October 7, 2011

Waste Isolation
Pilot Plant

Fact Sheet

Planned Change Notice
Salt Disposal Investigations

Background

The Salt Disposal Investigations (SDI) are a series of laboratory and field tests designed to evaluate the high temperature response of salt. This testing will provide data on the thermomechanical, hydrological and chemical behavior of salt, and provide data that improve the modeling of high temperature response. The major steps in the test program are:

1) Test planning (currently underway)
2) Laboratory studies of thermal and mechanical properties of salt and crushed salt
3) Laboratory studies of chemical response and hydrologic properties of salt and crushed salt
4) Coupled process modeling for test design and
5) Installation and operation of a field test in a newly mined section in the north end of the WIPP facility

This fact sheet focuses on the fifth step because it is the only step that directly affects the operation of the WIPP.

What Field Testing Is Proposed At WIPP?

The primary goal of the SDI field test is to measure the properties and behavior of *in situ* salt in response to temperature in excess of 320°F. The preliminary planning for the SDI test uses five 8.5 kilowatt (kW) heaters in mined alcoves of a central pillar. The preliminary design envisions a two-year heating phase followed by an 18- to 24-month cool-down phase after the heaters are turned off. After the cool-down phase, personnel will reenter the test alcoves to perform additional testing on the halite adjacent to the heaters. Figure 1 is a diagram of a single alcove and heater. The alcove is partly filled with crushed salt generated by mining operations. No radiological material will be used during the field testing.

Where Will The Field Test Be Installed?

The field test will be installed in a remote, newly mined area of the WIPP repository. The new mining for the SDI test occurs in the northern section of the underground facility, historically termed the "Experimental Area", that is currently vacant and unused. The access drifts and alcoves for the SDI heaters will be approximately 2,300 feet (0.43 miles) from Panel 1, which is the waste panel that is closest to the alcoves.

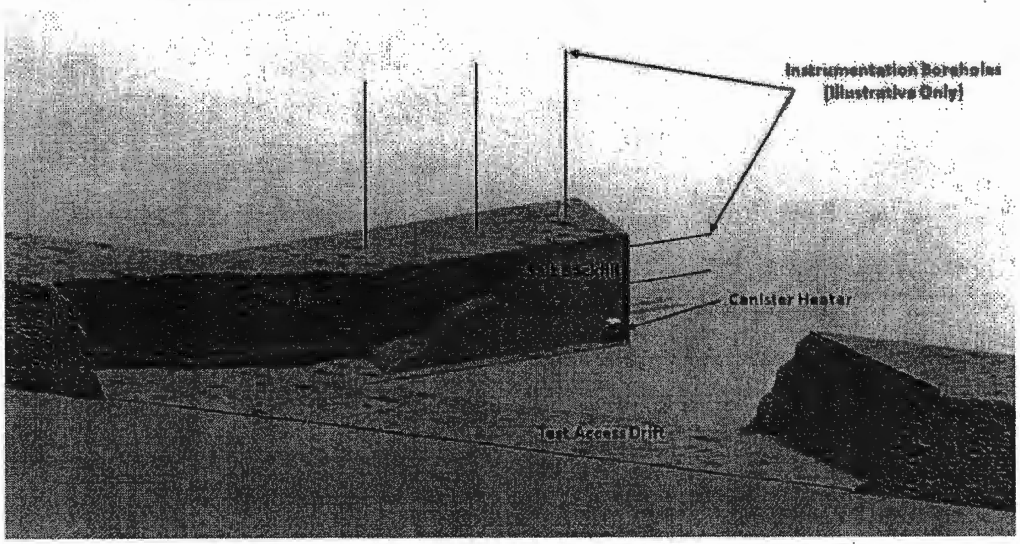


Figure 1. Diagram of an Alcove and Heater for the SDI Test (1 of 5)

What Are The Operational Impacts on WIPP?

Operational impacts to WIPP from the field test have been evaluated by DOE. The results of this evaluation are as follows:

- **From Mining SDI** - There are no significant operational impacts from mining the test facility because waste emplacement panels will not be mined while the test facility is being mined (except for minor maintenance for the main facility).
- **At Station A** - The mining of the test facility will not impose a significantly greater aerosol loading on the return air at Station A than current mining operations at WIPP. The maximum temperature change in the ventilation air at Station A is predicted to be very small, less than 0.6°F, because the heat from the SDI test would be diluted in the total return air flow. Operation of the test will not have significant impacts on the capability of the shrouded probes at Station A to take representative samples from the ventilation air stream.

What Are The Long-Term Impacts on WIPP?

Long-term impacts to WIPP from the field test have also been evaluated by DOE. The results of this evaluation are as follows:

- **Thermal** - The SDI test will generate a thermal pulse that moves outward from the test area into the surrounding halite. The maximum temperature change from this thermal pulse is less than 0.2°F at Panel 1, which is closest to the heaters, and therefore of low consequence to repository performance.

- **Closure of Alcoves** - Deformation of the salt walls surrounding the alcoves will redistribute mechanical stresses as the alcoves close. This stress redistribution near the alcoves is primarily a local effect because salt creeps most rapidly in high temperature salt with the greatest deviatoric stresses, and temperatures and stresses are greatest close to the alcoves. It will not have a significant impact on the waste panels, which are at least 2,300 feet away.
- **Subsidence** - Mining of the SDI facility does not result in a significant increase in subsidence relative to subsidence from waste-filled panels because the extraction ratio for the test facility is very low, on the order of 0.15.
- **Performance Assessment (PA)** - The impact of the SDI facility on long-term performance has been evaluated in the SDI PA (Camphouse et al. 2011). The normalized releases for the SDI PA are essentially identical to the normalized releases for the Performance Assessment Baseline Calculation performed in 2009, which is the current PA baseline.

For more Information

This Planned Change Request is available for review on the EPA website at http://www.epa.gov/radiation/news/wipp-news.html#sdi.

Waste Isolation Pilot Plant

October 5, 2011

WIPP Technical Fact Sheet

Planned Change Request Repository Reconfiguration

Background

The Waste Isolation Pilot Plant (WIPP) is the nation's only repository for defense-generated transuranic (TRU) waste. The WIPP underground is mined out 2,150 feet beneath the earth's surface in ancient salt beds that dates back 250 million years. In the mined out area underground, contact-handled and remote-handled TRU radioactive waste is disposed.

The underground layout has eight waste disposal panels, each with seven rooms measuring 33 feet wide, 13 feet high and 300 feet long in which TRU waste is being disposed. Each disposal panel is separated in the main access drifts by pillars measuring 200 feet wide. Each disposal room within the panel is separated by pillars measuring 100 feet.

The WIPP repository is configured for 10 disposal panels as described in the Compliance Certification Application, although the current WIPP underground configuration layout has eight waste disposal panels. The original design plan for Panels 9 and 10 was to widen the existing main access drifts, currently being used for transport routes for waste, hauling mined salt and ventilation, and to allow for other underground operations. The existing drifts to be used as part of the original design are the East (E)-300, E-140, West (W)-30, and W-170 access drifts (See Figure 1). Each underground drift is named according to the east/west direction and distance (in feet) from the Salt Shaft.

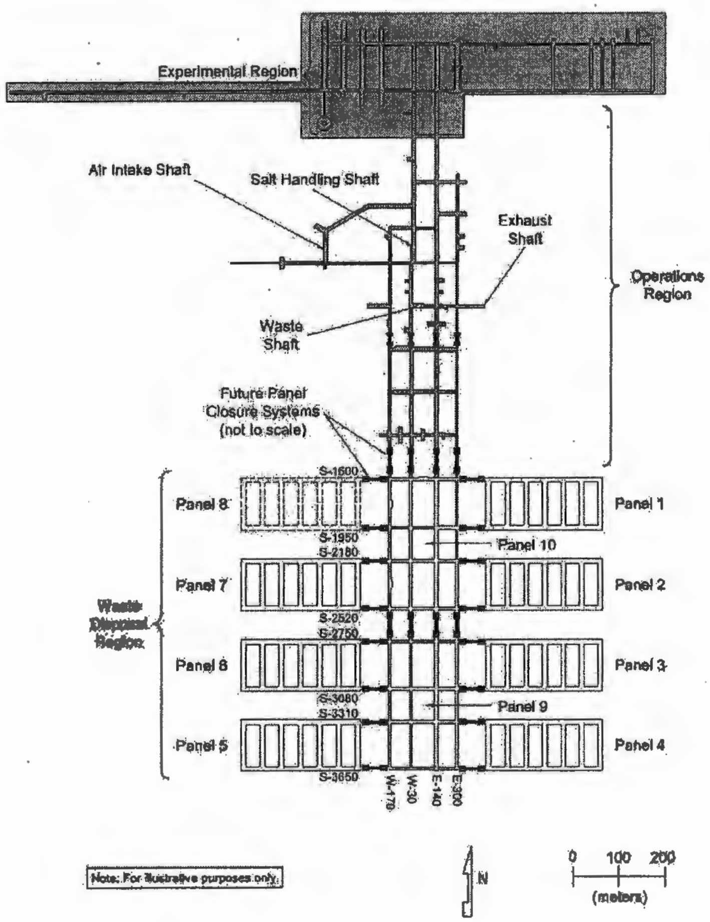


Figure 1

However, after years of mining and waste disposal activities, potential issues in the main access drifts and cross drifts have been identified. Due to the age of the access drifts and proximity of other mined waste panels higher rates of convergence and fracturing have been observed. Convergence is the movement or "creep" of the salt as it moves to fill voids created by mining. Fractures are separations or cracks in the salt that result from compression and tension stresses as the formation creeps. Observations have shown that widening areas, previously mined for daily functions other than waste disposal, can actually increase the salt creep rate from one to two inches per year to as high as five to seven inches per year. This has caused an increase in maintenance efforts in the form of trimming the floor, walls and roof (due to convergence) to established dimensions and installation of additional roof bolts and chain link mesh to control convergence and fractures and maintain safe conditions.

What is Proposed?

The DOE is proposing to modify the 40 CFR Part 191 Compliance Certification with a change in the current configuration to the WIPP underground repository. Due to the geotechnical issues and the extensive maintenance to existing, older sections of the WIPP underground, DOE is proposing to relocate Panels 9 and 10 from the existing north-south access drifts, south of the existing Panels 4 and 5, to mine what are being designated as Panels 9A and 10A (See Figure 2). Panels 9A and 10A will have the same dimensions as the previous eight panels. Relocating Panels 9 and 10 to the south of Panels 4 and 5 will enhance worker safety and reduce maintenance requirements by providing a more stable geotechnical environment for the two new waste panels.

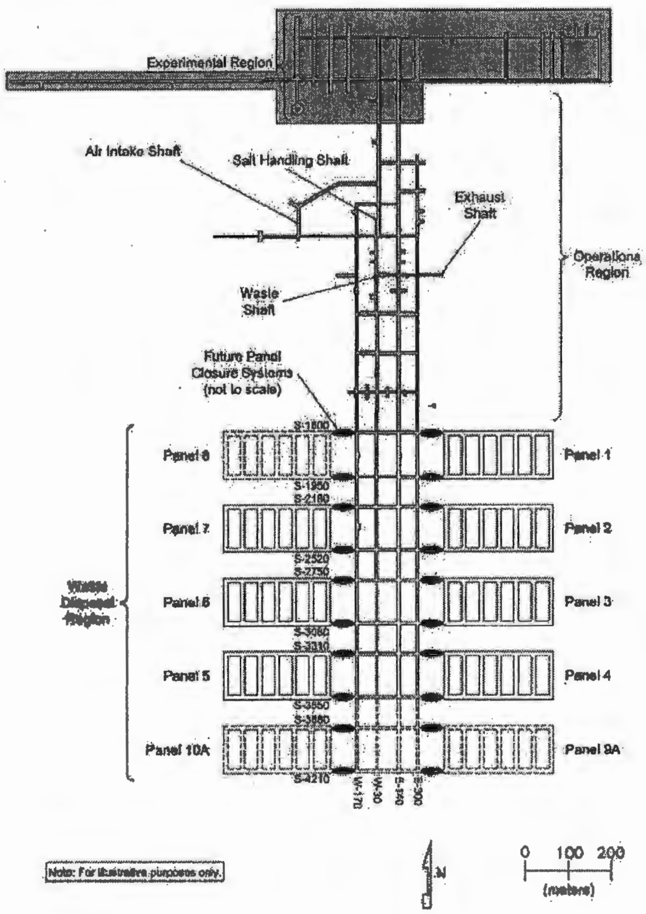


Figure 2

Impact on WIPP Performance

A Performance Assessment has been conducted to evaluate the effects of the proposed change on the long term performance of the repository. Containment of TRU waste at the WIPP is regulated by the U.S. Environmental Protection Agency (EPA) according to the regulations in Title 40 of the Code of Federal Regulations (CFR), Part 191. Compliance with the containment requirements in Title 40 CFR Part 194 Certification Criteria is demonstrated by means of performance assessment (PA) calculations performed by Sandia National Laboratories (SNL). WIPP PA calculations estimate the probability and consequence of potential radionuclide releases from the repository to the accessible environment for a regulatory period of 10,000 years after facility closure. The impact of the proposed repository reconfiguration on long-term repository performance has been evaluated with a PA that represents the relocation of Panels 9 and 10. This PA, which is called the Panel Closure Redesign and Repository Reconfiguration PA (PC3R PA), demonstrates that the combined changes from repository reconfiguration and panel closure redesign result in predicted total mean normalized releases that are very similar to the predicted total mean normalized releases for the Performance Assessment Baseline Calculation-2009 (PABC-2009), which is the current PA baseline as shown in Figure 3 The WIPP will therefore remain in compliance with the containment requirements in 40 CFR Part 191 for the combined changes from repository reconfiguration and panel closure redesign.

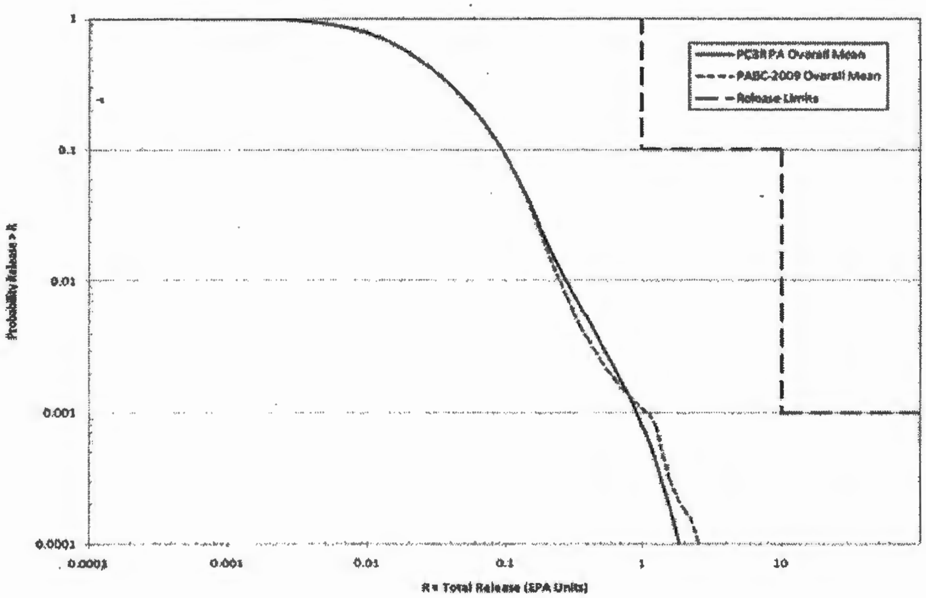


Figure 3 Overall mean CCDFs for total normalized releases for the PC3R PA and for PABC-2009

For more Information

This Planned Change Request is available for review on the EPA website at http://www.epa.gov/radiation/news/wipp-news.html#reconfig.

October 19, 2011

Fact Sheet

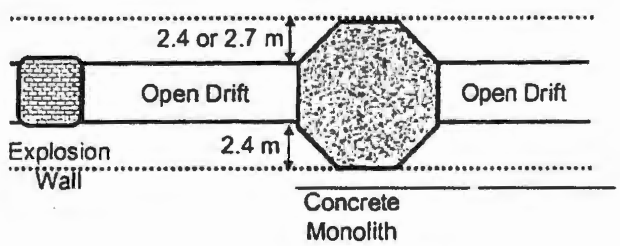
DOE Proposed Panel Closure Redesign Planned Changed Request

Changes to the WIPP Hazardous Waste Facility Permit

Background

The Waste Isolation Pilot Plant (WIPP) is the nation's only repository for defense generated transuranic (TRU) waste. The WIPP underground is mined out 2,150 feet beneath the earth's surface in ancient salt beds that date back 250 million years. In the mined out area underground, contact-handled and remote-handled TRU radioactive waste is disposed.

The U.S. Department of Energy (DOE) has submitted a planned change request to the Environmental Protection Agency (EPA) to modify Condition 1 of the Final Certification Decision (EPA, 1998) for 40 CFR Part 194 for the WIPP. Condition 1 specifies that the panel closure system to be used at WIPP is the one designated as Option D. The Option D design consists of the installation of a concrete block explosion/isolation wall, removal of the majority of the disturbed rock zone (DRZ) in the area of the closure and emplacement of a large Salado Mass Concrete (SMC) monolith. SMC is a salt-saturated concrete originally designed for use in the shaft seals on repository closure. This closure would be installed in each panel of the repository after waste emplacement in that panel is complete.



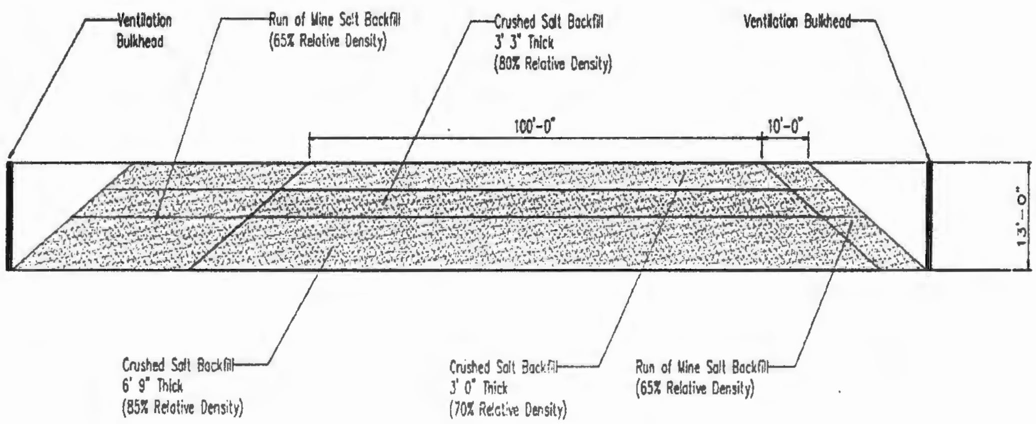
Option D Design

What is Proposed?

After the initial certification of the WIPP facility, the DOE initiated tests of SMC. SMC testing results showed that the material as specified in Condition 1 could not meet the performance requirements outlined in the Compliance Certification Application (CCA) Appendix Panel Closure System (PCS). In addition, closed panels were monitored for hydrogen and methane concentrations. Data collected after two and a half years of monitoring shows that neither methane nor hydrogen concentrations approach the lower explosive limits of these gases.

After 12 years of operations, the DOE found itself in a position to redesign a panel closure system to meet performance standards (as defined in CCA, Appendix PCS) and ensure it is less expensive and easier to install than the original Option D. The Run-Of-Mine (ROM) Panel Closure has two components: two bulkheads and a ROM salt backfill.

The construction methods and materials to be used in this design have been proven in mining and construction projects. In the base design two ventilation bulkheads will be used at either end. In those panels that already have a block wall bulkhead in place, the block wall will form one end of the closure, with a ventilation bulkhead used at the outer end after placement of the salt. The ROM salt backfill will be placed in contact with the salt surfaces of the drifts, including the back or roof. A variety of techniques are available for placing the ROM salt. The bulk of the salt can be placed using equipment already in use at the WIPP and flingers or blowers can be used for final placement against the back. The ROM salt will be placed until the entire drift is filled over a minimum distance of 100 feet. Over time, creep closure of the drifts will ensure that the salt backfill consolidates to a condition approaching intact salt with a low permeability. The fabrication, installation, and maintenance of bulkheads, such as those proposed for the closure, are standard at the WIPP facility.



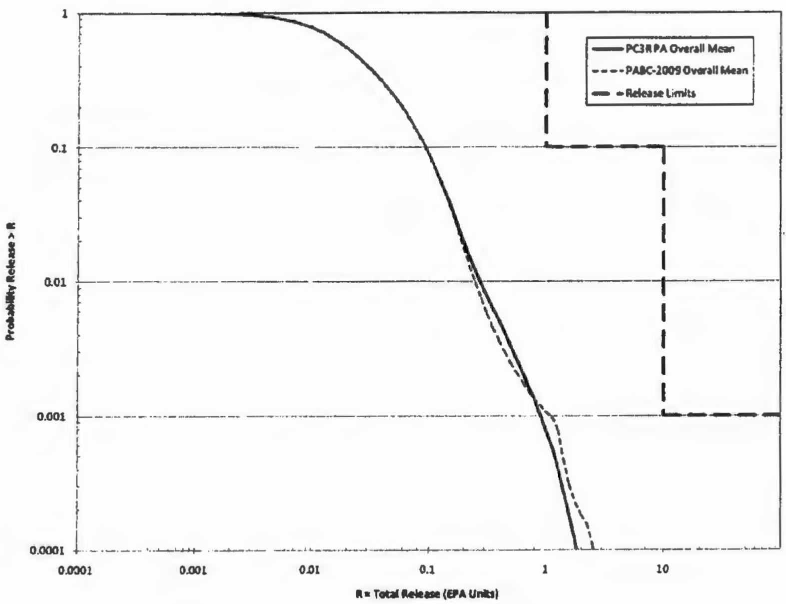
1. Crushed Salt Backfill Layers 100' 0" minimum length and minimum thicknesses as indicated..
2. Salt layers can be inclined as long as minimums maintained.
3. Lines through Run of Mine Salt show possible initial layering of backfill.

Impact on WIPP

As a result of increased understanding of salt, salt movement, repository performance and characteristics of emplaced waste obtained over 12 years of operation, the DOE has determined that a revision of the approved panel closure design can be made. A change in the design specified in Condition 1 of the Final Rule is also required because SMC cannot be produced to the specification in the CCA while meeting the design requirements of the Option D design. Airflow modeling has shown this design will contain Volatile Organic Compounds below regulatory limits, and it will perform its desired function of protecting workers, the public and the environment before repository closure.

The analyses provided with this planned change request demonstrates that long-term releases are insensitive to a broad range of panel closure permeabilities, and the impact of the proposed new closure design on long-term performance is negligible.

The results of earlier Performance Assessments show that the repository performance is not sensitive to the permeability of the panel closure over quite a wide range. An analysis of the likely permeability of the ROM salt indicates that once consolidation occurs due to creep of the surrounding salt, a process that might take at most 100 years, the permeability of this design is essentially the same as that of Option D. While there might be a small difference in early performance, the long-term performance of the revised design will be indistinguishable from that for Option D.



PC3R PA and PABC-2009 Overall Mean CCDFs for Total Normalized Releases

For more Information

This Planned Change Request is available for review on the EPA website at <u>http://www.epa.gov/radiation/news/wipp-news.html#panelclosure</u>