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Ms. Kristin B. Westbrook, Project Manager
Geotechnical Branch, MS-623ss
Division of Waste Management, NMSS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: BWIP Tectonic Workshop and Field Trip, March 12-16, 1984 (Part Two - Final)

REFERENCE: NRC FIN A0294, "Technical Assistance in Seismo-Tectonic Impacts in Repositories"

Dear Ms. Westbrook:

This is to transmit a letter report by Mr. Robert A. Whitney, Geologist, of our team. This letter report deals specifically with his field trip after the subject workshop. A draft version of this letter report was submitted on April 18, 1984 for your information.

If you have any questions, please let us know.

Sincerely yours,

Dae H. Chung
Leader
Nuclear Waste Management Project

DHC/ic

Attachment: Final Field Trip Letter Report by R. A. Whitney (Two pages).

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A-0294 PDR

June 23, 1984

Dr. Dae Chung, L-95
Project Manager
Nuclear Systems Safety Program
Lawrence Livermore National Laboratory
P.O. Box 808
Livermore, CA 94550

Dear Dae;

This letter is to transmit the final version of my observations and itenerary during the brief field reconnaissance trip following our March 12-15, 1984, meeting with DOE and RHO in Richland, Washington. Color transpariencies were acquired for the areas visited.

Thursday, March 15, Kristin Westbrook of NRC and I were in the field late in the afternoon. We inspected a new road cut for highway construction on the northwest flank of Badger Mountain, one of the anticlinal structures marking the RAW lineament. The excavation exposes an overthrusted fault and shows the Ringold Formation af. cted as well as the uppermost (Pomona?) basalt unit. S. Reidel (pers. comm.) indicates this is the uppermost thrust in a series of at least three imbricate related faults, dipping southwest. The exposure is being logged by RHO personnel (S. Reidel, pers. comm.).

Friday AM, March 16, was spent with DOE personnel and Kristin Westbrook and Warren Rehfeldt of NRC, inspecting the Gable Mountain structure within the Hanford Reservation. We visited the area of trenching on the south limb of the anticline and those on the Central Fault system crossing the structure. Multiple hypotheses for the causative tectonics for the structure observed in these trenches are possible. Upon receipt of the published interpretations in Reno, a review and comments will be submitted. Friday PM was spent with the NRC personnel inspecting the Saddle Mountains structure at Sentinel Gap and in the Lower Crab Creek drainage, just east of Sentinel Gap. The geometry of the anticline exposed in this area is indicative of folding accomplished by overthrusting on faults which decrease in dip with depth. We observed no surficial geomorphic features indicative of fault displacement of Holocene age. The NRC personnel departed by commercial airlines late Friday PM.

Saturday AM, March 17, I inspected the RAW structure where it is crossed by the Yakima River, the north front of the Horse Heaven Hills anticline, and the RAW structure southeast of the Yakima River. The following was observed: RAW apparently does not affect the uppermost basalt flows (Pomona?) in the location of the Yakima River cut through RAW. Geomorphic and geometric features indicate both Rattlesnake Mountain and Badger Mountain are overthrust to the northeast, with fault planes decreasing in dip with depth. These features include the counterclockwise rotation of the basalt units (looking northwest) from horizontal on the southwest to about a 30° dip on top of the anticline. This forms a distinctive concave upwards cross section through the basalts and interbeds on the southwest limb of the structure.

Other features which indicate the thrusting are landslides on the northeast face of the structure, absence of the northeast limb of the anticline, and imbricate structure thrust faults along the northeast face reported by S. Reidel (pers. comm.). The largest anticline along RAW between Rattlesnake Mountain and Badger Mountain exhibits the concave upward ramping on the northeast limb and has landslides on the southwest face. This may indicate the thrusts in this structure dip in an opposite sense than those on Rattlesnake and Badger Mountains. The Horse Heaven Hills anticline, in the area immediately south of Rattlesnake Mountain, exhibits these same features, with geometries indicating the thrusting dips to the southwest.

Geomorphic features indicative of Holocene activity, such as fault scarps, were not observed along RAW. Horse Heaven Hills has a steep sloped scarp on the northern flank with hourglass valleys dissecting the hanging wall and small steep alluvial fans on the foot wall. These features are indicative of Holocene displacement and scarp height indicates this movement could be as much as several meters. Several excellent locations exist in this locality for trench emplacement to attempt to determine age of faulting and displacement parameters.

I departed from Pasco Airport early in the PM on Saturday, with excellent low-sun angle conditions for aerial reconnaissance. The flight path was along the northern flank of the Horse Heaven Hills, and observation of the northern flank of this sturcture in these conditions shows a steep sloped scarp at the base of the anticline which has been affected minimally by erosion of streams and scarp slope degradation. I believe this scarp is indicative of Holocene faulting along this structure.

I am pleased to have been a participant in the NRC/RHO/DOE workshop and thank you for the support for the above described field reconnaissance.

Bob Whitney

Robert A. Whitney
Geologist

cc: D.B. Slemmons