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NOV 18 1985

Dr. Donald L. Vieth
Director
Waste Management Project Office
U.S. Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, NV 89114-4105

Dear Dr. Vieth:

The ability of the DOE to provide forensic documentation of the procedures and methods utilized during drilling, transportation, and storage of core will be essential to the successful defense of a license application for a geologic repository. Through various interactions with the site personnel the NRC staff has identified numerous concerns related to the handling of core collected for the NNWSI project. The purpose of this letter is to document our specific concerns and propose an approach for resolving them.

During the geology data review conducted in September, 1984 the staff examined core in the core library at the Nevada Test Site and noted three major problems: 1) core library staff were apparently unfamiliar with the applicable procedures for collecting and handling core; 2) those procedures were not available at the core library; and 3) pertinent information in the library (e.g. drill speed and fluid pressure) on the core sampling had not been logged at the wells (March 28, 1985, letter from Coplan to Vieth). At that time the staff recommended that procedures be implemented for logging and other handling activities to avoid logging errors and to provide the necessary documentation to track core from source to library.

Following the September, 1984 data review, the NRC staff, having become increasingly aware of the need for the DOE to evaluate the usability of the presently available core for licensing, requested that DOE identify "(1) the procedures under which the core already on hand was collected and subsequently logged and handled; and (2) the procedures by which they plan to obtain, log, and handle core during site characterization" (July 31, 1985, note from Prestholt to Vieth). The purpose of this request was to enable staff to review the procedures and provide guidance to the NNWSI as plans for drilling during site characterization were being formulated. These procedures have not been received.

During a site visit the week of September 16, 1985, a member of our geotechnical staff met with core library personnel to discuss the staff's concerns with regard to the treatment of NNWSI core. This discussion was based

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on a list of 16 questions (Attachment 1). The NRC observations from this discussion are summarized as follows:

- The division of responsibility between NNWSI contractors for core custody is supported by documentation of questionable adequacy which may create difficulties in tracking the core samples from drill site to final disposition (i.e., core library or testing facility).

- Core documentation is currently maintained at various locations, and the extent of the existing records has not been determined;

- NNWSI core has been maintained with other NTS samples and has been readily accessible to all site contractors. Access to the NNWSI core samples may not be adequately controlled to assure that samples will not be lost or misplaced in the core library.

The questions concerning handling and documentation of the core samples may ultimately affect the licensability of the NNWSI site. The core is the primary source of much information obtained from field studies and laboratory testing to date. The information ultimately derived from core sampling will not be defensible in support of a license application if the record of core from source to destination, core library or testing facility, is not available and complete.

The NRC staff recommends that the DOE conduct the activities summarized below so that information derived from the core may be adequate to support a license application:

o Establish a controlled and central location for maintenance of documents and core samples. This will require clear identification of responsibility for core custody.

o Develop and implement procedures for drilling, transportation, and storage of all new core to be collected. These procedures and the rationale supporting their development should be submitted to the NRC staff for review and comment prior to future drilling.

o Compile all existing documentation related to the core and core custody for the NNWSI project, and identify the procedures used for drilling, transportation, and storage of previously collected core which may be used to support licensing.

o For previously collected core samples to be used in licensing, develop a method to review the core and core documentation to determine if they are

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acceptable for licensing. Since not all core may have QA adequate for licensing, some confirmatory drilling and corroboration may be necessary. The procedures and rationale supporting their development should be submitted to the NRC staff for review and comment prior to future drilling.

We are aware that the NNWSI is addressing potential problems associated with the existing core samples/record and is striving to implement new procedures for future core sampling activities and for qualifying existing core samples. The staff further understands that the NNWSI is planning drilling in the near future, and strongly recommends that drilling not be conducted until procedures are in place to adequately conduct and document all core handling activities.

The resolution of the problems associated with the past and future core samples is the responsibility of the DOE, as the applicant for a license. The NRC QA and technical staff stand prepared to review and comment on the procedures for future drilling, transportation, and storage of core samples, on procedures for qualifying existing core, and on the DOE's rationale for the acceptability of the core in licensing. We strongly recommend this detailed review be performed before any future drilling activities are initiated. If you have any questions on this matter please contact King Stablein (FTS 427-4611) or myself (FTS 427-4672).

Sincerely,

"ORIGINAL SIGNED BY"

John J. Linehan, Section Leader
Repository Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Record Note: This letter has been coordinated with John Trapp (WMGT, Geology Section), Susan Bilhorn (WMRP, Quality Assurance Projects Section), and James Kennedy (WMRP, Quality Assurance Projects Section). KS

VIA PHONE

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John Trapp Trip Report to NNWSI

REFERRED TO	DATE	RECEIVED BY	DATE
HMiller HM 10/16	10/29		11/12
~~Johnson~~ King Stablein			

ENCLOSURES

Send Robert copy to King Stablein

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REMARKS

Closed 11/18/85 Letter to D. Keith.

Tucker
King S
cc Jink
John L
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NOTE TO: Hub Miller 10/14

FROM: Mal Knapp

SUBJECT: JOHN TRAPP TRIP REPORT TO NNWSI, SEPTEMBER 17-19, 1985.

I have read the subject trip report and feel that the recommendations, presented on page 4, make sense and should be implemented. It is my understanding that John has talked with Jim Kennedy and Sue Bilhorn, and that they are drafting a letter to NNWSI to cover the relevant points. I would appreciate being kept informed as to the status of this letter, and receiving a copy of the final letter, when it is transmitted.

Mal

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 03 1985

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

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

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.

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.

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

Enclosures:
As stated

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.

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?