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GAO

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Resources, Community, and
Economic Development Division

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The Honorable Judy M. Sheldrew
Commissioner, Public Service Commission
State of Nevada
727 Fairview Drive
Carson City, Nevada 89710

Mr. Alex Radin
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We appreciate the opportunity you gave us to comment on your draft statement of work for the independent financial and management evaluation of the Department of Energy's (DOE) Yucca Mountain Site Characterization Project. This evaluation was chartered by the Secretary of Energy as one part of her ongoing review of the DOE program established by the Nuclear Waste Policy Act of 1982, as amended, to dispose of highly radioactive wastes produced by civilian nuclear power plants and by DOE's nuclear weapons complex.

We are primarily concerned that the scope of the evaluation, as chartered, is limited to selected issues pertaining to the Yucca Mountain project. Broader issues are not included within the scope of review; for example, the evaluation is designed to focus on project schedules and funding rather than on the larger issue of whether the disposal program is organized and managed to facilitate the accomplishment of its mission. Although the evaluation could provide useful insights into the project, it would not satisfy our earlier call for reviews of the disposal program by both the Secretary and an independent entity.

Because its scope is limited, the evaluation could accept the assumptions of DOE's existing approach to site characterization without considering fundamental changes, if warranted, to the approach. In our view, the proposed emphasis on project schedules and milestones and on the

"adequacy" of project funding is not particularly relevant. A more appropriate work statement would seek to determine whether DOE has defensibly estimated (1) the site characterization work that needs to be done and, on the basis of that work, (2) the combinations of time and money needed to complete the required investigation.

Determining whether a candidate site is suitable for use as a repository involves first determining what site investigation work needs to be done and then spending the necessary time and money on the investigation. Imposing a limit on any one of three factors--the scope, cost, or timing of the investigation--necessarily affects one or both of the other factors. Limiting the time available for investigating the site, for example, requires spending more money during the limited time to complete the planned scope of the investigation or relaxing the scope of the investigation, or a combination of both. Likewise, the scope of the investigation work that is thought to be necessary to determine the suitability of the site and of the repository design necessarily affects estimates of the time and annual funding needed to complete the project. Complicating this issue is the fact that there is no precedent for determining how much effort is needed to satisfactorily investigate a candidate site to assess its suitability as a repository for disposing of highly radioactive waste, how long that investigation should take, and how much it should cost.

We are also concerned that the draft statement of work puts too much emphasis on evaluating issues that others--including the Nuclear Waste Technical Review Board, DOE's Office of Inspector General, and GAO--have previously reviewed. Instead of redoing work already done, you should, we believe, use the earlier work as a starting point for analyzing potential causes of problems in the program and project. This approach would allow the development of sound recommendations for corrective actions. The recent report prepared for the Secretary of Energy summarizing outside documentary criticisms of the program dated between January 1, 1989, and December 31,

1993, would be one source.[1] In addition, earlier studies should be reviewed.[2] These studies place the program's management in the context of alternative management systems and provide a perspective that is essential for making informed judgments on the financial and managerial integrity of the program as it operates today.

Overall, we are concerned that the draft statement of work is too narrow and may result in a product that, while useful, will not address many of the major issues confronting the disposal program. We also recognize that a broader evaluation would probably take longer than the 6 to 12 months and cost more than the minimum of $500,000 that DOE has estimated. Nevertheless, we believe that a broadly based evaluation--such as the Nuclear Waste Technical Review Board, GAO, and others have recommended--is needed. Such a review need not affect critical ongoing site investigation work but would pay large dividends in the long run. We recognize, however, that you may have to conduct the evaluation within the scope defined by your charter.

To help you make your evaluation as useful as it can be, we have enclosed our comments on many of the detailed statements of work for the proposed evaluation (see enclosure I). We have also enclosed a list of GAO products that you may find relevant to your evaluation (see enclosure II).

We are sending copies of this letter to the Secretary of Energy and to the Governor of Nevada. We will make copies available to others upon request.

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[1]Dr. James A. Thurber, Report on Selected Published Works and Written Comments Regarding the Office of Civilian Radioactive Waste Management Program, 1989-1993, Center for Congressional and Presidential Studies, School of Public Affairs, The American University (Mar. 1, 1994).

[2]See, for example, two studies by the Office of Technology Assessment (OTA), Managing Commercial High-Level Radioactive Waste (OTA-0-172, Apr. 1982) and Managing the Nation's Commercial High-Level Radioactive Waste (OTA-0-171, Mar. 1985), as well as a study by the Secretary of Energy's Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities, Managing Nuclear Waste - A Better Idea (Dec. 1984).

If you have any questions about this letter, please telephone Mr. Dwayne Weigel of my staff at (202) 512-6876.

Victor S. Rezendes
Director, Energy and
Science Issues

Enclosures

COMMENTS ON THE DRAFT STATEMENT OF WORK FOR THE FINANCIAL AND MANAGEMENT REVIEW OF THE YUCCA MOUNTAIN PROJECT

Work Program Reference

A. Financial and Contract Management Techniques and Controls

1. **Analyze the DOE financial and contractual management system to assess techniques and controls to manage contractors.**

GAO comment: Emphasis should be placed on the effect on the Yucca Mountain project of having responsibility for project contracts and financial accountability dispersed among Department of Energy (DOE) headquarters and field offices.

2. **Assess steps taken by DOE to reduce the cost of site characterization, and additional steps which might be taken in this regard, without jeopardizing scientific studies.**

GAO comment: We suggest that you rephrase the inquiry to assess DOE's efforts to identify essential scientific studies and then assess DOE's efforts to organize and manage site characterization to ensure that DOE conducts these studies in the most timely and cost-effective manner.

3. **Determine whether scientific work has been compromised by the decision, resulting from "Mission 2001," to adjust some project contractors' scope of work in order to permit the submission of a license application by October 2001. Have measures to reduce or eliminate activities from the site characterization plan been provided to the Nuclear Regulatory Commission for review and comment?**

GAO comment: The Mission 2001 report was completed in September 1992. Recently, DOE has been putting into place a new approach to site characterization and licensing. Under this approach, DOE proposes to defer certain as-yet-undetermined site investigation work to the performance confirmation period that follows the issuance of a construction authorization by the Nuclear Regulatory Commission. It would be useful to find out whether there is a connection between the work that the authors of the Mission 2001 study believe could be deferred and the work that DOE plans to defer under its new approach to site characterization. In assessing this connection, the evaluation team should review the processes and/or mechanisms DOE is using to ensure that any reductions in previously planned scientific work are being made for the right

reasons. What criteria are being used to determine whether a scientific study can be prudently deferred, and what criteria should be used? What role do the various change control boards play in ensuring that any decision to reduce or defer scientific work is based on scientific criteria and not on cost or scheduling concerns? What role will the new position of Chief Scientist play in ensuring that all essential scientific and technical work is completed and completed at the appropriate time?

Another aspect of the Mission 2001 study that should be explored is why, when the actual project budget was about half the amount in the approved project baseline, DOE proposed to answer the question "License Application 2001 - Can It Still Be Done?" while assuming that adequate funds would be provided each year. In designing and conducting the study, DOE assumed that ". . . a logical sequencing of activities to accomplish license application would determine the necessary annual funding" (Executive Summary, p. 4.). Yet DOE's project budget requests for fiscal years 1991-94 fell more than $900 million short of the approved cost, schedule, and technical baseline for the project.

4. Determine the cost effectiveness of buying versus leasing the tunnel boring machine.

GAO comment: See comment on statement A.5.

5. Compare the economic and safety considerations of the larger (25 foot) versus smaller (18 foot) tunnel.

GAO comment: The Nuclear Waste Technical Review Board has generally addressed statements A.4 and A.5. For example, concerning the tunnel boring machine, the Board concluded that rather than purchasing a 25-foot-diameter tunnel boring machine, DOE should have hired a contractor to bore a tunnel who, under normal business practices, would have owned the appropriate boring equipment. The Board also pointed out that a smaller-diameter machine, such as the recoverable 18-foot-diameter machine at the Nevada Test Site, would have been safer and less costly than the larger-diameter machine DOE purchased.

The independent evaluation could contribute to the understanding of this issue by evaluating the management process through which DOE decided to purchase a large-diameter tunnel boring machine. For example, what analyses were prepared, and by whom, for the procurement decision? Were recognized experts on tunnel boring consulted? What factors

(cost, schedule, etc.) were weighed, and by whom, in making the decision? For example, when project budgets were considered far too low to keep the project on track, why did DOE purchase a machine that was costlier than a smaller-diameter machine?

6. **Analyze the studies that would be deleted if funding is constrained to the existing level, and the significance of the unavailability of that data to site suitability and license determination.**

GAO comment: As written, this statement assumes that the site characterization schedule is fixed and that "constrained" funding must therefore lead to a reduction in the scope of characterization work over the fixed schedule. Our previous work has shown that funding has been constrained largely by DOE's budget priorities. We suggest that you explore how long, under "constrained" funding, it would take to complete the work needed to make site suitability and licensing determinations. It is likely that neither DOE nor its contractors have identified which investigation activities are considered essential to completing site characterization and which activities could reasonably be deferred.

B. Project Schedules and Credibility of Milestones

1. **Assess DOE's strategy for contingency planning. Include analysis of potential program sunk costs relative to alternatives selected by DOE.**

GAO comment: Contingency planning is an important area to review. In several of our earlier reports--covering such diverse subjects as monitored retrievable storage, development of transportation casks, and estimation of the program's long-range cost--we have found an absence of contingency planning by the Department. We have recommended that such planning, including the publication of contingency plans, be made a part of the disposal program.

2. **Analyze the reasonableness of program schedules and milestones, given alternative funding scenarios developed by DOE in 1994.**

GAO comment: As discussed in our cover letter, it is not enough to analyze the reasonableness of schedules and milestones in conjunction with alternative funding scenarios. It is also critical to determine the scope of the scientific and technical activities necessary to establish a satisfactory

level of confidence in the site's safety and to factor into the analysis the estimated cost of conducting these activities.

3. **Evaluate the scheduling of the surface based testing program, including core drilling, in light of current and projected funding.**

GAO comment: DOE acknowledges that the 40 boreholes that it planned to "dry drill" with the technology it developed will take 29 years to complete at the present pace (1 rig, 1 shift per day, 5 days per week). Originally, DOE had intended to buy up to four of the special drill rigs, but now it apparently cannot afford to do so. The evaluation team might, as we suggested in discussing the issues involving the tunnel boring machine, look at the management process through which DOE decided to develop the dry drilling technology, procure the special drill rig, and assume that funding would be adequate to purchase and operate more rigs. Also, it might be useful to assess the project office's effort to shorten the projected 29-year drilling program and still acquire the essential data.

4. **Assess the extent to which imposed schedules have and can in the future affect the scientific investigation program for site characterization.**

GAO comment: In our view, it would be more appropriate to explore why DOE has chosen to impose schedules that constrain the scientific investigations instead of defining a defensible scope of work that could lead to a sound site suitability determination.

C. Project Organizational Effectiveness and Internal Planning Processes

1. **Analyze all existing regulatory requirements of the program (for example, EPA 40 CFR 191; NRC 10 CFR 60; and DOE 10 CFR 960) and assess the management and organizational structure, including resources needed to understand and apply the requirements of the program.**

GAO comment: This is an excellent work step. It should help shed light on how DOE translates regulatory requirements into specific investigatory tasks and how DOE knows when enough work on specific tasks has been completed to permit it to "roll up" the results of each task into overall conclusions on the suitability of the site. DOE applies a myriad of internal requirements, such as DOE orders, to the project. It might be useful to see to what extent the project funds are being used

to satisfy internal requirements and to determine whether some of these requirements could be waived or adjusted (given the requirement that the Nuclear Regulatory Commission license and regulate the repository) so that the project funds saved could be applied to important scientific and technical activities.

3. **Analyze the DOE organization to assess the effectiveness of the integration, including internal planning processes and systems, of the Yucca Mountain Project Office, DOE Headquarters, and OCRWM.**

GAO comment: This is an important topic. Appropriate questions to answer along this line include the following:

-- What is the best way to organize the management of a complex, first-of-a-kind scientific investigation, such as the characterization of Yucca Mountain?

-- Is it cost-effective and efficient to have the principal office for the disposal program based in Washington when the program is essentially based in Las Vegas?

-- Should DOE personnel manage the project on-site, or should they set the objectives of the project and oversee a management and operations contractor to ensure that the objectives are met? If DOE personnel should manage the project, can they acquire sufficient technical skills to effectively perform this function?

-- Should DOE use a "performance-based" management contract--a concept developed by its recent contract reform team--to manage the investigation of Yucca Mountain?

4. **Evaluate the role of the management and operations contractor, especially in relationship to DOE staff and other contractors.**

GAO comment: Evaluating the role of the management and operations contractor in relation to DOE staff and other contractors is important. Therefore, this review should not be scoped too narrowly and should take into account the history of the project to characterize Yucca Mountain. Seven participants that began the Yucca Mountain site characterization project were drawn from the nuclear weapons testing program at DOE's Nevada Test Site. They included two architect-engineer firms (Holmes and Narver and Fenix and Scisson), a construction contractor (Reynolds Electrical and Engineering Company), three DOE laboratories (Livermore, Los Alamos, and Sandia), and the

U.S. Geological Survey. In addition, in 1987 DOE hired Science Applications International Corporation to provide technical and management support. DOE's Yucca Mountain Project Office (now called the Yucca Mountain Site Characterization Office) managed the technical work of all of these project participants, but the contracts were administered by DOE's Nevada, Albuquerque, and San Francisco operations offices. Then in February 1991, DOE hired a systems engineering, development, and management contractor (TRW Environmental Safety Systems, Inc.) to manage the disposal program, including the Yucca Mountain project. This contract is administered by DOE headquarters rather than by the site characterization office. Moreover, DOE has not given the management contractor authority to manage the characterization of Yucca Mountain.

In view of the project's history, a basic evaluation of the project's organization and management is in order. Such an evaluation needs to address issues such as the resources that are needed for the scientific investigation of Yucca Mountain and the ways that these resources should be organized and managed to approach the investigation most effectively and efficiently. Put another way, is the current mix of contractors, and the distribution of work among them, the best way, in terms of science and in terms of cost, to characterize the site? A review of the report prepared by the Secretary of Energy's contract reform team should be helpful in addressing this issue.[1]

Also, should the project's ties to the Nevada Test Site be severed entirely, both administratively and physically? For example, DOE uses Reynolds Engineering, a major contractor at the test site, to manage the project's construction. Could construction activities be managed and performed more economically if these activities were put up for bid? Why not move the fences so that the project is no longer on or connected to the test site, where it can be argued that "cleared" contractors such as Reynolds must be used?

Finally, the independent review might evaluate the changes that DOE reportedly is making at the project, the effect these changes may have on relationships among project contractors and between DOE and the management and operations contractor, and any more fundamental changes, such as those suggested above, that DOE might have considered.

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[1]Making Contracting Work Better and Cost Less (DOE/S-0107, Feb. 1994).

5. **Evaluate whether adequate efforts are being made to integrate the views of stakeholders during the decisionmaking process.**

GAO comment: In addressing this issue, the evaluation team will need to clearly articulate the criteria it is using to review the adequacy of DOE's efforts to integrate stakeholders' views in the decision-making process. Moreover, the evaluation team may wish to explore what DOE has done to implement the recommendations of the Secretary's task force on public trust and confidence.

D. Adequacy of Funding Levels and Funding Priorities

1. **Provide a total system life cycle cost analysis of the overall mission and program in order to identify the costs of the functional elements of the program, including a total system life cycle cost analysis of the funding levels needed in the Nuclear Waste Fund to pay for a repository through the time it has reached closure under the current program plan and proposed program plans currently being considered by DOE. The examination should include the actual expenses incurred through fiscal year 1994 (or through fiscal year 1993, if 1994 data are not available) and the additional costs necessary to complete site characterization of the Yucca Mountain site as described in Section 113 (c) of the NWPA under the current program plan and any proposed program plan currently being considered by DOE.**

GAO comment: For the purposes of this review the evaluation team should ask whether the methodology can provide data precise enough to ensure the integrity of the Nuclear Waste Fund and, therefore, the adequacy of the fees charged through utilities to their customers. An important aspect of this review is the extent to which contingencies, such as finding that Yucca Mountain is not a suitable site for a repository, are considered in the analysis. Reasonable contingencies and their possible effects on life-cycle costs and projections of fees' adequacy should be factored into the analysis to ensure the long-term solvency of the Nuclear Waste Fund. Over the years, GAO has recommended the development of contingency assumptions as a basis for more realistic assessments of the Nuclear Waste Fund's integrity.

2. **Assess the allocation to date of funds between scientific and technical activities, and those used to support the Project's infrastructure, and evaluate alternative funding allocations which would better achieve the Project's objectives.**

GAO comment: It may be useful for the evaluation team to build on past work by GAO and others by identifying the process and the rationale by which the disposal program and the Yucca Mountain project budgets are set and the funds are allocated to contractors for infrastructure activities and for scientific and technical activities.

3. **Evaluate the benefits and risks of DOE's proposal for the establishment of a revolving fund which would be used to fund part or all of the financial requirements of the Project.**

GAO comment: The evaluation should include an assessment of where the funds would likely be spent; the project's ability to efficiently absorb increased funding; and the ability of DOE, as a policy-setting organization within the executive branch, to maintain the course laid out in program plans from one administration to another. Such predictability is essential if the program is to be stable and efficient over the next decade. This question would also require the evaluation team to determine who is going to pay for items such as the proposed multipurpose canister and for interim storage beginning in 1998.

The Office of Technology Assessment and others have questioned DOE's ability to provide the institutional environment to ensure technical excellence and to insulate the program from shifts in political winds from one administration to another. Changes in the pace and direction of the program through changes in administrations can dramatically affect the long-term efficiency of program expenditures. The questions, therefore, become how to insulate the program from these changes and how, even if these changes do occur, to ensure good program management. The immediate question does not appear to be one of funding as such but of DOE's ability to effectively and efficiently use the appropriated funds. For example, in recent years project appropriations have increased, but, as we reported in May 1993, infrastructure costs accounted for 64 percent of the project appropriations for fiscal year 1992. Consequently, only 36 percent of the project funds remained for the technical and scientific activities necessary to characterize Yucca Mountain.

ENCLOSURE I

7. **Assess whether sufficient funding is being provided for the range of activities that could facilitate identification, as soon as possible, of features that would disqualify the site.**

GAO comment: As discussed in our comments on statement A.6., the "sufficiency" of funds can only be addressed in relation to the work that is considered essential to reaching suitability and licensing determinations on the Yucca Mountain site and the schedule for completing the work. In addition, the issue of the sufficiency of project funding needs to be addressed within the larger context of how efficiently and effectively DOE has been using available funds. External reviewers have expressed concerns about inefficient and ineffective project management. In our view, therefore, it is imperative to ensure that the available funds are being spent efficiently and effectively before addressing whether "sufficient" funds are being provided to the project.

General

If not already covered above, review recommendations, responses and implementation status of recommendations made by the Nuclear Waste Technical Review Board in their studies or letter reports dated March 1993, October 1993 and February 1994; the General Accounting Office report dated May 1993 (GAO/RCED-93-124), the draft March 15, 1994 Inspector General's Report, and subsequent reports made by these and other relevant agencies.

GAO comment: This step seems to direct the review efforts toward the most recent critiques of the program by the Nuclear Waste Technical Review Board, GAO, and DOE's Inspector General. As discussed in the cover letter, we believe the scope of the review should be much broader. It should include all of the literature identified in the report prepared for the Secretary summarizing outside documentary criticisms of the program dated January 1, 1989, through December 31, 1993, as well other major works published over the life of the program, such as the Office of Technology Assessment reports previously mentioned.

RELATED GAO PRODUCTS

Nuclear Waste: Yucca Mountain Project Management and Funding Issues (GAO/T-RCED-93-58, July 1, 1993).

Nuclear Waste: Yucca Mountain Project Behind Schedule and Facing Major Scientific Uncertainties (GAO/RCED-93-124, May 21, 1993).

Energy Issues: Transition Series (GAO/OGC-93-13TR, Dec. 1992).

Nuclear Waste: Status of Actions to Improve DOE User-Fee Assessments (GAO/RCED-92-165, June 10, 1992).

Nuclear Waste: DOE's Repository Site Investigations, a Long and Difficult Task (GAO/RCED-92-73, May 27, 1992).

Nuclear Waste: Development of Casks for Transporting Spent Fuel Needs Modification (GAO/RCED-92-56, Mar. 13, 1992).

Nuclear Waste: Operation of Monitored Retrievable Storage Facility Is Unlikely by 1998 (GAO/RCED-91-194, Sept. 24, 1991).

Nuclear Waste: Changes Needed in DOE User-Fee Assessments (GAO/T-RCED-91-52, May 8, 1991).

Nuclear Waste: DOE Expenditures on the Yucca Mountain Project (GAO/T-RCED-91-37, Apr. 18, 1991).

Nuclear Waste: Changes Needed in DOE User-Fee Assessments to Avoid Funding Shortfall (GAO/RCED-90-65, June 7, 1990).

Nuclear Waste: DOE Should Base Disposal Fee Assessment on Realistic Inflation Rate (GAO/RCED-88-129, July 22, 1988).

Key Elements of Effective Independent Oversight of DOE's Nuclear Facilities (GAO/T-RCED-88-6, Oct. 22, 1987).

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