

United States Department of Energy

**Presentation Before the
United States Nuclear Regulatory Commission
on the Matter of
Draft 10 CFR Part 60**

November 18, 1982

**F. D. Coffman
Acting Director
Office of Terminal Waste Disposal
and Remedial Action
Office of Nuclear Energy
U.S. Department of Energy**

TEXT

8211240162 821118
PDR PR
60 PDR

Good Afternoon Gentlemen

It is a pleasure to have this opportunity to inform you of the Department's position concerning the publication of the technical criteria to implement 10 CFR 60. The staff has just today presented to the Commission options with respect to the finalization of the technical criteria. The Department of Energy, the future license applicant, does not believe that any of those options properly addresses the Department's concerns. To do that we recommend that the Commission modify Sections 60.112 and 60.113 before publication, perhaps utilizing the results from a searching peer review if the Commission needs an additional technical evaluation beyond that already available to them in our and other participants comments.

Before elaborating on this recommendation let me affirm the Department of Energy's support for the Nuclear Regulatory Commission in the matter of 10 CFR 60. As the Department testified in the Oversight hearing on Nuclear Waste Programs before the House Interior Subcommittee, we saw the need for Commission involvement early in the Department's site exploration and characterization activities. I should note the effective on-going interaction between the Department and Commission staffs in these areas.

Viewgraph #1

In addition, we do feel that the draft final rule as presented in the public meeting at DOE-Germantown on July 29, 1982, has many positive features which deserve publication. Without enumerating them in detail, the draft rule does provide for the public health and safety, it also supports an overall system performance objective upon which we have

taken a strong supportive position, and provides guidance in many key areas. Resolution of these key areas are a result of NRC staff work in response to the comments provided by the Department and other participants.

However, the DOE continues to disagree with portions of the 10 CFR 60 technical criteria as we discussed in our letters to the Commission of November 5, 1981, and October 29, 1982. The concerns center on; the lack of technical justification for numerical subsystem requirements, the probable complications and delay in the licensing process that would occur in demonstrating compliance, and the probable cost of developing components that would be required. The enclosure to the October 29, 1982, letter provided a sampling of the extensive comments sent to the Commission in response to their specific request that reviewers comment on the subsystem performance requirements of 60.113. The Department believes that the weight of these comments on the draft proposed rule support deletion of the subsystem performance requirements in favor of an overall system performance objective. In our letter of November 5, 1981, we stated: "The Department feels that the primary emphasis should be placed upon meeting an overall system performance objective. The final determination concerning levels of performance required of individual subsystems should be made during the preparation of an overall system analysis for a specific site and design." We further stated: "Essentially, we believe that: 1) the regulation should be based on achieving an overall system performance requirement, in the manner of the EPA standard; 2) a multiple-barrier system should be proposed by the Department;

3) the performance of intermediate subsystems (barriers) of the system should be proposed by the Department and should support the overall system performance criterion; 4) the numerical criteria should be justified by engineering principles and proven site-specific data; and 5) the methods by which compliance is to be demonstrated should be clearly defined." These statements summarize our position, and we believe that the draft final rule does not meet or fulfill these goals.

Viewgraph #2

Our comments center on the contents of Sections 60.112 and 60.113, that is, specifically, we feel that the requirement to meet generic levels of performance on site-specific subsystems is inappropriate. We also believe there is a significant degree of uncertainty in the intent of the two sections.

Viewgraph #3

We recommend that Section 60.113 be eliminated in total, that 60.112 be redrafted to emphasize systems analysis procedures, and that consultation between the NRC and DOE staffs and other participants take place to resolve other concerns such as definitions, proofs of compliance, and proposed regulatory guides. At the completion of these actions, we encourage publication of the final rule. On the other hand, the Commission may feel that it is preferable to turn to a technically competent group for analysis of the NRC staff's and our respective positions. If that is the case, we suggest that the Commission

may wish to consider requesting the ACRS Subcommittee on Waste Management or the National Academy of Sciences, who are presently developing a paper in this area, to comment or appoint a hearing board. Either of these actions should be followed by specific recommendations, including a draft of the final rule, to the Commission by the peer group or hearing board.

Viewgraph #4

The fundamental difference between the NRC staff and the DOE is summarized by the two points that are shown on this viewgraph. Our interpretation of the NRC staff's position is that they believe that man can build a repository with less uncertainty in its performance by depending on engineered systems rather than relying on the performance of natural barriers. This position is inconsistent with our Generic Environmental Impact Statement (GEIS) on HLW disposal. Further, the staff states that by specifying subsystem performance, the uncertainty of total system performance can be reduced. However, the staff has acknowledged both to you and others that the requirements contained in 60.113 will not in and of themselves guarantee compliance with the interagency draft EPA standard. Regardless of the above statement, they allege that the uncertainty in a repository's performance would be reduced by reliance on the engineered subsystem performance requirements; as opposed to taking appropriate credit for the attributes of nature. We believe that the compliance with any overall performance criteria is achieved by host rock properties and that it is not possible or desirable to place specific numerical requirements on engineered subsystems to ensure individual site

performance within various rock types.

Viewgraph #5

In this viewgraph, we have indicated what the expected performance of typical host rocks would be, based solely on measured ground-water travel times in those formations. The first possible release to the accessible environment is presented as the left-hand end of the blue lines. These initial release times range from 12,000 to 130,000 years and assure compliance with the interagency draft EPA standard. Yet, it should be noted that under the draft final rule, if we were to place a repository in any one of these sites, there is a strong presumption that DOE would still be required to produce a 1,000 year waste package and to retard to one part in ten to the fifth. We recognize that there are provisions for exception; however, there is nothing in the draft final rule that indicates that the exception can take the form of a lower number or how such an exception would be authorized.

Viewgraph #6

To illustrate the relative effectiveness of engineered barriers versus natural ones, a series of calculations have been made using the currently available site-specific data for basalt at the Hanford site. The left-

hand figure shows the degree of protection provided if only the requirements as specified in 60.113 are considered. Note that the interagency draft EPA limit is exceeded in under 3,000 years by a factor of over one thousand, and that the total environmental insult continues for thousands of years.

On the other hand the right hand figure shows the calculated level of protection provided by natural barriers alone. Note that no release is projected until 35,000 years have past (because of the ground-water travel time) and that the level of release is approximately 11 percent of the interagency draft EPA standard quantities.

The center figure, when compared to those on the sides, illustrates that: 1) application of the 60.113 requirements only reduce the release allowed by the natural barriers by four percent, and 2) application of the natural barriers to the releases allowed by the 60.113 requirements reduce them by four orders of magnitude. We believe that this comparison clearly demonstrates that the release is controlled by the natural barriers.

Viewgraph #7

The comparison demonstrated for basalt in the previous viewgraph may be developed in another manner as illustrated in this viewgraph. The left-hand column represents the expected effect of the entire repository inventory in terms of multiples of the interagency draft EPA standard. The next three columns show the successive cumulative effect of applying site-specific parameters sequentially. The figure shows that the ground-water travel time reduces the expected release by three orders of magnitude,

and retards the expected release till 35,000 years after repository closure. Inclusion of solubility limits reduces the expected release by an additional three orders of magnitude and sorption an additional one order of magnitude.

However, application of a 1,000 year waste package retention time does not reduce the expected release, it merely delays it from 35,000 to 36,000 years. Further, the engineered system release limit of one part in ten to the fifth only reduces the level of expected release by four percent, where the natural barriers (only three of which were used in this calculation) reduced the expected release by seven orders of magnitude. In support of our position, we note with interest that one of the NRC staff's own major contractor, the Sandia Laboratory, has also concluded that the imposition of the 1,000 year waste package criteria is ineffective in assuring compliance with the standard.

Viewgraph #8

A further demonstration of the effectiveness of natural barriers is seen in the next viewgraph where we calculated the expected release resulting from a drilling intrusion into a bedded salt repository immediately after closure. Because of ground-water travel time limitations, the expected release is not seen until after 50,000 years have passed and is limited in extent by the self-sealing characteristics of bedded salt.

Viewgraph #9

In this viewgraph, we have indicated that part of our defense in depth is provided by multiple natural phenomena or barriers. Besides the engineered barriers, including the waste form, the waste package itself, canister, buffer materials, overpack and surrounding materials or backfill, the manner in which we actually excavate and emplace each of these materials will also act as a barrier. You will note that the natural barriers include vertical separation of the repository from ground-water, low to negligible host rock permeability, and geochemical conditions that are enhanced by buffer materials. Allowance must also be made for absorption within the rocks and fissures in the rocks.

Viewgraph #10

The staff has yet to provide us with guidance as to what will constitute proof of compliance, and consequently we are now directing our efforts toward proving 100 percent compliance. Proving compliance with the criteria, most specifically the 1,000 year waste package, requires an extrapolation that is extraordinarily large for an engineering problem, but not for natural phenomena. This viewgraph illustrates that the waste package data base available to us at the time repository closure will be on the order of 50 years. Yet we are being required to extrapolate that performance to 1,000 years, i.e., by a factor of 20. We believe that this is stretching engineering capabilities beyond credible limits, given the uncertainties of performance at higher pressures, for example. Rather, we believe that we should be allowed to specify an expected mean life and to demonstrate that that performance with its associated expected leakage rate will not compromise the goal of meeting the

overall performance criteria. We have asked the staff on numerous occasions for guidance as to the level of compliance, i.e., what would be a permissible failure rate, but have not received any direction in this area.

Comparing this viewgraph to the next,

Viewgraph #11

we see that the relative extrapolation required for natural phenomena is very small compared to that of the engineered systems. In natural systems, we have a period of time ranging between one to two million years where we know what has happened, and what has not happened. In this case we are only being asked what we can reasonably expect will occur in the next 10,000 years. That period of time is on the order of one-half to one percent of the geologic record where we already know what has occurred. We believe that extrapolation of one-half to one percent is much more reasonable than an extrapolation of 2,000 percent.

Viewgraph #12

Consequently, we feel that proof of compliance with the criteria for engineered systems will be extremely difficult to assure when we must extrapolate performance under uncertain conditions by factors of 20.

Viewgraph #13

Further, I would like to bring to your attention the requirements of the interagency draft EPA standard, specifically Section 191.14. Here is

indicated that compliance shall be determined through site-specific projections, etc., and that these projections will be realistic and that all the engineered and natural barriers of the disposal system will be considered. The NRC staff has chosen not to follow this recommendation. Instead in their rationale document, the staff used hypothetical sites with unreasonable site parameters to attempt to justify the imposition of the release limit of one part in ten to the fifth.

The staff has suggested that the current format of 60.113, in which they require compliance with certain levels of performance or other levels of performance deemed appropriate by the Commission, is adequate for our purposes at this time. We disagree.

Viewgraph #14

Since we have no information as to what the compliance requirements will be or what level of performance is expected or may be allowed, we must now strive to design and develop a system that meets the stated requirement. If we do request that an alternative level of performance be accepted in our license application, the Department and the Commission will have to readdress these questions anew. Thus, the option of alternative levels of performance, as proposed by the staff gives the Department no relief from the arbitrary criteria now proposed.

Viewgraph #15

Such reconsideration can only give the impression that either the Department is seeking redress from requirements that will have been in place for

some period of time or that the Commission is easing the repository criteria to accommodate the Department, and perhaps relaxing the guards to the public's health and safety. Further, such actions will ultimately extend the time and effort expended upon the review of the construction authorization or the license to possess. This added time results from the fact that replacing a previously defined criteria with a new performance figure requires two separate actions. First, the Department will have to convince the staff that it is not necessary to attain the initial criterion, and that the proposed value is as effective as the initial requirement in meeting the overall performance criterion. After that effort, we will then have to demonstrate to the staff that the proposed performance value will in fact be attained. We believe that this procedure will extend the review process and open it to procedural delays.

Viewgraph #16

It is our belief that the current proposed requirements of 60.113 add complex issues to the licensing process by focusing attention on near-field performance, and do not allow proper consideration for the overall performance of the repository which also includes far-field host rock parameters. A number of the issues that will be raised are indicated on this viewgraph. Additionally, we bring to the Commission's attention the fact that our preliminary analysis for a basalt site indicates that the net effect of the proposed criteria is a reduction of forty possible health effects, over all time. This relatively low possible

benefit should be weighed against the Commission's own criteria of \$1000 per person-rem, as promulgated in 10 CFR 50, Appendix I.

In conclusion, I return to the second and third viewgraphs. Our concerns about the proposed technical criteria for 10 CFR 60 as expressed in our letter of November 5, 1981, have not yet been adequately addressed in the present draft final rule.

Viewgraph #17

These concerns center on Sections 60.112 and 60.113. We believe that the requirement to meet generic levels of performance on a site-specific basis is inappropriate. We also feel that there is an inconsistency in intent between Sections 60.112 and 60.113, and that 60.112 should be clarified and redrafted to support the use of systems analysis procedures, as described in our November 5, 1981, letter. Further, we question the imposition of generic site performance assumptions on specific rock types as is done 60.112. As a final point, we respectfully note to the Commission that the staff appears to have modified the concept of a geologic repository to that of an engineered one. The implications of this decision on the part of the staff should be reviewed by the Commission.

Viewgraph #18

Consequently, we recommend the elimination of 60.113, the redrafting of 60.112, and consultation between the staffs and other participants to resolve other concerns, which would be followed by publication of the final rule.

If the Commission decides that they wish to address this matter in another way, we urge that a technical evaluation of the staff position be made in comparison with ours and other participants by a peer group. This could be done by the ACRS Subcommittee on Waste Management, or the NAS, or by a hearing board, as you deem appropriate. The peer group should make recommendations as to the form of the final rule to the Commission after which the final rule could be published.

I would like to thank you for the opportunity to bring our concerns to your attention. I believe that we can continue to work together closely in supporting one another in our respective responsibilities.