



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

May 1, 1992

Mr. James M. Taylor
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Taylor:

SUBJECT: REVIEW OF NRC HIGH-LEVEL RADIOACTIVE WASTE RESEARCH
PROGRAM PLAN (DRAFT NUREG-1406)

During its 41st meeting, March 12-13, 1992, the Advisory Committee on Nuclear Waste (ACNW) met with representatives of NRC's Office of Nuclear Regulatory Research (RES) to review the NRC High-Level Radioactive Waste (HLW) Research Program Plan (Draft NUREG-1406). Also providing input to our review was a discussion held on February 18, 1992, by the ACNW Chairman with Dr. David L. Morrison, Chairman, NRC Nuclear Safety Research Review Committee (NSRRC). The ACNW also had the benefit of input from Dr. Fred J. Molz, one of the members of the NSRRC who attended our meeting with the RES staff. Discussions of this matter were also held during our 42nd meeting, April 22-24, 1992.

Our review of the draft Research Plan and our discussions with the RES staff indicate that organization of many of the RES activities is yet to be completed and that there are fundamental deficiencies or disconnects between the RES program, as described, and the needs of the Division of High Level Waste Management (HLWM). In short, the Research Plan is still evolving and major questions are yet to be resolved. Elaboration of these comments is provided below. Additional comments can be found in the transcript of our 41st meeting.

1. From the point of view of the ACNW, the principal role of the RES staff is to serve as program managers. In many ways, RES staff members appear to view themselves primarily as research scientists. The confusion between these two roles may be the source of some of the problems. One example is the fact that the draft Research Plan fails to mention rigorous independent scientific reviews to ensure that the proposed plans are justified and that the outcome will be of acceptable quality. Part of the management strategy should be to develop an in-depth and rigorous external review of individual research projects as well as review of the overall Research Plan.

2. Our review of the draft Research Plan revealed the need for developing a strategy document (either separately or as a portion of the Research Plan) in which the RES staff delineates its research goals, how the supporting program will be planned, and how priorities will be established and implemented. A key factor is the timeliness of some of the proposed research. That is, will the data be available when needed? Although the draft Research Plan discusses these subjects in a general sense, there remains a need to document in a formal manner the procedures by which priorities will be set. The approach, currently outlined, could, and apparently does, allow a limited number of NRC staff members to decide major program priorities. We believe this is inappropriate. Another key component of the strategy document should be a description of and, particularly, a justification for determining which portions of the RES HLW research will be generic in nature and which will be specifically directed to the proposed Yucca Mountain Site. Also included in a strategy document should be a description of how the RES program will be focused on the critical concerns of, and coordinated with, HLWM. Most importantly, a description should be provided of how studies conducted under the aegis of the RES program will be coordinated with those in Technical Assistance (TA). (See Item 5 below.)
3. The draft Research Plan is difficult to follow. The Introduction should contain a clear statement of the guidelines and policies or principles that are being used by RES to decide what type of program it will pursue. The early chapters should indicate how decisions will be made on the research to be conducted by the NRC, compared with the research being done by the Department of Energy (DOE), and how these research efforts will be coordinated. Although the draft Research Plan appropriately states in the introductory portions that NRC research should be limited to that of a confirmatory nature, our discussions of individual projects frequently revealed that some of the data that will be collected under the program may not be so justified and thus may not be warranted. One example is the research on the water level in the Lucky Friday Mine. Where the RES work overlaps DOE activities, the Research Plan needs to include a clear description of the rationale used to justify the overlap and at what point, if any, the NRC is expected to be "ahead" of DOE in a given area. For example, research on the regional aspects of volcanism that the NRC staff believes are important should, as stressed in the Site Characterization Analysis, be primarily the responsibility of DOE and be incorporated into its Site Characterization Plan (SCP).
4. As mentioned above, there is a need to identify how the goals of the NRC research program relate to the licensing effort for

the proposed HLW repository. In this regard, the RES staff appears to be assuming that the principal reason for the research program is to obtain the data necessary to confirm that the repository being proposed by DOE will comply with 10 CFR Part 60. The staff acknowledges only in passing that the primary goal of its licensing review is to ensure that the health and safety of the public is protected. We find this disturbing for two reasons: (a) the Systematic Regulatory Analysis has clearly shown that portions of Part 60 need to be revised, and (b) Part 60 specifies that the total system (not the individual subsystem) requirements must be demonstrated to comply with the standards being developed by the Environmental Protection Agency.

5. The draft Research Plan includes a host of individual research programs whose interfaces and coordination are not always clear. More attention needs to be directed to ensuring the integration of the overall RES research effort. Further complicating this situation is the fact that, according to information provided to the ACNW, the funds currently being spent by RES for TA support of the HLW licensing program are double those being spent on HLW research. It would be beneficial if, in the future, the ACNW could hear a combined discussion and description of these two programs, including details on how they are related and how they are coordinated. Otherwise, our review is incomplete. That better coordination is necessary was illustrated by the fact that new research, even where staff members in both offices are in agreement, might require a year or more to initiate. We believe that the processes for identifying research needs and developing focused programs to address these needs, together with the administrative matters associated with implementing the research, should be subjected to analysis to streamline these processes and make them more responsive in a timely manner to the requirements of the Commission.
6. The establishment and functioning of the Center for Nuclear Waste Regulatory Analyses (CNWRA) appear to have initiated certain problems that need attention. One of the stated goals of the NRC staff is to ensure that the funding and staffing of the CNWRA are maintained on a relatively stable basis. Although such a goal is understandable, it can limit research flexibility and may tend to set artificial priorities. Further, it may require that the time of many CNWRA staff members be directed to several projects, with a loss of both efficiency and research effectiveness. One way to overcome some of these problems is to limit the number of projects on which each CNWRA staff member works, and to ensure that the CNWRA and/or NRC staffs have adequate funds and authority to subcontract selected research projects in areas where the CNWRA does not have sufficient expertise.

7. Although we concur with the emphasis in the draft Research Plan on the use of natural analogs in identifying and evaluating relevant models, processes, procedures, and principles, effective use of analogs can only be based on a clear definition of the relevance of the analog in either a generic or a site-specific sense and the manner in which the results can be transferred to the licensing concerns of the NRC. It is not at all clear that this principle is an effective part of the Research Plan. In this regard, there may be a need to develop a major site in the United States for investigating various questions related to the development of an HLW geologic repository. Although other countries, such as Canada, Sweden, and Switzerland, have well-established underground exploratory sites, the United States does not at present have such a laboratory. Useful data have been made available through work at the Apache Leap Tuff Site and the Lucky Friday Mine, but other relevant sites, such as the G-Tunnel in Nevada, are not available. If the necessary permits can be obtained to begin underground explorations at Yucca Mountain, perhaps that will provide the needed facilities. The NRC should encourage the DOE to initiate the establishment of a relevant experimental underground laboratory in the United States.
8. We offer the following comments on specific research projects and activities:
 - a. The draft Research Plan includes no research on problems related to airborne releases of carbon-14. We understand that this is being corrected, but we believe that this deficiency may illustrate a lack of comprehensive planning.
 - b. Although the draft Research Plan includes a discussion of the need to reduce uncertainties, the distinction between and the rationale for focusing on "regulatory" or "technical" uncertainties are neither clear nor convincing. We believe that this distinction should be made clear, that the focus of RES should be on technical issues demonstrably connected to NRC's role in licensing, and that the RES staff should describe how it intends to accomplish this. This information should be incorporated into the Research Plan.
 - c. There often appears to be confusion in the draft Research Plan on what is "transferable." Although data may not be readily transferable from one site to another, the methodologies for obtaining the data generally should be. We recommend that the RES staff concentrate on the development of transferable methodologies and applicable principles and models, not transferable data. This

should be emphasized and clarified in the next version of the Research Plan.

- d. A key part of the licensing effort for the proposed HLW repository will be to confirm models and methods for scaling or projecting from experiments conducted on a short-term, and perhaps modest-scale, basis to the behavior of materials and equipment over long-term durations, and at full scale. This research mode may need to receive more attention.
- e. More effort needs to be directed to the development of models that will be applicable to evaluations of repository performance in unsaturated media. Included in this effort should be work to support the understanding of the behavior of the various factors influencing the movement of water and radionuclides in such media.
- f. Although a sizable effort is under way to select a potential host site for the Monitored Retrievable Storage (MRS) facility, there is little research under way on this subject within the NRC. The reason for this, according to the RES staff, is that the MRS, as envisioned, will use only standard equipment (dry storage casks, etc.) that has already been approved (licensed). Although this may be the case, we urge that the HLWM and RES staffs conduct a careful analysis of the MRS as a system to ensure that no areas are in need of confirmatory research, and that the skills of the staff in addressing relevant licensing issues are likely to be adequate.
- g. At several points in the draft Research Plan, the NRC staff has identified milestones for the completion of certain research efforts. In some cases, the milestones listed are those of DOE, not the NRC. Although the DOE schedule for the HLW repository is an important factor for consideration in the NRC research program, we believe that the RES staff must be careful not to let its research program schedule be unduly influenced by DOE schedules. This problem reflects a confusion in scope of the RES program that needs to be clarified in the next version of the Research Plan.

On the basis of our review of the RES draft Research Plan, the presentations by the RES staff at our 41st meeting, and considerable discussion of other parts of the HLW research program, we offer the following recommendations some of which are beyond those imbedded in our previous comments.

1. The RES staff should prepare a strategy document, the contents of which are in accord with our previous comments. The final document should be closely coordinated with HLWM.
2. The RES and HLWM staffs should coordinate the RES program, its strategies and goals, and the current and expected TA activities. The results of this coordination and delineation of schedules should be described in the Research Plan, should serve as the guiding document for program and resource decisions, and should be the subject of a future review by the ACNW.
3. RES management should devise and implement administrative procedures whereby the RES staff is afforded periodic opportunities for prolonged (e.g., one year) full-time assignments in research (e.g., sabbatical leave to a university). During other times, the RES staff should focus its attention on the strategy, management, and evaluation of the research programs supported on behalf of HLWM.
4. RES management should clarify and insert into appropriate documents (e.g., the strategy plan) the goals and interfaces of the HLW research activities, especially as they relate to DOE activities and the needs of HLWM.

In summary, it is our belief that the RES staff needs to carefully review and reevaluate its plans for managing the HLW research program. Once this is done, the draft Research Plan should be extensively reorganized and rewritten. Areas in need of attention include the preparation of a strategy document in which the RES staff delineates its research goals; the development of a system for in-depth and rigorous external review of individual research projects as well as the overall Research Plan, including studies being conducted under both the research and TA programs; and the identification of the role that each project and/or product will play in the licensing process. Included in this reevaluation should be a careful review of the programs being conducted by, and staff assignments within, the CNWRA.

We appreciate the opportunity to review and comment on this program. We stand ready to review the revised Research Plan when completed.

Sincerely,



Dade W. Moeller
Chairman

Mr. James M. Taylor

7

May 1, 1992

References:

1. U.S. Nuclear Regulatory Commission, "NRC High-Level Radioactive Waste Research Program Plan," (Draft Report for Comment) NUREG-1406, February 28, 1992
2. Morrison, D. L., Nuclear Safety Research Review Committee, Letter to E. S. Beckjord, Office of Nuclear Regulatory Research, NRC, February 24, 1992