



**AGENCY FOR NUCLEAR PROJECTS  
NUCLEAR WASTE PROJECT OFFICE**

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October 26, 1993

Mr. Dwight Shelor  
Associate Director  
Office of Systems and Compliance  
Office of Civilian Radioactive  
Waste Management  
U.S. Department of Energy  
Washington, D.C. 20585

Dear Mr. Shelor:

I have reviewed your August 20, 1993 letter to Mr. J. Holonich of the U.S. Nuclear Regulatory Commission (NRC) regarding DOE's investigation of pneumatic pathways. I am concerned that your letter indicates an unwillingness by DOE to properly investigate those pathways of potential radionuclide migration from a high-level nuclear waste repository. The State of Nevada continues to be concerned that the Exploratory Studies Facility which DOE plans to construct will interfere with the collection of undisturbed site pneumatic data. DOE's interpretation of NRC regulations, which you use to rationalize interference with the collection of those data, are incorrect, in our opinion.

Your August 20 letter states:

"Although data are not yet available to show how ESF construction will affect existing pneumatic conditions, extensive data about ambient conditions may prove to be of limited value for long-term performance modeling. Predicting repository-scale performance will largely depend on conditions in the postclosure period when radionuclides are present and capable of being released from the repository. Site conditions prior to characterization represent a temporal snapshot in the range of conditions that are anticipated over the period of regulatory concern. Seasonal and topographic variations in gas circulation that have been observed are

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likely to be overshadowed by repository heat effects at any foreseeable thermal load.

This statement suggests that DOE will ignore analysis of potentially adverse conditions required by NRC's rules. Particularly, CFR 60.122(c)(24) provides:

(24) Potential for the movement of radionuclides in a gaseous state through air-filled pore spaces of an unsaturated geologic medium to the accessible environment.

The purpose of site characterization is to establish the geologic conditions and the ranges of those conditions in the past and present. The conditions form the basis of predicting future conditions against which repository performance will be assessed, ultimately in an NRC licensing proceeding. Even though DOE may feel at this time that the "extensive data about ambient conditions may prove to be of limited value for long-term performance modeling", the undisturbed conditions of the site including the condition of its pneumatic pathways must be studied and evaluated in order that the potentially adverse conditions be properly analyzed.

An understanding of the pathways of pneumatic movement is the key to predicting gas flow in the future under anticipated repository conditions. Also, before repository performance can be modeled under anticipated thermal load conditions, the ambient vapor conditions must be understood and confidently modeled. Only data collected from undisturbed sites can be used to accurately define ambient conditions. As I stated in my February 4, 1993 letter to the NRC, excavation of the ESF will likely preclude the collection of undisturbed data necessary for characterization of pneumatic pathways under ambient conditions.

The State of Nevada disagrees with DOE's interpretation of 10 CFR 60.122<sup>1</sup>. Your letter to Mr. Holonich correctly quotes 60.122(a)(1) that the geologic setting shall exhibit an appropriate combination of favorable conditions so that, in combination with the engineered barriers system, site performance objectives will be met. But your conclusion that favorable conditions (including engineered barriers) may be relied upon to ameliorate the existence of potentially adverse conditions is unfounded. In fact we believe just the opposite is true.

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<sup>1</sup>10 CFR 60.122 is currently the subject of potential revision by the NRC. See, 58 Fed. Reg. 36902, July 9, 1993.

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The NRC's understanding of the current requirements of 10 CFR 60.122 is that the combined effect of potentially adverse conditions must be analyzed<sup>2</sup> when evaluating whether they compromise the ability of the geologic repository to meet the performance objectives relating to isolation of the waste. 10 CFR 60.122(a)(2). Inasmuch as engineered barriers are, generally speaking, favorable to waste isolation, they may not be considered in potentially adverse condition analysis.<sup>3</sup>

The State's position, pointed out in our earlier letter is that the site must be investigated in such a manner in order to compel a conservative analysis of the combined effects of all the potentially adverse conditions contained in NRC's rule. In order to evaluate the potential for the movement of radionuclides in a gaseous state through air-filled pore spaces (pneumatic pathways), in conjunction with other physical characteristics identified in 10 CFR 60.122(c), the presence of pneumatic pathways must be investigated prior to disturbance of the site by excavation of the ESF.

The State also disputes your interpretation that 10 CFR 60.113 does not require that DOE characterize and model water vapor, but only aqueous water flow. The fact that DOE did not include an analysis of vapor in its site characterization plan signifies nothing other than DOE's omission of an important area of investigation. Our understanding is that the NRC redefined groundwater in a manner different from its scientific definition (in 10 CFR 60.113(a)(2)) so as to include vadose zone moisture (both liquid and vapor), thereby requiring a calculation of the pre-waste emplacement vapor-phase groundwater travel time along the fastest path of likely radionuclide travel.

The fact that NRC may not have identified vapor-phase travel as a concern on a previous occasion does not bar the NRC from identifying it as a concern now. DOE should remember that NRC is not bound by its past statements as the NRC "may comment at any time in writing to DOE, expressing current views on any aspect of site characterization." 10 CFR 60.18(i). Moreover, "[a]ll issues

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<sup>2</sup>See 58 Fed. Reg. 36903

<sup>3</sup>Except of course where the interaction of engineered barriers and the site's natural characteristics create a new adverse condition. See, e.g., 10 CFR 60.122(c)(7)

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will be finally and completely resolved only in the licensing proceeding or by rulemaking after public notice and comment."<sup>4</sup>

This Office is available at any time to discuss this matter further with DOE. Please feel free to call.

Sincerely,



Carl A. Johnson  
Administrator of Technical Programs

CAJ:sjc

cc: B. J. Youngblood, NRC  
Dade Moeller, NRC-ACNW  
Steve Kraft, EEI  
Dwayne Weigel, GAO

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<sup>4</sup>April 8, 1992, Memorandum from William C. Parler, General Counsel and James M. Taylor, Executive Director for Operations to Chairman of the Nuclear Regulatory Commission.