



# Lawrence Livermore National Laboratory

NUCLEAR SYSTEMS SAFETY PROGRAM

WM DOCKET CONTROL CENTER

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Mr. Michael E. Blackford  
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Geotechnical Branch  
Division of Waste Management  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555

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SUBJECT: Monthly Management Letter Report No. 16  
Progress for the Month of July 1984  
NRC FIN A0294  
Technical Assistance in Seismo-Tectonic Impacts in Repositories

Dear Mr. Blackford:

1. PROGRAM OBJECTIVES AND DESCRIPTION

The description of the program objectives and specific tasks has been deleted from the Monthly Management Letter Report at the direction of the NRC project management.

2. PROGRESS - JULY 1984

General Accomplishments

During this reporting period, we have accomplished our development of a draft Generic Technical Position (GTP) paper on "Seismo-Tectonic Impacts on Design considerations and Performance Assessment of Underground High-Level Waste Repositories". The task order for this work was issued on April 26, 1984, by the NRC project management. The draft document was due NRC on or before September 30, 1984. We submitted our draft GTP document on July 31, 1984.

Our draft GTP document is intended to identify general concerns which may be applicable to one or more of the DOE-proposed repository location sites. The basic framework of this draft GTP document is the NRC Salt Site Technical Position, which included input from our STP papers on BWIP, NNWSI, and the Gibson Dome Salt Site.

Basically, our draft GTP document was divided into five major discipline-related sections. The basic divisions were as follows:

- (1) Geomorphic setting
- (2) Stratigraphic/lithologic setting

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- (3) Structural/tectonic setting
- (4) Seismic setting, and
- (5) Drilling, mining, fluid withdrawal and fluid injection activities.

The organization of the draft GTP document presented above seems to cover all currently identified areas of concern related to geologic stability. We anticipate that other general technical concerns will be added to the draft GTP document in the future.

Technical issues in seismo-technics, pertinent to potential high-level nuclear waste repositories in bedded and domal salts, were identified by us in April-May 1984. See LLNL Monthly Management Letter Report No. 13, dated May 10, 1984. Similar issues for repository in tuff and in basalt are listed below:

### TUFF

#### I. Seismic

##### A. Seismic Exposure

1. Source/strength
2. Frequency of events
3. Attenuation factors
4. Potential for induced seismicity
5. Volcanic related seismicity

##### B. Fault Movements

1. Location and tectonic style of local and regional Quaternary faults
2. Recurrence intervals along local and regional faults
3. Style of faulting - normal, strike-slip, and listric (detachment) faults

##### C. Secondary Effects

1. Potential for ground failure (e.g., rock slides)
2. Sympathetic movement on conjugate faults
3. Soil/structure interactions
  - a. Surface facilities
  - b. Transitional facilities (e.g., shafts)
  - c. Effects at repository horizons

## II. Tectonic

- A. Tectonic Setting - History
- B. Regional Stress Field
  - 1. Direction/magnitudes
  - 2. Relationship to existing faults
  - 3. Potential to further fracture rocks (change characteristics of hydrologic systems)
- C. Regional Isostatic Movements
  - 1. Areal uplift/erosion
    - a. Potential to exposed waste
    - b. Fault formation/reactivation of faults beneath repository horizon
    - c. Fracture formation and enlargement
    - d. Change in groundwater levels, patterns, and/or characteristics
  - 2. Areal subsidence
    - a. Flooding/inundation
    - b. Fault formation/reactivation
    - c. Fracture formation/enlargement
- D. Volcanism
  - 1. Nearby
    - a. Intersection of conduit with repository horizon
    - b. Change of groundwater patterns
  - 2. Distant
    - a. Effects of ash fall on emplacement retrieval operations

## BASALT

### I. Seismic

- A. Seismic Exposure
  - 1. Sources/strength
  - 2. Frequency of events
  - 3. Attenuation factors
  - 4. Potential for induced seismicity
- B. Fault Movements
  - 1. Activity of "Basement" faults near repository sites

2. Extent of propagation of faults upward into basalt cover near repository sites
3. Locations and tectonic styles of any regional Quaternary faults - evidence regarding extension and changes in frequency of activity with time
4. Bedding plane faults, potential for movement related to regional warping effects

C. Secondary Seismic Effects

1. Potentials for ground failures (e.g., liquefaction, sliding)
2. Soil/structure interactions
  - a. Surface facilities
  - b. Transitional facilities (e.g., shafts)
  - c. Effects at repository horizon(s)

II. Tectonic

A. Tectonic Setting - History

B. Regional Stress Field

1. Directions/magnitudes
2. Potential to further fracture rocks
3. Potential to induce new faults, reactivate old faults

C. Regional Movements

1. Areal uplift/erosion
  - a. Potential to expose waste
  - b. Fault formation/reactivation
  - c. Fracture formation/enlargement
  - d. Areal warping (changes in patterns/characteristics of hydrologic systems)
2. Areal subsidence
  - a. Flood risk, operational risk/isolation phase

D. Volcanism

1. Distant
  - a. Effects of ash fall on emplacement/retrieval operation

Progress on Specific Sites

### BWIP

The draft Site Technical Position (STP) paper was submitted to NRC for comments on February 28, 1984. During this reporting period, we received NRC comments, and are presently making progress to include these comments into the document.

The BWIP team generated a draft technical report entitled "The Saddle Mountains: The Evolution of an Anticline in the Yakima Fold Belt". The NRC project management tasked us to evaluate this draft report. We are in the midst of our review and evaluation of this report. The draft report is being reviewed and evaluated for its implications on the folds near the proposed repository location. The focus of our evaluation is the question of the typicality of the Saddle Mountains fold with respect to the entire Yakima (fold and/or thrust fault) belt.

During this reporting period, we received a set of DOE's draft Environmental Assessment (EA) report on the BWIP site. The NRC task order has not been received by us yet, but we are making ourselves familiarized with the EA report.

### NNWSI

A set of draft EA reports on the NNWSI site has been received. Our effort in review and evaluation of this report has begun.

### SALTS

One set each of draft EA reports on the Davis Canyon and Lavender Canyon salt sites (about 30 pounds) was received. On July 31, 1984, we also received an NRC task order for LLNL to provide a review and evaluation of these EA reports. We began our evaluation on these EA's.

During this reporting period, we also received one set each of the following EA's (90 pounds): (1) Deaf Smith County salt location, (2) Swisher County salt location, (3) Vacherie salt location site, (4) Cypress Creek salt location site, and (5) Richton salt location site.

### Project Coordination

The NRC Project Manager (Michael E. Blackford) called for a project coordination meeting on Friday, July 6, 1984. The meeting took place at Willste Buiding on that date starting at 0900 hours. The meeting was very useful to both NRC and LLNL. Topics discussed were: (1) recent change of the NRC project management (for A0294), (2) LLNL progress to this date, (3) present status of A0294, (4) scope of work for the remainder months in FY'84, (5) expected scope of work for FY'85 and budget, and (6) EA reviews.

### 3. PLANS FOR NEXT MONTH

During the next reporting period, we plan to accomplish (1) our input to the STP paper on the BWIP site, and (2) our evaluation of S. Reidel's report on the Saddle Mountains.

As noted above, we received nine (9) EA reports (about 150 pounds) as follows: (1) BWIP, (2) NNWSI, (3) Davis Canyon location, (4) Lavender Canyon location, (5) Deaf Smith county location, (6) Swisher County location, (7) Vacherie salt, (8) Cypress Creek salt, and (9) Richton salt sites. Our review and evaluation of these EA's will continue for the next few months.

4. ESTIMATED PROJECT FINANCIAL STATUS

To be submitted separately.

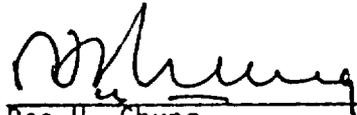
5. LIST OF CONSULTANTS/SUBCONTRACTORS

D. Burton Slemmons, Consulting Geologist (Subcontractor).

D. B. Slemmons and Bob Whitney provided their input to (1) our STP paper on the BWIP site, and (2) our GTP document. Slemmons and his assistants (Whitney, De Polo, Metz, Ramelli) were assigned to provide their input to EA review and evaluation for (1), (2), (3), and (4) sites above. Slemmons and Whitney both are reviewing S. Reidel's report on the Saddle Mountains. In this regard, all members of the LLNL team for the project (Carpenter, Chung, De Polo, McKague, Metz, Ramelli, Slemmons, and Whitney) met on July 26, 1984, for the purpose of task coordination and assignments.

6. PROJECT CONCERNS

None.



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Project Manager



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