



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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March 18, 1980

The Honorable John W. Wydler
United States House of Representatives
Washington, D.C. 20515

Dear Congressman Wydler:

This is in reply to your letter of November 20, 1979, regarding certain aspects of the Nuclear Regulatory Commission's proposed new 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories - Procedural Aspects."

In your letter you expressed a number of concerns with respect to our proposed procedures for licensing a high-level waste repository, particularly those concerning site characterization. As you know, these procedures have been published only recently for public comment and are not yet an NRC rule. The proposed rule will be evaluated on the basis of public comment. However, at this time the NRC believes that multiple site characterization at disposal depth should be an integral part of any repository development program. Thus, we do intend to require exploratory shafts and some at-depth tests and measurements at 3 to 5 alternative sites. This conclusion was reached after extensive consideration of the factors discussed below. A copy of the proposed rule which was published for comment in the Federal Register on December 6 is enclosed.

The intent of the proposed rule is to allow and promote needed data gathering and testing with a minimum of delay. At this time, the NRC considers that in-situ testing and exploration is needed to support a licensing decision on an application for construction authorization. This view is supported by many in the earth science community, including members of the U.S. Geological Survey (USGS). The need for exploration and testing at depth has also been cited by the Interagency Review Group on Nuclear Waste Management (IRG), the NAS, and by the NAS Panel on the Waste Isolation Pilot Plant (WIPP), which recommended exploration at depth to acquire additional site specific information.

The actual scope of exploration and testing needed to characterize a site will vary depending on the complexity of geologic conditions, the availability of existing data either from the literature or exploration by others, and the applicability of data from generic experiments such as the DOE demonstration facilities. We do not plan to require specific in-situ tests or experiments. Rather, we plan to concentrate on identifying information that will be needed for site characterization. Some of the types of information that will be needed are identified by the National Academy of Sciences in their report, "Implementation of Long-Term Environmental Radiation Standards: The Issue of Verification" (Committee on Radioactive Waste Management, 1979). Tests that may be used to gather the needed information

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are described in the DOE Symposium Proceedings on Geotechnical Assessment and Instrumentation Needs for Nuclear Waste Isolation in Crystalline and Argillaceous Rocks, (GAIN), LBL-7096 UC-70, July 16-20, 1978.

Data gathered from tests completed at DOE facilities, the STRIPA mine in Sweden, and other facilities, certainly will be useful in the development of testing techniques and in scientific inquiry. The results of such tests, however, are highly dependent on geologic conditions at the sites where such tests are performed. Geological conditions and properties at proposed repository sites, which are the key to long-term isolation of the waste, are almost sure to be different from those of the demonstration facilities. Therefore, exploration at depth and in-situ experiments at proposed repository sites will most likely be needed to properly support DOE's application for construction authorization. Also, experience has shown that laboratory testing does not take the place of field testing. Small samples of rocks often are not representative of field conditions when making such measurements as rock permeability, deformation under heat loading, and geochemical retardation. The results of in-situ heater tests in the STRIPA experimental mine in Sweden, for example, clearly demonstrated that the joints and fractures in the rock significantly affect test results. This was clearly recognized in the IRG Subgroup Report TID 28818 dated October 1978.

Exploration and testing would be conducted at a repository site in any case, either as a part of site characterization or during construction. It is not anticipated that DOE will characterize all candidate sites at the same time. When the site characterization program has proceeded to the point that sufficient information is available for the comparison of alternatives, the choice of a primary site can be made and an application for construction authorization for a repository at that site can be prepared. Other sites which have been characterized and found acceptable would be available for future development should the primary site prove unsatisfactory or when sites for additional repositories are being sought.

Currently, the NRC and DOE have estimated different total costs for exploration and testing at depth. The NRC believes that the primary reason for the disparity is the different bases for the estimates. The NRC currently envisions the need for an exploratory shaft approximately ten feet in diameter with limited excavation at depth, lateral drilling and in-situ experiments. The NRC estimate for a site characterization program which includes those features is approximately \$20 million per site. The DOE estimate of \$50 million to \$100 million per site includes substantial development costs such as excavation of tunnels extending to the limits of the repository operations area. If these additional costs are deducted from the DOE estimate, the NRC and DOE estimates are in reasonable agreement. In fact, the NRC estimate is somewhat higher than the cost of an actual test shaft of similar extent constructed for the Bureau of Mines near Rifle, Colorado. Moreover, with regard to costs, much of the exploration and in-situ experimentation may be integrated with the Earth Science

Technical Plan. According to that joint DOE and USGS plan, such exploration and testing will be conducted in any event. Thus, it seems reasonable to conduct these tests at sites which have potential for repository development. The NRC staff has been working with their DOE counterparts to ensure that there is a mutual understanding of what NRC considers to be necessary for determining site characteristics.

The NRC's need to consider alternative sites arises from its obligations under the National Environmental Policy Act (NEPA). NEPA requires federal agencies to develop and thoroughly consider alternatives to proposed actions. 42 U.S.C. 4332(a)(C)(iii) and (E). The performance of this duty requires substantive, good-faith consideration of alternatives "to the fullest extent possible," a very high standard. Calvert Cliffs' Coordinating Committee, Inc. v. Atomic Energy Commission, 449 F.2d 1109, 1114 (D.C. Cir. 1971). While this analysis need not be exhaustive, the agency is required to provide information sufficient to permit a reasoned choice of alternatives so far as environmental aspects are concerned. National Resources Defense Council, Inc. v. Morton, 458 F.2d 827, 836 (D.C. Cir. 1972). The nature and form of analysis required in any given situation are matters left to the discretion of the agency as long as those reading the statement are provided with the requisite information. State of Alaska v. Andrus, 580 F.2d 465, 480 (D.C. Cir. 1978). However, the extent of detail required in a statement is necessarily related to the complexity of environmental problems involved, and the magnitude of the proposed project. Robinson v. Knebel, 550 F.2d 422, 426 (8th Cir. 1977). More resources should be devoted to the environmental analysis of a multi-billion dollar program than for smaller federal projects. Scientists' Institute for Public Information, Inc. v. Atomic Energy Commission, 481 F.2d 1079, 1091-92 (D.C. Cir. 1973). In this regard, the Council on Environmental Quality has stated that agencies shall include in environmental impact statements information relevant to adverse impacts if it is essential to a reasoned choice among alternatives and the costs to obtain it are not exorbitant. 40 CFR 150.22(a) (1979). Moreover, even if the costs of obtaining essential information about alternatives is exorbitant, the agency must weigh the need for action against the risk of proceeding in the face of uncertainty. 40 CFR 150.22(b) (1979).

The Commission believes that the information which will result from a detailed characterization of alternative sites is necessary for a reasonable comparison among alternatives. The level of information required by the proposed 10 CFR Part 60 is, in our view, commensurate with the complexity of the environmental problems involved and the magnitude of the proposed project. As explained, the NRC estimates that the costs to obtain this essential information will not be exorbitant. Moreover, the Commission believes that these costs are justified when weighed against the risks of proceeding in the face of uncertainty. Accordingly, the Commission believes that the proposed requirements for alternatives site characterization are consistent with its responsibilities under NEPA.

On the basis of the information available at this time, the NRC believes that this approach is sound. Any apparent delay in conducting site characterization work should be more than compensated for in the long run, since premature commitment to a single site risks far greater delay should that site prove unacceptable. The NRC considers that chances of finding a significant problem at any one site are high enough to warrant the exploration of alternatives to a considerable degree. Moreover, this approach does not represent a shift in NRC policy. Reliance on site geology is an essential element in multiple-barrier protection. Additional reliance on engineered barriers is complementary to site geology, not a substitute.

You asked a number of other specific questions in your letter which I would like to address.

1. The NRC licensing procedures tend to be counter to Congressional desires to remove institutional problems by directing DOE to select sites at Hanford or the Nevada Test Site (NTS).

Our intent is not at all to discard the possibility of selecting sites in these areas or even diminish emphasis on them as primary candidates. Rather, it is to assure that reasonable alternatives be considered as required by NEPA.

It is certainly not our intent to agitate the residents of sites chosen for site characterization. In fact, our proposed licensing procedures are intended to relieve the pressure of institutional factors by permitting characterization of sites which are chosen through a rational and open process. Because a site will not be chosen until sufficient data are available to compare alternatives, there would be no commitment to any site where site characterization work is planned. We would expect considerably less public concern in the long run.

2. What is the statistically expected number of construction worker deaths associated with the investigation of multiple repository sites?

The NRC has not made any formal estimates of deaths due to site exploration. Although data are available for mine construction, such data may not be applicable to the sort of test facility we envision. Due to the small scale of operations needed during exploration and in-situ testing at depth, we would not anticipate any loss of life. For example, no deaths or major accidents have been experienced to date at the Bureau of Mines test facilities in Rifle, Colorado or at any of the DOE surface test facilities.

3. What is the statistically expected number of deaths to the general public associated with the failure of a repository located without multiple site investigations?

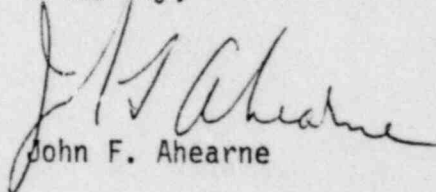
We would not expect to approve of any repository which would result in any significant threat of death or injury. The important issue is the risk of not finding an acceptable site in a prompt fashion.

In the NRC's view, which is shared by many in the earth sciences, the chances of selecting a single site which later proves to be undesirable at some point in the development of a repository, are high enough to warrant a cautious approach. Experience in siting and constructing underground facilities shows that unexpected geologic features are frequently discovered during construction. One might expect to find similar features at a potential repository site during the late stages of site characterization or even during construction. It is not unlikely that such a discovery could disqualify a site. Therefore, it seems prudent not only to conduct exploratory excavations at depth early during site characterization but also to explore alternative sites in the event the primary site had to be abandoned at some time during construction.

In summary, we consider that the steps outlined in our draft procedure provide a reasonable process for selecting a suitable repository site with the minimum potential for delay. This approach, together with increased reliance on engineered barriers to contain the waste during the time when it presents the principal hazard, should provide the multiple barriers which the NRC believes are appropriate for the disposal of radioactive waste. We are pleased to note your statement of support for the multi-barrier approach, and for increased reliance on the waste package.

Thank you for this opportunity to answer questions regarding our licensing procedures. We are including your letter and our response with the comments received on the proposed rule.

Sincerely,



John F. Ahearne