

SITE VISIT ON CORE DRILLING

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DEC 07 1989

Mr. Ralph Stein, Associate Director
for Systems Integration and Regulations
Office of Civilian Radioactive Waste Management
U. S. Department of Energy, RW 30
Washington, D.C. 20545

Dear Mr. Stein:

SUBJECT: AUGUST 9-11, 1989 SITE VISIT ON "CORE DRILLING WITH AIR"

The purpose of this letter is to transmit to you the enclosed U.S. Nuclear Regulatory Commission (NRC) staff trip report regarding staff observations at the August 9-11, 1989 site visit to observe the U.S. Department of Energy's (DOE's) experiment for core drilling with air. The trip involved an NRC staff visit to Milford, Utah, site of the DOE prototype drilling program.

Overall, the NRC staff found the trip to be productive because it provided an opportunity to gain insight into the work being done under DOE's drilling program. The NRC staff will coordinate with DOE and the State of Nevada to plan future observations of site characterization experiments with respect to air core drilling.

If you have any questions regarding this matter, please contact the Project Manager for this area, Brian Thomas, who can be reached on (301) 492-0435 or FTS 492-0435.

Sincerely,

ISI.

John J. Linehan, Director
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management

Enclosure: As stated

cc: R. Loux, State of Nevada
C. Gertz, DOE/NV
S. Bradhurst, Nye County
M. Baughman, Lincoln County
D. Bechtel, Clark County
K. Turner, GAO

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ENCLOSURE

NRC Staff Trip Report on Core Drilling With Air At Milford, Utah August 9-11, 1989

On August 9-11, 1989, staff from the U.S. Nuclear Regulatory Commission (NRC), and representatives from the U.S. Department of Energy (DOE) engaged in a technical exchange of information regarding core drilling methods that are used by DOE at its Milford, Utah facility. This activity is in support of DOE's efforts to characterize the Yucca Mountain site through testing and analyzing representative core samples of the repository block area. No representatives from the State of Nevada or affected units of local government participated in the exchange.

The major focus of the exchange was to observe and discuss DOE's prototype core drilling program and to explore regulatory and technical concerns associated with the program's implementation. Issues surrounding the prototype drilling program are of particular interest to the NRC and DOE staffs because deep core drilling at the geologic repository block area is the only planned "at depth" site characterization activity other than drilling of the Exploratory Shaft Facility (ESF). Like the ESF, there are concerns with which drilling techniques can be used to obtain uncontaminated core samples that are representative of the geologic repository block area and can be used for site characterization testing and analyses.

Technical concepts and ideas regarding deep core drilling techniques were discussed during the site visit. The DOE staff explained that the standard core drilling methods use water for flushing and cooling the drill bits and for lifting rock cuttings to the surface. In the air-cooled technique, air is used instead of water to prevent contamination of the drilling site and to recover core samples of uncontaminated rock. This is an important regulatory concern for the NRC staff because deep core drilling is the only proposed at depth site characterization activity of the future repository block other than the ESF underground excavations. The ESF as currently designed would provide site characterization of a limited area of the block at the repository depth (exploratory drifting). Therefore, deep core drilling will be used to characterize a large portion of the site.

NRC staff observation of the prototype drilling program located at the abandoned "Horn Silver" mine near Milford, Utah included observations of equipment modifications to better facilitate site characterization. Modifications to the drill rig used, which was the Lang Model LM-120 that is designed for deep rotary drilling, involved modifications for dry drilling using a modified rotary roller-cone bit and for recovery of the core by air lift. Another modification allowed the use of wireline dry diamond core drilling where the core is lifted in a standard 10 foot core barrel by wireline.

As observed by the NRC staff, the wireline core technique developed by the DOE and its contractors Reynolds Electrical and Engineering Company and Science Applications International Corporation resulted in a coring rate of 9 to 10

feet per hour and recovery averages of about 95%. The core was in good condition with no visually detectable alteration due to excessive heat. The DOE stated that tests are planned to be conducted to assure that no mineral alteration takes place during coring and to determine if there is any change in fluid content.

Other applications observed by the staff, include the use of an 8-inch diameter core drilling with air blowing capabilities for blowing the core to the surface into the "core catcher." This produced core cylinders of about 4" in diameter and 6" in length. As observed by the staff, the quality of this core was adversely affected by abrasion and impacts during the air lift.

The NRC staff believes that the results achieved by the prototype drilling program must be viewed with caution since the deepest test so far is only 550 feet. The planned deep core drilling at Yucca Mountain is in the range of 1000 to 2000 feet (the repository depth is approximately 1000 feet below surface).

DOE indicated that it intends to continue the effort to find the right technique for exploratory core drilling to obtain uncontaminated representative samples. The NRC staff indicated that there is a need for monitoring the core drilling effort since the exploratory core drilling is important to site characterization and to licensing.

The following are names of representatives of the participants present during the site visit:

NRC

J. Peshel
P. Prestholt

DOE

R. Cady, et al.