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MEMORANDUM FOR: Malcolm Knapp, Chief
Geotechnical Branch
Division of Waste Management

FROM: John Trapp
Geology-Geophysics Section,
Geotechnical Branch
Division of Waste Management

SUBJECT: TRIP REPORT: APPENDIX 7 (DOE/NRC SITE-SPECIFIC PROCEDURAL AGREEMENT) VISIT TO NNWSI, SEPTEMBER 17-19, 1985

On September 17th to 19th, the NRC Staff visited Yucca Mt, the DOE Waste Management Project Office, and the United States Geologic Survey (USGS) office in Las Vegas. The primary purposes of this visit was to examine the results of recent trenching conducted near Yucca Mt and to be briefed on core handling procedures which have and will be utilized by the NNWSI project. The following is a listing of activities, significant observations and personnel involved in the site visit. With the exception of trench 14A and a small unnumbered trench between trench C2 and C3, a trench location map and preliminary diagrams of trench walls, as prepared by the USGS, can be found in USGS Open file Report 84-788. A photo log is attached to this trip report. The negatives of these photos are in the DCC and a set of prints can be obtained from my office.

September 17: Field visit of the east side of Yucca Mt.

Activities: Examination of trench 14 and 14A, reconnaissance of the proposed exploratory shaft area including the Ghost Dance Fault, reconnaissance of the crest of Yucca Mt and reconnaisance of the area along Drill Hole Wash.

Significant observations: The majority of effort was spent examining trench 14 and trench 14A. Trench 14 had been open during the last NRC site visit in September of 1984. Since that time this trench has been deepened and cleaned which allows the very complex vein filling, primarily of carbonate and silica, to be examined. An additional significant feature in this trench is the presence of a carbonate "apron". The carbonate "apron" which extends down slope from what has been described as the main fault (Figure 11A, USGS-OFR-84-788), is present from the K horizon near the surface, to the base of the trench. In trench 14A, which has been opened to the north of trench 14 since the last NRC site visit, the carbonate apron is not present and a complex fault pattern is visible down slope from what is assumed

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to be the main fault. The NRC staff noted no readily apparent surficial expression of faulting in the area of these two trenches and, based on field observations, suspect that the faulting pattern visible in trench 14A, down slope from the main fault, is also present in the area of trench 14, but has been obscured by the carbonate "apron". It was also noted that the main fault in trench 14A, appears to contain less carbonate and silica infilling than the same zone in trench 14. The origin and timing of emplacement of the carbonate and silica infilling is presently under study by the USGS. Two modes of emplacement have been proposed. The mode presently favored by the USGS is due to infilling during soil formation and weathering that would bring the material from above in a low temperature environment (see USGS-OFR-85-224), however, a mechanism whereby the solutions are brought in from below, such as by hydrothermal injection or seismic pumping could also explain the field observations. The USGS is conducting detailed logging of these trenches along with sample gathering for geochemical analysis and age determination. The results of this study may be important for evaluating the suitability of the Yucca Mt site, and the NRC should follow the results of this study closely.

September 18: Field visit to the west side of Yucca Mt-Crater Flat area.

Activities: Examination of trench 8, trench 10A, trench 10B, trench C2 and trench C3, and general reconnaissance of the area of the Solitario Fault.

Significant Observations: In trench 8, materials similar to those encountered in trench 14 and 14A were observed. While examining this trench, discussions were conducted on the processes which have and are occurring in the area of Busted Butte. There have been no detailed studies in the area of Busted Butte, however, all parties agreed that such studies could potentially resolve some of the questions relating to the origin of the carbonate and silica infilling, and could provide additional insight into the geologic framework of Yucca Mt, and, therefore, would appear warranted. At trench 8, the NRC staff noted that there appears to be a break in slope along strike of the fault exposed within the trench, and upslope of this fault is a similar break in slope as well as apparent knick points which suggest additional splays of the Solitario fault are present which have not been trenched. At trench 10A and trench 10B, the NRC noted that the trenches appear to intercept

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two separate "splays" of the Solitario fault zone, suggesting a complex nature for this fault zone.

In the area of trench C2 and C3, the USGS is in the process of performing detailed mapping and sampling. The cleaning and layout of the trenches for detailed mapping, and the location of sampling sites, indicates a high quality professional mapping operation has been started. As these trenches are along a visible scarp in the alluvium, and the materials encountered in the trench appear quite "young" compared to the material present in other trenches examined by the NRC staff at Yucca Mt, this trenching operation may help better define the age of youngest faulting in the area of Yucca Mt.

Personnel involved in site visits: P. Prestholt, M. Blackford, A. Ibrahim, J. Trapp, NRC; C. Purcell, LLL; C. Johnson, State of Nevada; G. Dixon, USGS; J. Szymanski, DOE.

September 19: Visit to DOE and USGS offices in Las Vegas.

Activities: Discussion of core handling and documentation procedures which have and will be utilized by NNWSI. The attached list of 16 questions provided the basis for the discussion.

Significant observations: The ability of DOE to provide documentation of core custody, and in some cases, segments of the core itself, is a major concern of the NRC staff. The standard contracting procedures which are utilized at the Nevada Test Site give the various contractors very specific areas of responsibilities. When the segregation of responsibilities brought on by the contracting procedures is combined with the division of responsibilities, as outlined in the agreement between the DOE and USGS, a complex system of interactions is apparent. At present, there does not appear to be any one location which contains all the necessary and required documentation, and while the various contractors all probably have partial documentation, a concern was expressed by both the USGS and DOE, that gaps might exist in the record such that it might be impossible to provide a complete history of the core from drilling to its present status, including final disposition of certain portions of core to various laboratories for testing. Until the existing records have been compiled, the severity of the potential problem cannot be ascertained.

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Based on discussion with the USGS personnel, it appears that many of the required procedures have been written and are at least informally in place. If this can be documented the NRC concerns may be lessened.

Based on the discussion which I conducted with the USGS and DOE personnel, I strongly recommend that the NRC staff, under the lead of QA personnel, undertake the following:

1. Recommend that DOE compile presently existing documentation relating to the core and custody of core that DOE may utilize as supporting information for a license application.

2. Obtain a copy of all pertinent quality assurance procedures, which will be utilized by the USGS, DOE, Fenix and Scisson, REECo, and Holmes and Narver for review by both the NRC quality assurance personnel and members of the Geotechnical Branch staff.

3. Prior to DOE drilling additional wells in the area of Yucca Mt and subsequent to receipt and review of the documents in 2. above, arrange for a meeting with DOE, the drilling contractor, the onsite geologist, and the USGS core library personnel. The purpose of this meeting would be to perform a detailed evaluation of the adequacy of core handling and documentation procedures with regard to forensic documentation.

4. Subsequent to DOE completing 1. above, review the available documentation to determine what portions of the existing record provide suitable forensic documentation.

Personnel involved: J. Trapp, NRC; U. Clanton, DOE; G. Dixon and M. Hait, USGS.

/s/

John S. Trapp
Geology-Geophysics Section
Geotechnical Branch
Division of Waste Management

Enclosures:
As stated

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PHOTO LOG

Photos number according to negative numbers:

Photos # 5, 6, 7 and 8. Close up of vein filling material along south wall of trench 14.

Photos # 9 and 10. South wall of trench 14 showing distribution of vein filling material.

Photos # 11 and 12. South wall of trench 14 showing relationship of vein filling material to main fault and carbonate "apron".

Photo # 13. South wall of trench 14A showing main fault.

Photo # 14. South wall of trench 14A showing area up slope from main fault. (upthrown block)

Photo # 15. South wall of trench 14A just down slope from main fault. (downthrown block)

Photos # 16, 17 and 18. North wall of trench C3 showing area of faulting.

Photo # 19. View from north of unnumbered trench between trench C2 and trench C3.

Photos # 20, 21, 22, 23 and 24. South wall of trench C2.

NOTES: Photos # 1-4 do not exist due to camera malfunction.
Photos # 5-15 taken 17 September, 1985.
Photos # 16-24 taken 18 September, 1985.
All Photos taken by P. Prestholt, NRC Nevada On-Site Representative.

LIST OF QUESTIONS FOR DISCUSSIONS ON CORE HANDLING PROCEDURES

1. What procedures and documentation does/has DOE utilize(d) to assure what interval was cored? ie How can it be shown that the depth of each core and drill run (start and finish) is as stated?

2. How does/has DOE assign and documented the percent of core recovered from each interval?

3. Within the cored interval, what procedures and documentation does/has DOE utilize(d) to assure that zones of core loss are assigned to the correct interval?

4. How does/has DOE document(ed) the condition of core as it comes from the ground?

5. What procedures does/has DOE utilize(d) to assure minimal core damage both during drilling and during removal and placement of the core in core boxes?

6. What procedures does/has DOE utilize(d) to assign drilling induced mechanical breaks, breaks induced during removal and placement of the core in core boxes and natural breaks, and how are these documented?

7. How are breaks in the core introduced subsequent to placement in core boxes documented?

8. What procedures and documentation does/has DOE utilize(d) to track core custody?

9. What procedures and documentation does/has DOE utilize(d) for core transportation?

10. What procedures and documentation does/has DOE utilize(d) during core storage?

11. What procedures and documentation does/has DOE utilize to assure that core tested is as close to in situ conditions as is reasonably achievable?

12. How does DOE assign, document and control drilling and testing equipment to assure that the equipment utilized will perform its intended function?

13. What procedures does DOE utilize to assure that coring produces the highest quality (best recovery) core reasonably achievable?

14. How does DOE document drilling conditions encountered? (zones of fast/slow drilling, circulation loss etc..)

15. How does DOE assure that personnel assigned are qualified and trained to perform their task?

16. What are the assigned roles and responsibilities of the various contracting agencies?