



APR 24 1981

Department of Energy
Washington, D.C. 20545

Mr. John B. Martin, Director
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Martin:

While we have not yet completed our review of the technical criteria to be included in 10 CFR 60, I am forwarding to you a number of comments concerning issues that we believe should and can be resolved before the document is resubmitted to the Commissioners. Our comments are based on the March 5, 1981 version of the document that was distributed at the Commission-sponsored symposium on waste management regulations held in Gatlinburg, Tennessee.

These comments are provided in the spirit, noted during the discussion of the procedural portion of 10 CFR 60, which encouraged resolution of issues at the earliest possible time. My staff will be pleased to meet with the Commission staff to discuss these issues and establish a means for their resolution in a timely fashion.

Sincerely,

Sheldon Meyers
Deputy Assistant Secretary
for Nuclear Waste Management
Office of Nuclear Energy

Enclosure

c w/encl:
Tom Rehm, Office of Executive
Director of Operations

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Attachment 1

DOE Comments on the March 5, 1981
Draft of 10 CFR 60 Technical Criteria

60.102 Concepts

60.102(b)(2) and 60.102(c)(1)

Two terms introduced in these sections need to be more carefully defined. The two terms are "storage" and "geologic repository operations area." In section 60.102(b)(2) it is stated that the "geologic repository operations area" is that area where radioactive waste handling activities are conducted. Section 60.102(l)(c) implies that the "geologic repository operations area" is that used for "storage" (which includes disposal) of high-level waste. Disposal is defined but storage is not. We believe that it is essential that these terms be clearly defined.

60.102(c)

This section seems to be mistitled. This title implies that the section will specify the functions of the geologic repository operations area. It does not. This section addresses the requirements necessary to invoke NRC control over a repository and a statement that TRU waste sent to a high-level waste repository will have to be treated as though it were high-level waste. The Department believes it would be beneficial if NRC staff stated the functions they believed that the geologic repository operations area should perform.

The reasons for treating TRU-waste in an identical manner to the high-level waste are not obvious. Depending on the assumed conditions, physical and chemical phenomena taking place in a repository, and the level of credit given to man-made barriers, this requirement could result in the need to convert all TRU-waste to a leach-resistant waste form. If this is the objective it might be more appropriate to state it directly.

60.102(f)

This section is most unclear concerning the concept and definition of the "containment period." Initially it states that the containment period would be defined as that time in which waste would be contained by the waste package portion of the engineered system or approximately 1000 years. However, in section 60.102(g) the definition of the containment period seems to be broadened to a time frame in which isolation is achieved by the "geologic repository." The geologic repository is defined (60.102 (d)) as the geologic repository operations area plus the geologic setting. Obviously the volume and time frame for containment are drastically different for each case.

60.102(g)

The definition of the term "isolation" needs to be reconsidered. The term isolation denotes a spatial separation, in this case of the radionuclides from the accessible environment. In this section it is stated that isolation is still maintained even after radionuclides enter the accessible environment as long as the concentrations stay below specified limits. The definition in 60.2 needs to be reconsidered.

60.111 Performance Objectives

60.111(a)(3)

As now stated, the repository will have to be designed for a life of 130 to 150 years. Is this the time frame the Commission envisioned when this requirement was proposed?

60.111(b)(1)

The term and concept of the "overall system" is introduced in this section. However, the subsystems, components and elements of the overall system are never referenced, they can only be deduced through implication. We are assuming that the "overall system" is defined by the bounds of the "geologic repository."

The level of performance in keeping radionuclides from the accessible environment is apparently specified by currently-unrevealed EPA standards. It would be more appropriate to cite the EPA standards directly if that is what is intended.

60.111(b)(3)

This section addresses the performance requirement placed on the geologic setting. In normal design practice, the function a facility, system, component, or structure is to perform is outlined before the performance level is specified. That structure might be used here so that the Commission staff can communicate what they expect the geologic setting will contribute to the repository.

60.111(b)(4)

This section establishes a requirement that a repository be located in a setting where the ground water travel time between the boundary of the underground facility and the accessible environment is at least 1000 years. We would like the NRC staff to explain the basis for the establishment of this figure.

60.122 Requirements for the Geologic Setting

60.122(a)(1)

This section identifies conditions within the "geologic setting" that contribute to waste isolation. It is extremely unclear as to how large an area might be included in the "geologic setting". A condition that is supposed to contribute to isolation is a low population density in the "geologic setting." Low population density may be desirable for a certain distance around a repository but the population density itself will not actually contribute to isolation. By definition the "geologic setting" is one of the three elements that constitutes the "geologic repository." If this implies, thereby, that this "geologic setting" is actually an exclusion zone, then the population may well be zero.

The term "mineral assemblages" is an important consideration in the repository's performance. It needs to be defined. It is also not clear whether the Department will have to show that the retardation for every nuclide will be increased by these assemblages.

Within this section it is stated that a condition that may contribute to waste isolation is the emplacement of the waste a minimum depth of 300 meters below the surface. We would appreciate understanding the technical rationale used to establish the number.

60.122(b)(2)

The term "disturbed zone" is defined for a second time in this section. In fact the term has three different definitions in this rule which are not necessarily consistent. Per the definition in this section, the disturbed zone passes through the accessible environment and thereby eliminates the possibility for a 1000 year ground water travel time between the two. It would be better if there was only one definition for the "disturbed zone" that was compatible with other requirements already identified.

This section identifies conditions in the disturbed zone that might adversely affect waste isolation. In that context we are not certain how to interpret item (xi) regarding earthquakes. This requires that the frequency and magnitude of earthquakes in the disturbed zone be less than in the geologic setting. Since the geologic setting completely surrounds the disturbed zone it is not clear that a differentiation can be made.

60.122(c)(2)(xix)

In this section attention needs to be given to the definition of the term "stability" as it relates to underground openings. The use of "stability" in this context does not appear to be consistent with the definition in 60.2. This requirement could be interpreted to rule out rocks that are subject to creep under lithostatic pressure. It could be interpreted to imply that the structure not require supports. This appears to be in conflict with 60.123(c)(5)(i) which outlines the structural supports required for stability.

60.122(b)(5)(iv)

The concept of requiring exploratory boreholes to be colocated with shafts for the facility appears to be a valid method of reducing the number of boreholes that must be plugged. However, this assumption is valid only if one assumes that the borehole and shaft are coincident over their entire length. This may not be the case since small diameter boreholes can often deviate laterally more than $1/4^\circ$ and could, at some point, extend beyond the confines of the shaft. If this occurred it would be difficult to determine and could result in a length of borehole remaining unplugged. For safety reasons, therefore, drill holes might better be plugged and certified independently of any shaft construction. It is also not clear how this requirement would affect the use of angled holes which the NRC staff believes are important to collect data on vertical permeability in fractured rock.

60.122(d)(2)

A requirement is established to evaluate undiscovered mineral deposits at the site. In view of the level of characterization required under this rule, we believe that if resources are not found they should be assumed not to be there.

60.122(d)(3)

This section attempts to define the information to be obtained during sub-surface exploration. This discussion is particularly vague and confusing. For example, it requires that the bulk geomechanical properties be provided for the geologic media. While the term "geomechanical properties" connotes a level of specificity, it does not denote which mechanical properties are desired. It is important for them to be defined since several geomechanical properties will be impossible to obtain for the "bulk" material. The same point holds true for the terms "bulk hydrological properties" and "bulk geochemical conditions." Parameters of pore pressure and ambient stress, which are cited as examples, are not bulk geomechanical properties but physical conditions found at the specific site.

The requirement "to determine the response of the bulk geomechanical, hydrogeological and geochemical systems to the anticipated thermal loading, given the pattern of fractures and other discontinuities..." may well be impossible to accomplish due to the sheer magnitude (size) of the rock mass involved. A firm conclusion on this cannot be drawn at this time because of the general lack of specificity as to the information wanted.

60.132 Requirements for Design and Construction60.132(a)(1)

We are not sure how to interpret the requirement that containment and isolation within the waste package and the underground facility be based on independent chemical and physical principles. For example, containment within a waste package will be enhanced by sorption and sorption will be a mechanism to retard travel through the underground facility. In each case the material doing the sorbing will be different but the principle will not. Would this situation fail to satisfy the NRC requirement?

60.132(a)(5)(ii)

The requirement to utilize noncombustible materials in the repository would appear to prohibit the use of wood for structural support. Is this intended? If so, why?

60.132(a)(8)

The waste package is a system important to safety. After it is emplaced in a hole in the repository, is it the intent that it be removed for periodic inspection, testing and maintenance? If not, this section should be modified to recognize the passive nature of a repository and that some safety related systems, once in place will not be inspected, tested or maintained.

60.132(c)

This section requires compliance with the performance objective outlined in section 60.111(b). This requires that the underground facility control the release of each radionuclide to less than 1 part in 10^5 annually of the amount that is present in any given year following 1000 years after decommissioning. This would imply that as the quantity of any individual isotope approaches zero due to radioactive decay that almost zero release from the underground facility would be required. Why would this be an essential requirement to protect public health and safety?

It is not clear why the release rate definition was changed to be referenced against the quantity of each radionuclide. We believe that the release rate referenced against the total inventory, as specified in the May 1980 version of the technical criteria, would be appropriate rather than the current draft.

60.132(c)(5)(i)

The use of the term "operation period" is unclear. Does this period include the 50 years after completion of emplacement plus the time necessary to effect retrieval?

60.132(c)(6)

The requirement that the design of the underground facility shall be based on the excavation method that would limit damage to the rock is overly restrictive. Obviously it should be a consideration but not necessarily the basis for the design.

60.132(c)(7)

It is not clear why the system to control the flow of gas or water into the underground facility should be capable of doing analytical chemistry on water and gas samples. The reason for this requirement should be provided.

60.132(c)(9)

Subsection (iii) and (vii) appear to be redundant.

60.132(d)

This section requires that boreholes and shafts be "sealed" over their entire length. The term "sealed" is not defined although there is a requirement placed on the materials to be used. It would be more appropriate to place a requirement on the performance of the total seal system as opposed to its individual components.

60.133 Requirements for the Waste Package and its Components

60.133(a)

The Department has reviewed the logic developed by NRC that established the requirement that a waste package provide containment for 1000 years. While the Department understands the logic behind the concept, we are not sure how demonstration of compliance with the performance objective can be met as specified in this section. We believe that there is high probability that the objective can be met, but we are not sure at this time that short term testing can be confidently extrapolated for the required time frame to the degree necessary to satisfy the demonstration of compliance required. Based on our current understanding of measurement science, performance evaluation, and long-term predictive capability, this may require significant advances in each of these areas. We believe that a thorough review of the basis for NRC acceptance of demonstration of compliance needs to be undertaken before this requirement is approved.

60.133(c)

There appears to be a major inconsistency in the waste package definition in this section and in the definition in 60.2. In 60.2 it requires that the package be bounded by a hermetically sealed canister. That requirement is not reflected or even referenced in this section. We believe that the requirements as specified in this section are adequate and the need for a boundary that is hermetically sealed is not necessary.

60.137 Performance Validation

60.137(b)(1)

The term "validation" is used very freely in this section. There is a specific requirement that the Commission be notified if "validation" is not achieved in various technical areas. In view of this requirement, validation should be defined in order to establish the baseline for appropriate action.

60.137(c)

This section requires an in-situ testing program to evaluate various components of the repository. The Department is prepared to conduct such testing programs. However, we would like to know which data the Commission believes important to make a decision concerning the safety of the repository.