

NATIONAL RESEARCH COUNCIL
COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND RESOURCES
2101 Constitution Avenue Washington, D. C. 20418

U.S. NATIONAL COMMITTEE
FOR ROCK MECHANICS

(202) 334-3137

December 7, 1984

Mr. Gupta:

Enclosed is a duplicate copy of the material
mailed November 28, 1984

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Terrie Noble
Terrie Noble
Administrative Assistant

WM Record File

108.9

WM Project 1

Docket No. _____

PDR ☒

LPDR _____

Distribution:

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NATIONAL RESEARCH COUNCIL

COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND RESOURCES

2101 Constitution Avenue Washington, D.C. 20418

U.S. NATIONAL COMMITTEE
FOR ROCK MECHANICS

OFFICE LOCATION:
JOSEPH HENRY BUILDING
21ST STREET AND
PENNSYLVANIA AVENUE, N.W.
(202) 334-3137

November 28, 1984

Mr. Dinesh Gupta
Engineering Branch
Division of Waste Management
Mail Stop 623 SS
Nuclear Regulatory Commission
Washington, D.C. 20555

WM Record File

108.9

WM Project

1

Docket No.

PDC

LPDR

Distribution:

(Return to WM, 623-SS)

Dear Mr. Gupta:

I am pleased to transmit comments on the Draft GTP, "In Situ Testing During Site Characterization for High-Level Nuclear Waste Repositories." The comments were solicited from members of the U.S. National Committee for Rock Mechanics, as requested in your letter of October 1984.

As you know, these comments reflect the individual opinions of the respondents. Therefore, they may not be considered to constitute an official position by either the National Research Council or the committee.

We appreciate the opportunity to assist the Nuclear Regulatory Commission in this activity.

Sincerely,



Susan V. Heisler
Acting Executive Secretary

Enclosures

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NATIONAL RESEARCH COUNCIL
COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND RESOURCES

2101 Constitution Avenue Washington, D. C. 20418

U.S. NATIONAL COMMITTEE
FOR ROCK MECHANICS

(202) 334-3137

TELEPHONE RESPONSES TO: Susan V. Heisler

SUBJECT: Draft GTP, "In Situ Testing During Site
Characterization for High-Level Nuclear
Waste Repositories"

From R.G. Lundquist:

I regret that I am unable to provide comments on the
draft GTP due to possible conflict of interest.

From K.H. Hadley:

My business schedule is such that I will be unable to
devote sufficient time to evaluate the GTP properly.

**PURDUE
UNIVERSITY** SCHOOL OF CIVIL ENGINEERING

November 2, 1984

Susan V. Heisler
Acting Executive Secretary
U. S. Committee for Rock Mechanics
National Research Council
2101 Constitution Avenue
Washington, D. C. 20418

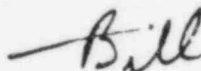
Dear Susan:

I have solicited comments on the Draft Generic Technical Position:
"In-Situ Testing During Site Characterization for High-Level Nuclear
Waste Repositories." Three responses follow:

1. TV and/or BH cameras should survey BHs to accurately locate orientations of discontinuities.
2. Provide for instrumentation of openings to assess σ changes with time and excavation processes. Some should be installed in long BHs ahead of excavation.
3. There should be experiments with different geometric shapes for the openings, to see how they affect excavation economics and stress distributions.

With best personal regards.

Sincerely,



C. W. Lovell
Professor and Member
USNC/RM



Grissom Hall
West Lafayette, Indiana 47907



United States Department of the Interior

BUREAU OF MINES

SPOKANE RESEARCH CENTER
EAST 315 MONTGOMERY AVENUE
SPOKANE, WASHINGTON 99207

November 19, 1984

Susan V. Heisler
Acting Executive Secretary
National Research Council
U.S. National Committee for
Rock Mechanics
2101 Constitution Avenue
Washington, DC 20418

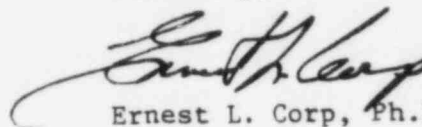
Dear Ms. Heisler:

The following comments are offered in reviewing NRC's Draft Generic Technical Position on "In Situ Testing During Site Characterization for High-Level Nuclear Waste Repositories".

- 1). There seems to be a lack of emphasis on making an adequate assessment of what in situ parameters are needed, why they are needed, how they will be used, or what is an acceptable minimum or maximum. Conducting massive batteries of tests to measure and report various properties can often overshadow how these properties are used in design, or what constitutes acceptance or rejection in terms of design needs.
- 2). Past experience with repository design has shown a tendency on the part of contractors to use average values of in situ properties. It should be emphasized that in many instances this is unacceptable. For example, flow of water through a repository is not a function of the average conductivity of the rock. A fracture system may control water flow to the extent that other conductivity measurements are meaningless.
- 3). Expensive large-scale tests of rock properties may not be needed; if behavior of full-scale openings can be successfully modelled by finite element or boundary element methods. This of course requires verification of the models by monitoring in situ deformations or stresses around the openings.
- 4). Section 3.1, page 10, Items 4 & 5. The extent and variability of the host rock cannot be estimated unless there is good prior evidence to indicate a consistent structure. This is not the case at several of the sites, particularly BWIP. Where consistency cannot be assured, the surface drilling may have to be very extensive regardless of the restrictions in 10 CFR 60.10 (d)(2). This is a factor which should have been considered under Preliminary Testing (p. 15, 4.2(a)), but has not been, and is evidently not within the scope of this GTP. This could be a serious flaw in the entire in situ characterization program.

- 5). Page 17, 4.4, NRC has expressed an example scale in 10 CFR 60 of two exploratory shafts and 1,000 feet of tunnel as being adequate for site characterization at depth. As stated in the previous comment, this could be more than adequate or grossly inadequate depending on the type, extent, and variability of the repository structure. This is a very important issue that must be settled before any program of in situ testing can be evaluated.

Sincerely,



Ernest L. Corp, Ph.D., P.E.

COMMENTS
SOLICITED by
D. J. Bolstad
ON BEHALF OF
THE USUC/RM

TERRY TULLIS

Comments on NRC's Generic Technical
Position on In Situ Testing
Received 11/27/84 by telephone, 11:15 am

I am not sure the procedure is adequate to evaluate this document. I think that someone knowledgeable in rock mechanics (which should be a subcommittee or committee) needs to sit down and think about problems for a couple of days. I'm concerned we might miss things under the current procedure.

Another major overall consideration is that our committee (but preferably with some detailed knowledge) also consider in situ testing for the performance confirmation. This current document is for site characterization testing but it also discusses confirmation testing. Later a document will come out addressing that. It seems it should be called performance evaluation testing instead of performance confirmation testing.

I think there needs to be more discussion of how it may be decided whether a site is unsuitable after the site characterization testing. For example: How large a fracture might be significant enough that the site cannot be used at all?

Overall Comment

In situ testing needs to take into account the overall hydrological environment rather than merely local rock properties.

Specific Comments

p. 12, A, (1), after semicolon add:

This geologic study is to include complete mapping and characterization of all fractures intersecting underground openings including, but not limited to: determining and recording for each fracture its orientation, aperture, roughness, rock type containing it, nature of fracture filling material (if any), evidence for alteration along fracture (if any), and evidence for groundwater influx along fracture (if any).

p. 12, A, (4):

Study of geological units and discontinuities should be checked in some locations by mine back excavation.

p. 13, between (3) and (4), insert as new (4):

Calculations of expected water transport behavior in all fractures mapped and characterized, with emphasizes on major fractures.

change old (4) to (5), and add:

These should include medium scale in situ permeability measurements in the locations of the repository excavation during excavation.

p. 13, C, (2):

Recent studies have shown that stress measurement in salt is difficult so account needs to be taken of these problems.

Performance Confirmation Testing:

Detailed fracture mapping and characterization should be made in all parts of eventual repositories. (Should be included in new document.)

JAMES H. COULSON

Comments on NRC's Generic Technical
Position on In Situ Testing
Received 11/28/84 by telephone, 8:25 am

This document is very generic in nature. The guidelines are good but the question remains if in situ testing at its current stage of development will answer or raise questions about adequacy.

The references make no mention of ASTM work for the NRC, although some of the ideas are very similar to those expressed in some D18.12 meetings. It may be wise to include a reference to ASTM for works to be published in the near future.

Comments from page 8, Sec. 60.21, C111 (3rd par., next to last line)

Rather than reading "laboratory tests which are representatives of field conditions," it should read "laboratory tests which are indicative of field conditions."

General comments

For each kind of information desired, there is often more than one test procedure which can be used. It is important that flexibility is maintained so the designer can choose the most appropriate test for the specific site.