



# Lawrence Livermore National Laboratory

## NUCLEAR SYSTEMS SAFETY PROGRAM

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Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

WM Record File

A-0294

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TICKET

A-ITC

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SUBJECT: Monthly Management Letter Report No. 14  
Progress for the Month of May 1984  
NRC FIN A0294  
Technical Assistance in Seismo-Tectonic Impacts in Repositories

Dear Ms. Westbrook:

### 1. PROGRAM OBJECTIVES AND DESCRIPTIONS

The objective of this program is to 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.

1)

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.

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Site characterizations 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, "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 - MAY 1984

### BWIP

During this reporting period, no new progress was made.

### NNWSI

The Neogene and Quaternary volcanism and tectonism in the area surrounding the NNWSI site is of immediate interest. We have put together the following important references related to this subject.

- Crowe, B.M., 1980, "Disruptive Event Analysis: Volcanism and Igneous Intrusion," Battelle Pacific Northwest Laboratory Report PNL-2822, 28 pp.
- Crowe, B.M., and W.J. Carr, 1980, "Preliminary Assessment of the Risk of Volcanism at a Proposed Nuclear Waste Repository in the Southern Great Basin," U.S. Geological Survey Open-File Report 80-357, 15 pp.
- Crowe, B.M., M.E. Johnson and R.J. Beckman, 1982, "Calculation of the Probability of Volcanic Disruption of a High-Level Radioactive Waste Repository Within Southern Nevada, USA," Radioactive Waste Management and the Nuclear Fuel Cycle, V.3, pp. 167-190.
- Crowe, B.M., and K.A. Sargent, 1979, "Major-Element Geochemistry of the Silent Canyon-Black Mountain Peralkaline Volcanic Centers, Northwestern Nevada Test Site: Applications to an Assessment of Renewed Volcanism," U.S. Geological Survey Open-File Report 79-926, 25 pp.
- Crowe, B.M., S. Self, and R.C. Amos, 1981, "Strombolian Eruptive Sequences," Transactions American Geophysical Union, EOS, V. 62, No. 45, pp. 1084.
- Crowe, B.M., D. Vaniman, W.J. Carr, and R.J. Fleck, 1980, "Geology and Tectonic Setting of a Neogene Volcanic Belt within the South-Central Great Basin, Nevada and California," in Geological Society of America Abstracts with Programs, Annual Meeting, V. 93, pp. 409.
- Crowe, B.M., S. Self, D. Vaniman, R. Amos, and F. Perry, 1983, "Aspects of Potential Magmatic Disruption of a High-Level Radioactive Waste Repository in Southern Nevada," J. of Geology (in press).

Our critical evaluation of the potential volcanism and tectonism in the NNWSI site area has begun.

#### SALT SITE

The NRC has given us a task order to develop a Draft Site Technical Position (draft STP) paper on the Gibson Dome Salt Waste Isolation Project (GIDWIP) site (see Monthly Management Letter Report No. 13, dated 10 May 1984, Page 7). We developed this draft STP document, and our draft STP REPORT (40 pages) was submitted to the NRC on May 17, 1984.

The draft STP report dealt with the geological stability issues for the GIDWIP site in Paradox Basin, Utah; it consisted of the following subheadings:

- o Geology (12 questions)
- o Seismicity (9 questions)
- o Stresses (2 questions)
- o Igneous Activity (One question)
- o Tectonics (7 questions)
- o Salt Migration/Dissolution (6 questions)
- o Human-Induced Changes (9 questions)

In our preparation of this draft STP report, we first generated a list of the most pertinent references related to the GIDWIP site and used these references (along with our general knowledge about the Paradox Basin area). The key references are as follows:

- Humphrey, James R., and Wong, Ivan, G., 1983, "Recent Seismicity near Capital Reef National Park, Utah," *Geology*, V. 11, pp. 447-451.
- Keller, G.R., Braile, L.W., and Morgan, P., 1979, "Crustal Structure, Geophysical Models and Contemporary Tectonism of the Colorado Plateau," *Tectonophysics*, 61, pp. 131-147.
- Office of Nuclear Waste, 1983, Technical Progress Report for the Quarter 1 April-30 June, 1983, ONWI-9 (83-3).
- Office of Nuclear Waste Isolation, 1983, Overview of the Regional Geology of the Paradox Basin Study Region, ONWI-92.
- Office of Nuclear Waste Isolation 1983, Stratigraphy, Structure, and Lithofacies Relationships of Devonian through Permian Sedimentary Rocks: Paradox Basin and Adjacent Areas - Southeastern Utah, ONWI-485.
- Ohlen, H.R., and McIntyre, L.B., 1965, "Stratigraphy and Tectonic Features of Paradox Basin, Four Corners Area," *Bull. of Amer. Assoc. of Petrol. Geologists*, V. 49, No. 11, pp. 2020-2040.
- Schneider, R., and Task, N.J., 1982, U.S. Geological Survey Research in Radioactive Waste Disposal, Fiscal Year 1980, U.S. Geol. Survey, Open File Rpt. 82-509.
- Thompson, George A., and Zoback, Mary Lou, 1979, "Regional Geophysics of the Colorado Plateau," *Tectonophysics*, 61, pp. 149-181.
- Warner, Lawrence, A., 1978, "The Colorado Lineament: A Middle Pre-Cambrian Wrench Fault System," *GSA Bull.*, V. 89, pp. 61-171.

We anticipate receiving comments by the NRC staff on this report so that we can finalize the draft STP report. It is essential that the DOE and its contractors have sufficient time for studying issues identified in our draft STP report prior to any future workshop meeting.

### 3. PLANS FOR NEXT MONTH

We plan to finalize the draft STP report on the Gibson Dome site. The neogene and Quaternary volcanism and tectonism in the NNWSI site area will be evaluated on the basis of the reading list presented above. Potential seismic hazard issues at the BWIP site need to be evaluated. The NRC has informed us that there will be a joint DOE/NRC workshop on the NNWSI site geology and geophysics in July 1984 and advised that we prepare ourselves for that workshop.

4. ESTIMATED PROJECT FINANCIAL STATUS

To be submitted separately.

5. LIST OF CONSULTANTS/SUBCONTRACTORS

D. Burton Slemmons, Consulting Geologist (subcontractor).

D. B. Slemmons and R. A. Whitney contributed to our preparation of the draft STP report on the Gibson Dome salt site. Slemmons reviewed our first draft STP document and provided his input to the document.

6. PROJECT CONCERNS

None.



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