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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 11 2000

OFFICE OF
AIR AND RADIATION

Ines Triay, Manager
Carlsbad Area Office
Department of Energy
P.O. Box 3090
Carlsbad, NM 88221

[SUMMARY OF EPA REVIEW OF CLAY SEAM G MINING PLAN] dtd 8/6/00

Dear Dr. Triay:

Thank you for your letter dated June 26, 2000, in which you notified us of your intent to raise the Waste Isolation Pilot Plant's repository horizon in Panels 3, 4, 5, 6, and 9 by approximately two meters so that the roof is located at Clay Seam G. My staff have reviewed your plan, and we agree that it will enhance operational safety without significantly affecting the long-term performance of the facility. A summary of our technical review is enclosed for your information. We will place this summary in our docket.

If you have any questions regarding the summary, please call Mary Kruger at (202) 564-9310.

Sincerely,

Frank Marcinowski, Acting Director
Radiation Protection Division

Enclosure

cc: Matthew Silva, EEG

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WIPP:1.5.2:REF:NQ:533387

Summary: EPA Review of Clay Seam G Mining Plan

1.0 Introduction

This report summarizes our consideration of a DOE plan to elevate the excavation of several new WIPP waste panels (3-6 and 9) such that the roof coincides with Clay Seam G. This plan was presented to EPA in a letter from Dr. Ines Triay, dated June 26, 2000, and during a technical meeting between EPA and DOE held in Carlsbad, New Mexico, on June 28 and 29, 2000.

2.0 Summary of DOE Plan

The current panel elevation results in a 2-meter thick beam of halite between the roof and Clay Seam G. Clay Seam G is thin but continuous and provides a layer with essentially no shear or tensile strength. This beam is subjected to considerable lateral loading. It tends to bend downward into the excavated room, fracture, and separate from the rest of the halite along the clay seam. Extensive rock bolting and maintenance are needed to maintain safe working conditions over extended periods of time. DOE plans to raise the entire panel excavation approximately 2 meters, so that the roof would coincide with Clay Seam G and the floor would be an additional 2 meters above Marker Bed 139. This plan would retain the current panel dimensions and waste loading.

The plan would increase the roof stability by allowing the upper room sidewall to move more freely toward the room along Clay Seam G, decreasing the load on the roof and transferring most of the lateral load to the floor, where buckling may occur but collapse would not. The primary benefits of this change would occur during the operational period. Eventually the salt would deform and encapsulate the waste in the same manner as for the current design. DOE does not expect that increasing the elevation of the waste panels by about 2 m will significantly affect long-term repository performance.

3.0 Assessment of DOE Plan

DOE's plan is justified based on the wealth of mining experience at the WIPP. The plan offers clear advantages to the miners during the operational phase. For example, on June 29 we were shown excavations at the salt handling shaft station where the roof had been raised to Clay Seam G about 5 years after original mining. These excavations were relatively stable, with no large scale fracturing, in contrast with the severe buckling that could be seen in rooms mined below Clay Seam G. A DOE report completed in 1994 describes Room D, where the roof was originally excavated to a continuous clay seam and where enhanced stability has been observed. This report also states, "Without exception, the field data demonstrate that initially mining drifts with a clay seam forming the roof makes for long-lasting, stable excavations. The field data also demonstrates that removing a roof beam well after excavation improves the stability of a drift."

(DOE-WIPP 94-025, "Investigation of the Advantages of Removing Highly Fractured Roof Beams," August 1994, p. 9).

These results are supported by numerical modeling, which shows a transfer of lateral stresses to the floor (DOE-WIPP 94-025, Figure 25). Although the strain in the corner between the floor and the sidewall considerably increases, the resultant fracturing is at the floor and is not considered hazardous, because it can be readily supported if needed in the same manner as the fractured halite presently observed at the corners of drift intersections.

The impacts of the plan on long-term repository performance appear minimal and are not expected to affect compliance adversely, as discussed below.

3.1 Probability of Borehole Intersection

The disposal panel dimensions and waste loading procedures will remain unchanged. The probability of intersecting the repository by an exploration borehole will therefore also remain unchanged, as will releases due to cuttings and cavings.

3.2 Spalling Releases and Direct Brine Releases

The affected waste panels would be approximately 2 m nearer the ground surface, possibly resulting in slightly lower borehole drilling fluid back pressure, slightly lower in situ rock stresses due to reduced overburden loading, and slightly lower pore water pressures. Such changes could result in minor changes in spallings releases, direct brine releases, repository gas pressures, and brine flows into and out of the repository. Some of these changes may be slightly adverse and some may be slightly beneficial; however, the change in elevation relative to the 655 m (2150 ft) total depth of the facility is only 0.3%. The effect of such a small room elevation change would have a negligible effect on long-term performance and should be well within the uncertainty of the calculations.

3.3 Castile Brine Reservoir

The height of the affected waste panels above a hypothetical Castile brine reservoir will be increased by approximately 2 m. This increase could result in slightly lower brine flows into the repository if such a reservoir were encountered due to the increased hydraulic head. This change may be slightly beneficial; however, the change in elevation relative to the approximately 259 m (850 ft) depth of brine reservoirs beneath the repository is only 0.8%, and the effect of such a small room elevation change would have a negligible effect on long-term performance.

3.4 Marker Bed 139

The distance between the affected waste panels and underlying Marker Bed 139 would be increased by about 2 m. The halite in this interval may continue to be included in the disturbed

rock zone (DRZ) in PA modeling because the increased distance would be offset by an increased lateral load. This marker bed averages about 2.8 feet thick and is the primary avenue for interbed flow into and out of the repository. Raising the waste panels by 2 m would approximately double the distance between the panel floor and Marker Bed 139 and could provide a small beneficial effect by decreasing brine flow between the panel and the marker bed.

3.5 Clay Seam F

Raising the waste panels would lower the height of Clay Seam F on the room walls. This change may be slightly adverse because it will allow the sidewalls to move more freely into the rooms. This movement will not affect long-term performance. Because Clay Seam F is dispersed rather than continuous, the operational difficulties posed by sidewall movement would not be severe and would be offset by the benefits gained by reducing the roof beam load.

3.6 Roof Rock Bolts

An increased stability of the roof would result in the use of fewer rock bolts, fewer short boreholes penetrating the roof, and less iron available for corrosion. These effects, although small, would be generally beneficial.

3.7 Floor Loading

The increase in the floor beam load would likely increase buckling and heaving of the panel floors. This movement will not affect long-term performance. Fractured and loosened halite in the floors does not present the same safety hazard as loosening in the roof because halite in the floors will not cause injuries by falling. Floor buckling can be addressed by removing the halite, thereby maintaining the design room height.

3.8 Room Sidewalls

As previously mentioned, strain at the edge of a waste panel where the floor and the sidewall meet would be increased, and increased fracturing may occur on the lower sidewalls. The resultant fracturing will be near the floor and is not hazardous because it can be readily supported with wire mesh in the same manner as the fractured halite presently observed at the corners of drift intersections. It will not affect long-term performance.

3.9 Anhydrite Layer B

Anhydrite layer B lies just above Clay Seam G. This anhydrite layer presently intersects the DRZ above the waste panel. Raising the waste panels would cause this anhydrite layer to directly intersect an affected waste panel at the roof. The anhydrite would be removed during mining because it may represent an operational safety hazard. The long-term effect of directly intersecting this anhydrite will be negligible because the layer is thin and not laterally extensive.