



# Lawrence Livermore National Laboratory

## NUCLEAR SYSTEMS SAFETY PROGRAM

WM DOCKET CONTROL CENTER

'84 APR 16 P3:23

April 10, 1984  
EG-84-029/DDD

WM Record File  
A0294

WM Project 10, 11, 16  
Docket No.             
PDR             
LPDR           

Ms. Kristen B. Westbrook  
Project Manager, MS-623ss  
Geotechnical Branch  
Division of Waste Management  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Distribution:  
K Westbrook Joan-Ticket  
PHHe  
(Return to WM, 623-SS) C2

**SUBJECT: Monthly Management Letter Report No. 12  
Progress for the Month of March 1984  
NRC FIN A0294  
Technical Assistance in Seismo-Tectonic Impacts in Repositories**

Dear Ms. Westbrook:

### 1. PROGRAM OBJECTIVES AND DESCRIPTION

The objective of this program is provide technical assistance to the U.S. Nuclear Regulatory Commission (NRC) on waste repositories in the following areas:

- a. Reviewing the uncertainties and limitations of the data and methods used in seismo-tectonic investigations completed by the U.S. Department of Energy (DOE).
- b. Identifying and evaluating issues<sup>(1)</sup> in seismo-tectonics related to design and construction, long-term repository performance and groundwater flow.
- c. Providing input to the technical basis for NRC technical positions in the area of seismo-tectonics.

Our approach to achieve this objective is to evaluate DOE's seismo-tectonic assessments through review of related DOE reports, including Site Characterization Plans (SCP); participation in workshops and site visits; and identification and evaluation of issues in seismo-tectonics related to design and construction, long term repository performance and groundwater flow. We will provide input to the technical basis for NRC technical positions in the area of seismo-tectonics.

B409120025 B40410  
PDR WMRES EXILL  
A-0294 PDR

<sup>1</sup> An issue is a question about a site that is critical to determination of site suitability at the construction authorization stage in terms of the performance objectives and requirements of 10 CFR 60, Subpart E.

1132

Site characterization review plans for FY'83 and FY'84 include Hanford-BWIP site, NNWSI, and a salt site. In preparing our reviews, we will consider the guidelines found in Regulatory Guide 4.17, "Standard Format and Content of Site Characterization Reports for High-Level Waste Geologic Repositories," "Review Plan for Site Characterization," and 10 CFR 60 (draft), "Disposal of High-Level Radioactive Wastes in Geologic Repositories: Technical Criteria."

Specifically, the NRC has requested LLNL to assist the NRC in meeting the needs described above by performing independent review and associated studies based upon LLNL's experience and expert knowledge.

### Specific Work Requirements

There are two (2) tasks as follows:

**Task 1: Review of the DOE Site Characterization Program in Seismo-Tectonics**

- 1.1 Preparatory Site Characterization Program Review
- 1.2 Preparatory Site Characterization Analysis
- 1.3 Review of SCP and SCP Biannual Updates
- 1.4 Review of Public Comments

**Task 2: General Technical Assistance to NRC**

With these tasks and subtasks above, four sets of NRC needs are recognized. First, there is the need to assemble existing data base and adequacy of methods used to collect and interpret the data. Second, there is the need to perform site-specific seismo-tectonic issues (in basalts at Hanford, tuff at the Nevada Test Site (NNWSI) and a salt site, yet to be determined). Third, there is the need to identify other additional information needed to perform quantitative assessments to determine if there is reasonable assurance that the site will meet the performance objectives of 10 CFR Part 60. The fourth need is to contribute to the technical basis for NRC technical positions or appendices to the Site Characterization Analysis (SCA) in the area of seismo-tectonics.

## **2. PROGRESS - MARCH 1984**

Our major effort for this reporting period was placed upon Task 1.

### BWIP

The Site Technical Position (STP) report (submitted to NRC on February 28, 1984) was briefly discussed on March 6th with the NRC staff as a preparatory to the BWIP Tectonic Workshop.

The Tectonic Workshop was held in Richland, Washington, on March 13-15, 1984. Four members of the LLNL group present were: Dae H. Chung, H. Larry McKague, D. Burton Slemmons, and Robert A. Whitney. Our Summary Report on the workshop was submitted to NRC on March 29, 1984. (A report by R. A. Whitney on a weekend-long field trip to the BWIP site area will be submitted to NRC in the next reporting period.) The report has dealt with the following topics: (1) tectonic models, (2) tectonic characterization/tectonic characterization plan, (3) Rattlesnake Hills - Wallula Gap

Alignment - RAW, (4) seismic impact, (5) swarm earthquakes, (6) growth rate, (7) pursuit of hydrocarbon exploration well data, (8) probabilistic analysis, and (9) geophysical logs and paleomagnetic studies. Our comments and recommendations on these topics were made in the trip report.

Presentations by RHO on the first day included: (1) an introductory summary, (2) a tectonic characterization overview, (3) a lithologic characterization overview, (4) an overview of a performance assessment activity, and (5) a concluding summary. On the second day the group divided into two sub-groups. One group discussed geophysical methods, data, and results. The second group discussed concepts regarding the development and applications of tectonic models. Initially, this latter group was to review in more detail seismic and tectonic topics covered during overviews on the first day. Members of LLNL participated in this second group.

Discussion of the attributes, use, and purposes of tectonic models was a recurring topic during the three days. Unfortunately, the extensive discussion on this subject in the tectonic group during the second day left little time for clarification on questions which arose during the overview presentations of the first day.

Review of the trip report from last year's workshop, April 12-15, 1983, reveals that a number of items have been addressed. However, some appear not to have been addressed and LLNL considers these to be open items. Items, or parts of items, which are open are: (1) tectonic rate, (2) resolution of tectonic vs. non-tectonic models, (3) causative tectonic processes, (4) seismogenic structures, (5) design earthquakes and attenuation to the site, and (6) stress drop. We believe that, while not specifically addressed during this year's workshop, work is being done on many of these items. Item (7), drill samples, has been satisfactorily addressed. Item (8), direction of research at RHO, has also been addressed. However, this is an area in which continued effort is required.

### NNWSI

We received a USGS letter to NRC (re: Letter WMPO:DLV-406 to NRC dated January 27, 1984) for comments. The LLNL group studied the letter. Our concern with neotectonic and Quaternary investigations, and the quality and character of trench logging is reflected in this letter. Many of our objections are being addressed by current USGS management and research at NTS. We believe that the NRC and the LLNL role should continue to be a careful and critical review of DOE and USGS research and development programs and the response shown by this letter suggest that advances are being made. Our (D. B. Slemmons) recent telephone discussions with Mike Carr (USGS task leader) indicate that there will be substantial progress in the future.

We feel that the proposed field trip will benefit the DOE and USGS programs, as well as LLNL and NRC review by combining an introduction to local and regional tectonic and Quaternary relations.

### SALTS

Since January 1984, we have begun to identify issues in seismotectonics pertinent to potential nuclear waste management facilities in bedded and domed salts. Issues we have identified thus far are necessarily generic in nature because no specific salt sites have yet been identified. However, in our compiling the lists, we have assumed that the

bedded salt areas of principal interest are located in western Texas and southern Utah and that the area of interest for domed salt is eastern Texas and Louisiana.

During the project coordination meeting (with Phil Justus, Ben Rice, and Kristin Westbrook) on February 9, 1984, M. Logsdon expressed his desire to know about "seismic risk work already done" on nuclear facilities. This request was then identified as an action item for LLNL. On March 9th, we have submitted our letter report entitled "Seismic Hazard Analysis for Critical Facilities" (4 pages) with the following three topical reports: (1) "Seismological Problems Associated with Repositories" (4 pages), (2) "Seismic Effects on Waste Repositories" (5 pages), and (3) "The Effects of Earthquakes on Underground Structures" (7 pages). Work under this request was accomplished by us during the weekends and several evenings.

3. PLANS FOR NEXT MONTH

We have received a NRC request to attend a meeting in Silver Spring, Maryland, for the purpose of a NRC mid-year project review. The date of this meeting has tentatively been set for April 26 (Thursday), 1984.

4. ESTIMATED PROJECT FINANCIAL STATUS

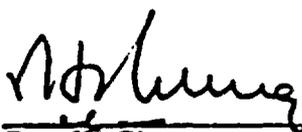
See Attachment A.

5. LIST OF CONSULTANTS/SUBCONTRACTORS

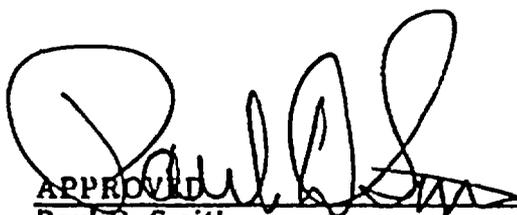
D. Burton Slemmons, Consulting Geologist (subcontractor).

6. PROJECT CONCERNS

None.



Dae H. Chung  
Project Manager



APPROVED  
Paul D. Smith  
Associate Program Leader  
Seismic and Structural Safety

DHC/tp

cc: W. J. Gallagher, DOE  
E. Davis, NRC/NMSS  
J. M. Johnson, LLNL<sup>Q5</sup>  
P. S. Justus, NRC/NMSS/DWM  
M. R. Knapp, NRC/NMSS/DWM  
H. J. Miller, NRC/NMSS/DWM

**ATTACHMENT A**

**Project Title: Seismo-Tectonic Impacts in Repositories  
Estimated Monthly Letter Financial Section  
NRC FIN A0294**

**A. PROJECT COSTS:**

Total Projected Project Cost	Funds Obligated to Date	Balance of Funds by Fiscal Year	
		FY'84	FY'85
\$850K	\$500K	\$0	\$350K

**B. COST ANALYSIS\***

	<u>March 1984</u>	<u>Cumulative</u>
Direct Lab Staff Effort - FTE	1.2 FTE-Mo.	1.5 FTE-Yr.
Direct Salaries	\$6.6K	\$98.3K
Materials and Services	0	1.2
ADP Support	0	0
Subcontracts	1.8	34.0
Travel Expenses	2.8**	18.2
Indirect Labor Costs	6.7	99.2
Other TID	0	0.5
General and Administrative	0	37.3
<b>Total Expenses</b>	<b>\$18.0K</b>	<b>\$288.9K</b>
<b>Liens</b>	<b>28.0</b>	<b>28.0</b>
<b>Total Costs and Liens</b>		<b>\$316.9K</b> (63%) of funding available

\*Note: These figures are for cost analysis only and may differ slightly from final billing figures.

\*\*Partial travel costs. Travel vouchers for all the workshop and site visit travel are not yet processed as of this date.