



Lawrence Livermore National Laboratory

NUCLEAR SYSTEMS SAFETY PROGRAM
L-196

November 5, 1987

Mr. Michael E. Blackford, MS-623ss
Project Officer, WMGT
Geology/Geophysics Section
Technical Review Branch
Division of High-Level Management
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Monthly Management Letter Report No. 15
Progress for the Month of October 1987
NRC FIN A-0297
Technical Assistance in the Identification and
Evaluation of Seismo-Tectonic Issues Related to
Repository Site Characterization Plans

Dear Mr. Blackford:

This is our Monthly Management Letter Report No. 15 under the subject
NRC FIN Number A-0297.

1. PROGRESS - OCTOBER 1987

General:

We participated in the joint DOE/NRC Meeting on SCP documents at the
DOE-HQ Building on 8-9 October 1987. The purposes of the meeting were (i)
to permit DOE to explain the organization and hierarchical position of the
SCP documents scheduled to be released by DOE in January, 1988 and (ii) to
obtain NRC staff and consultant reactions to these aspects of the SCP.

BWIP:

Richard W. Galster participated in a field trip program conducted for
a field review of exposures and trenches developed by the U.S. Bureau of
Reclamation near O'Sullivan Dam and on Smyrna Bench on 30 September 1987.
This field trip was preceded on 29 September 1987 by a field review of the
geology of the Smyrna Bench led by R. D. Bentley. Galster's formal trip
report has been submitted to NRC on 13 October 1987.

A NRC workshop/field trip planned for 19-22 October 1987 was
indefinitely postponed.

The structural geology workshop for the BWIP site (sponsored by
Confederated Indian Tribes) was held in Richland, WA on 28-29 October 1987.
Richard W. Galster, along with NRC staff, participated in this meeting.
Galster's formal trip report is presently in preparation.

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WM Project: WM-10, 11, 16

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WM Record Files: A-0297

LPDR yes

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NNWSI:

Near-field displacements associated with normal faulting have important implications for tectonic stability of the NNWSI site, i.e., the Ghost Dance fault in Yucca Mountain. A normal faulting model described recently by Barnett et al. (1987) relates fault length to displacement along the fault and to deformation in a volume of rock surrounding the fault -- a zone of ductile deformation. As we described in our Letter Report, dated 16 October 1987, one characteristic of this model is that it allows prediction of the radius of ductile deformation that surrounds the fault. This volume of rock is referred to as the fault volume and it comprises those rocks along and surrounding the fault surface, which are affected by near-field displacements due to fault movement. Ductile deformation most often shows up as reverse drag and could affect the porosity and permeability in the rocks surrounding the fault.

For example, the Ghost Dance fault in Yucca Mountain using a displacement of 60 m and an r/D ratio of 20 for faults with maximum displacements (D) of less than 10 m, the perceptible drag radius (r) would be 120 m. Thus, using this model, we estimate the zone of ductile deformation extending to 120 m perpendicular to the Ghost Dance fault. There are several caveats on this as follows:

- o r/D ratio is for rocks in sedimentary basins inversely varying with the shear modulus of the rock
- o r/D ratio varies for different volcanic tuffs depending upon the degree of welding between grains
- o Amount of deformation decreases outward from the fault
- o Even very near the fault changes in porosity and permeability may be insignificant with regard to hydrology.

Other detailed discussions of this normal fault model are referred to our Letter Report on the subject, dated 16 October 1987.

SALTS:

In accordance with requests in a NRC memorandum Cardone to Blackford, we have initiated a program that will evaluate the tectonics of the Amarillo-Wichita Uplift and associated geologic structures. This work is in progress. This work, once accomplished, will become a basis for future analysis and evaluation of the proposed HLW repository site at the Deaf Smith County and/or the Swisher County locations.

A Letter Report, dated 8 October 1987, was submitted on our review and evaluation of "Numerical Modeling of Deformation in Salt Basin," BMI/ONWI Tech. Rept. No. 649, prepared originally by Woodward-Clyde Consultants. The subject report is one of the major contributions to the

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literature concerning the seismo-tectonics of salt basins.

2. PLANS FOR NEXT MONTH

A project coordination meeting is desired in view of recent political and administrative developments in Washington with respect to HLW programs.

A workshop on "Late Cenozoic Evolution of the Southern Great Basin" is to be held in Reno, NV on 9-13 November 1987. The workshop is convened by D. Burt Slemmons and others of University of Nevada. One member of our team plans to participate in this important workshop.

A letter report of our work on geomorphic examinations of the NNWSI site at and near the location of the proposed shaft and ramp openings is to be completed by C. Rus Purcell and Ted Johnson of NRC.

A literature search and analysis program on the tectonics of the Amarillo-Wichita Uplift and associated geologic structures will continue for next few months.

Materials have been received for us to initiate and perform new tasks as follows: (1) Review the BWIP SCP-related documents (No. SD-BWI-TI-293, Rev. 0; No. GS-GW-101; and SD-BWI-ER-005), and (2) interpretation of SLAR imagery.

Our informal review of sections in Draft SCP's (a preliminary version) for the BWIP and the NNWSI sites will continue for the next few months.

3. ESTIMATED PROJECT FINANCIAL STATUS

See ATTACHMENT A. The Attachment A will become available in late November 1987. We will submit it when it becomes available.

We received \$100K of the budgeted \$495K for FY1988.

4. LIST OF CONSULTANTS/SUBCONTRACTORS

D. B. Slemmons and Associates
Robert D. Bentley
Richard W. Galster
Charles (Rus) Purcell
Robert J. Wright

Note that Dr. Robert J. Wright has moved to his new residence as of 1 November 1987 as follows:

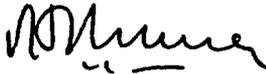
149 Meadowbrook Drive, Princeton, NJ 08540
Tel: (609)-921-2297

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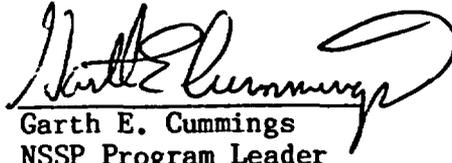
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5. PROJECT CONCERNS

None.



Dae H. (Danny) Chung
Project Leader



Garth E. Cummings
NSSP Program Leader

cc: K. Anderson, LLNL/NSSP
Gary Peterson, DOE/SAN
E. Davis, NRC/NMSS
J. M. Johnson, LLNL/NSSP
P. S. Justus, NRC/WMG
J. S. Trapp, NRC/WMG

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