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LPDR-Wm-11(2)

SITE VISIT NNWSI/TJ

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JUL 22 1987

WM Record File

102

WM Project 11

Docket No. _____

PDR ✓

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Distribution:

MEMORANDUM FOR: R. John Starmer, Section Leader
Technical Branch
Division of Low-Level Waste Management
and Decommissioning

(Return to WM, 623-SS)

FROM: T. L. Johnson
Technical Branch
Division of Low-Level Waste Management
and Decommissioning

SUBJECT: REPORT OF SITE VISIT TO NNWSI PROJECT

On May 5, 1987, I was accompanied by Paul Prestholt on a site visit to the NNWSI Project. The purpose of the visit was to observe site features and to assess the flooding and erosion potential at the proposed surface locations of the various shafts and ramps associated with the project.

The proposed locations for repository access were delineated in Figure 3-10 of "Two-Stage Repository Development at Yucca Mountain: An Engineering Feasibility Study," (SAND 84-1351); this report was used to approximately locate the surface entrances to the shafts and ramps.

In general, I have concluded that many of the shafts and ramps are likely to be susceptible to flooding and erosion during the site characterization, operational, and post-closure phases. In my opinion, DOE should perform detailed flooding, erosion, and geomorphic analyses to fully characterize the design problems that may be present. DOE may also wish to re-examine the siting process used to locate these shafts and ramps, particularly in light of the flooding and erosion problems identified.

Assessments of each of the proposed shaft and ramp locations are enclosed. If you have any questions, I may be contacted at X74490.

Original Signed By

T. L. Johnson
Technical Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS

Enclosure: As stated

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WM Project: WM-

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SITE VISIT NNWSI/TJ

JUL 22 1987

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FOR: R. John Starmer, Section Leader, LLTB
 FROM: T. L. Johnson, LLTB
 SUBJECT: REPORT OF SITE VISIT TO NNWSI PROJECT
 DATE: 7/21/87

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DATE CONCURRED
 07/22/87

(Original not received in the WMDCC)
 7/23/87 5:03 p.m.
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NNWSI SITE VISIT

FLOODING AND EROSION COMMENTS

SHAFT AND RAMP LOCATIONS

A. Exploratory Shaft

1. Location. This shaft will be located approximately 400 feet east of the location shown in SAND 84-1351 on a very steep hillside, apparently to avoid potential flooding problems on Coyote Wash. Using a cut-and-fill operation, a pad will be constructed immediately adjacent to Coyote Wash.
2. Flooding and Erosion Potential. The proposed shaft will be located at an elevation such that surface runoff in Coyote Wash will apparently not enter the shaft under normal flooding conditions. However, surface runoff on the face of the steep hillslope above the shaft could possibly enter the shaft. Very high flow velocities can be anticipated if the runoff becomes channelized.

Particularly for the long term, flood velocities in Coyote Wash could present problems. Over a 10,000-year period, a significant amount of lateral and vertical erosion is a possibility, due to the hydraulically steep channel slopes present. Therefore, it may be necessary to provide a significant amount of erosion protection to stabilize the channel and prevent erosion toward the sealed shaft. If the shaft seal is exposed by erosion, deterioration due to weathering could be expected, resulting in the entrance of surface runoff into the shaft; the runoff could be produced both by the localized channels and Coyote Wash.

3. Feasibility of Hydraulic Design Measures. Depending upon the results of performance assessments, it may be necessary to construct a permanent diversion berm to prevent surface water inflow. While the contributing drainage area appears relatively small, flow velocities in channels and gullies are likely to be very high due to the steep slope, necessitating the possible use of very large riprap to prevent erosion of the berm. Additionally, sedimentation behind the berm could pose an unacceptable long-term maintenance problem.

Flow velocities in Coyote Wash adjacent to the shaft area will also likely require the use of very large riprap to prevent lateral and vertical erosion in the main stream channel. The riprap will likely be needed for some distance upstream and downstream of the shaft location.

If the shaft will be imbedded in rock along Coyote Wash, the situation is much improved. However, the competency of the rock in the area will need to be assessed to verify its resistance to erosion and long-term weathering. A detailed geomorphic analysis should be performed to determine if the potential for significant lateral and/or vertical erosion exists. This analysis should then be followed by a detailed hydraulic analysis to determine if the shaft may be susceptible to flooding and erosion under the changed conditions identified in the geomorphic study.

B. Waste Handling Ramp Portal

1. Location. The waste handling ramp opening will be located immediately adjacent to the east side of Exile Hill. At this location, the eastern slopes of Exile Hill are relatively steep (approximately 25%) and are subject to gullying. The surface opening will be placed at an approximate elevation of 3660 ft. msl, which will place it in an area having a surface slope of approximately 8-10%.
2. Flooding and Erosion Potential. The proposed ramp opening will be located such that surface runoff from Yucca Wash is not likely to enter the ramp, even under extreme flood conditions. However, surface runoff from the eastern slopes of Exile Hill may be a potential problem, particularly if the runoff becomes channelized in the immediate vicinity of the surface entrance.

Very high flow velocities can be expected on the 25% slopes of Exile Hill and the 8-10% slopes in the immediate ramp vicinity, thus requiring the possible use of heavily-armored diversion structures to prevent erosion and entrance of surface water. These flow velocities and potential for erosion could pose problems during the site characterization, operation, and post-closure phases.

3. Feasibility of Hydraulic Design Measures. Depending upon the results of performance assessments and flooding analyses, it may be necessary to provide diversion structures to divert flows on the steep hillslope above the shaft. While the contributing drainage area appears relatively small, flow velocities in channels and gullies are likely to be very high, necessitating the use of very large riprap to prevent erosion. Additionally, sedimentation behind the berm could pose a long-term maintenance problem.

Flow velocities on the 8-10% slopes adjacent to the ramp opening will also likely necessitate the use of very large riprap to prevent erosion. The riprap armoring will likely be needed for some distance upstream and downstream of the shaft location.

C. Muck Handling Ramp Portal

1. **Location.** This portal will be located approximately 2500' northwest of the high point of Exile Hill at an approximate elevation of 3800 ft. msl. The ramp entrance is located in an area of numerous gullies and appears to be located in or very near to the floodplains of Pagany Wash and several other small intermittent drainages.
2. **Flooding and Erosion Potential.** The proposed ramp entrance will be sited such that surface runoff from Pagany Wash and several other unnamed washes could potentially cause flooding of the ramp entrance. The slope of the ground surface in this area appears to be approximately 5%. Very high flow velocities can be expected on such a slope, particularly in well-defined channels.

Due to the relatively large drainage areas involved (particularly Pagany Wash), erosion can be expected in the area. Therefore, it may be necessary to provide a significant amount of erosion protection in order to stabilize the existing channels and to prevent erosion of any engineered structures.

3. **Feasibility of Hydraulic Design Measures.** Depending upon the results of a performance assessment, it may be necessary to construct extensive diversion structures to divert surface water flows away from the ramp entrance. The contributing drainage areas appear relatively large, and flow velocities in nearby channels and gullies are likely to be high, necessitating the use of very large riprap to prevent erosion. Additionally, sedimentation could pose a long-term maintenance problem.

For this particular ramp, the situation is further complicated by the existence of several separate drainage areas which could impact the site; in addition to Pagany Wash, the site could possibly be inundated and eroded by separate flows from the northwest and southwest. A very detailed flooding and erosion analysis will be needed to determine flow patterns and velocities in this area. Additionally, a geomorphic investigation should be undertaken to assess the potential for long-term changes which could occur in this area.

D. Men and Materials Shaft

1. **Location.** This shaft will be located adjacent to Drill Hole Wash, about 2000' feet north of the proposed exploratory shaft. The shaft entrance will apparently be located on a steep hillslope at an elevation of approximately 4200 ft. msl. The hillslope above the entrance is relatively steep (25%), and the tributary drainage areas of potential upstream gullies are relatively small (several acres).

2. Flooding and Erosion Potential. The shaft will be located at an elevation such that surface runoff in Drill Hole Wash will apparently not enter the shaft even under severe flood conditions. However, surface runoff on the face of the steep hillslope could possibly enter the shaft, particularly if the runoff becomes channelized. Very high flow velocities could be anticipated in the localized channels, thus necessitating the use of diversion measures to prevent erosion near the shaft.

Particularly for the long-term, flood velocities in Drill Hole Wash could present problems. Drill Hole Wash has a relatively large drainage area, and over a 10,000-year period, a significant amount of erosion, both lateral and vertical, is a possibility, due to the hydraulically steep channel slopes present in this wash. It may be necessary to provide a significant amount of erosion protection to stabilize the channel and prevent erosion toward the sealed shaft.

3. Feasibility of Hydraulic Design Measures. Depending upon the results of a performance assessment, it may be necessary to construct a diversion berm to divert flows on the steep hillslope above the shaft. While the contributing drainage area appears relatively small, flow velocities in channels and gullies are likely to be very high, necessitating the possible use of very large rock sizes to prevent erosion of the berm. Additionally, sedimentation behind the berm could pose a long-term maintenance problem.

Flow velocities in Drill Hole Wash adjacent to the shaft may require the use of very large riprap to prevent lateral and vertical erosion in the main stream channel. A detailed geomorphic analysis should be performed to determine if the potential for significant lateral and/or vertical erosion exists. This analysis should then be followed by a detailed analysis to determine if the shaft will be susceptible to flooding and erosion.

E. Waste Emplacement Ventilation Exhaust Shaft

1. Location. The shaft will be located approximately 3000' southeast of the proposed exploratory shaft. The ramp entrance is located in an area of several channels and gullies, and appears to be located in or very near to the floodplain of an unnamed drainage area which flows to the east.
2. Flooding and Erosion Potential. The shaft entrance will be sited such that surface runoff from an unnamed wash could potentially cause flooding. The slope of the ground surface in this area appears to be approximately 4%. Very high flow velocities can be expected on such a slope, particularly in localized channels and gullies.

Because some erosion could occur in this area, it may be necessary to provide erosion protection to stabilize (laterally and vertically) the existing channels and to prevent erosion of any engineered structures.

3. Feasibility of Hydraulic Design Measures. Depending upon the results of a performance assessment, it may be necessary to construct diversion structures to divert surface water flows away from the shaft entrance. Flow velocities in nearby channels and gullies may be high, thus requiring the use of large rock. Sedimentation and long-term maintenance could also pose a problem.

A very detailed flooding and erosion analysis will be needed to determine the flow patterns and velocities in this area. Additionally, geomorphic investigations should be conducted to assess the potential long-term changes which could occur.