

NOTATION VOTE

RESPONSE SHEET

RELEASED TO THE PDR

9/12/90
date

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initials

TO: SAMUEL J. CHILK, SECRETARY OF THE COMMISSION
FROM: COMMISSIONER CURTISS
SUBJECT: SECY-90-162 - COMMENTS ON WORKING DRAFT NO. 2 OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S HIGH-LEVEL WASTE DISPOSAL STANDARDS

APPROVED ^{X/in part}_{w/comments} DISAPPROVED ^{X/in part}_{w/comments} ABSTAIN

NOT PARTICIPATING REQUEST DISCUSSION

COMMENTS:

See attached comments.

00123

James R. Curtiss
SIGNATURE

July 20, 1990
DATE

RELEASE VOTE

WITHHOLD VOTE

ENTERED ON "AS" YES No

LF02
11

Commissioner Curtiss' comments on SECY-90-162:

I have the following comments:

- 1) Stringency of EPA's Standards: I disagree with the approach proposed by staff for addressing the concern over the excessive stringency of EPA's standards (see comments #1 and #2). Staff takes the position that the concern over the stringency of EPA's standards is primarily one of misperception by an uninformed general public, and that this problem could be addressed if EPA would simply do a better job of explaining the basis for its standards (which we ourselves then curiously offer up on EPA's behalf in our comments). The clear implication here is that staff does not share the concern that EPA's standards are too stringent.¹

I am not prepared at this point to dismiss the stringency issue on the ground that EPA has simply done a poor job of explaining its standards, particularly in view of the rising level of concern recently from various quarters over the excessive stringency of the standards (see Remarks of Leo P. Duffy, Commission Briefing, December 20, 1989; Letter from Dade W. Moeller to Chairman Carr, December 21, 1989; First Report to the U.S. Congress and the U.S. Secretary of Energy from the Nuclear Waste Technical Review Board, March 1990, p. 31; Rethinking High-Level Radioactive Waste Disposal, National Research Council, July 1990). Indeed, I think there is a very real possibility that we may want to pursue this issue as we get more experience with the application of these standards to WIPP and as others take a more careful look at the basis for EPA's standards.²

In order to enable the Commission to evaluate these recent comments more carefully, and to preserve the Commission's option of addressing this issue when we formally comment on EPA's proposed rule, I would propose that we take a more neutral posture in our comments at this juncture. Proposed changes to the subject letter are attached.

- 2) Anticipated/Unanticipated Processes and Events: The term "anticipated/unanticipated processes and events" is a significant term that will play a crucial role in evaluating

¹ Staff says as much in its Memorandum to the Commission of April 6, 1990, wherein it rejects any concern that EPA's standards are too stringent. See Memorandum from James M. Taylor to the Commissioners, April 6, 1990, pp. 3-4,

² I would note that the National Academy of Sciences has scheduled a Symposium on Radioactive Waste Repository Licensing for September 17 and 18, 1990. It is my understanding that this very issue will be on the agenda for that conference.

repository performance. Comment #5 indicates that the staff is exploring an alternative approach to the existing language in 10 CFR Part 60. While I do not object to a general reference to the staff's initiative, I think it is premature to release the revised terminology before the Commission has had an opportunity to hear from the staff on this issue, with a thorough discussion of the basis for the staff's proposal and how it would differ from the existing regulatory approach. Accordingly, I would delete the more detailed discussion of this concept from comments 5 and 6.

Editorial comments on the cover letter are attached.

Richard Guimond, Director
Office of Radiation Programs, ANR-458
U.S. Environmental Protection Agency
Washington, DC 20460

Dear Mr. Guimond:

Enclosed are the comments of the staff of the U.S. Nuclear Regulatory Commission on Working Draft No. 2 of the U.S. Environmental Protection Agency (EPA) environmental standards for management and disposal of high-level and transuranic radioactive wastes.

As you know, the Commission plans to issue "conforming amendments" to our regulations (10 CFR Part 60) to adopt the requirements of your standards. Ideally, I would like to propose those amendments to Part 60 concurrently with proposal of your standards, so that both documents can be reviewed by the public simultaneously. In order to achieve this goal, significant interactions between our staffs will be needed. ~~Our staffs have worked well together in the past, and a~~ A starting point for ~~future these~~ interactions might be the development of a common set of terms for use in both regulations, as addressed in one of our comments. I propose that our staffs meet as soon as practical to work toward development of the common terminology.

I am concerned that there continues to be considerable controversy regarding the perceived stringency of your standards, ~~with n.~~ Many ~~observers have argued~~ that the standards are excessively conservative when compared with other accepted standards. ~~One of our comments~~ We recommends that EPA provide further insight into the basis for the standards ~~in a way that would to permit a~~ ready comparison with other regulatory standards and guidance, ~~and as well as with other risks experienced by society.~~ I strongly encourage you to be ~~very explicitly and thoroughly in your description~~ of the basis for your standards ~~in such a way so that the level of safety can be evaluated in public comments, and so that questions about of excessive stringency can may be resolved.~~

~~Finally, there continues to be e~~ Considerable controversy also exists, both within the NRC and outside, about the probabilistic format of your standards and the potential difficulties ~~that might be encountered in attempting to implement those standards of implementing them.~~ In ~~the enclosed comments include a reiteration we reiterate (with slight modification) of one of NRC's the same concern expressed in our 1983 comments. This comment suggests~~ We once again suggest rewording the "containment requirements" ~~so as to~~ in a manner that should achieve ~~the same a level of safety comparable to that now sought by EPA, while.~~ Modifying the text as recommended would, at the same time eliminating ~~e~~ the need for numerical predictions of the probabilities of ~~very highly unlikely processes and events.~~ I strongly encourage you to ~~consider adoption of this recommended~~

text as a way of ending the debate ~~about your~~ surrounding the standard's probabilistic format.

Thank you for the opportunity to review and comment on Working Draft No. 2 and look forward to working closely with EPA during reissuance of your standards.

Sincerely,

Robert E. Browning, Director

over
Concerns ~~that~~ the
very low levels of
risk called for
by EPA's standards,
compared to
other federal health
and safety standards.

COMMENTS ON WORKING DRAFT NO. 2

OF EPA'S HIGH-LEVEL WASTE STANDARDS

General

insert & cites:
ACNW
DOE
TRB
NAS/NRC

1. There continues to be considerable controversy regarding the perceived stringency of the U.S. Environmental Protection Agency's (EPA's) environmental standards for disposal of spent nuclear fuel, high-level radioactive wastes (HLW) and transuranic radioactive wastes (TRU). This controversy results, at least in part, from differing perceptions of the actual level of risk allowed by EPA's standards, and by an inability of many observers to relate that level of risk to other risks experienced by society. We are concerned that a clear public understanding and acceptance of the standards will not be achieved until EPA has explicitly documented the acceptable risk level that underlies the release limits of the standards and the way in which the release limits were derived from that risk level. As we understand EPA's development, it consisted of the following:

1) EPA determined that radiological impacts from disposal of HLW should be no greater than those experienced by individuals and populations today. EPA therefore surveyed the radiological impacts of natural background radiation exposure, nuclear weapons testing fallout, unmined uranium ore deposits, and nuclear power operations to provide benchmarks for evaluating the waste isolation capability of HLW repositories.

2) EPA described several hypothetical HLW repositories and conducted performance assessments to evaluate their waste isolation capabilities. These performance assessments showed that repositories are able to restrict population impacts to less than 1,000 health effects over 10,000 years -- a level comparable to or less than the benchmarks surveyed in step 1, above. Individual radiological impacts were found to be very low.

3) Because of the large uncertainties involved in calculations of radiation doses far into the future, EPA used a generic environmental model to translate its 1,000 health effects goal into a table of allowable limits for releases of radioactive materials to the environment. While these release limits might correspond to fewer than 1,000 health effects at an actual repository site, EPA's Science Advisory Board found this translation to be appropriate for a generic analysis. In EPA's view, any conservatism involved in developing the table of release limits is well justified in light of the implementation difficulties that would be involved if the standards required long-term projections of population locations, sizes and lifestyles.

4) The long regulatory time period of interest and the sizeable uncertainties involved in projecting releases over that time period caused EPA to use the term "reasonable expectation" to describe the level of confidence required for

The Commission is concerned about this issue. So that the Commission might better understand the basis for your proposed standards,

a demonstration of compliance with the standards. As EPA stated (50 FR 38071, September 19, 1985), "[t]his phrase reflects the fact that unequivocal numerical proof of compliance is neither necessary nor likely to be obtained."

We encourage EPA to clearly and concisely document the ^{risk} basis for its standards, so as to improve public understanding and acceptance of those standards.

2. Another reason for the ^{concern over the} perception of excess stringency is the technical basis for the standards. ~~As discussed above,~~ EPA developed descriptions of several hypothetical repositories, and used relatively simple analyses to project the performance of those facilities. The release limits of the standards were then set so as to require actual repositories to perform approximately as well as EPA's hypothetical repositories. Standards developed in this way may be perceived to be overly stringent for the following reasons:

We understand that

1) In setting the standards, EPA has stated its belief that real repository sites can be found that can be shown to perform as well as its hypothetical sites. But, experience to date in the HLW repository program reveals that real sites that have been investigated are much more complex than EPA's hypothetical sites, and projected performance is much less certain. EPA's release limits may be too restrictive to accommodate the uncertainties at these sites, or more generally, at any real site. In any event, documentation that real sites can be shown to perform as well as the hypothetical sites is lacking.

2) EPA's analyses of repository performance are very simplistic. EPA's models are not able to accurately simulate some of the phenomena potentially important for projecting repository performance, such as groundwater flow and contaminant transport in fractured, unsaturated media, and the effects of waste-generated heat on the geochemical, hydrologic, and mechanical properties of a repository. Again, EPA's release limits may be too restrictive to accommodate the uncertainties that will be inherent in more realistic analyses of repository performance.

3) EPA has not considered a complete range of release scenarios in its supporting analyses. Some processes and events were omitted from EPA's analyses, such as the gaseous release pathway for unsaturated repository sites. Also, combinations of processes and events, such as fault movement followed by drilling, were not considered. These omissions caused the release limits to be set at a level that might rule out repositories capable of providing an adequate level of protection of public health and safety.

In the NRC staff's view, there are several actions that ^{need to be taken} ~~EPA could take~~ to respond to these concerns. For example, ~~EPA could perform~~ much more detailed and realistic supporting analyses to defend the achievability of its release

This is addressed in comment #1 as revised

are necessary

~~limits. Also, when presenting its release limits, EPA could place increased emphasis on comparisons with other regulatory standards and guidance, and with other risks experienced by society. EPA's analyses of hypothetical repository performance would then play a less prominent role in supporting the standards. Finally, EPA could modify the standards in the manner discussed below (comment no. 8) so as to reduce potential difficulties in demonstrating compliance with the standards for low probability events.~~

d. transmissivity

we recommend that EPA

Applicability

3. The applicability statements of 40 CFR 191.01 and 191.11 are limited to spent nuclear fuel, HLW and TRU. In 40 CFR 191.02, however, the term "radioactive waste" also includes any other radioactive material managed or disposed of with spent fuel, HLW or TRU. This definition suggests that EPA intends to avoid the potential for two or more different standards to be applicable to a single repository, if both HLW and non-HLW are disposed of in that facility. If that is actually EPA's intent, it can be accomplished by revising the applicability statements to refer to ". . . radioactive waste as defined herein at any facility that is intended to be used for, or may be used for, the permanent disposal of high-level radioactive waste, transuranic radioactive waste, or spent nuclear fuel . . ." The NRC staff would support such a broadened statement of applicability for the standards, provided it was accompanied by an explicit exemption from other EPA radioactive waste standards (e.g., low-level waste standards) that might otherwise be applicable.

Subpart A

4. The NRC staff notes that Subpart A continues to specify dose limits in terms of individual organ doses even while Subpart B proposes to adopt the newer "effective whole body dose equivalent" concept. The NRC staff supports use of the newer concept, and notes that amendments to the Commission's regulations for radiation protection, 10 CFR Part 20, have been proposed that would adopt the updated concepts. EPA's Supplementary Information should explain the reason for the different treatment in 40 CFR Part 191 and EPA's plans for updating the format of Subpart A.

Definitions

5. The NRC staff is considering proposals to revise 10 CFR Part 60 by substituting new terms for the current definitions of "anticipated" and "unanticipated processes and events." The new terms would serve the same purpose in the rule as the current terms -- i.e., to specify the design conditions for the engineered barriers in 10 CFR 60.113 and the range of conditions for analysis of overall system performance in 10 CFR 60.21. The NRC

staff is particularly interested in working with EPA to try to develop a common set of terms that could be used in both agencies' regulations. The following paragraphs present the revised terminology currently being considered by the NRC staff.

The current term "anticipated processes and events" would be replaced by:

"Anticipated performance" means the predicted behavior of a geologic repository, taking into account the uncertainties in predicted behavior, if the geologic repository is not disrupted by human intrusion or the occurrence of an unlikely process or event.

The Supplementary Information would explain that human-initiated disruptions other than intrusion into the repository (e.g., ground water pumping) may be anticipated, if they are sufficiently likely.

The term "unlikely process or event" in the definition above might also need to be defined, either in the rule or in the Supplementary Information.

The full range of conditions for which performance of the repository must be evaluated (currently "anticipated" plus "unanticipated processes and events") would be defined by:

"Significant processes and events that may affect the geologic repository" means all processes and events potentially affecting the geologic repository that are sufficiently credible to warrant consideration. Significant processes and events that may affect the geologic repository may be either natural processes and events or processes and events initiated by human activities other than those activities licensed under this part. Processes and events initiated by human activities may only be found to be sufficiently credible to warrant consideration if it is assumed that:

- (1) the monuments provided for by this part are sufficiently permanent to serve their intended purpose;
- (2) the value to future generations of potential resources within the site can be assessed adequately under the applicable provisions of this part;
- (3) an understanding of the nature of radioactivity, and an appreciation of its hazards, have been retained in some functioning institutions;
- (4) institutions are able to assess risk and to take remedial action at a level of social organization and technological competence equivalent to, or superior to that which was applied in initiating the processes or events concerned; and

(5) relevant records are preserved, and remain accessible, for several hundred years after permanent closure.

The Supplementary Information would discuss EPA's suggested probability cut-off for categories of processes and events (1/10,000 over 10,000 years) as in the previous conforming amendments.

6. The NRC staff particularly notes the distinction between "anticipated performance," as defined above, and "undisturbed performance" in Working Draft No. 2. In our view, "undisturbed performance" may be a very unlikely set of conditions and, therefore, may have little merit for evaluating individual barrier performance as contemplated by 10 CFR 60.113. Although EPA's classification of "undisturbed performance" serves quite a different purpose, we nevertheless urge EPA to consider adopting "anticipated performance," as defined above, as a replacement term.

7. Although EPA's definition of "ground water" comports with common use (see, e.g., Webster's New Collegiate Dictionary), the NRC staff notes that the term is used differently in Part 60. Discussions are needed between EPA and NRC staff to try to develop a common definition.

Containment Requirements

the Commission continues to be concerned about

8. As EPA is aware, ~~there continues to be controversy regarding~~ the workability of standards that require numerical probability estimates for very unlikely processes and events. In our formal comments on EPA's proposed standards, we suggested alternative wording for the containment requirements that would ease potential implementation problems while retaining approximately the same level of safety sought by EPA. That alternative would have required development of a complementary cumulative distribution function (CCDF) only for the more likely disruptive processes and events (those now defined as "anticipated" in 10 CFR Part 60). Very unlikely processes and events ("unanticipated" in Part 60 parlance) would be restricted by a release limit applied event-by-event, rather than cumulatively. With this structure for the containment requirements, there would be no need to develop precise numerical probability estimates for very unlikely processes and events. The following text for 40 CFR 191.13 illustrates the concept recommended in the Commission's earlier comment.

191.13 Containment Requirements

(a) Disposal systems . . . shall be designed to provide a reasonable expectation that, for 10,000 years after disposal:

(1) anticipated performance will not cause cumulative releases of radionuclides to the accessible environment to have a likelihood greater than one chance in 10 of exceeding the quantities calculated according to Table 1 (Appendix B); and

(2) the release resulting from any process, event, or sequence of processes and events that is sufficiently credible to warrant consideration will not exceed ten times the quantities calculated according to Table 1 (Appendix B).

The term "anticipated performance" would be defined as suggested in comment no. 5, above.

The Commission would, of course, need to evaluate compliance by means of appropriate performance assessments. This would involve analyses that: (1) identify all processes and events that might affect the disposal system and are "sufficiently credible to warrant consideration," and (2) estimate the releases of radionuclides caused by those processes and events. For anticipated performance, a performance assessment would also (3) estimate the probability of likely processes and events, and (4) to the extent practicable, combine the release and probability estimates for likely processes and events into an overall probability distribution of cumulative release.

We strongly recommend that EPA reconsider adopting this concept for the containment requirements, because it would impose almost exactly the same level of safety on a repository, while avoiding the potential pitfalls of probability estimation for very unlikely and speculative events that could occur far in the future.

9. The NRC staff also notes that EPA continues to use the term "reasonable expectation" in the text of the containment requirements. In our previous "conforming amendments," we found that DOE and some other commenters perceived "reasonable expectation" to be a much less stringent standard than "reasonable assurance," as used in Part 60. A dialogue is needed between EPA and NRC staff to identify a single term to be used in both regulations.

Assurance Requirements

10. The NRC staff objects to the two new assurance requirements of Working Draft No. 2, and would not recommend to the Commission that it add comparable provisions to its regulations as implied by the parenthetical statement of 40 CFR 191.14. The Commission's views on the impracticality of an "as low as reasonably achievable" (ALARA) requirement were discussed extensively in the Supplementary Information accompanying the technical criteria of 10 CFR Part 60 (48 FR 28194, 28198, June 21, 1983). There the Commission noted that the substantial uncertainties involved with predicting long-term repository performance, the already low EPA release limits and the already stringent requirements of the performance objectives of 10 CFR Part 60 make it doubtful that an ALARA requirement could be applied in any meaningful way.