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November 29, 1983

U.S. Nuclear Regulatory Commission  
Division of Contracts  
Washington, D.C. 20555

ATTN: Cindy Fleenor  
Technical Assistance Contracts Branch

SUBJECT: Monthly Progress Report - September 1983 Interagency Agreement  
Number NRC-02-80-075, "State-of-the-Art Assessment for Large  
Diameter Horizontal Nuclear Waste Emplacement Holes"

Dear Mrs. Fleenor:

Enclosed is our second monthly progress report on the subject interagency agreement for October 1983. This is in accordance with Article 1, Number 3.1-Reporting Requirements.

Earle B. Amey

Earle Amey  
Staff Engineer  
Division of Health and Safety  
Technology

Enclosures

WM Record File  
36939

WM Project 10,11/6

Docket No. \_\_\_\_\_

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October 1983 Monthly  
STATE-OF-THE-ART ASSESSMENT  
OF

LARGE DIAMETER HORIZONTAL  
NUCLEAR WASTE EMPLACEMENT HOLES

**1.0 Drilling of Emplacement Holes**

Principal Investigator - Gerald L. Finfinger

Information obtained from the computer literature search as well as product specifications from equipment manufacturers are continually being received. From available data obtained, no tunnel boring machines are manufactured smaller than 5 feet in diameter.

A meeting was held with a leading borehole surveying company to discuss state-of-the-art surveying equipment and methods. Information was requested concerning the accuracy of surveying data provided by their measurement while drilling with downhole sensors. Also requested was an explanation of the algorithm and statistical approach used by their uphole microprocessor to reduce error in calculating borehole locations.

**2.0 Maintaining Integrity of Emplacement Holes**

Principal Investigator - Daniel R. Babich

The investigation of basalt and tuff has begun in an attempt to develop a more complete picture of the characteristics of each. A table of values of the material properties of each was formulated. Other characteristics under investigation include the virgin stresses, stress redistribution around circular openings, the possibility of damage resulting from dynamic effects (earthquakes, volcanism), and geologic characterization of typical tuff and basalt deposits. Also, the effect of temperature and the long term behavior of joints and their effect on emplacement hole integrity are being investigated.

Additional research has been conducted on types and methods of casing commercially available. To date, it appears that no one type of casing is suitable under all conditions. Materials such as concrete and steel are all subject to various deficiencies such as heat, water, or long term exposure. In conjunction, some form of backfill between the casing and rock may be necessary. Investigation of this problem has been initiated.

**3.0 Backfilling of Emplacement Holes**

Principal Investigator - Robert J. Evans

Work conducted at the Pennsylvania State University's Materials Research Laboratory, on tailored nuclear waste backfill materials, was discussed with Dr. D. Roy and Dr. P. H. Licastro. In addition, twenty-two articles on backfilling techniques and materials characterization were reviewed.

During the next month, review of the literature will continue. Meetings will be conducted with government and industry personnel to discuss hydraulic and pneumatic techniques for backfill emplacement.

Literature reviewed to date indicates that special attention should be given to the study of emplacement techniques that will provide adequate compaction of backfill materials having high thermal conductivity and low hydraulic conductivity.

#### 4.0 Retrieving Waste Canisters from Emplacement Holes

Principal Investigator - Gerald L. Finfinger

No significant progress to report. Principal Investigator has been involved in a great deal of travel.

*Edward D. Thimons*  
Edward D. Thimons

Man-EffortTaskMan-Hours  
This PeriodTotal Man-Hrs.  
to DatePercent of  
Available Hrs.

1.0	104	126	11 %
2.0	88	136	11.5%
3.0	88	148	23.5%
4.0	0	0	0.0%