

REVIEW OF:

**Proposed Rule on Design Basis for the Geologic Repository
Operations Area, Dated March 3, 1992**

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TABLE OF CONTENTS

1. INTRODUCTION 1

2. GENERAL COMMENTS 2

 2.1. DOSE TERMINOLOGY 2

 2.2. CONTROLLED AREA 2

 2.3. SITE AND SITE BOUNDARY 3

 2.4. DEFINITION OF "IMPORTANT TO SAFETY" 4

 2.5. CONSISTENT USE OF TERMINOLOGY FOR DESIGN
EVENTS 4

 2.6. INTEGRATED APPROACH TO THE PERFORMANCE
OBJECTIVES 5

3. SPECIFIC COMMENTS 6

APPENDIX A A-1

LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
1	EXAMPLES OF DIFFERENT TERMINOLOGIES USED IN THE PROPOSED RULE TO DESCRIBE DESIGN EVENTS OR CONDITIONS . . .	A-2
2	EXAMPLES OF DIFFERENT TERMINOLOGIES USED IN 10 CFR PART 60 TO DESCRIBE DESIGN EVENTS OR CONDITIONS . . .	A-4

1. INTRODUCTION

The review of the proposed rule on design basis for the geologic repository operations area has primarily focused on five general areas of interest. These five areas are concerned with consistency of the proposed regulatory text with the following:

- the presentation to the NMSS Office Director, on January 17, 1992 given as an enclosure to the "Note to File," by Michael P. Lee, dated February 27, 1992, hereafter called the "Bernero Presentation;"
- the regulations of 10 CFR Part 72 that are applicable, since a geologic repository operations area will have some inherent similarities and differences from an ISFSI or MRS;
- the new 10 CFR Part 20, as published in the Federal Register, Vol. 56, No. 98, Tuesday, May 21, 1991, pages 23360 to 23474;
- the portions of 10 CFR Part 60 which remain unchanged; and
- the Supplementary Information provided with the Proposed Rule.

The CNWRA has found that the Proposed Rule was consistent with the fundamental concepts in the Bernero Presentation and with the concepts in 10 CFR Part 72. There may be, however, some potential inconsistencies related to the use of specific terminology in the proposed rulemaking language that may present difficulties or additional uncertainties. Pointing out these potential inconsistencies in the proposed terminology does not suggest that any fundamental principles were ignored or misrepresented. In fact, the fundamental principles were all addressed in the body of the Proposed Rule and the suggested changes to 10 CFR Part 60 will remove many of the regulatory uncertainties associated with the design bases for a geologic repository operations area.

The following General Comments and Specific Comments are given for consideration by the NRC for potential modifications to the Proposed Rule. We have not prepared specific suggested modifications to the Proposed Rule. Any specific modifications to the Proposed Rule could be provided by the Center following NRC concurrence with a General or Specific Comment, if desired.

2. GENERAL COMMENTS

2.1. DOSE TERMINOLOGY

COMMENT AND RECOMMENDATION: Since 10 CFR Parts 50, 60, and 72 were originally written, the International Commission on Radiological Protection (ICRP)¹ and the National Council on Radiation Protection and Measurements (NCRP)² have adopted the new terms "total effective dose equivalent and committed dose equivalent" regarding dose limits to individuals. The newly issued 10 CFR Part 20 has also adopted these terms which are defined in 10 CFR 20.1003. Since 10 CFR Part 60 is using the dose limits of 10 CFR Part 20, its terminology regarding dose to individuals should be made consistent with that in 10 CFR Part 20. Thus, revisions may be required (on page 11, paragraphs 1-2, and page 13, § 60.21(c)(1)(ii)(G) and § 60.123(b) of the Proposed Rule) to use these terms or reference Part 20 annual occupational dose limits for adults when making reference to a radiation dose to an individual. There would be no impact on other sections of the Proposed Rule.

POTENTIAL IMPACT ON 10 CFR PART 60: There would be no impact on the other sections of 10 CFR Part 60 because the above information does not conflict with information that will be retained in the regulation. The only place where dose information was found in 10 CFR Part 60 was in the definition of "important to safety" and this is being changed to contain no reference to exposures.

2.2. CONTROLLED AREA

COMMENT AND RECOMMENDATION: 10 CFR Part 60 currently contains a definition of a "controlled area," however, this definition applies only to the postclosure time frame and is therefore, not applicable to preclosure operations. This definition is now in conflict with the definition of "controlled area" contained in the new 10 CFR Part 20. The 10 CFR Part 20 definition is conceptually consistent with the definition of "controlled area" in 10 CFR Part 72 and "exclusion area" in 10 CFR Part 100. Since the geologic repository operations area must be designed so that radiation exposures and radiation levels are maintained within the limits of 10 CFR Part 20 which defines "public dose" using its term "controlled area," this terminology in 10 CFR Part 60 should be consistent with that in 10 CFR Part 20. This could be accomplished in the Proposed Rule by renaming the current Part 60 definition of "controlled area" as the "postclosure restricted area," introducing a new definition of "controlled area," which is the same as 10 CFR Part 20, and for the new § 60.123 use the term "controlled area."

¹International Commission on Radiological Protection, A Compilation of the Major Concepts and Quantities in Use by the ICRP, ICRP Publication 42, Ann. ICRP, 14(4): 1-18 (1984).

²National Council on Radiation Protection and Measurements, Recommendations on Limits for Exposure to Ionizing Radiation, NCRP Report No. 91, Bethesda, MD, 1987.

Specific locations in the Proposed Rule where changes are required are as follows: page 10, para. 1; page 10, para. 4; page 11, para. 1; page 11, para. 2; page 12, para. 4; page 13, § 60.21(c)(1)(ii)(G); and pages 13 and 14, § 60.123(a), (b), and (c).

POTENTIAL IMPACT ON PART 60: A new definition of a "controlled area" could be added to § 60.2 that is the same as the definition of a "controlled area" in 10 CFR 20.1003. The current definition of "controlled area" in 10 CFR Part 60 may need to be renamed as the "postclosure restricted area." Other requirements in 10 CFR Part 60 which currently reference "controlled area" would require an editorial substitution of "postclosure restricted area" for "controlled area." Locations in 10 CFR Part 60 where these changes would be required are listed below:

§ 60.2	§ 60.102(c)
§ 60.21(c)(1)(i)	§ 60.121(a)(1)
§ 60.21(c)(1)(ii)(B)	§ 60.121(b)
§ 60.21(c)(3)	§ 60.122(b)(6)
§ 60.21(c)(7)	§ 60.122(c)
§ 60.21(c)(8)	§ 60.122(c)(12)
§ 60.43(b)(5)	§ 60.122(c)(17)
§ 60.46(a)(3)	§ 60.122(c)(18)
§ 60.51(a)(2)	§ 60.122(c)(19)

This will make 10 CFR Part 60 consistent with 10 CFR Part 20 and conceptually consistent with 10 CFR Part 72.

2.3. SITE AND SITE BOUNDARY

COMMENT AND RECOMMENDATION: 10 CFR Part 60 currently defines "site" as the "controlled area." This definition may be in conflict with the definitions in 10 CFR Part 20 and 40 CFR Part 191, Subpart A. As a result, it may be unclear where Commission and EPA preclosure dose limits are applicable. 10 CFR Part 20 defines "site boundary," which is used for limiting doses to the public for both NRC and EPA standards applicable to operations. Having in 10 CFR Part 60 the term "site" only related to postclosure is inconsistent with 10 CFR Part 20 and the EPA standards. Also the current definition of "site" is redundant with "controlled area," which may be changed to "postclosure restricted area." To make Part 60 consistent with Part 20 the definition of "site" in Part 60 may need to be made compatible with "site boundary," in 10 CFR 20.1003. The proposed rule would require modification on page 13, by adding the definition of "site boundary."

POTENTIAL IMPACT ON PART 60: In general the term "site" was used in 10 CFR Part 60 in an easily understood context, especially when associated with site characterization. Where the term "site" was specifically intended to mean the "postclosure

restricted area" Part 60 may need to be changed to reflect this intent. Editorial changes may be needed for only the following citations of Part 60 to reflect the Part 20 meaning of "site boundary:"

- | | |
|-----------------|------------------|
| § 60.21(c)(8) | § 60.122(c)(17) |
| § 60.102(c) | § 60.122(c)(18) |
| § 60.122(c)(12) | § 60.122(c)(19). |

2.4. DEFINITION OF "IMPORTANT TO SAFETY"

COMMENT AND RECOMMENDATION: The aspects of the geologic repository operations area that can prevent damage to the waste packages may need to be included in the second part of the definition of "important to safety." Items that have a high-risk associated with them may include the waste packages, which will serve as a primary confinement/containment barriers of the HLW. If there is a feature of the geologic repository operations area where an operation or malfunction could damage these primary confinement/containment barriers, then this feature should also be considered "important to safety." The second part of the definition should include a reference to damage to waste packages.

As receiving, packaging, and retrieval are specific elements of operations, other specific operational elements are also vital to defense-in-depth necessary for HLW. These other operational elements include: transport (onsite-transportation), containment, shielding, emplacement, and disposal. Omission of these operational elements may convey the concept that they are not "important to safety." The third part of the definition should include operations (which includes receipt, transport, storage, handling, containment, shielding, emplacement, disposal, and retrieval).

POTENTIAL IMPACT ON PART 60: None, other than the planned change to the definition of "important to safety."

2.5. CONSISTENT USE OF TERMINOLOGY FOR DESIGN EVENTS

COMMENT AND RECOMMENDATION: The Supplemental Information captures the basic concept regarding design events and conditions and how different types of equipment must be designed for different classes of design events and conditions. However, terminology used to describe given classes of design events and conditions is not consistent. This inconsistency is three-fold: (1) it is not in agreement with the terminology used in the Bernero Presentation, and (2) it is internally inconsistent in the Supplemental Information (several different terms intended to have the same meaning are used), and (3) it is inconsistent with terms currently used in Part 60. When coupling the existing inconsistent use of terminology in Part 60 with the additional use of inconsistent terminology in the Proposed Rule, it appears that uncertainty is not reduced.

Specific examples of the different terms used in the Proposed Rule to describe the various classes of design events and conditions are given in Table 1 of Appendix A. 10 CFR Part 60 currently contains many references to conditions or events under which certain items must be designed to perform. Also, many sections of 10 CFR Part 60 are silent on any conditions or events under which certain items should perform. Specific examples of the different terms or lack of terms used in 10 CFR Part 60 to describe the various classes of design events and conditions are presented in Table 2 of Appendix A. The net effect is there remains uncertainty about application of the design bases.

The terminology used in the Bernero Presentation should be used in the Proposed Rule. Since these terms are not being defined, it is important to present them in a standardized phraseology throughout the Proposed Rule. These terms should also be contained in a proposed regulation rather than only discussed in the Supplementary Information, because a clear and concise statement of the application of the various classes of design events and conditions would reduce the uncertainties significantly. Also, see the Integrated Approach to the Performance Objectives, General Comment 2.6.

POTENTIAL IMPACT ON 10 CFR PART 60: Consistent use of design basis terminology will enhance the clarity of 10 CFR Part 60. This change would impact several citations, but the impact would be editorial in nature, i.e., modifying undefined or unclear terminology. The citations affected would be:

- | | |
|-------------------|----------------|
| § 60.21(c)(3)(i) | § 60.131(b)(8) |
| § 60.131(b)(5)(i) | § 60.132(c)(1) |
| § 60.131(b)(7) | § 60.133(g)(2) |

2.6. INTEGRATED APPROACH TO THE PERFORMANCE OBJECTIVES

COMMENT AND RECOMMENDATION: The proposed regulatory language may not take a clear and integrated approach to addressing the performance objectives, especially related to the various types of design events and conditions for ensuring preclosure radiation safety and defense-in-depth. According to NUREG-1350, Volume 3 (Information Digest, 1991 Edition, Office of the Controller, page 3) to ensure clarity any proposed and current regulations should be coherent, logical, and practical. The Digest states that there should be a clear nexus between regulations, and agency goals and objectives whether explicitly or implicitly stated, and that agency positions should be readily understood and easily applied.

10 CFR 60.111(a) requires that the geologic repository operations area be designed so that the radiation control regulations will not be exceeded, during planned operations (at all times including retrieval) as explained in the Proposed Rule's Supplementary Information. But, 10 CFR 60.111(a) still remains explicitly silent as to what classes of design events and conditions the radiation control limits (10 CFR Part 20) must be applied. Also, the proposed regulatory language does not explicitly reconcile that the types of items that are "important to safety" have additional performance objectives, beyond those for the remainder of the geologic repository

operations area. This is explained in the Supplementary Information, but this lengthy explanation may need to be succinctly stated in the Proposed Rule to best assure clarity. The performance objectives should clearly and unambiguously convey NRC's high-order positions on radiation safety and defense-in-depth. It is essential that the rule itself contain this information, because as personnel (on the staff of the licensee or the NRC) change, over the years during this long project, the intent of the NRC's rule may be progressively and primarily be conveyed without the currently published Supplemental Information. If 10 CFR Part 60 is written as a stand-alone document (which ideally it should be) misinterpretation is unlikely.

The Proposed Rule to ensure perpetual clarity, and an integrated and consistent rule package may need to state explicitly in the rule that it is NRC's practice that the performance objectives related to preclosure protection against radiation exposures and releases of radioactive material are:

- For regular events, frequently occurring events, and infrequent events expected to occur during the lifetime of the geologic repository operations area (Design Events I, II, and III), that the geologic repository operations area shall be designed so that radiation exposures, radiation levels, and releases of radioactive materials will be maintained within the limits specified in Part 20 of this chapter and such generally applicable environmental standards for radioactivity, as may have been established by the Environmental Protection Agency.
- For postulated credible events not expected to occur during the lifetime of the geologic repository operations area (Design Events IV), that structures, systems, and components important to safety shall be designed to perform their safety functions. Also, that the geologic repository operations area shall be sited, designed, and operated to control the impact to radiological health and safety during and after any postulated credible design basis event (Design Event IV), which may result in a radiation accident.

POTENTIAL IMPACT ON PART 60: This may require a modification of 60.111(a) and then modification or deletion of undefined phrases, such as: "normal operations," "accident conditions," "credible disruptive events," and "anticipated operational occurrences," in other sections of 10 CFR Part 60. Refer to the sections listed under General Comment 2.5 for all specific examples.

3. SPECIFIC COMMENTS

- The statement on page 2, para. 3, that the standards of 10 CFR Part 20 apply to operations at a repository by virtue of section 60.111(a) is incomplete. The revised 10 CFR Part 20, in § 20.1002, states that the regulations in Part 20 apply to licensed operations under Part 60. Other sections of 10 CFR Part 60 also directly reference

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Part 20 [i.e., § 60.21(c)(7) and § 60.131(a)]. Other sections of 10 CFR Part 60 reference § 60.111(a) [i.e., § 60.132(b), § 60.132(c)(1), § 60.133(c), and § 60.133(g)(1)].

- On page 3, in the first paragraph, reference is made to Regulatory Guide 3.48 dated October 1981. It may need to be mentioned that the Regulatory Guide was updated as Revision 1 in August 1989. This revision to Reg. Guide 3.48 does not contain the four definitions quoted, but Revision 1 does reference ANSI/ANS-57.9-1984 which contains the same definitions, as quoted.
- The Supplementary Information discussed different types of "human-induced events" on page 4, para. 2, line 5; page 5, para. 4, line 4; page 6, para. 5, lines 18-19; page 7, para. 3, line 8; page 10, para. 3, line 4; and page 12, para. 6, lines 15-16. However, 10 CFR Part 60 does not have any design criteria for "human-induced events," which may be appropriate in § 60.131(b)(1). This may be needed to assure consistency with § 72.94(c) and the discussion in the Supplementary Information.
- The current § 60.122 is limited in scope to site assessment for postclosure issues. Site assessment for preclosure issues is not addressed in the proposed § 60.123 at the same level of detail as 10 CFR Part 72, Subpart E. It may need to be pointed out that the current § 60.21(c)(1) and the new § 60.21(c)(1)(ii)(G) will, in more general terms, address all the same concepts presented in 10 CFR Part 72, Subpart E.
- The assessment of the regional impact of the geologic repository operations area is not addressed in the same manner as in § 72.98 and § 72.100. It may need to be pointed out that regional impact of the geologic repository operations area will be fully addressed in DOE's Environmental Impact Statement, ref. § 60.21(a).
- The text of § 60.131(a)(4) may need to be modified to add the words "and means to decontaminate those systems to which access is required" in order to make the design bases for those systems the same as in § 72.126(a)(2).
- Modification of § 60.131(b)(4) may be required to make its design bases more general and consistent with § 72.122(g).
- The proposed siting criteria, in § 60.123, does not address a collective dose (total dose to a specified population), as is implied by § 100.11(a)(3). The Supplementary Information may need to point out that not having a collective dose assessment for radiation accidents, at this time, is consistent with 10 CFR Part 72 and the new 10 CFR Part 20.
- The term "monitored retrievable storage facility" should be replaced with "monitored retrievable storage installation," on page 4, para 3, line 7.

- The word "reasonable" [sic] on page 3, para. 1, line 10, is misspelled.
- The word "an," on page 7, para. 3, line 7, may need to be "any."
- The word "prvide" [sic] on page 3 in the footnote, line 5, is misspelled.
- The word "iniitiative" [sic] on page 8 in the quotation from the Federal Register , para. 6, line 3, is misspelled.
- The word "additon" [sic] on page 9, para. 2, line 5, is misspelled.
- The word "beyone" [sic] on page 13 in the last para., line 2, is misspelled.
- The word "event" may have been omitted from after the words "design bases" on page 7, para. 3, line 9.
- The word "control" may have been omitted from between the two words, "preclosure area," on page 8, para. 2, last line.
- The words "such a class of" may have been omitted from before "design basis" on page 9, para. 4, line 11.
- The "(1)" is missing from in front of the word "Estimates" on page 12, last para., line 11.
- The phrase "(1) A description and assessment of the site..." appears to be missing from page 13, after "(c) The Safety Analysis Report shall include." Also, on page 13, the "(1)" was omitted from "3. In section 60.21, new paragraph 60.21(c)__(ii) (G)..."
- The word "Commission" on page 2, para. 2, line 2, may need to be "Act." Also the Energy Reorganization Act may need to be mentioned in the context of this paragraph.
- Page 2, para. 5, the last 3 lines state, "if the emplaced waste has to be retrieved as contemplated by 60.111(b)." The word "contemplate" may be misused, since the regulations provide criteria if retrieval becomes necessary.
- On page 6 in the first line of the first full paragraph (para. 4), it states, "The Commission's concern in singling out this class of structures," The word "concern" may be not be positive enough. "Concern" versus "intent" of the Commission may convey two different messages.

- The concepts discussed in the last paragraph of page 6 and the first two paragraphs of page 7 may appear inconsistent with concepts discussed in the third paragraph on page 9. Check for consistency of the concepts discussed in these two separate areas of the Proposed Rule.

APPENDIX A

Examples of different terms used to express the various classes of design events or conditions in the Proposed Rule (Table 1) and in 10 CFR Part 60 (Table 2)

Table 1. EXAMPLES OF DIFFERENT TERMINOLOGIES USED IN THE PROPOSED RULE TO DESCRIBE DESIGN EVENTS OR CONDITIONS

Termonologies Used	Citation		
	Page	Par	Lines
accidents or other unanticipated conditions	1	8	2
unanticipated accidents or natural events	2	2	13
accident conditions	2	4	2
the most extreme credible set of conditions	2	4	10
planned operations	2	4	13
normal conditions, including those recurring events that can be expected to require an interruption of operations	3	2	1-3
those classes of conditions	3	2	8
more unlikely scenarios	3	2	13
fairly remote eventualities	3	2	17
condition. . . expected to be reasonably likely to occur at some time during the lifetime of a facility	3	2	17-18
all credible conditions no matter how speculative and unlikely	3	2	23-24
postulated accidents	3	3	5
very unlikely events	4	2	5-6
expected events	4	4	14
unexpected events	4	4	14
most improbable yet credible situations	4	4	15
very low probability situations that have potentially serious consequences	4	5	3
accidents	5	1	2
range of "accidents"	5	4	1
full range of credible occurrences	5	4	4-5
very low-probability conditions	6	2	3-4
most unlikely (yet credible) scenarios	7	1	2-3
low-probability scenarios	7	1	3-4

16

Termonologies Used	Citation		
	Page	Par	Lines
most unlikely credible conditions	7	3	2-3
all likely conditions	7	3	11-12
truly extraordinary case	7	3	13-14
likely conditions, including those that can be expected to occur during the period of operations at the GROA	8	4	3-5
most unlikely (yet credible) conditions	8	4	12
significant conditions, namely those that are unlikely yet credible	8	5	3-4
any of the credible conditions that may arise	9	4	3-4
accident conditions	10	3	6
accidents or natural phenomena events	13	(G)	3
postulated design basis event	13	(G)	8-9

Table 2. EXAMPLES OF DIFFERENT TERMINOLOGIES USED IN 10 CFR PART 60 TO DESCRIBE DESIGN EVENTS OR CONDITIONS

Part 60 Citations	Stated Design Events or Design Conditions Under Which Requirements Must be Met
21(c)(3)(i)	under normal conditions and under conditions that may result from anticipated operational occurrences, including those of natural origin
21(c)(3)(ii)	natural phenomena
111(a), 131(a), 131(b)(3)(iii), 131(b)(5)(ii)&(iii), 131(b)(9), 131(b)(10), 132(a), 132(b), 132(c)(2), 132(d), 132(e), 133(a)(1), 133(b), 133(c), 133(d), 133(e)(1), 133(e)(2), 133(f), 133(g)(1), 133(g)(3), 137	(Not Stated. This could be assumed to include <u>all</u> conditions and events.)
131(b)(1)	natural phenomena and environmental conditions anticipated at the GROA
131(b)(2)	equipment failure and similar events and conditions
131(b)(3)(i)	during and after credible fires or explosions in the GROA
131(b)(3)(iv)	operation or failure of fire suppression systems
131(b)(4)(i)	during an emergency
131(b)(4)(ii)	emergency conditions
131(b)(5)(i)	under both normal and accident conditions
131(b)(7)	under normal and accident conditions - unless at least two unlikely, independent, concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety
131(b)(8)	over anticipated ranges for normal operations and for accident conditions
132(c)(1)	during normal operations
133(a)(2)	credible disruptive events during the period of operations, such as floods, fires, and explosions
133(g)(2)	during normal operations and under accident conditions