

AUG 14 1992

Mr. John P. Roberts, Acting Associate Director
for Systems and Compliance
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Mr. Roberts:

SUBJECT: DETAILED TECHNICAL REVIEW OF U.S. DEPARTMENT OF ENERGY STUDY PLAN FOR CHARACTERIZATION OF THE YUCCA MOUNTAIN REGIONAL SURFACE-WATER RUNOFF AND STREAMFLOW

In a letter to the U.S. Department of Energy (DOE) dated May 14, 1991, the Nuclear Regulatory Commission informed DOE that the NRC staff's Phase I Review had identified no objections with any of the activities proposed in the study plan for "Characterization of the Yucca Mountain Regional Surface-Water Runoff and Streamflow" (Study Plan 8.3.1.2.1.2). At that same time, NRC also indicated that it had decided to proceed with a Detailed Technical Review of that study plan. The purpose of this letter is to transmit the results of the NRC staff's Detailed Technical Review.

The subject study plan has two activities: 1) surface-water runoff monitoring (8.3.1.2.1.2.1) and 2) transport of debris by severe runoff (8.3.1.2.1.2.2). These activities consist of measuring and recording the temporal, spatial, and physical characteristics of runoff and streamflow, and the locations, quantities, and characteristics of debris transport. The NRC staff considers that the results of these activities are important as they will be used in the evaluation of design and performance issues.

In its Detailed Technical Review the NRC staff identified two comments and three questions relative to the study plan. The detailed review comments and questions (enclosed) on this study plan will be tracked by the NRC staff as open items similar to SCA objections, comments, and questions. NRC recommends timely resolution of these comments and questions and is prepared to interact with DOE upon DOE's request to work toward resolution.

In order for the NRC staff to be able to complete its review in a timely manner, DOE should provide its responses to the enclosure within 60 days of the date of this letter. If DOE is unable to provide the information within the requested time, please notify the NRC staff of when the responses will be provided.

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Mr. John P. Roberts

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If you have any questions concerning this letter or the enclosure, please contact Charlotte Abrams, of my staff, at (301) 504-3403.

Sincerely,

JS

Joseph J. Holonich, Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

- cc: R. Loux, State of Nevada
- T. J. Hickey, Nevada Legislative Committee
- C. Gertz, DOE/NV
- S. Bradhurst, Nye County, NV
- M. Baughman, Lincoln County, NV
- D. Bechtel, Clark County, NV
- D. Weigel, GAO
- P. Niedzielski-Eichner, Nye County, NV
- B. Mettam, Inyo County, CA
- V. Poe, Mineral County, NV
- F. Sperry, White Pine County, NV
- R. Williams, Lander County, NV
- P. Goicoechea, Eureka County, NV
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Activity 8.3.1.2.1.2.1 Surface-water runoff monitoring

COMMENT 1

The NRC staff considers that specific attention should be given to the study of surface runoff flows from the west face of Yucca Mountain and in Solitario Canyon.

BASIS

In response to the objectives of the study plan, an impressive array of surface-runoff measuring sites have been proposed and the program has been divided into two types of stream-gaging networks. One is for a regional study and the other is for a site study. However, the focus of the investigations and location of the majority of the runoff gaging sites are associated with an attempt to assess the contribution of channel flow to the regional groundwater table.

DOE acknowledges that the "regional streamflow-measurement network is not of adequate areal density, or of a needed level of detail, to satisfy the information needs" (p. 3.1-25) to determine the contribution (if any) of infiltration and surface runoff to the moisture flow in the "deep" unsaturated zone. Because of this need, DOE has proposed the 23 locations shown on Figure 3.1-4.

With respect to the input to the unsaturated flow regime above the repository and an evaluation of repository performance, the site study aspect of the plan is as important, if not more important, than the regional study. Also given the nature of the precipitation and runoff events of this region, a network of small watershed sites may also provide more data and information over the duration of the study.

The geologic formations dip from the Solitario Canyon fault zone to the east under Yucca Mountain. There is a possibility that ephemeral flows from the face of Yucca Mountain and in Solitario Canyon could be a supply of water (amounts, duration, and ponded heads) for porous and fracture groundwater flow in the geologic formation above and in which it is proposed to locate the repository. In this regard, consideration should also be given to locating the gaging stations with respect to the site characterization wells proposed in other parts of the SCP (e.g., 8.3.1.2.2.3.2, 8.3.1.2.2.3.3, 8.3.1.2.2.4.9, and 8.3.1.4.3.1.1). Also, the shortest distance from the ground surface to the repository is from the Solitario Canyon face of Yucca Mountain. NRC recognizes that three gaging stations are proposed for Solitario Canyon from the information in Figure 3.1-4. Although gaging sites are proposed for the east side of the mountain (i.e., SY1,6,8,10, and 11), no sites are proposed for the west face of the mountain.

RECOMMENDATION

DOE should consider placing some gaging sites on the western side of the mountain, show the boundaries of the drainage areas for all watersheds, and develop in more detail the relationship of the three proposed Solitario Canyon gaging sites and any additional sites with respect to the existing wells, proposed wells, raingage locations, soils and surficial deposits, channel incisions, and exposed geologic formations in the Solitario Canyon area.

Activity 8.3.1.2.1.2.1 Surface-water runoff monitoring

COMMENT 2

The NRC staff cautions against rejecting evaluating the probabilities of runoff magnitudes by any regionalization procedure or method.

BASIS

In the paragraphs discussing the estimation of runoff frequencies (p.3.1-28), it is stated that the alternatives to at site evaluation of runoff magnitude recurrence frequencies of 1) using precipitation and basin characteristics and 2) regionalized runoff relations were rejected. In the publication "Estimating Probabilities of Extreme Floods; Methods and Recommended Research" (National Research Council, 1988, p. 8), it is stated that:

[i]nitially a single at-site analysis can be preformed. This is a good starting point, and it uses recorded data at the point of interest. However, it must be recognized that data at a single site are too limited to permit more than a rough estimate and then only for relatively common floods.

After some discussion about the consideration of appropriate probability distributions, it is stated in the report:

After these preliminaries, the emphasis should be on increasing the data pool as much as practicable. There are two ways to do this: use of historical and other data, and the use regional analysis. (NRC, 1988, p. 8)

RECOMMENDATION

The NRC staff refers DOE to guidance of the 1988 publication by the National Research Council and suggests that regional methods be included in the site characterization analyses.

REFERENCE

National Research Council (NRC), 1988, "Estimating Probabilities of Extreme Floods; Methods and Recommended Research," Committee on Techniques for Estimating Probabilities of Extreme Floods, Water Science and Technology Board, National Academy Press, Washington, D.C.

Activity 8.3.1.2.1.2.1, Surface-water runoff monitoring

QUESTION 1

Have the field-tests of the surface runoff measurement devices, systems, and proposed techniques been completed? And, if not, when will they be completed?

BASIS

DOE has indicated that it is important to have the site runoff measuring stations operating as soon as possible, "in the near future (FY 1991 and 1992)" (p. 3.1-25). However, this operational phase is dependent upon the completion of field-tests of the measurement devices, systems, and proposed techniques that were to be done "hopefully" in FY 1990 (p. 3.1-26). However, the NRC staff has no knowledge that such field-testing has been accomplished. If the site runoff measurement locations are not instrumented at the beginning of the restart of site characterization activities, it will be difficult to collect the needed information from these tests prior to the submittal of a license application.

RECOMMENDATION

Provide a discussion of the status and schedules for the planned field-test of the surface runoff measurement devices.

Activity 8.3.1.2.1.2.1 Surface-water runoff monitoring

QUESTION 2

Has DOE considered any other instrumentation for measuring in situ flow depth and velocity, especially for large ephemeral flows such as sonar, pressure transducers, and induction probes?

Basis

In Table 3.1-3 of the study plan, DOE has listed a number of technical procedures that will be used for this study. Two of these procedures (HP-116,RO and HP-100,RO) are associated with the measurement of channel flow. To augment or supplement the stilling well with float or bubbler measurements of stage, the DOE might consider the use of sonar and pressure transducers. Price current meters have limitations with respect to making velocity measurements in large ephemeral flows that occur in the semiarid environment. Thus, DOE may wish to consider using other types of instrumentation for measuring flow velocity, especially for the large ephemeral flows, in the planned measuring flumes. There has been some experience with induction velocity probes for the measurement of high velocity flow in flumes which might be considered (Smith and others, 1982).

RECOMMENDATION

Provide a discussion of the evaluations made and the types of flow measuring structures and instrumentation considered and selected (if appropriate) for the surface runoff monitoring activity.

REFERENCE

Smith, R. E., Chery, D.L., Jr., Renard, K.G., and Gwinn, W.R., 1982, Supercritical flow flumes for measuring sediment-laden flow: U.S. Department of Agriculture, Agricultural Research Service, Technical Bulletin 1655.

Activity 8.3.1.2.1.2.2, Transport of debris by severe runoff

QUESTION 3

Are there plans for taking sediment samples at the gaging stations?

BASIS

The debris transport activity is significantly different from that of the surface-water runoff monitoring activity (Section 3.1) in that it is a "field-reconnaissance" type of investigation as contrasted to the extensive field instrumentation planned for the 3.1 activity. Therefore, there will be limited quantifiable data except for the description (size and composition) of a debris flow and of selected point surface and channel erosion. The information about the storm events and size of runoff or flow that caused or deposited a debris flow can only be inferred. Therefore, the references to monitoring on pages 3.2-3 and 3.2-4 can only be associated with some aspects of the erosion part of the investigation unless there are plans to do sediment transport sampling at the gaging sites proposed in activity 3.1.

RECOMMENDATION

Provide a discussion of plans (if any) for sediment sampling.