

**ATTACHMENT G1**

**WIPP PANEL CLOSURE (WPC) DESCRIPTION AND SPECIFICATIONS**

Adapted from the October 2012 Design Report for a Panel Closure System at the Waste Isolation Pilot Plant



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## ATTACHMENT G1

### WIPP PANEL CLOSURE (WPC) DESCRIPTION AND SPECIFICATIONS

#### Introduction

An important aspect of repository operations at the WIPP facility is the closure of filled waste disposal panels. Each panel consists, among other things, of a panel air-intake drift and a panel air-exhaust drift. After completion of waste disposal activities in a panel, that panel must be closed. The closure of individual panels during the operational period is conducted in compliance with the requirements in this Permit (Permit). The WIPP Panel Closure (WPC) design has been selected to close filled panels at the WIPP facility in compliance with Permit requirements.

This attachment presents the applicable specifications and requirements for fabrication, installation and maintenance of the WPC in the WIPP facility and the information presented here is taken primarily from the Design Report for a Panel Closure System at the Waste Isolation Plant (RockSol, 2012).

#### G1-1 WPC Description

Engineering drawings of the WPC design are presented in Appendix B. The WPC design consists of a minimum of 100 feet of emplaced run-of-mine (ROM) salt configured between two steel bulkheads for panels that do not have explosion-isolation walls installed in them. For panels with installed explosion-isolation walls, an alternate WPC configuration consists of one steel bulkhead, a minimum of 100 feet of emplaced ROM salt and one block wall. The minimum 100 feet of ROM salt is shall be emplaced to completely fill the drift from side to side and top to bottom. The construction methods and materials used in the design represent available technologies. No special requirements are identified for these components during the operational period of the repository. The fabrication, installation and maintenance of ventilation bulkheads are standard practice. Salt can be pushed tight to the underground surfaces of the drifts.

After completion of waste emplacement operations in future active panels, steel bulkheads will shall be installed in the intake and exhaust panel entries. Next, the minimum 100 feet of ROM salt is shall be emplaced using conventional mining equipment. After ROM salt emplacement, the outer (accessible) steel bulkhead is installed.

The performance of the WPC design has been numerically modeled. The model results show that an air gap forms between the excavation roof and the top of the ROM salt fill due to the settlement of the emplaced ROM salt. The model predicts that an air gap above the emplaced ROM salt remains until creep closure of the salt closes the air gap. This process is expected to take 23 years after panel closure. While the air gap is present, restriction to release of volatile organic compounds (VOCs) through the WPC is shall be controlled in part by the accessible bulkhead. After closure of the air gap, the resistance to release of VOCs through the WPC is dominated by the 100 feet of emplaced ROM salt. Until closure of the air gap, maintenance of the accessible bulkhead will shall -be conducted, as necessary, to restrict the release of VOCs from the panel.

### G1-1a Permit Design Requirements

The applicable design requirements are provided in Permit Attachment G, Section G-1e(1). The WPC was designed and evaluated to be compliant with these requirements

### G1-1b Design Component Descriptions

This section presents a description of the components of the WPC to be installed (i.e., steel bulkheads and ROM salt). Technical specifications and drawings for the WPC are provided in Appendices A and B, respectively. Individual specifications address shaft and underground access and materials handling, construction quality control, treatment of surfaces in the closure areas, and applicable design and construction standards. Bulkheads are not included in the specifications since they are routinely constructed and used at the WIPP facility.

#### G1-1b(1) Steel Bulkhead

The steel bulkhead (Figure G1-1) serves to block ventilation at the intake and exhaust of the panel and prevents personnel access. This use of a bulkhead is a standard practice and will shall be constructed as a typical WIPP bulkhead with no access. The bulkhead will shall consist of a noncombustible steel member frame covered with sheet metal. Telescoping tubular steel or functionally equivalent material is shall be used to bolt the bulkhead to the floor and roof. Flexible flashing material such as a rubber conveyor belt (or other appropriate material) will shall be attached to the steel frame and the salt as a gasket, thereby providing an effective yet flexible blockage to ventilation air. The steel bulkheads need shall be maintenance maintained for air flow resistance and the accommodation of panel entry salt creep during a the approximately 23-year period following each individual panel closure installation. The WPC relies upon bulkheads for approximately 23 years to control VOC flow. During this period, accessible steel bulkheads may need to be maintained or replaced and the surrounding DRZ may need to be treated or removed to provide air flow resistance as intended. The maintenance activities will shall include repair and/or replacement of bulkhead components or may included construction of a new accessible bulkhead in front of the existing one.

The WPC design was evaluated assuming an air flow resistance value for the accessible bulkhead during the 23 years after installation. Instead of monitoring each accessible WPC bulkhead for air flow resistance, the performance of accessible WPC bulkheads will shall be monitored using a two component approach as follows:

- Inspection of accessible WPC bulkheads for integrity and deterioration as required in Permit Attachment E. Corrective actions will shall be taken in accordance with associated operational procedures to repair observed deterioration as needed. General inspection requirements pertaining to WPC bulkhead inspections (e.g., schedule, frequency, log forms, records, etc.) are as specified in Permit Part 2, Section 2.7.
- Monitoring closed panel emissions of VOCs through a system wide approach utilizing the running annual averages for VOCs derived from the Repository VOC Monitoring Program (Permit Attachment N). Running annual average trends will shall be used to initiate corrective actions that may -include additional VOC monitoring activities around specific panels to better locate the source of the increased emissions, corrective actions to limit VOC emissions from the active panel, and/or repair/replacement of accessible WPC bulkheads. Associated Repository VOC Monitoring requirements (e.g., reporting, notification, remedial action, etc.) are as specified in Permit Part 4, Section 4.6.2.

G1-1b(2) ROM Salt

ROM salt material from mining operations is as delivered by haul truck or load haul dump (LHD) units to the panel closure area in a loose state. As such, it is a noncombustible natural material that is completely compatible with the repository environment. The ROM salt is shall be emplaced over a minimum length of 100 feet.

The ROM salt can be emplaced using conventional mining equipment in such a manner that will result in a slope at the ends. The ROM salt can shall be emplaced as is from the mining operations or from a storage pile. The ROM salt is shall be emplaced up to the block wall in panels with existing block walls installed.

Attachment G, Figure G-4 illustrates the design for panels with and without block walls. Variations in entry height are expected for individual WPCs. For WPCs emplaced in panel entries with block walls, the end slope for the ROM salt may be steepened to accommodate the full length of ROM salt. The emplacement of ROM salt will avoid putting significant lateral pressure on bulkheads.

G1-2 Technical Specifications

The technical specifications are included in Appendix A and are summarized in Table G1-31. The specifications cover the general requirements of the system, quality assurance and quality control, site work, and ROM salt emplaced in the panel entries. Bulkheads are not included in the specifications since they are routinely constructed and used at the WIPP facility.

**Table G1-1**  
**Technical Specifications for the WIPP Panel Closure System**

<b><u>Division 1 – General Requirements</u></b>	
<u>Section 01010</u>	<u>Summary of Work</u>
<u>Section 01090</u>	<u>Reference Standards</u>
<u>Section 01400</u>	<u>Contractor Quality Control</u>
<u>Section 01600</u>	<u>Material and Equipment</u>
<b><u>Division 2 – Site Work</u></b>	
<u>Section 02010</u>	<u>Mobilization and Demobilization</u>
<u>Section 02222</u>	<u>Excavation</u>
<b><u>Division 4 – Salt</u></b>	
<u>Section 04100</u>	<u>Run-of-Mine-Salt</u>

G1-3 Drawings

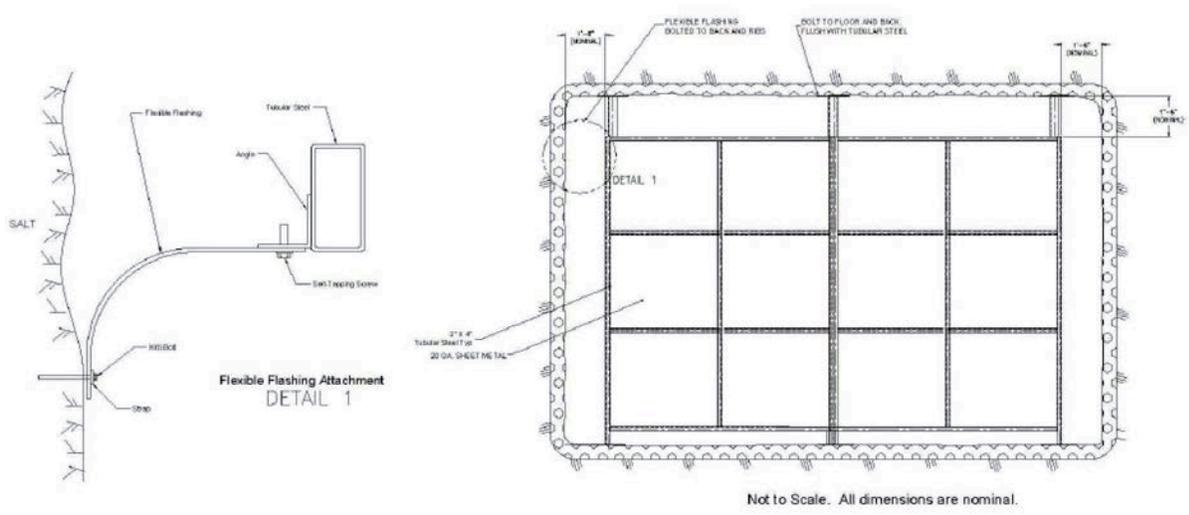
The Drawings (Appendix B) are summarized in Table G1-42. The drawings illustrate and describe the construction and details for the WPC.

**Table G1-2**  
**WIPP Panel Closure System Drawings**

<u>Drawing Number</u>	<u>Title</u>
<u>262-001</u>	<u>WIPP Panel Closure System Title Sheet</u>
<u>262-002</u>	<u>WIPP Panel Closure System, Underground Waste Disposal Panel Configurations (3, 4, 6, 7, 8)</u>
<u>262-003</u>	<u>WIPP Panel Closure System, Underground Waste Disposal Panel Configurations (1, 2, 5)</u>
<u>262-004</u>	<u>WIPP Panel Closure System, Construction Details</u>

References

RockSol Consulting Group, Inc., 2012, Design Report for a Panel Closure System at the Waste Isolation Pilot Plant, Westminster, CO



**Figure G1-1**  
**Typical Bulkhead for the WPC**