reaction is removed. DOE and LANS are confident that this additional layer of defense for the RNS drums will prevent an unintended radiological release similar to what occurred at WIPP.



The RNS waste is stored in drums like the ones pictured above.



A HEPA filtration system will be installed on the RNS drums.



Pressure build-up would be relieved by the HEPA filtration system.

Remediated Nitrate Salt Drums Storage at Los Alamos National Laboratory

Background

Technical Area (TA) 54 is Los Alamos National Laboratory's transuranic (TRU) and low-level waste storage, characterization, and remediation area.

The 63-acre site is located one mile from the community of White Rock and approximately one-eighth mile from the boundary between Pueblo de San Ildefonso and the Laboratory.

As a part of its national security mission, the Laboratory conducts research that generates waste contaminated with radioactive isotopes. During operations, waste is processed, packaged, and shipped to licensed disposal facilities. TRU waste is permanently disposed of at the nation's only TRU waste repository, the Waste Isolation Pilot Plant (WIPP), which is located southeast of Carlsbad, New Mexico. Because WIPP did not open until 1999, the Laboratory stored TRU waste on site at Area G, an area within TA-54.

After the historic Las Conchas wildfire burned within four miles of TA-54 in 2011, reducing the amount of waste in Area G was prioritized. Between October 2011 and May 2014, the Laboratory shipped over 4000 above-ground TRU waste containers.

Breach at WIPP

In February 2014, a Los Alamos drum breached underground at WIPP. The drum contained nitrate salt waste that was remediated with an organic absorbent. Laboratory scientists conducted experimental and modeling studies to determine what caused the breach. Their investigations indicated that the mixture of nitrate salts and an organic absorbent together with high temperatures and internal pressure can create a potential for exothermic chemical reactions.

After the drum breached, the Laboratory suspended TRU waste shipments and secured the nitrate salt waste drums that remained at the Area G. In addition to the remediated nitrate salt (RNS) waste at the Laboratory, similar drums are underground at WIPP and at Waste Control Specialists (WCS) in Andrews, Texas. The drums at WCS are packed into standard waste boxes inside modular concrete containers. The containers are buried in a disposal cell that is covered with backfill and sand. The remediated nitrate salt waste at WIPP is underground in waste panels that are now sealed.



TRU waste is stored at Area G within TA-54.



The PermaCon at Area G houses the remediated nitrate salt drums.



RNS drums are packed inside standard waste boxes inside the PermaCon.



Safe Storage of Remediated Nitrate Salt Drums

A significant amount of information was learned through the Laboratory's investigation into the WIPP radiological event. This has helped the Laboratory to develop measures for the safe storage of the RNS drums and their eventual treatment.

The RNS drums at Area G are nested in either steel standard waste boxes or 85-gallon drums and are stored in a contamination-control structure known as a PermaCon. Designed for the storage and handling of radiological waste and kept free of flammable materials, this structure is equipped with fire suppression, a high-efficiency particulate air system (HEPA), and a climate control system. The containers are monitored for temperature, sampled for gases, and visually inspected.

In August 2015, the Laboratory installed a supplemental cooling system where the RNS drums are stored. Although the waste is currently in a safe configuration and is being monitored, controlling the temperature inside the structure adds another layer of protection. This effort is among several layers of precautions designed to secure the waste.

To help further reduce the potential for pressure to contribute to an exothermic chemical reaction, beginning in the spring of 2016 the Laboratory will install supplemental HEPA filtration vents and pressure relief discs on the RNS drums. This will prevent pressure from building up inside an RNS drum.

A plan for the treatment of the RNS drums is being developed. After the drums are treated, they will be ready for shipment offsite.



A supplemental cooling system was installed where the RNS drums are stored.



A 40-ton chiller provides supplemental cooling for the RNS drums inside the PermaCon.

Wildfire Mitigation at Los Alamos National Laboratory

Background

Established in 1943, Los Alamos National Laboratory (LANL) consists of 1,280 buildings in 47 technical areas spread out over 37 square miles. The complex includes 11 nuclear facilities and more than 10,000 workers.

In the past, large wildfires in the area, including the La Mesa Fire (1977), the Dome Fire (1996), the Oso Fire (1998), the Cerro Grande Fire (2000), and the Las Conchas Fire (2011) demonstrate that forests on and surrounding the Laboratory are susceptible to destructive crown fires – fires which spread from treetop to treetop.

Current snowpack and prior moisture has placed northern New Mexico at a lower risk for catastrophic wildfires than seen in recent years. Nonetheless, conditions change quickly and the Laboratory maintains a high level of readiness to respond to a wildfire.

Wildfire Mitigation

Emergency Operations maintains an annual and a five-year wildfire management plan that responds directly to Los Alamos National Security, LLC (LANS) and Department of Energy (DOE) policies.

Central to the Laboratory's Fire Mitigation program are 5 wildfire buffer zones comprising approximately 12,000 acres. Each of these zones is carefully maintained to prevent combustible materials from igniting to create a hazard from wildfire. Mitigation strategies include:

- Establishing defensible zones around sensitive areas
- Removing invasive species
- Clearing dead trees
- Mulching vegetation
- Ensuring that potential fuels remain at knee height or below

An Integrated Approach

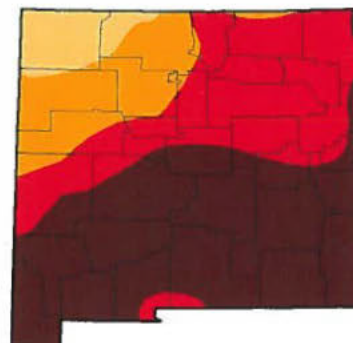
The Laboratory's Fire Mitigation program is closely integrated with Los Alamos County, the U.S. Forest Service and the National Park Service to fight any wildfire in the region. The Laboratory's Fire Management posts daily Fire Danger Ratings on their website. Local and regional resources are staged and tracked dependent on the severity of the rating. Fire hazard is assessed on a scale of 1 to 5, with 1 being most severe. Firefighters at the Laboratory conduct routine drills beginning in April. Drills cover a wide variety



Reviewing procedures at the Emergency Operations command center.

U.S. Drought Monitor New Mexico

June 28, 2011
(Released Thursday, June 30 2011)
Valid 7 a.m. EDT



Drought Conditions (Percent Area)	Date				
	06/28	06/24	06/20	06/16	06/12
Extreme	0.00	0.00	0.00	0.00	0.00
Severe	0.00	0.00	0.00	0.00	0.00
3 Months Above Normal	0.00	0.00	0.00	0.00	0.00
1 Month Above Normal	0.00	0.00	0.00	0.00	0.00
Equal or Below Normal	100.00	100.00	100.00	100.00	100.00
Good Year or Above Normal	0.00	0.00	0.00	0.00	0.00

Legend:
 0.00 Above Normal
 0.01 to 0.09 Above Normal
 0.10 to 0.33 Above Normal
 0.34 to 0.66 Above Normal
 0.67 to 0.99 Above Normal
 1.00 to 3.00 Extreme Drought
 3.01 to 4.00 Severe Drought
 4.01 to 5.00 Extreme Drought

The Drought Monitor reflects an overall picture of drought conditions and does not necessarily reflect the severity of drought conditions for individual states or counties.

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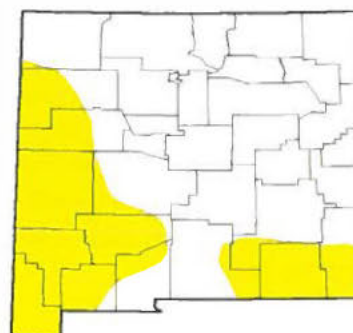
USDA, NCEM, NCEM/DMA, NCEM/DMA

<http://droughtmonitor.nrc.gov/>

Drought conditions in northern New Mexico at the time of the 2011 Las Conchas Fire.

U.S. Drought Monitor New Mexico

March 1, 2016
(Released Thursday, March 3, 2016)
Valid 7 a.m. EDT



Drought Conditions (Percent Area)	Date				
	03/01	02/24	02/17	02/10	02/03
Extreme	0.00	0.00	0.00	0.00	0.00
Severe	0.00	0.00	0.00	0.00	0.00
3 Months Above Normal	0.00	0.00	0.00	0.00	0.00
1 Month Above Normal	0.00	0.00	0.00	0.00	0.00
Equal or Below Normal	100.00	100.00	100.00	100.00	100.00
Good Year or Above Normal	0.00	0.00	0.00	0.00	0.00

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USDA, NCEM, NCEM/DMA, NCEM/DMA

<http://droughtmonitor.nrc.gov/>

Drought conditions in northern New Mexico as of March 1, 2016.

of scenarios to test different firefighting strategies and tactics.

The Interagency Fire Base located at Technical Area (TA) 49 serves as a regional command center for fire suppression activities in the area. Engine crews, Helo Crews, and light air resources are stationed on site during wildfire season. Large air tankers are stationed within two hours of Laboratory property in Durango, Colorado; Clovis and Alamogordo, New Mexico. Smaller tankers can fight fires from their bases in Las Vegas or Taos, New Mexico.

Mitigation Strategies at Area G

Area G, the Lab's waste disposal site, is where above-ground waste is stored, including drums of remediated nitrate salts (RNS). The RNS drums are secured inside a steel-framed contamination-controlled structure covered in a fire retardant fabric dome. Ensuring these drums remain stored safely is a top priority for DOE and LANS.

Additional mitigation activities are in place that further reduce the risk of fire to the RNS drums. LANS has conducted extensive thinning operations in the canyons that border Area G. A defensible perimeter has been created around the structure that houses the remaining RNS drums – no vegetation taller than 6 inches grows within 75 feet of this structure. The RNS drums are protected by a sprinkler system that activates automatically when the indoor temperature reaches 155°F. Combustible materials within all of Area G are strictly controlled and minimized.

Area G Facility Emergency Response Actions have been upgraded to augment the protection of the RNS drums in the event of an imminent fire hazard. Safety protocols in place include:

- Increased monitoring of interior and exterior temperatures
- Increased monitoring of ventilation and fire suppression systems
- Placement of fire retardant blankets over the RNS drums

The Los Alamos Fire Department Pre-Incident Plan for Area G identifies the structure where the RNS drums are stored as a priority response location in the event of a wildfire. This response would include using air tanker support to lay a blanket of fire retardant chemicals on the canyon slope adjacent to the building where the RNS drums are stored.



Fire suppression crews onsite at the Laboratory.



Above-ground waste is stored at Area G at TA-54.



The perimeter of Area G before and after thinning operations.



The Los Alamos Fire Department routinely conducts drills at the Laboratory.