



# Lawrence Livermore National Laboratory

NUCLEAR SYSTEMS SAFETY PROGRAM

L-196

August 28, 1987

Mr. M. E. Blackford, MS-623ss  
Project Officer, WMGT  
Technical Review Branch  
Division of High-Level Management  
Office of NMSS  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: Transmittal of Two Reference Field Investigation Reports  
(Preliminary Draft)

References:

- (a). "Soil/Geomorphic Characterization of the Crater Flats Area," by C. Rus Purcell. Two pages.
- (b). "Geomorphic/Erosion Field Reconnaissance of the Proposed Shaft and Ramp Portal Area, Yucca Mountain, Nevada," by C. Rus Purcell. Three pages.

Dear Mr. Blackford:

Attached herewith, please find the reference two (2) field investigation reports prepared by C. Rus Purcell. These reports cover Purcell's recent work on: (1) soil/geomorphic characterization of the Crater Flats area and (2) geomorphic/erosion field work in the proposed shaft and ramp portal area in the NNWSI site. The work was conducted in close coordination with Ms. C. Abrams and Ted Johnson of the NRC.

If you have any questions, please let us know.

Sincerely yours,

Dae H. (Danny) Chung  
Project Leader

DHC/ic  
Attachment as stated.

cc: C. Abrams, NRC/WMGT

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WM Projects: WM-10, 11, 16  
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WM Record File: A-0297  
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To: D. Chung  
From: R. Purcell  
Date: August 27, 1987  
Subject: Soil/Geomorphic Characterization of the Crater Flats Area.

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**TASK:**

Five days ( Aug. 17 - 21, 1987 ) were spent in the field in the Crater Flats area with Dr. F. F. Peterson, University of Nevada - Reno, who is working on a soils project for John Bell, Nevada Bureau of Mines and Geology. This week marked the third and final week in the field for Dr. Peterson's assignment ( refer to Item no. 6, Trip Report dated July 23, 1987, for more discussion ). The final report will be included in the Nevada Bureau of Mines and Geology Annual Report for 1987. This publication is expected to be available on or around February, 1988.

**PURPOSE:**

My purpose for participating was threefold: 1) to observe and help in the detailed soil descriptions, 2) to participate in discussions of the soil/geomorphic relationships of the area based on my past work in the area, and 3) to maintain a close relationship with all parties involved in soil/geomorphic studies pertinent to the proposed Yucca Mountain Nuclear Waste Repository Site.

**ACTIVITIES:**

The week was spent doing detailed soil descriptions from existing backhoe pits, exploratory trenches, and hand dug shovel pits, and discussing the potential relationship between the soils data and the geomorphic surfaces in the Crater Flats area.

**RESULTS:**

1) There are identifiable relict surfaces in the Crater Flats area that can be described by a combination of surface ( desert pavement, desert varnish on clasts, degree of dissection, etc. ) and subsurface (soils ) characteristics ( especially on Q<sub>2</sub> or older surfaces ).

a) These characteristics, when better understood, will be the basis for correlation of surfaces throughout the Yucca Mountain area.

2) Because of the very dense, hard nature of the pans ( lower horizons ) in the older soils of the area, hand dug shovel test pits are inadequate. Additional backhoe pits are necessary to effectively describe the pan which is one of the most important characteristics for separating QTa from Q<sub>2</sub> surfaces.

3) Many of our observations are in basic agreement with the original observations made by the USGS, however, these data are more applicable to developing a correlation of geomorphic surfaces and not deposits as previously presented.

**RECOMMENDATIONS:**

1) Encourage the State of Nevada to continue with their soil/geomorphic studies, including a detailed backhoe pit/soils description study to complete the necessary soils characteristics to develop data for area correlations.

2) Continue close relationships with the State and its consultants to maintain as high a level of pertinent, up-to-date developments and data as possible.

To: D. Chung

From: R. Purcell

Date: August 27, 1987

Subject: Geomorphic/Erosion field reconnaissance of the proposed shaft and ramp portal areas, Yucca Mountain, NV.

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### PURPOSE:

Two days ( Aug. 6 & 7, 1987 ) were spent in the field observing surficial characteristics of the watersheds that may potentially impact the proposed shaft and ramp portal areas for the Yucca Mountain high level nuclear waste site. Special attention was given to areas of potential future erosion and debris dam formation. I was accompanied in the field by Mr. Robert Gelson ( LLNL ) on August 6, 1987.

### ACTIVITIES:

#### DAY 1 - PROPOSED SHAFT LOCATIONS

- 1 -- Visual overview of the major involved watersheds from atop Yucca Mountain.
- 2 -- Walking Coyote? Wash (closest to the proposed Exploratory Shaft ) from its headwaters to its confluence with Drill Hole Wash.
- 3 -- Driving existing roads up washes including Wren and Drill Hole Wash to observe the surface characteristics of these areas.
- 4 -- Examining the proposed location of the Exploratory Shaft, Men and Materials Shaft and the Steel Lined Shaft.

#### DAY 2 - RAMP PORTAL LOCATIONS

- 1 -- Driving up Pagany Wash ( Canyon ) to the end of the existing road and then walking approximately an additional mile up the wash.
- 2 -- Driving along Isolation Ridge to the headwaters of Pagany Wash and making numerous stops to observe the surficial characteristics of the canyon.
- 3 -- Examining the proposed location of the Muck Ramp Portal.
- 4 -- Inspecting the location of the proposed Waste Emplacement Ramp Portal from nearby Exile Ridge.
- 5 -- Return to reexamine the proposed shaft locations along Drill Hole Wash.

## OBSERVATIONS

### SHAFT LOCATIONS:

- 1 -- Many of the washes of concern have been disrupted in their lower reaches by construction activities making direct observations difficult to impossible.
- 2 -- The small watersheds draining the eastern side of Yucca Mountain that are tributary of Drill Hole Wash are very narrow, steep, and bottom almost entirely in bedrock.
- 3 -- Steep surface slopes have, at best, a thin veneer of soil.
- 4 -- The primary material subject to mass wasting are the boulders and cobbles that litter the steep valley sides and channel bottom, and the underlying bedrock.
- 5 -- These materials tend to build up at the mouths of the small drainages as the result of flood events. However, it doesn't appear likely that these deposits have ever progressed very far from their locations near the valley mouths.
- 6 -- The shafts appear to be located far enough upslope that the threat of flood waters and/or debris flow materials are highly unlikely, however, the potential for lateral erosion in the shaft areas needs to be carefully evaluated.

### RAMP PORTAL LOCATIONS

- 1 -- Very little debris is present in the upper reaches of Pagany Wash.
- 2 -- Although much larger in square miles and wider in most reaches, the surficial characteristics of Pagany Wash are very similar to the tributaries to Drill Hole Wash; fairly steep side slopes with, at best, a thin soil veneer, bottom primarily in bedrock, and surface boulders and cobbles and steep, exposed bedrock bluffs being most prone to mass wasting.
- 3 -- The maximum relief of Pagany Canyon is much greater than the canyons of tributaries to Drill Hole Wash, making rock falls more likely.
- 4 -- Debris accumulation is in the lower reaches of Pagany Wash, in an area where the canyon is quite narrow.

- 5 -- There are various levels ( ages ) of valley fill deposits in the lower reaches of Pagany Canyon, ranging from about 30' above the modern channel to contemporaneous gravel bars.
- 6 -- Bedload in the modern channel of Pagany Wash appears to be far greater than in the tributaries to Drill Hole Wash and includes boulders up to 4-5' in diameter.
- 7 -- Evidence suggests recent floodwaters top the lowest valley fill materials ( about 2-5' above the modern channel ) in Pagany Wash.

**COMMENTS** - The following items need to be evaluated regarding the emplacement of the proposed surface facilities.

- 1 -- The potential maximum flood events.
- 2 -- The potential erosive capabilities of sediment and debris laden waters of all the pertinent washes.
- 3 -- The potential for lateral erosion of the slopes below the shaft locations.
- 4 -- The potential for alluviation in the area of the Muck Handling Ramp Portal.
- 5 -- The potential for downcutting of Pagany Wash where it crosses the Muck Handling Ramp.
- 6 -- The feasibility of haul roads to the presently proposed facilities.

WM-23S

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WM Project 10, 11, 16

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Distribution:

Blackford T. Johnson

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cc: C. Abrams

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