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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 30 1989

OFFICE OF
EXTERNAL AFFAIRS

Mr. Samuel Rousso
Acting Director
Office of Civilian Radioactive Waste Management
Department of Energy
Washington, DC 20585

Dear Mr. Rousso:

In response to Secretary Herrington's letter of December 28, 1988, and in accordance with Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has reviewed the U.S. Department of Energy's (DOE) Site Characterization Plan for the Yucca Mountain Site. This site is to be characterized for future possible use as a high-level nuclear waste repository. EPA generally agrees with the proposed characterization plan, and we believe it will provide the necessary data to analyze compliance with EPA's standards for the disposal of high-level radioactive waste.

DOE has described a comprehensive and systematic approach towards determining compliance with the EPA standards that were promulgated in 1985. DOE's approach will consider a wide range of potential release mechanisms with appropriate analytical simplifications and screening procedures to avoid considering insignificant release mechanisms. Similarly, one concern we have with the approach involves human activities. We want to make it clear that the containment requirements of the disposal standards will apply to the total projected releases from all significant processes and events, and that the complementary cumulative distribution function (CCDF) used to determine compliance must incorporate both natural and human-initiated processes and events. Compliance may not be considered separately for these two categories.

The plan indicates that backfill is not required in the repository for hydrologic reasons. However, backfill and seals are deterrents to human intrusion for those time periods when institutional controls can no longer be relied on.

EPA strongly supports DOE's commitment to carry out performance projections for 100,000 years, even though such projections are not required. In addition, we recommend that DOE determine the origin of the calcite-silica veins found in the Yucca Mountain area, since these deposits relate to the geological history and tectonic stability of the site. Additional detailed comments are enclosed for your use.

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We appreciate the opportunity to comment on the Plan, and, if we may be of further assistance, please contact me or Mr. Richard Guimond (475-9600), the Director of EPA's Office of Radiation Programs. The respective contacts on our staffs are Dr. W. Alexander Williams (382-5909) and Ms. Priscilla Bunton (475-9633).

Sincerely,

Richard E. Sanderson
Director
Office of Federal Activities

Enclosure

DETAILED COMMENTS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY
ON THE U.S. DEPARTMENT OF ENERGY'S
YUCCA MOUNTAIN SITE CHARACTERIZATION PLAN (SCP)

GEOLOGY

1. Emphasis should be placed on determining the origin of the calcite-silica veins found in the Yucca Mountain Area because this relates to the question of tectonic stability. A U.S. Geological Survey refers to the calcite-silica veins as "hydrogenic" which infers that they could be the result of either descending surface waters or ascending hydrothermal waters from tectonic events. One theory is that the deposits might be hydrothermal and related to Quaternary volcanism. The concern is that hydrothermal activity at or near the site could corrode the waste package and accelerate release of radionuclides to the accessible environment. The resolution of this concern is significant in determining site suitability. To determine the origin of the calcite-silica veins, more focus should be given to the study of other types of minerals in the area, which could yield clues as to the origin of the calcite-silica veins. Also, the study of magma production in the area is important because it relates to tectonic stability.

HYDROLOGY

2. Our hydrology review focused on the matrix and fracture flow characteristics of the saturated and unsaturated zones in relation to the travel time of groundwater from the potential repository horizon to the accessible environment. Although investigations are planned for "characterization of the regional ground-water flow system" in section 8.3.1.2.1.3, the SCP does not indicate any specific plans to determine the boundaries of the subbasins which make up the hydrographic study area. These boundaries are necessary to fully understand the effects of potential hydrological changes in the region. Three subbasins, the Oasis Valley Subbasin, the Alkali Flat-Furnace Creek Ranch Subbasin, and the Ash Meadows Subbasin, make up this area. The boundaries have been inferred "from potentiometric levels, geologic controls of subsurface flow, discharge areas, and inferred flow paths." Suggested methods which could assist in determining the boundaries are: (1) using flow nets to determine the direction of groundwater flow; and (2) performing pump tests, such as the Boulton method, to verify the results of the drawdown recovery method. Other methods which could be used in determining boundaries are: (3) collecting rainfall data along the gradients; and (4) using different methods for measuring evapotranspiration by determining run-off, recharge and precipitation to validate results.

3. Although the SCP includes plans to investigate the groundwater flow system in the saturated zone, the methods for the investigations should be more explicit, such as indicating the type

and number of pump tests to be run, with justification for the type of pump test selected.

4. In the unsaturated zone, the flow characteristics should be measured to determine where and when fracture flow characteristics dominate over matrix flow characteristics.

CONCEPTUAL REPOSITORY DESIGN

5. Several areas of chapter 6 indicate that backfill is not required in the repository for hydrologic reasons. However, while the design for closure currently includes backfilling the underground openings, from section 6.2.7, "the need for backfill must be assessed based on the stability analyses of the underground openings and the analyses of the hydrologic conditions within the repository." Another factor to be considered in the need for backfill is using it as a deterrent for human intrusion, along with the seal system, even if it is found that backfill is not required for stability or hydrologic reasons.

CONCEPTUAL WASTE PACKAGE DESIGN

6. Many uncertainties are addressed in the conceptual design, and while this design may exclude certain events which appear to have a low probability of occurrence, the final design should consider all investigation results during the final design process to ensure that no conditions or events have been overlooked. Specifically, on page 7-8, a design condition for the waste package is that it is assumed to be subject to a pressure of one atmosphere. This design condition gives no consideration to the potential for faulting effects on the waste package, which could cause the package to be subject to a pressure greater than one atmosphere. Faulting effects are not identified as being design uncertainties in chapter 7, although the SCP does include faulting in the investigations of section 8.3.1.8.2, which studies effects of tectonic events on the waste package. The integration of the design conditions in chapter 7 and the results of these investigations is unclear.

PERFORMANCE ASSESSMENT

7. Compliance with EPA standards. With regard to assessing the system's long-term performance after closure, the Department has described a very comprehensive and systematic approach towards determining compliance with the EPA disposal standards that were published in 1985. This approach will consider a wide range of potential release scenarios, but with appropriate analytical simplifications and with screening procedures to avoid considering scenarios that should not contribute significantly to the overall analyses.

We have one concern with the approach towards determining compliance with the containment requirements (section 191.13). On page 8.3.5.13-23 of the SCP, the Department states that:

> In calculating the CCDF, the DOE intends to take into account all those natural processes and events that are sufficiently credible to warrant consideration. (emphasis added)

The implication of this sentence and the following paragraphs is that processes and events that might be initiated by human activities will be treated in some different, separate way. We recognize that very different types of uncertainties will apply to natural and human-initiated events, and it will often be appropriate to study them separately while planning site characterization. However, we want to make it clear that the containment requirements will apply to the total projected releases from all significant processes and events, and that the CCDF to be used to determine compliance must incorporate both natural and human-initiated processes and events. Compliance may not be considered separately for these two categories.

8. 100,000-year performance projections. On pages 8.3.5.18-21 through 18-27, the SCP describes the Department's approach for carrying out performance projections for 100,000 years, as discussed in 10 CFR 960.3-1-5. EPA wants to strongly endorse DOE's continued commitment to do these very long-term projections, even though they are no longer strictly required after passage of the NWPAA. A very useful approach for these analyses was established in 10 CFR 960, and proceeding with them will add confidence to the site characterization process.

9. External review of performance assessment methods and results. In many places throughout section 8.3.5, the Department refers to peer reviews of analytical models and data and to the professional and expert judgments that will be needed to do the performance assessments. EPA agrees that such judgments and reviews will be an essential part of the process, and we want to encourage the Department to include a wide spectrum of participants from many organizations in these reviews. In addition, the Department should do all it can to make the computer programs used available and accessible to all who might be interested in carrying out their own evaluations of the protection provided by the site.