IDENTIFICATION AND EVALUATION OF REGULATORY AND INSTITUTIONAL UNCERTAINTIES IN 10 CFR PART 60 VOLUME 2 — IDENTIFICATION

Prepared for

Nuclear Regulatory Commission
Contract NRC-02-88-005

Prepared by

Center for Nuclear Waste Regulatory Analyses
San Antonio, Texas

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APPENDIX A

Program Architecture Relational Database
Content and Development Instructions,
Revision 1, September 11, 1989
Attachment A, Section 14

14. UNCERTAINTIES (PAPD Step 4 and part of Steps 11 and 12)

Definitions - Generally, uncertainty is associated with a perceived insufficiency in a specific item. There are three specific types of Uncertainties:

Institutional Uncertainty - Lack of certitude regarding the roles, missions, actions, and schedules of agencies with REGULATORY REQUIREMENTS that affect the high-level waste regulatory program, their impacts, or their integration with the NRC regulatory program.

INSTITUTIONAL UNCERTAINTIES are derivable only from REGULATORY REQUIREMENTS.

Regulatory Uncertainty - Lack of certitude as to what is meant by the REGULATORY REQUIREMENT or its REGULATORY ELEMENTS OF PROOF, or the adequacy, completeness, and/or necessity of the requirement itself.

REGULATORY UNCERTAINTY may stem from lack of clarity in the quoted statement, the omission of an essential requirement from the regulation, and/or the inclusion of requirements in the regulation that do not contribute to or detract from the regulatory program.

An inconsistency with the statute that constitutes the basis of authority for the regulation represents a REGULATORY UNCERTAINTY. A REGULATORY UNCERTAINTY is also created if a regulation exceeds its statutory authority. However, the omission from the regulation of a material part of the statute does not create an UNCERTAINTY since the statute is the senior document.

REGULATORY UNCERTAINTIES are directly derivable only from REGULATORY REQUIREMENTS and REGULATORY ELEMENTS OF PROOF. However, since the two are essentially synonymous, it is preferred that Candidate REGULATORY UNCERTAINTIES be associated with the specific REGULATORY TEXT in the REGULATORY REQUIREMENT.

Development of the REGULATORY ELEMENTS OF PROOF logic hierarchy may expose additional REGULATORY UNCERTAINTY(IES) related to the logical relationship of two or more ELEMENTS or the completeness of the REGULATORY REQUIREMENT. If a program or system requirement is needed to complete a REGULATORY REQUIREMENT or a REGULATORY ELEMENTS OF PROOF logic structure, but is not embodied in the regulation or the authorizing statute, an "omission of an essential requirement" is present and a Candidate REGULATORY UNCERTAINTY is identified. The rationale for such an UNCERTAINTY must clearly show that the omission has the potential to significantly impact the achievement of system performance objectives.

Technical Uncertainty - Lack of certitude as to (1) how to demonstrate (DOE action) or determine (NRC action) compliance, (2) how to acceptably

reduce a previously identified TECHNICAL UNCERTAINTY, or (3) how to obtain the requisite information for either purpose.

A TECHNICAL UNCERTAINTY is created by the absence of a defined and accepted means to resolve a technical program need. TECHNICAL UNCERTAINTIES are derivable from DOE COMPLIANCE DEMONSTRATION METHODS, NRC COMPLIANCE DETERMINATION METHODS, UNCERTAINTY REDUCTION METHODS and INFORMATION REQUIREMENTS.

Because of the wide variety of potential technical concerns, a standardized list of possible subjects for TECHNICAL UNCERTAINTIES is impractical. The following are provided solely as examples of the types of technical concerns that should be considered:

a. How well the parameter of interest must be known (i.e., the required accuracy/precision or statistical confidence).
b. The acceptability of design safety margins or factors.
c. The availability of an applicable theory.
d. The level of acceptance in the technical community for the applicability of the theory to the conditions/processes of concern.
e. The acceptability of a given approach to modeling or simulation of a process/phenomenon.
f. How the causal factors can be identified with acceptable certitude.
g. How the local environment can be acceptably analysed or simulated.
h. How the variables of interest (e.g., frequency, duration, limits, properties) can be identified and described with acceptable accuracy.
i. The availability of methods and/or instrumentation to obtain the needed data with sufficient accuracy <u>for its intended use</u>.

<u>Background</u> - Uncertainties may include one or more of several types; e.g., definition, clarity, consistency, technical acceptance, proof. Uncertainties generally act as a constraint on action in some area of interest. However, -- and this is a point that must be carefully considered in identifying and defining uncertainties -- the fact that some work remains to be completed does not, of itself, cause the results of that work to be an uncertainty. If the method of completing the work is unknown or lacks general acceptance, the <u>method</u> may be the subject of an uncertainty. Or, if the work is completed and the results will not support a useable conclusion, the <u>conclusion</u> may be the subject of an uncertainty.

The UNCERTAINTY statement may be thought of as the definition of a perceived insufficiency and the general type of corrective action for that insufficiency. Together, these provide the basis for the identification of detailed corrective methods, information needs and plans in subsequent steps of the Program Architecture process.

The development of an NRC UNCERTAINTY occurs in three stages as follows:

Candidate Uncertainty (PAPD Step 4)

a. Perception and partial definition (Records 14a - h)
b. Correlation search
c. If an "Original", completion of definition (Records 14i - 14o), initial investigation and decision to include/exclude.
   OR
   If the Candidate is a "Matching" Uncertainty for a previously identified Original, completion of correlation analysis (Records 14k through 14r, as prescribed) and linkage with the Original through the PASS ID numbers.

(See Figure A3, Uncertainty Definition and Correlation Process, for the complete process logic of this stage. See Table A2 for the records applicable to each Status.)

Potential Composite Uncertainty (PAPD Steps 10 and 15a)

d. Definition of Potential Composite Uncertainty (Record 15)
e. Identification of Uncertainty Components (Record 16)
f. Preparation of Potential Composite Uncertainty Reduction Methods Analysis (Record 18)
g. NRC review and Uncertainty Reduction Method selection

NRC Composite Uncertainty (PAPD Step 13)

h. Preparation of final definitions of Composite Uncertainty and Uncertainty Reduction Method

The steps of these stages are described in full in Attachment F, Steps 4, 10, 15a and 13. Additional pertinent instructions are contained in TOP-001-02, Section 5.4.2. The process is summarized in the following paragraphs.

The first stage involves the initial perception and serious consideration of an insufficiency. At that point it is termed a "Candidate" UNCERTAINTY. (For details of initial UNCERTAINTY identification, see Attachment F, Steps 2.9, 2.10 and 7.11.). A search of the Correlated UNCERTAINTIES records determines whether the Candidate UNCERTAINTY is a "Matching" UNCERTAINTY for one previously identified or if it is an "Original" UNCERTAINTY. (Note that an Original may be an Included UNCERTAINTY or an Excluded UNCERTAINTY.) If the perceived UNCERTAINTY is an Original, the review of relevant documentation serves to verify or deny the initial perception. This provides the primary input for Record 14i, Rationale for Uncertainty Inclusion or Exclusion. If the UNCERTAINTY is confirmed to be a match for an Included Original, it becomes one of a set of correlated "Potential" UNCERTAINTIES and the associative link is made in the PADB.

In the second stage a Potential COMPOSITE UNCERTAINTY is constructed from each set of correlated Potential UNCERTAINTIES. ALL IDENTIFIED

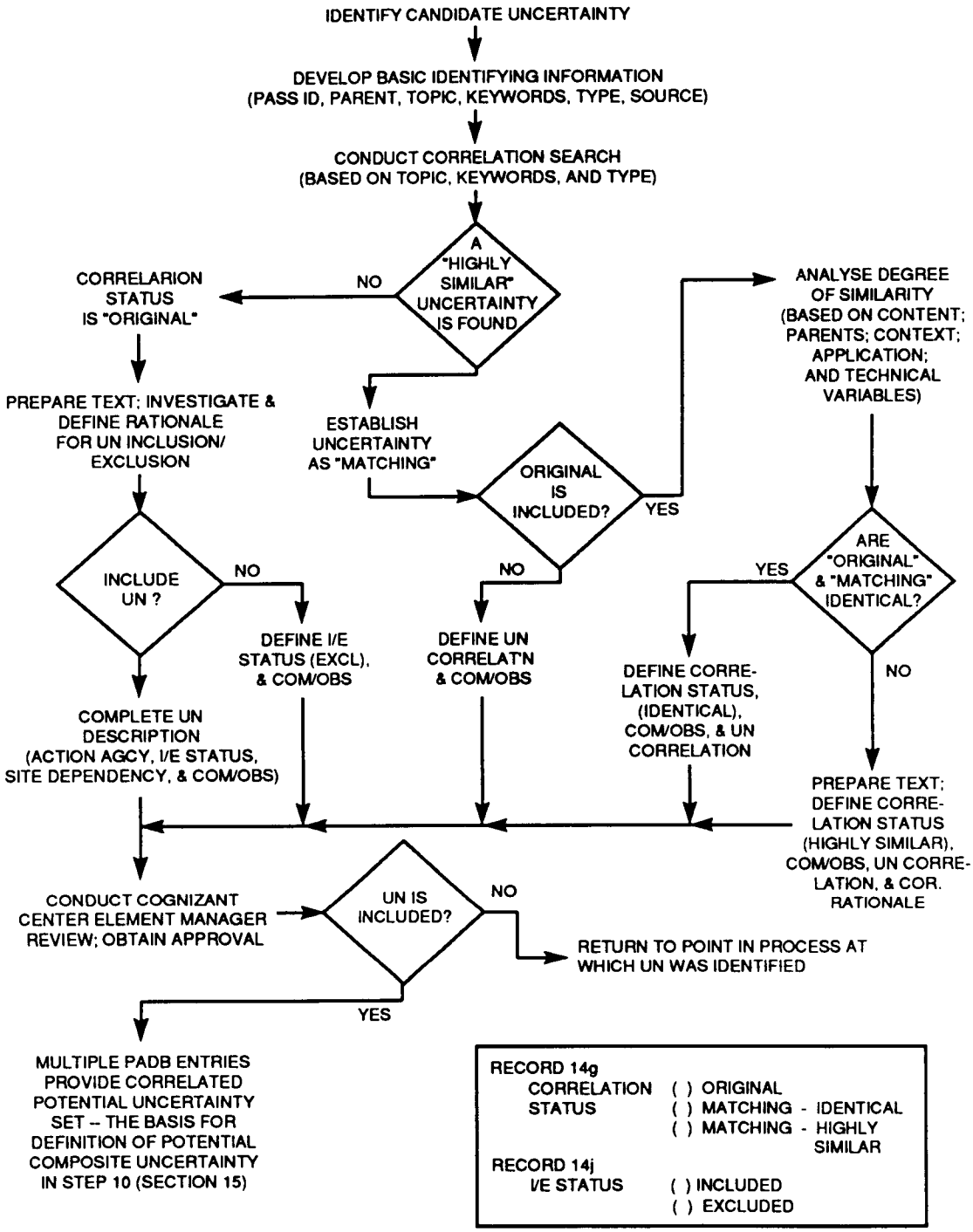

Figure A-3. Uncertainty Definition and Correlation Process

TABLE A2

RECORDS APPLICABLE TO EACH UNCERTAINTY STATUS

Record	-- Included Uncertainties -- Orig'l	Matching Ident'l	Matching Highly Sim.	-- Excluded -- Orig'l	Match'g
a. PASS ID	X	X	X	X	X
b. Parent	X	X	X	X	X
c. Topic	X	X	X	X	X
d. Keywords	X	X	X	X	X
e. Type	X	X	X	X	X
f. Source	X	X	X	X	X
g. Corr. Status	X	X	X	X	X
h. Action Agency	X	X	X		
i. Site Dependency	X			X	
j. In/Ex Status	X			X	
k. Text	X		X	X	
l. Rationale	X		X	X	
m. References	X		X	X	
n. Com/Obs'vatns	X	X	X	X	X
o. References	X	X	X	X	X
p. Correlation		X	X		X
q. Rationale			X		X
r. References			X		X

UNCERTAINTIES, REGARDLESS OF SOURCE, ARE CORRELATED. ONLY NRC UNCERTAINTIES ARE USED TO CONSTRUCT A POTENTIAL COMPOSITE UNCERTAINTY.

The Composites then undergo the complete preliminary analyses described in Attachment F, Steps 10 and 15a.1 through 15a.9. The results are submitted to the NRC for review by the legal and/or technical staffs. Those Potential COMPOSITE UNCERTAINTIES that are concurred with in the NRC review go on to the third stage as NRC COMPOSITE UNCERTAINTIES. That third stage begins with Step 15a.12 and continues through the complete uncertainty reduction process. All correlated UNCERTAINTIES of a set are the beneficiary of any action related to the COMPOSITE derived from them. That includes research, investigations and Uncertainty Reduction.

Those UNCERTAINTIES that are investigated at any point in the PA process and found to be without substance have the status of "Excluded" UNCERTAINTIES. Later, after entry into the PADB, the status of some UNCERTAINTIES may be changed to "Excluded" on the basis of further analysis, legal decisions or similar factors. The procedure for such a change is described in Attachment H.

Comprehensive analysis for the presence of Candidate UNCERTAINTIES is a key part of the PA process. These analyses are to cover the full scope of the Section 14 "Definitions" for the potentially applicable type(s) of UNCERTAINTY(IES). This ranges from questioning whether a rule is both necessary and sufficient to fulfill the objectives of the NRC (Potential REGULATORY UNCERTAINTY) to questioning the feasibility of obtaining technically adequate data concerning a specific property/parameter (Potential TECHNICAL UNCERTAINTY). The question of "sufficiency" includes consideration of NRC regulatory intent and whether the rule does all it was intended to do.

Additional criteria are provided in Section 3.5, Content.

Content - The records of this section describe the Individual UNCERTAINTIES identified in the construction and analysis of the subject REGULATORY REQUIREMENT. These records will include descriptions and correlations of the UNCERTAINTIES put forth by the NRC, Center, DOE, State of Nevada and other affected parties.

This record is to include an entry for any Candidate UNCERTAINTY perceived and seriously considered by the Center or the NRC at any point in the PA process, whether the UNCERTAINTY is "included" or "excluded". UNCERTAINTIES identified by Sources (agencies) other than the NRC are to be correlated in the same manner described for Candidate UNCERTAINTIES of the NRC. WHENEVER POSSIBLE, UNCERTAINTIES IDENTIFIED BY THE NRC OR THE CENTER ARE TO BE ENTERED AS THE "ORIGINAL" UNCERTAINTY.

DOE UNCERTAINTIES will be entered in this record until the Licensing Support System (LSS) becomes operational. From that point, DOE UNCERTAINTIES will be identified by an appropriate reference to the LSS;

that is, the record will contain the identifier or code to be used to obtain this information from the LSS.

For an Uncertainty defined by the DOE or an affected party, Records 14h and 14i are to contain only information from DOE or affected party documentation. NRC and CNWRA ASSESSMENTS AND COMMENTS ARE TO BE ENTERED ONLY IN RECORD 14m.

If any of the information called for in the records below is unavailable or incomplete, so indicate and provide an explanation in (1) the affected record if it is a text record or (2) the Comments/Observations record. The explanation shall include the planned source of that information.

The following records are described in Section 14, UNCERTAINTIES:

a. Uncertainty PASS ID Number
b. Parent Record
c. Topic of the Uncertainty
d. Uncertainty Keywords
e. Uncertainty Type
f. Uncertainty Source
g. Correlation Status
h. Uncertainty Action Agency
i. Site Dependency
j. Inclusion/Exclusion Status
k. Uncertainty Text
l. Rationale for Uncertainty Inclusion or Exclusion
m. References for Uncertainty Text and Rationale
n. Comments/Observations
o. References for Comments/Observations
p. Uncertainty Correlation
q. Rationale for Correlation
r. References for Rationale

Records 14a through 14r are to be repeated for each Individual Candidate UNCERTAINTY associated with the subject REGULATORY REQUIREMENT.

14a. Uncertainty PASS Identification Number

This record contains the unique PASS ID number assigned by the Center Cognizant Element Manager to the Individual UNCERTAINTY and associated information that are described in Records 14b through 14r. The PASS ID number is made up of the PASS ID number of the subject REGULATORY REQUIREMENT plus the unique number assigned to the subject COMPLIANCE DETERMINATION STRATEGY. The format of this PASS ID number is RRxxxx/UNxxxx, where "xxxx" is a four-digit number with, when necessary, leading zeros. Record size limit - 13 characters.

14b. Parent Record

Identify the PASS Identification number of the single Individual REGULATORY TEXT, REGULATORY ELEMENT OF PROOF set, DOE COMPLIANCE DEMONSTRATION METHOD, NRC COMPLIANCE DETERMINATION METHOD, UNCERTAINTY REDUCTION METHOD or INFORMATION REQUIREMENT in which the UNCERTAINTY of Record 14k is found. If no uncertainties were identified by the NRC, DOE or affected party relative to the subject REGULATORY REQUIREMENT or any of its supporting information, enter "None" in this record and go to Record 20. Record size limit - TBD characters.

14c. Topic of the Uncertainty

This record contains the principal subject of the single UNCERTAINTY in Record 14k. The Topic must uniquely identify the subject of that UNCERTAINTY relative to any others associated with the subject REGULATORY REQUIREMENT. The Topic is intended as a vehicle for consistent identification and correlation of UNCERTAINTIES that are of the same type and/or related to the same subject. Record size limit - If possible, less than 40 characters; absolute limit - 80 characters.

14d. Uncertainty Keywords

This record contains the keywords of the UNCERTAINTY in Record 14k. For complete Keywords content instructions, see Section 3.2. Record size limit - 50 characters per keyword; no limit on the number of keywords.

14e. Uncertainty Type

This record identifies that the subject UNCERTAINTY is either Regulatory, Technical or Institutional. Enter an "X" on the input form next to the one correct type.

14f. Uncertainty Source

This record identifies the source(s) of the UNCERTAINTY in Record 14k. A "source" is an agency that presented or identified the UNCERTAINTY for resolution or reduction. (The agency with action responsibility is identified in Record 14h.) Potential sources include the NRC, DOE, State of Nevada and other affected parties. Record size limit - TBD characters.

14g. Correlation Status

This record identifies the Correlation Status of the subject UNCERTAINTY. The UNCERTAINTY definition and correlation process, including the possible statuses, is explained in "Background" above and diagrammed in Figure A3.

The Input Form lists the possible Correlation Status conditions for Original and Matching UNCERTAINTIES. (Record 14p provides for entry of the PASS ID Number of the Original UNCERTAINTY with which a Matching UNCERTAINTY is to be correlated.) Enter an "X" next to the one Correlation Status that applies.

14h. Uncertainty Action Agency

THIS RECORD DOES NOT APPLY TO NRC "MATCHING" UNCERTAINTIES.
This record will identify the government agency(ies) responsible for resolving/reducing the UNCERTAINTY; e.g., DOE, DOT, EPA, NRC, Congress. For REGULATORY UNCERTAINTIES, this is a single agency. For TECHNICAL UNCERTAINTIES, except in rare instances, this is also a single agency. Other agencies may coordinate in or approve certain aspects, but only one agency is responsible for eliminating or reducing the lack of certitude. In the case of INSTITUTIONAL UNCERTAINTIES, two or more agencies may share responsibility. Record size limit - TBD characters.

14i. Site Dependency

Two categories of site dependency have been defined. "Generic" relates to those Waste Management System characteristics or approaches that are in all significant respects independent of the specific location, properties and characteristics of the site. This includes, for example, the many surface facility layouts and the steps in the waste handling process that would be substantially the same for any selected site.

"Site Specific" includes those system characteristics or approaches that to a significant degree are dependent on the properties and characteristics of the site; e.g., structural design for seismic characteristics, waste package material selection.

This record identifies that the UNCERTAINTY is either Site Specific or Generic (site independent). Enter an "X" on the input form next to the one correct type.

14j. Uncertainty Status

This record identifies the Inclusion/Exclusion Status of the subject UNCERTAINTY. The UNCERTAINTY definition and correlation process, including the possible statuses, is explained in "Background" above and diagrammed in Figure A3.

The Uncertainty Input Form lists for this record the possible statuses at the time the first UNCERTAINTY of a given subject is entered in the PADB -- Included or Excluded (see Figure A3 and Attachment G). FOR "ORIGINALS" ONLY, enter an "X" next to the one status that applies (see Table A2). (That status may be updated at a later time -- see Attachment H.)

14k. Uncertainty Text

Enter each DOE or affected party UNCERTAINTY exactly as described by that source. Denote references used as follows: (Reference n0). Note that the numbers are in increments of ten to In this callout, "n0" is the number assigned to the reference in Record 14m. This callout may be preceded in the text record by the commonly used name or number of the subject document (e.g., NUREG-0804).

For each NRC UNCERTAINTY, a brief statement is to be provided that identifies what is uncertain (e.g., The regulatory intent ...), defines what is needed to correct the uncertainty (e.g., ... needs to be clarified), and identifies why the uncertainty needs to be corrected. These are to be positive statements; i.e., what is needed, rather than what is not now available. Additional examples of each UNCERTAINTY type would include:

a. A [specific] term requires further definition to avoid . .
b. Jurisdiction must be established [relative to a specific interest] so that . . .
c. The applicability of [a specific theory] needs to be demonstrated to provide the basis for . . .
d. Bounds must be established [for a specific item] in order to . . .
e. Acceptability of the [specific] test method in a fractured welded tuff media needs to be proven to provide the basis for . . .

Note that these statements imply action but are not in themselves action statements. Action statements will be developed in Record 17, DOE Uncertainty Reduction Methods, in Record 18, NRC Uncertainty Reduction Methods Analysis, and in Record 19, Selected NRC Uncertainty Reduction Method. Record size limit - Up to 32K characters.

141. Rationale for Uncertainty Inclusion or Exclusion

THIS RECORD DOES NOT APPLY TO NRC "MATCHING" UNCERTAINTIES.
For an Uncertainty included by the DOE or an affected party, this record is to contain a summary of the documented rationale for the presence of the Uncertainty plus a reference to the full statement documented by the Uncertainty Source. No NRC or Center interpretations or comments are to be included in this record for DOE or affected party Uncertainties. Such reactions are to be entered only in Record 14n, Comments/Observations.

For a NRC Uncertainty this record contains a brief explanation of the rationale, criteria, assumptions and any other bases for decisions made in the process of analyzing the subject Candidate UNCERTAINTY and either accepting (including) it or excluding it. The Supplementary Information of the Federal Register notice on the rule together with other documentation of the regulatory intent are to be consulted in making the decision and in establishing this rationale. For 10 CFR 60, this includes such sources as the Statements of Consideration and the formal

NRC responses to public comments (NUREG-0804). Record 141 is to contain the rationale for UNCERTAINTY exclusion at any stage of the process.

If the UNCERTAINTY is based on the perception that the regulation exceeds its statutory authority, the Rationale must present an argument that clearly supports that contention.

For a NRC Uncertainty this record may also contain comments/observations provided that (1) they are germane to the UNCERTAINTY Text (Record 14k) or the Rationale (Record 141) and (2) they make a positive contribution to the analysis. General observations are to be avoided. Each comment/observation is to be ended with the name of the contributor and the date of the input. Denote references used in preparing this record as follows: (Reference n0). Note that the numbers are in increments of ten to allow for possible later insertion of references. In this callout, "n0" is the number assigned to the individual reference in Record 14m. This callout may be preceded in the text record by the commonly used name or number of the subject document (e.g., NUREG-0804). Record size limit - Up to 32K characters.

14m. References for Uncertainty Text and Rationale

THIS RECORD DOES NOT APPLY TO NRC "MATCHING" UNCERTAINTIES.
For DOE or affected party Uncertainties, this record lists by TDI identifier, and beginning and ending page numbers of the relevant material, the source document(s) in which the Uncertainty is identified and the rationale is described.

For NRC Uncertainties, this record lists references used in the analysis of the Candidate UNCERTAINTY or in the development of the rationale to include or exclude. References are cited by TDI identifier, and beginning and ending page numbers of the relevant material. **VERIFY THAT THE TDI IDENTIFIER IS FOR THE CORRECT AMENDMENT OF THE SOURCE STATUTE, OR THE CORRECT DATE, EDITION OR REVISION OF THE SOURCE REGULATION OR OTHER DOCUMENT**. List and number references in the order cited in the preceding records. If no references were used, enter "None". Record size limit - TBD characters.

14n. Comments/Observations

NRC and Center assessments, comments and/or observations (e.g., regarding completeness, adequacy, clarity) may be included in this record for a DOE or affected party Uncertainty provided that (1) the inputs are germane to the subject Uncertainty and (2) they make a positive contribution to the analysis.

For a NRC Uncertainty, general comments/observations may be included provided the above criteria are satisfied. In any case, general observations are to be avoided.

Each individual input is to be ended with the name of the contributor and the date of the input.

Identify any material available to the Center Technical Library (e.g., a technical paper, report, correspondence) that (1) is closely related to the topic of the subject UNCERTAINTY, (2) has NOT been referred to in preparing these records, and (3) has the potential to be selected as a reference or extracted and included in NRC or Center documents on the topic of the subject UNCERTAINTY. This is intended to provide a bibliography of related technical papers and other documentation for general reference.

Denote references used in preparing this record as follows: (Reference n0). Note that the numbers are in increments of ten to allow for possible later insertion of references. In this callout, "n0" is the number assigned to the individual reference in Record 14o. This callout may be preceded in the text record by the commonly used name or number of the subject document (e.g., NUREG-0804). Record size limit - TBD characters.

14o. References for Comments/Observations

This record lists references used in the development of Record 14n by TDI identifier, and beginning and ending page numbers of the relevant material. **VERIFY THAT THE TDI IDENTIFIER IS FOR THE CORRECT AMENDMENT OF THE SOURCE STATUTE, OR THE CORRECT DATE, EDITION OR REVISION OF THE SOURCE REGULATION OR OTHER DOCUMENT**. List and number references in the order cited in the preceding record. If no references were used, enter "None". Record size limit - TBD characters.

14p. Uncertainty Correlation

THIS RECORD DOES NOT APPLY TO NRC "ORIGINAL" UNCERTAINTIES
This record presents the PASS Identification number of the "Original" UNCERTAINTY with which the subject UNCERTAINTY has been correlated. The criteria for correlation and the process are described in TOP-001-02, Section 5.4.2, and in the "Background" for this Section. If no Matching UNCERTAINTY is found (i.e., if the subject UNCERTAINTY is an Original), enter "None". Record size limit - 13 characters.

14q. Rationale for Correlation

THIS RECORD DOES NOT APPLY TO NRC "ORIGINAL" OR "MATCHING - IDENTICAL" UNCERTAINTIES.
This record contains a brief explanation of the rationale, criteria, assumptions and any other bases for decisions made in the process of correlating the subject UNCERTAINTY with the "Original" UNCERTAINTY identified in Record 14p. If correlation with a different Original was seriously considered, the PASS ID number of that other Original is to be identified and the rationale for the choice is to be included here.

This record may also contain comments/observations provided that (1) they are germane to the correlation of the subject UNCERTAINTY and (2) they make a positive contribution to the analysis. General observations

are to be avoided. Each comment/observation is to be ended with the name of the contributor and the date of the input. Denote references used in preparing this record as follows: (Reference n0). Note that the numbers are in increments of ten to allow for possible later insertion of references. In this callout, "n0" is the number assigned to the individual reference in Record 14r. This callout may be preceded in the text record by the commonly used name or number of the subject document (e.g., NUREG-0804). Record size limit - Up to 32K characters.

14r. References for Rationale

THIS RECORD DOES NOT APPLY TO NRC "ORIGINAL" OR "MATCHING - IDENTICAL" UNCERTAINTIES.
This record lists references used in the correlation analysis described in Record 14q. References are cited by TDI identifier, and beginning and ending page numbers of the relevant material. **VERIFY THAT THE TDI IDENTIFIER IS FOR THE CORRECT AMENDMENT OF THE SOURCE STATUTE, OR THE CORRECT DATE, EDITION OR REVISION OF THE SOURCE REGULATION OR OTHER DOCUMENT**. List and number references in the order cited in the preceding record. If no references were used, enter "None". Record size limit - TBD characters.

APPENDIX B

TABLE B1a. REGULATORY AND INSTITUTIONAL UNCERTAINTIES IN 10 CFR PART 60

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCER IDENT	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY	GROUP	PAGE
10	10(b)	RR3006	UN01	"Significant implications" need further clarification	1	X	1
15	15	RR0050	UN02	Regulatory language inconsistent w. statute	NA	NONE	4
16	23	RR0052	UN01	"Environmental Report" vs. "EIS"	3	VII	5
16	17	RR0052	UN02	Radioactive materials use in site characterization	NA	NONE	6
21	21	RR0074	UN01	Information requirements for DOE unclear	1	X	7
21	24(a)	RR0074	UN02	License docketing criteria absent	2	X	8
22	22(d)	RR0073	UN03	DOE responsibility cannot include NRC/PDR req.	7	X	10
31	31	RR0061	UN01	No consideration of performance confirmation plan	2	VII	12
31	31(a)(5)	RR0061	UN02	Subpart I not published	2	XII	14
31	31(c)	RR0061	UN03	Supplemental information inconsistent with reg	NA	NONE	15
32	32(a)	RR0062	UN01	Reg. reads protect H&S, security or env. values	NA	NONE	16
32	32(a)	RR0062	UN02	Construction auth. conditions for H&S unspecified	NA	NONE	18
46	46(a)(1)	RR0070	UN01	Clarify "substantially incr. retrieval difficulty"	1	VI	20
51	51(a)(2)(ii)	RR0071	UN01	Archives consultation likely/potential intruders	1	VII	22
51	51(a)(2)(i)	RR0071	UN02	Monuments "as permanent as practicable"	NA	NONE	23
51	51(b)	RR0071	UN03	Inconsistency in environmental report reference	NA	NONE	24
52(a)	52	RR0072	UN01	Can license be terminated if DOE has spent fuel?	NA	NONE	25
71(a)	72(b)(6)	RR3012	UN02	"Construction problems" need clarification	1	III	28
71(a)	72(b)(7)	RR3012	UN03	"Anomalous conditions" need clarification	1	III	29
73	73(a)	RR3013	UN01	Meaning of "substantial safety hazard"	1	III	30
73	73(b)	RR3013	UN02	Meaning of "significant deviation"	1	III	31
111(a)	111(a)	RR0004	UN01	ALARA properly applicable?	NA	NONE	32
111(a)	111(a)	RR0004	UN02	What does "at all times" mean here?	NA	NONE	34
111(a)	111(b)	RR0004	UN03	Reference clarificaton	2	V	38
111(a)	111(a)	RR0004	UN05	Design radiation dose criteria	1	V	40
111(b)(1)	111(b)(1)	RR0002	UN01	Design to permit or not to preclude retrieval?	1	VI	43
111(b)(1)	133(i)	RR0002	UN02	Might refer to different groundwater system	NA	NONE	46
112	112	RR1001	UN01	"Anticipated and unanticipated processes/events"	1	II	48
112	112	RR1001	UN02	Part 60 amendment need after issuance of EPA std.	2	XI	51
112	112	RR1001	UN03	Need for CDM after issuance of EPA std	NA	NONE	53
113(a)(1)(i)(A)	113(a)(1)(i)(A)	RR1002	UN01	"Substantially complete containment"	1	IV	55
113(a)(1)(i)(B)	135(c)(1)	RR1003	UN03	Clarification re gas fission products needed	2	IV	57
113(a)(2)	113(a)(2)	RR2000	UN01	Fastest path of travel/favorable conditions	NA	NONE	60
113(a)(2)	113(a)(2)	RR2000	UN02	Definition of "disturbed zone"	NA	NONE	62
113(a)(2)	113(b)	RR2000	UN03	Meaning of "anticipated processes and events"	1	II	63
113(a)(2)	113(c)	RR2000	UN04	Meaning of "unanticipated processes and events"	1	II	66

TABLE B1b. REGULATORY AND INSTITUTIONAL UNCERTAINTIES IN 10 CFR PART 60

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCER IDENT	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY	GROUP	PAGE
121(a)	121(a)(1)	RR0055	UN01	When does DOE guarantee "control" of land?	2	IX	69
122(a)(1)	122(b)(1),(c)(15,16)	RR2001	UN01	Definition of "Quaternary Period" in this context	NA	NONE	70
122(a)(1)	122(b)(7)	RR2001	UN02	GWTT along "fastest path of radionuclide travel"	NA	NONE	72
122(a)(1)	122(b)(1),others	RR2001	UN03	Clarification of "geologic setting"	1	I	74
122(a)(1)	122(b)(5,7)	RR2001	UN04	Definition of "disturbed zone"	NA	NONE	76
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN01	"Taking into account the degree of resolution"	1	I	82
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(iii)(A)	RR2002	UN02	Performance objectives not significantly affected	1	I	84
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(ii)	RR2002	UN03	Need of criteria for "adequately evaluated"	2	I	86
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN04	Meaning of "not likely to underestimate effect"	1	I	91
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN05	Need of criteria for "adequately investigated"	2	I	93
122(a)(2), 122(c)(1)-(c)(24)	122(b)	RR2002	UN12	Definition of "geologic setting"	1	I	97
122(a)(2), 122(c)(1)-(c)(24)	122(b)(7)	RR2002	UN14	Meaning of "fastest path of radionuclide travel"	NA	NONE	99
122(a)(2), 122(c)(1)-(c)(24)	122(b)(5,7)	RR2002	UN15	Meaning of "disturbed zone"	NA	NONE	101
122(a)(2), 122(c)(1)-(c)(24)	21(c)(1)(ii)(C),122	RR2002	UN17	Inconsistency in treating adverse conditions	3	I	103
122(a)(2), 122(c)(3)	122(c)(3)	RR2004	UN18	Meaning of "regional gdwater flow system"	1	I	106
122(a)(2), 122(c)(4)	122(c)(4)	RR2005	UN18	Meaning of "regional gdwater flow system"	1	I	108
122(a)(2), 122(c)(8)	122(c)(8)	RR2009	UN18	"Sorption" too constraining a term	2	I	110
122(a)(2), 122(c)(10)	122(c)(10)	RR2011	UN18	Focus should be on implications of "evidence"	NA	NONE	112
122(a)(2), 122(c)(14)	122(c)(14)	RR2015	UN18	Meaning of "typical of the area"	NA	NONE	114
122(a)(2), 122(c)(15)	122(c)(15)	RR2016	UN18	Focus should be on implications of "evidence"	NA	NONE	116
122(a)(2), 122(c)(16)	122(c)(16)	RR2017	UN18	Focus should be on implications of "evidence"	NA	NONE	118
122(a)(2), 122(c)(16)	122(c)(16)	RR2017	UN19	Clarification of "extreme erosion"	1	I	120
122(a)(2), 122(c)(18)	122(c)(18)	RR2019	UN18	Focus should be on implications of "evidence"	NA	NONE	122
122(a)(2), 122(c)(19)	122(c)(19)	RR2020	UN18	Focus should be on implications of "evidence"	NA	NONE	124
122(a)(2), 122(c)(24)	122(c)(24)	RR2025	UN18	"Air-filled" not general enough	2	I	126
131(b)(1)	131(b)(1)	RR0001	UN01	"Anticipated Processes and Events" in GROA design	NA	NONE	128
131(b)(3)	131(b)(3)(i)	RR0088	UN01	System redundancy - fires and explosions	NA	NONE	130
131(b)(3)	131(b)(3)(iv)	RR0088	UN02	Should explosion suppression be included?	NA	NONE	131
131(b)(3)	131(b)(3)(iv)	RR0088	UN03	Provisions and means of protection unclear	NA	NONE	134
131(b)(4)	131(b)(4)(ii)	RR0089	UN03	Does reg preclude aid in emergency response?	NA	NONE	135
131(b)(5)	131(b)(5)	RR0090	UN01	Design all utility systems for essential function	2	III	136
131(b)(6)	131(b)(6)	RR0091	UN01	"Design to permit periodic inspection"	2	III	138
131(b)(7)	131(b)(7)	RR0092	UN01	Reg allows 2-event criticality	NA	NONE	140
131(b)(7)	131(b)(7)	RR0092	UN02	Difference in safety margin from 10CFR72 analog	NA	NONE	142
131(b)(7)	131(b)(7)	RR0092	UN03	Reg provides no methods for criticality control	NA	NONE	143
131(b)(8)	131(b)(8)	RR0093	UN01	Identification of I&C systems	NA	NONE	145

TABLE B1c. REGULATORY AND INSTITUTIONAL UNCERTAINTIES IN 10 CFR PART 60

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCER IDENT	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY	GROUP	PAGE
131(b)(9)	131(b)(9)	RR0080	UN01	Secondary effects/non-radiological accidents	7	VIII	147
131(b)(9)	131(b)(9)	RR0080	UN02	Applicability of secondary references	NA	NONE	149
131(b)(9)	131(b)(9)	RR0080	UN03	Reg doesn't include procedures, only design	NA	NONE	151
131(b)(10)	131(b)(10)	RR0081	UN01	Insufficient guidance in design criteria	2	III	153
133(e)	133(e)(1)	RR0003	UN01	Will NRC regulate non-radiological safety?	1	VIII	155
152	10 CFR 50, App.B(IX)	RR3017	UN01	Meaning of "special process"	1	X	158
Subpart I	Subpart I	RR3021	UN01	Subpart not published	2	XII	160

REGULATORY REQUIREMENT RR3006: COMPLETENESS AND ACCURACY OF INFORMATION

Primary Regulatory Text Citation

10CFR60 10 * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Information Having Significant Implications

Parent Record: 10 CFR 60.10(b)

Text of the Potential Uncertainty

The term "significant implication" needs clarification in relation to the fields of public health and safety, and common defense and security. Clarification or definition will avoid unnecessary action by the DOE in minor matters and will ensure proper action for those matters of importance which satisfy the regulatory intent of the Commission.

Rationale for Inclusion

The regulation fails to provide guidance for safety and security related information which must be reported to the NRC by the DOE. Without reporting specifications, conditions which could have a deleterious effect on the public health and safety, or which could compromise common defense and security might not be reported to the Commission.

High-order criteria that are consistent with the intent of the Commission are necessary to define what constitutes "information which has significant implication for public health and safety or common defense and security." One example of such a criterion might be information in regard to conditions which compromise, or may compromise, the ability of the repository to meet the performance objectives in the areas of public health and safety, or common defense and security.
Mark V. Muller 2/13/90

In the absence of decision criteria, reliance on individual judgement to determine significance makes different interpretations possible in response to a given situation. Generic, high-order criteria to codify significance would serve to identify those situations worthy of reporting and provide for a measure of consistency in implementation of the regulation.

In addition, it is also desirable to attempt to prevent significant problems before they occur. As explained in the

Supplementary Information (Reference 10), regulatory violations carry penalties commensurate with the magnitude of the offense. At present, the reporting of significant information appears to rest entirely on the judgement of the licensee. It is prudent to consider the possibility of a standard for significant information. This would promote vigilance by the licensee, and provide an additional measure of assurance for detecting situations that produce significant risks, and promote reporting that is consistent with the needs of the Commission.

Mark V. Muller 2/13/90

Reference for Inclusion Rationale

(10) Rules and Regulations, Nuclear Regulatory Commission, 10 CFR Parts 2, 30, 40, 50, 55, 60, 61, 70, 71, 72, 110, and 150; Completeness and Accuracy of Information; December, 31, 1987; 52 FR 49362-01.

REGULATORY REQUIREMENT RR0050: SITE CHARACTERIZATION PROGRAM

Primary Regulatory Text Citation

10CFR60 15 * July 3, 1989

Associated Regulatory Text Citations

42USC 10133 (c) (2) * December 22, 1987

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Preclusion of the use of radioactive tracers

Parent Record: 10 CFR 60.17

This uncertainty has been moved to RR0052 as the excluded uncertainty UN0002.

REGULATORY REQUIREMENT RR0050: SITE CHARACTERIZATION PROGRAM

Primary Regulatory Text Citation

10CFR60 15 * July 3, 1989

Associated Regulatory Text Citations

42USC 10133 (c) (2) * December 22, 1987

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- Regulation of Radioactive Materials During Site Characterization

Parent Record: 10 CFR 60.15

Excluded Uncertainty Text

The absence in 10 CFR 60.15 of restrictions on the use of radioactive materials during site characterization causes the NWPAA to be the sole source of the regulatory text. This absence should be addressed to ensure compliance with the NWPAA by the licensee.

Rationale for Exclusion

10 CFR 60.15 identifies restrictions that apply during site characterization activities. These conditions are designed to reduce the long term adverse conditions that site characterization activities might impose on the geologic repository. 42 U.S.C. 10133(c)(2) specifically addresses the conditions under which radioactive materials can be used for site characterization and as such constitutes restrictions on site characterization activities. It was originally felt that these restrictions on the use of radioactive materials during site characterization should appear as part of 10 CFR 60.15 so that the regulations can be used to determine compliance with the statute. As it presently is written, the statute is the sole source of the regulatory requirement text. However, the presence of the restrictions in the statute is sufficient and, although it might be desirable to expand 10 CFR 60.15 to include regulations relating to the use of radioactive materials during site characterization, no change is necessary.

J. T. O'Brien 12/4/1989

REGULATORY REQUIREMENT RR0052: SITE CHARACTERIZATION PLAN

Primary Regulatory Text Citation

10CFR60 16 January 1, 1989

Associated Regulatory Text Citations

10CFR60 17 * January 1, 1989

10CFR60 23 January 1, 1989

Referenced Regulatory Text Citation

42USC 10132 (a) December 22, 1987

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Inconsistent Text in 10 CFR 60.23

Parent Record: 10 CFR 60.23

Text of the Potential Uncertainty

10 CFR 60.23 uses the terms "environmental report" and "Site Characterization Report", which is inconsistent with Nuclear Waste Policy Act (NWPA) and with other July 3, 1989, changes to 10 CFR Part 60. It should be made clear that these terms are intended to be "environmental impact statement" and "Site Characterization Plan," respectively.

Rationale for Inclusion

Consultation with the NRC indicates that this potential uncertainty is an oversight that will be corrected at the first opportunity so that 10 CFR 60.23 agrees with other sections of 10 CFR Part 60, as they were amended on July 3, 1989 (Reference 10) and the NWPA, as amended. This is intended to be accomplished simply by changing 'environmental report' to read 'environmental impact statement' and 'Site Characterization Report' to read 'site characterization plan.'

R. W. Field 02/12/90

Reference for Inclusion Rationale

(10) Federal Register, Final Rule to 10 CFR Part 60, 54 FR 27871, July 3, 1989.

REGULATORY REQUIREMENT RR0052: SITE CHARACTERIZATION PLAN

Primary Regulatory Text Citation

10CFR60 16	January 1, 1989

Associated Regulatory Text Citations

10CFR60 17 *	January 1, 1989
10CFR60 23	January 1, 1989

Referenced Regulatory Text Citation

42USC 10132 (a)	December 22, 1987

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- Preclusion of the use of radioactive tracers

Parent Record: 10 CFR 60.17

Excluded Uncertainty Text

There appeared to be an inconsistency between 10 CFR 60.17(a)(2)(ii) and the Nuclear Waste Policy Act, as amended (NWPAA), regarding the use of radioactive materials, including radioactive tracers. This appeared to be an inconsistency because of the near impossibility of retrieving all radioactive material when radioactive tracers are used, and needed to be addressed so that all parties know whether or not radioactive tracers can be used during site characterization.

Rationale for Exclusion

The NWPAA (42 USC 10133(c)(2)(B)(ii)) requires that all radioactive material used in site characterization be fully retrievable. There is no inconsistency and, in fact, the wording of the regulations (10 CFR 60.17(a)(2)(ii) and 60.18(e)) will help to assure that the NWPAA restrictions on the use of radioactive materials will be adhered to. By requiring the specific details of planned use of radioactive tracers (10 CFR 60.17(a)(2)(ii)) and by specifically requiring Commission concurrence in the use of radioactive tracers (10 CFR60.18(e)) attention is focused on this potential site characterization activity. These regulations assure the Commission will have an opportunity to review such use and concur that the proposed use of such materials complies with the NWPAA.

J. T. O'Brien 2/15/90

REGULATORY REQUIREMENT RR0074: LICENSE APPLICATION AND CONTENT

Primary Regulatory Text Citation

10CFR60 21 *	July 3, 1989

Associated Regulatory Text Citations

10CFR60 23	January 1, 1989
10CFR60 24 (a)	July 3, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Detailed Content of Application not in 10 CFR 60.21

Parent Record: 10CFR60 21 *

Text of the Potential Uncertainty

Although 10 CFR 60.21 describes general requirements for what should be included in the general information and Safety Analysis Report in the license application, more detailed guidance is required so DOE can prepare a complete application.

Rationale for Inclusion

The content requirements of the license application need to be better specified so that DOE can determine what information needs to be developed or collected to support the License Application and can submit a complete and high-quality license application. For other regulated facilities NRC has found the need to address similar situations by issuing a license application format and content guide; such as NUREG-1199, Standard Format and Content of a License Application for Low-Level Radioactive Waste Disposal Facility or Regulatory Guide 3.48, Standard Format and Content for the Safety Analysis Report for an ISFSI or MRS. This uncertainty will be addressed in the Format and Content Regulatory Guide for the Geologic Repository. This uncertainty is originally presented in Reference 10.

R. W. Field, 12/14/89

Reference for Inclusion Rationale

(10) Regulatory Strategy and Schedules for High-Level Waste Repository Program (SECY-88-285), U.S. Nuclear Regulatory Commission, October, 1988.

REGULATORY REQUIREMENT RR0074: LICENSE APPLICATION AND CONTENT

Primary Regulatory Text Citation

10CFR60 21 * July 3, 1989

Associated Regulatory Text Citations

10CFR60 23 January 1, 1989

10CFR60 24 (a) July 3, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0002 -- Criteria Used to Accept the License Application for Docketing

Parent Record: 10CFR60 24 (a)

Text of the Potential Uncertainty

It is uncertain whether 10 CFR Part 60 and other regulations adequately describe the means used to qualify a License Application for docketing. Adequate criteria are needed by both the DOE and the NRC to determine the acceptability of the application for docketing.

Rationale for Inclusion

This uncertainty was originally presented in SECY-88-285 (Reference 10). Acceptance criteria for docketing are apparently not addressed in 10 CFR Part 60, or 10 CFR Part 2. The presence of well-defined criteria serves to improve the effectiveness of prelicensing consultation and the licensing review process. 10 CFR 60.24(a) states:

> The application shall be as complete as possible in the light of information that is reasonably available at the time of docketing.

10 CFR 2.101(f)(3) states:

> If the Director of Nuclear Material Safety and Safeguards determines that the tendered document is complete and acceptable for docketing, a docket number will be assigned and the applicant will be notified of the determination. If it is determined that all or any part of the tendered document is incomplete and, therefore, not acceptable for processing, the applicant

will be informed of this determination and the respects in which the document is deficient.

J. Hageman, M. V. Muller 2/8/1990

The questions underlying this potential uncertainty are (1) what criteria will be used to determine if the application is "complete" and (2) whether "completeness" (presumably with respect to the Format and Content Regulatory Guide and/or the License Application Review Plan) is sufficient as the sole criterion used to accept the application for docketing.

J. Hageman, M. V. Muller 2/8/1990

Reference for Inclusion Rationale

(10) Regulatory Strategy and Schedules for High-Level Waste Repository Program (SECY-88-285), U.S. Nuclear Regulatory Commission, October, 1988.

REGULATORY REQUIREMENT RR0073: FILING LICENSE APPLICATION AND EIS

Primary Regulatory Text Citation

10CFR60 22 *	July 3, 1989

Associated Regulatory Text Citations

10CFR60 21 (a)	July 3, 1989
10CFR60 4 (a)	January 1, 1989
10CFR60 24 *	July 3, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Responsibility for Public Document Room

Parent Record: 10 CFR 60.22(d)

Potential Uncertainty Text

As presently written, 10 CFR 60.22(d), when taken in the context of the balance of 60.22, can be interpreted to require DOE to be responsible for the contents of an NRC public document room. The intent of the regulation needs to be clarified.

Rationale for Inclusion

Subpart B of 10 CFR Part 60 is divided into sections which, in general, contain either generally applicable requirements or requirements applicable to a single agency. Where a section contains a mix of responsibilities (e.g., 60.18) the agency responsible for the requirement(s) of each paragraph is clearly identified. The outstanding exception is paragraph 60.22(d) which includes no explicit assignment of responsibility. However, because the balance of 60.22 and the subject (and title) of 60.22 are clearly DOE responsibilities, 60.22(d) would normally be read in that context.

The above facts, the definition of "public document room" in 10 CFR Parts 2 and 60, and the fact that DOE also has public document rooms, combine to produce the perceived uncertainty.
D. T. Romine, 2/13/90

10 CFR 60.22(d) requires that "At the time of filing of an application and any amendments thereto, a copy shall be made available IN (emphasis added) an appropriate location near the proposed geologic repository operations area (which shall be a

public document room if one has been established) for inspection by the public...". As used in 10 CFR Parts 2 and 60, the term public document room means an NRC public document room. DOE cannot be required to be responsible for the contents in a public document room which is under NRC control.

An alternative interpretation is that these documents should be made available in a "DOE public document" room. If this was the intent of the regulation, then the public location must clearly be defined as a "DOE public document room." In either case the intent of the regulation needs to be clarified.

J. T. O'Brien, 12/18/89

The term "in" can reasonably be expected to mean that the DOE, by providing a copy to the NRC with a transmittal requesting that it be made available in the public document room in accordance with 10 CFR 60.22(d), has fulfilled their requirement to put it in the public document room.

Again, the actual intent of the NRC needs to be clarified.

W. C. Patrick, 2/13/90

REGULATORY REQUIREMENT RR0061: REVIEW OF LICENSE APPLICATION AND ENVIRONMENTAL IMPACT STATEMENT

Primary Regulatory Text Citation

10CFR60 31 * July 3, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Consideration of Performance Confirmation During Construction Authorization

Parent Record: 10 CFR 60.31

Text of the Potential Uncertainty

The intent of the NRC needs to be clarified relative to the review and/or approval of the performance confirmation program (Subpart F of 10 CFR 60) to be performed during the construction phase. Performance confirmation should be considered as a part of the construction authorization process to maintain consistency within 10 CFR 60.31(a) (which references consideration of the programs and/or plans of Subparts E, G, H, and I) and to provide consistency with Subpart F (in particular, 60.140). Approval of the planned Performance Confirmation Program should be an aspect of NRC's considerations to authorize construction.

Rationale for Inclusion

10 CFR 60.31 relates various Subparts of 10 CFR Part 60 to review and consideration of construction authorization, which in turn regulates the authorized activities of DOE. One of these DOE activities is the performance confirmation program (described in Subpart F of 10 CFR 60), which is required to begin during site characterization and continue until closure. NUREG-0804 (Reference 10) states that the reference to Subpart F was deleted here, and moved to 10 CFR 60.74. However, section 60.74 is directed specifically toward the regulation of DOE actions rather than the review and authorization of these actions by NRC.

J. Hageman, Mark V. Muller 2/8/1990

10 CFR 60.137 solely applies to requirements that DOE, the licensee, must comply with. 10 CFR 60.31 is what NRC, the license grantor, must accomplish. This is clarified by quoting 10 CFR 60.31, "Upon review and consideration of an

application and environmental impact statement submitted under this part, the Commission may authorize construction if it determines:" (emphasis added).

J. Hageman, 2/1/1990

10 CFR Part 60 does not presently require DOE to prepare a plan for Performance Confirmation. Since Performance Confirmation will be an integral and important part of the construction phase, it would seem appropriate for DOE to submit such a plan in the construction authorization (license) application for review by the NRC under the same constraints provided in 10 CFR 60.31(a) for other applicable Subparts of 10 CFR Part 60. The NRC intent in this regard needs to be made clear to all parties.

D. T. Romine, 2/13/90

Reference for Inclusion Rationale

(10) NUREG-0804, Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Waste in Geologic Repositories," December 1983.

REGULATORY REQUIREMENT RR0061: REVIEW OF LICENSE APPLICATION AND ENVIRONMENTAL IMPACT STATEMENT

Primary Regulatory Text Citation

10CFR60 31 * July 3, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0002 -- Unpublished Subpart I in 10 CFR Part 60

Parent Record: 10 CFR 60.31(a)(5)

Text of the Potential Uncertainty

10 CFR 60.31(a)(5) requires the Commission to determine that DOE's emergency plan complies with the criteria in Subpart I, a reserved (unpublished) Subpart in 10 CFR Part 60. Subpart I needs to be published in order to provide emergency plan criteria.

Rationale for Inclusion

The NRC on page 12 of Reference (10) states that Subpart I will be set forth in the future. Publication of Subpart I is required (1) to provide the NRC staff with criteria to use in determining that the DOE emergency plan is in compliance, and (2) to provide DOE with the criteria needed to develop an emergency plan.

R. W. Field, 12/13/89

Reference for Inclusion Rationale

(10) NUREG-0804, Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Waste in Geologic Repositories," December 1983.

REGULATORY REQUIREMENT RR0061: REVIEW OF LICENSE APPLICATION AND ENVIRONMENTAL IMPACT STATEMENT

Primary Regulatory Text Citation

10CFR60 31 * July 3, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- NRC Supplementary Information and 10 CFR 60.31(c)

Parent Record: 10 CFR 60.31(c)

Excluded Uncertainty Text

It is uncertain that the language of 10 CFR 60.31(c), which requires the NRC review of various benefits versus the environmental costs to determine whether construction should be authorized, is consistent with the position of the Commission as expressed in the Supplementary Information for the Proposed Rule Change to 10 CFR Parts 2, 51, and 60 (Reference 10). This potential inconsistency should be addressed to clarify the role of NRC in the license review process.

Rationale for Exclusion

The text in 60.31(c) does not require change because the NRC will weigh environmentally related costs and benefits in issuing a construction authorization. This was clarified in Reference (10), which states:

> The language of the findings for the issuance of the construction authorization requires consideration of costs and benefits and consideration of alternatives, section 60.31(c). This language would not be changed. However, it should be understood that a determination that it is practicable to adopt the DOE environmental impact statement will necessarily result in the specified environmental finding that the action called for is issuance of the construction authorization.
>
> J. Hageman, 2/1/1990

Reference for Exclusion Rationale

(10) Supplementary Information, Proposed Rule Change to 10 CFR Parts 2, 51, and 60, Federal Register, Vol. 53, page 16143, May 5, 1988 (53 FR 16131 - 16147)

REGULATORY REQUIREMENT RR0062: CONDITIONS OF CONSTRUCTION AUTHORIZATION

Primary Regulatory Text Citation

10CFR60 32 * January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- Application of Construction Conditions

Parent Record: 10 CFR 60.32(a)

Excluded Uncertainty Text

This was raised as Uncertainty 3 in Reference 10, and was stated as follows:

> 10 CFR 60.32(a) states that "A construction authorization shall include such conditions as the Commission finds to be necessary to protect the health and safety of the public, the common defense and security, or environmental values." There are two uncertainties here. The first uncertainty, ..., is the use of the word "or" in "...or environmental values." A literal interpretation of the subsection is that the construction authorization needs to include either conditions necessary to protect health and safety or conditions necessary to protect the common defense and security or conditions necessary to protect the environment, but not all three, or even two of the three.
>
> This represents an insufficiency in the regulation. It is doubtful that the regulation means, for example, that a construction authorization needs to include only environmental protection, and that, if it concerns itself with environmental protection, health and safety are of no concern.

Rationale for Exclusion

This uncertainty was excluded because the Commission can include any CONDITION in the construction authorization that they need in order to protect:
(1) health and safety of the public,
(2) the common defense and security, or
(3) environmental values.
ANY condition that NRC places on DOE does not have to apply to all three items above, just to any one or more of the three, to have regulatory validity.

J. T. O'Brien and J. P. Hageman, 12/19/1989

Reference for Exclusion Rationale

(10) "Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E", Report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty #3 and 4.

REGULATORY REQUIREMENT RR0062: CONDITIONS OF CONSTRUCTION AUTHORIZATION

Primary Regulatory Text Citation

10CFR60 32 * January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- Definition of Construction Conditions

Parent Record: 10 CFR 60.32(a)

Excluded Uncertainty Text

This was raised as Uncertainty 4 in Reference 10, and was stated as follows:

> 10 CFR 60.32(a) states that " A construction authorization shall include such conditions as the Commission finds to be necessary to protect the health and safety of the public, the common defense and security, or environmental values." There are two uncertainties here. The second uncertainty, ..., lies in the lack of definition of "such condition". Although the regulation clearly assigns the responsibility of defining the conditions to the Commission, they must be defined before DOE can proceed with an application for construction authorization.
>
> This vagueness is an insufficiency in the regulation. The uncertainty can be removed by defining the parameters for the conditions necessary to protect health and safety, the common defense and security, and environmental values while still leaving the Commission some discretion in the definition.

Rationale for Exclusion

10 CFR 60.32(a) concerns the CONDITIONS that NRC might place upon any construction authorization. NRC is purposely reserving what these specific conditions may be because, until they see the application, it is impossible to determine what additional specific conditions might be needed. 10 CFR 60.32(a) does specify the BASIS by which these conditions (restrictions on construction) will be established by the Commission. These conditions will be established, as needed, for any one or any combination of the following reasons: (1) to protect the health and safety of the public, (2) to protect the common defense and security, or (3) to protect environmental values. To the extent that DOE satisfies these BASES in the construction authorization application, the

conditions (restrictions) placed on the construction authorization by the Commission will be minimal.

J. T. O'Brien and J. P. Hageman, 12/19/89

Reference for Exclusion Rationale

(10) "Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E", Report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty #3 and 4.

REGULATORY REQUIREMENT RR0070: ACTIVITIES REQUIRING LICENSE AMENDMENT

Primary Regulatory Text Citation

10CFR60 46 * January 1, 1989

Referenced Regulatory Text Citation

10CFR60 45 (a) January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Definition of "substantially increase the difficulty of retrieving"

Parent Record: 10 CFR 60.46(a)(1)

Text of the Potential Uncertainty

There appears to be an inconsistency between the phrase "substantially increase the difficulty of retrieving such emplaced waste" in 10 CFR 60.46(a)(1) and the intent of 10 CFR 60.111(b), as expressed in NUREG-0804. This apparent inconsistency may place an unnecessary regulatory burden on both the NRC and DOE in that it would require license amendments under 60.46(a)(1) for changes which "substantially increase the difficulty of retrieving" while the basic requirement of 60.111(b) is only that retrieval be possible.

Rationale for Inclusion

This uncertainty was included in the document "Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60" (Reference 10). There exists a potential inconsistency with the wording in 10 CFR 60.46(a)(1) and the present understanding of the intent of 10 CFR 60.111(b) as expressed in NUREG-0804 (Reference 20). If the intent is that the repository only be designed not to preclude retrieval, then changes to the repository design that make retrieval more difficult but still possible remain consistent with this intent. Thus, the requirement to amend the license is unnecessary.

D. T. Romine, J. P. Hageman, and J. T. O'Brien 2/9/90

There is another interpretation that may be argued relative to 10 CFR 60.46(a)(1). Retrievability methods are site and design specific. Consequently, individual technical criteria may change considerably because of specific site conditions. Because of this site-specific nature, retrievability will be defined by the design/plan submitted in the Safety Analysis

Report (60.21(c)(12)) when that design/plan is approved by the NRC and incorporated in the license. Any action which would result in a substantial increase in the difficulty of retrieving emplaced waste (relative to the plan in the license), would require an amendment.

If this interpretation reflects the NRC intent, the incorporation in the public record of a statement such as that above would (1) divorce 60.46(a)(1) from any uncertainty in 60.111(b) and (2) answer for all parties the question "substantially increase difficulty relative to what?"

D. T. Romine, J. P. Hageman, and J. T. O'Brien 2/9/90

Reference for Inclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty #7.

(20) Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes In Geologic Repositories," NUREG-0804, Nuclear Regulatory Commission, Page 11, December, 1983.

REGULATORY REQUIREMENT RR0071: LICENSE AMENDMENT FOR PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 51 * July 3, 1989

Associated Regulatory Text Citations

10CFR60 45 (a) January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Compliance Demonstration/Determination Regarding Human Intruders and Record Archiving

Parent Record: 10 CFR 60.51(a)(2)(ii)

Text of the Potential Uncertainty

In the absence of specific criteria, the phrase "that would likely be consulted by potential human intruders" does not lend itself to explicit definition and requires clarification so that realistic archiving can be accomplished.

Rationale for Inclusion

It may be very difficult to identify 'potential human intruders' or to project the likelihood of 'potential human intruders' consulting archives in the United States or anywhere in the world, in the future after permanent closure.
R. W. Field, 12/13/89

Per 10 CFR 60.21(c)(15)(vi), the license application (SAR) must include plans for permanent closure, which includes the use of archives. The provision, for example, of generic high-order decision criteria for archive selection would clarify the NRC intent for all parties without loss of regulatory flexibility in any detrimental sense.
T. Romine, J. Hageman, 2/8/1990

REGULATORY REQUIREMENT RR0071: LICENSE AMENDMENT FOR PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 51 * July 3, 1989

Associated Regulatory Text Citations

10CFR60 45 (a) January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- As Permanent as is Practicable

Parent Record: 10 CFR 60.51(a)(2)(i)

Excluded Uncertainty Text

This requirement dictates that monuments used for geologic repository operations area identification and controlled area identification after permanent closure be "designed, fabricated, and emplaced to be as permanent as is practicable." The phrase "as permanent as is practicable" needs to be more clearly defined so that compliance can be assessed.

Rationale for Exclusion

This uncertainty was excluded because it was felt the term "permanent as is practicable" would be sufficiently clear to engineers and geologists who may be tasked with selecting the material(s) for such a monument.

R. W. Field, 11/20/89

REGULATORY REQUIREMENT RR0071: LICENSE AMENDMENT FOR PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 51 * July 3, 1989

Associated Regulatory Text Citations

10CFR60 45 (a) January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- Environmental Report

Parent Record: 10 CFR 60.51(b)

Excluded Uncertainty Text

The use of the term "environmental report" in the January 1989 issue of 10 CFR 60.51(b) was an uncertainty because it was inconsistent with the Nuclear Waste Policy Act, as amended, and it was to be changed to "environmental impact statement".

Rationale for Exclusion

The summary of Reference 10 stated that "The changes are needed in order to reflect the provisions of the NWPA of 1982, as amended. Under that Act, the Commission is required to adopt the DOE's environmental impact statement (EIS) to the extent practicable."

J. Hageman, 2/22/90

This uncertainty has been excluded because the inconsistency was eliminated with the publication of Reference 20.

R. W. Field, 11/20/89

Reference for Exclusion Rationale

(10) Federal Register, May 5, 1988, Page 16131 (53 FR 16131).
(20) Federal Register, July 3, 1989, page 27872 (54 FR 27872).

REGULATORY REQUIREMENT RR0072: TERMINATION OF LICENSE

Primary Regulatory Text Citation

10CFR60 52 (a) January 1, 1989

Associated Regulatory Text Citations

10CFR60 52 (b) January 1, 1989

10CFR60 45 (a) January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- Termination Authorized by Law

Parent Record: 10 CFR 60.52

Excluded Uncertainty Text

This is discussed as Uncertainty 8 in Reference 10. An uncertainty is identified with respect to termination of the repository license if termination is not allowed by the Atomic Energy Act because of the possession, presumably by DOE, of special nuclear material.

Rationale for Exclusion

The NRC fully recognizes that the termination of the license must be authorized by the Atomic Energy Act as stated in 10 CFR 60.52(c) and 60.52(c)(3): "A license shall be terminated only when the Commission finds with respect to the geologic repository: That the termination of the license is authorized by law, Sections 57, 62, and 81 of the Atomic Energy Act." The Atomic Energy Act may not definitively allow termination, but there is no regulatory uncertainty since the regulation clearly states that the license can only be terminated when such termination is allowed by law.

The rationale originally provided for the inclusion of this uncertainty is provided for background:

10 CFR 60.52 provided in pertinent part:

> Section 60.52 Termination of License.
> (a) Following permanent closure and the decontamination or dismantlement of surface facilities, DOE may apply for an amendment to terminate the license.
>
> ....

> (c) A license shall be terminated only when the Commission finds with respect to the geologic repository:
>
> ....
>
> (3) That the termination of the license is authorized by law, including sections 57, 62, and 81 of the Atomic Energy Act, as amended.

Section 57 of the Atomic Energy Act (42 USC 2078) provides, in pertinent part:

> Sec. 57. Prohibition. --
> a. Unless authorized by a general or specific license issued by the Commission, which the Commission is authorized to issue pursuant to section 53, no person, (including a government agency) may transfer or receive in interstate commerce, transfer, deliver, acquire, own, possess, receive possession of or title to, or import into or export from the United States any special nuclear materials. (42 USC 2077)

"special nuclear material" is defined by sec. 11(aa) of the Atomic Energy Act (42 USC):

> aa. The term "special nuclear material" means (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section 51, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material.

Section 123 of the nuclear Waste Policy Act (42 USC 10143) as amended, provides:

> Delivery, and acceptance by the Secretary, of any high-level radioactive waste or spent nuclear fuel for a repository constructed under this part shall constitute a transfer to the Secretary of title to such waste or spent fuel.

The combination of these provisions raises the question of whether a "termination of license" may ever "be authorized by law" (as the law is presently constituted) so as to satisfy 10 CFR 60.52 (c)(3). Simply put: (1) Spent fuel contains "special nuclear material". (2) Possession or transfer requires a license. and, (3) DOE will have title (possession) at closure and therefore will either retain title and possession or transfer title and possession. Either would seem to require a license pursuant to section 57 (42 USC 2078) with respect to "special nuclear material."

Similar considerations are present with respect to "by-product material" and "source material" contained in spent nuclear fuel and possession or transfer of which requires a license pursuant to section 62 (42 USC 2092) and section 81 (42 USC 42111) of the Atomic Energy Act.

R. W. Field, 12/19/89

Reference for Exclusion Rationale

(10) "Analysis and Evaluation of Regulatory Uncertainties in 10 CFR Part 60 Subparts B and E," CNWRA 89-003, May 1989.

REGULATORY REQUIREMENT RR3012: RECORDS AND REPORTS (DOE)

Primary Regulatory Text Citation

10CFR60 71 (a)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 71 (b)	January 1, 1989
10CFR60 72 *	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0002 -- Construction Problems

Parent Record: 10 CFR 60.72(b)(6)

Text of the Potential Uncertainty

The term "construction problems" requires further definition in order to ensure documentation of all those problems of interest to the Commission, and to clearly identify appropriate recordkeeping requirements for the DOE.

Rationale for Inclusion

In response to this requirement, the DOE might define threshold criteria for "construction problems" that are not consistent with the intent of the Commission and, hence, not sufficiently conservative. It would seem desirable for the NRC to require, for example, documentation of those problems which could ultimately have an effect on the ability of the repository to function as designed. The extent of documentation required by the Commission in the regulation is not clear.

Mark V. Muller 2/13/90

In the absence of decision criteria, the "construction problems" reported by the licensee under Section 60.72(b) will be the result of situational judgement, and may vary depending on the individual involved. The uncertainty resides in the possibility of inconsistent and inadequate implementation of the regulation, given its reliance on individual interpretation.

Mark V. Muller 2/13/90

REGULATORY REQUIREMENT RR3012: RECORDS AND REPORTS (DOE)

Primary Regulatory Text Citation

10CFR60 71 (a) January 1, 1989

Associated Regulatory Text Citations

10CFR60 71 (b) January 1, 1989

10CFR60 72 * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Anomalous Conditions

Parent Record: 10 CFR 60.72(b)(7)

Text of the Potential Uncertainty

The term "anomalous conditions" requires further definition in order to ensure documentation of all those conditions of interest to the Commission, and to clearly identify appropriate recordkeeping requirements for the DOE.

Rationale for Inclusion

In response to this requirement, the DOE might define threshold criteria for "anomalous conditions" that are not consistent with the intent of the Commission and, hence, not sufficiently conservative. It would seem desirable for the NRC to require, for example, documentation of those problems which could ultimately have an effect on the ability of the repository to function as designed. The extent of documentation required by the Commission in the regulation is not clear.

Mark V. Muller 2/13/90

In the absence of decision criteria, the "anomalous conditions" reported by the licensee under Section 60.72(b) will be the result of situational judgement, and may vary depending on the individual involved. The uncertainty resides in the possibility of inconsistent and inadequate implementation of the regulation, given its reliance on individual interpretation (see RR3012/UN0002).

Mark V. Muller 2/13/90

REGULATORY REQUIREMENT RR3013: REPORTS OF DEFICIENCIES

Primary Regulatory Text Citation

10CFR60 73 * January 1, 1989

Referenced Regulatory Text Citations

10CFR20 Appendix D * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Substantial Safety Hazard

Parent Record: 10 CFR 60.73(a)

Text of the Potential Uncertainty

The term "substantial safety hazard" requires further definition in regard to the characteristics of the site and the design and construction of the geologic repository operations area. More specific guidance is needed to ensure that those hazards reported by the DOE satisfy the regulatory intent of the Commission.

Rationale for Inclusion

The use of the word "substantial" in the regulation implies that only a specific class of safety hazards are to be reported to the Commission, and that minor hazards apparently should be excluded from these reports. However, division between "minor" and "substantial" hazards is unclear. More explicit guidance would serve to clarify the intent of the Commission.

Mark V. Muller 2/13/90

The definition of "substantial safety hazard" in 10 CFR Part 21, also appears to have an uncertainty ("...major reduction...."). However, neither 10 CFR 21, which is planned for Program Architecture analysis at a later date, nor the hearing records associated with Part 21 were included in the regulatory analysis for this potential uncertainty. 10 CFR Part 60 does not reference Part 21; however, 10 CFR Part 60 is within the scope of Part 21. The interaction between these two regulations will be considered at a later date.

Mark V. Muller 2/13/90

REGULATORY REQUIREMENT RR3013: REPORTS OF DEFICIENCIES

Primary Regulatory Text Citation

10CFR60 73 * January 1, 1989

Referenced Regulatory Text Citations

10CFR20 Appendix D * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0002 -- Significant Deviation

Parent Record: 10 CFR 60.73(b)

Text of the Potential Uncertainty

The term "significant deviation" requires further definition in regard to "design criteria and design bases stated in the application." More specific guidance will ensure that those deviations reported by the DOE satisfy the regulatory intent of the Commission.

Rationale for Inclusion

The use of the word "significant" in the regulation implies that only a specific class of deviations are to be reported to the Commission. That is, minor issues are apparently intended to be excluded from these reports. However, given the present wording of the regulation, the Commission's intent regarding the division between "minor" and "significant" deviations is unclear.

Mark V. Muller 2/13/90

The definition of "deviation" in 10 CFR Part 21 does not serve to clarify the meaning in 60.73(b). However, neither 10 CFR 21, which is planned for Program Architecture analysis at a later date, nor the hearing records associated with Part 21 were included in the regulatory analysis for this potential uncertainty. 10CFR Part 60 does not reference Part 21; however, 10CFR Part 60 is within the scope of Part 21. The interaction between these two regulations will be considered at a later date.

Mark V. Muller 2/13/90

REGULATORY REQUIREMENT RR0004: RADIATION EXPOSURES AND RELEASES

Primary Regulatory Text Citation

10CFR60 111 (a) January 1, 1989

Associated Regulatory Text Citations

10CFR60 130 January 1, 1989
See Regulatory Requirement RR0034

10CFR60 131 (a) * January 1, 1989
See Regulatory Requirement RR0035

10CFR60 131 (b) (1) January 1, 1989
See Regulatory Requirement RR0001

10CFR60 131 (b) (2) January 1, 1989
See Regulatory Requirement RR0037

10CFR60 131 (b) (3) * January 1, 1989
See Regulatory Requirement RR0088

10CFR60 131 (b) (4) * January 1, 1989
See Regulatory Requirement RR0089

10CFR60 131 (b) (5) * January 1, 1989
See Regulatory Requirement RR0090

10CFR60 131 (b) (6) January 1, 1989
See Regulatory Requirement RR0091

10CFR60 131 (b) (7) January 1, 1989
See Regulatory Requirement RR0092

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0001 -- Radiation Exposures and Releases as Low as Reasonably Achievable

Parent Record: 10 CFR 60.111(a)

Excluded Uncertainty Text

10 CFR 60 and 10 CFR 72 need to be consistent with one another in their treatment of radiation release limits so that similar facilities will be regulated by the NRC in similar ways.

Rationale for Exclusion

Although much of 10 CFR 20 deals with the specific tabulated limits, it also requires ALARA in 20.1(c), where it is clear that ALARA applies in addition to the tabulated limits. Furthermore, 10 CFR 60 and 10 CFR 72 do not have to be consistent.

When the issue was addressed in NUREG-0804, the Commission took a position against ALARA (Reference 10), but it is clear that the concern was with the post-closure period. The Commission concluded that the long-term performance requirements should not be explicitly tied to an ALARA principle. They did not discuss ALARA in reference to the short term, pre-closure period which is the concern in this regulatory requirement.

Based on 10 CFR 20, both ALARA and the tabulated values apply, so the licensee must keep exposures and releases as low as reasonably achievable, but in no case can they be higher than the tabulated values. Both requirements can be met in this manner, and there is no uncertainty.

D. S. Moulton, 12/12/1989

The rationale originally proposed for inclusion of this uncertainty can be stated as follows. 10 CFR 60.111(a) and several of the associated regulatory texts refer to 10 CFR 20 as the standard for radiation exposures and releases. The monitored retrievable storage facility, which has many functions similar to a repository, is subject to the concept of "as low as is reasonably achievable" (ALARA) in accordance with 72.104(b) and 72.126(d) as the main standard for radiation release limits.

Reference for Inclusion Rationale

(10) NUREG-0804 "Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, 'Disposal of High-Level Radioactive Wastes in Geologic Repositories'", U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Dec. 1983, pp 14-15.

REGULATORY REQUIREMENT RR0004: RADIATION EXPOSURES AND RELEASES

Primary Regulatory Text Citation

10CFR60 111 (a) January 1, 1989

Associated Regulatory Text Citations

10CFR60 130 January 1, 1989
See Regulatory Requirement RR0034

10CFR60 131 (a) * January 1, 1989
See Regulatory Requirement RR0035

10CFR60 131 (b) (1) January 1, 1989
See Regulatory Requirement RR0001

10CFR60 131 (b) (2) January 1, 1989
See Regulatory Requirement RR0037

10CFR60 131 (b) (3) * January 1, 1989
See Regulatory Requirement RR0088

10CFR60 131 (b) (4) * January 1, 1989
See Regulatory Requirement RR0089

10CFR60 131 (b) (5) * January 1, 1989
See Regulatory Requirement RR0090

10CFR60 131 (b) (6) January 1, 1989
See Regulatory Requirement RR0091

10CFR60 131 (b) (7) January 1, 1989
See Regulatory Requirement RR0092

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0002 -- Application of Design Radiation Dose Criteria

Parent Record: 10 CFR 60.111(a)

Excluded Uncertainty Text

An uncertainty exists in the phrase "at all times" in reference to the Part 20 pre-closure design basis limits for protection against radioactivity. In order to establish the design basis unequivocally, it must be determined whether or not the release limits apply to accident and other off-normal conditions as well as to normal operation conditions (hence, "at all times").

Rationale for Exclusion

In the currently applicable source for 10 CFR 60, Subpart E (Reference 20), the Commission has stated: "There must be an 'unrestricted area' to which releases of radioactive materials will be maintained within the limits specified in 10 CFR Part 20 (10 CFR 60.111(a)). The establishment of this unrestricted area must also take accidents into consideration, since structures, systems, and components 'important to safety,' as defined in 10 CFR 60.2, must be designed so as to limit radiation doses under accident conditions to 0.5 rem at the boundary of the unrestricted area." This clearly indicates that the limits are to be applied for both normal and accident (or off-normal) conditions, and the uncertainty is therefore excluded. The Part 20 limit is the same as that established by the EPA as an alternative standard for "infrequent exposure" of "any member of the public". (Reference 30)

Other pertinent passages from the same published criteria for the final rule (Reference 20) follow.

"Structures, systems, and components are important to safety if, in the event they fail to perform their intended function, an accident could result which causes a dose commitment greater than 0.5 rem to the whole body or any organ of an individual in an unrestricted area. The value of 0.5 rem is equal to the annual dose to the whole body of an individual in an unrestricted area that would be permitted under 10 CFR Part 20 for normal operations, the same as permitted for normal operations of certain other activities licensed by NCR." (page 28202 of Reference 20) The NRC intent that the definition of 'important to safety' refers to 'accidents' finds additional support in 60.131(b)(5) and 60.131(g).

E. Tschoepe, 2/14/1990

The origin of this uncertainty came about as a result of discussions with NRC personnel, whose opinion was that "at all times" (in reference to the Part 20 pre-closure design basis limits for protection against radioactivity) was intended to apply to normal operations, not to accident conditions. Searches for NRC documentation evidencing this opinion led to Reference 20 (the published criteria for the final rule), which indicates that the intent was that the release limits apply to both normal operations and to accident conditions. For completeness, excerpts from rationale previously used to support the uncertainty are included below.

E. Tschoepe, 2/15/1990

Recent rulemaking decisions by the NRC regarding design basis accident guidelines and the DOE interpretation of the phrase "at all times" in the site characterization plan brings into question the intended meaning of that phrase.

The phrase 'at all times' is uncertain because for designs of this type, different radiation dose criteria are often specified for normal and accident conditions. This is clearly the expectation in DOE's Site Characterization Plan in the safety assessment in the section on accidental radiological releases (Reference 40), for which DOE is developing a pre-closure risk assessment methodology (PRAM). The approach includes an extensive, formal procedure to develop design basis accidents to complement those that may be required by regulatory authorities, with limits to be defined which differ from those applicable under normal conditions. (Reference 50) DOE states that steps to petition the NRC to amend 10 CFR 60 to include an accident dose guideline have been initiated. They expect one to be issued as indicated by the statement: 'When such guideline is promulgated, it will be addressed in the repository design.' (Reference 60) The DOE clearly does not think the phrase 'at all times' was meant to include accident conditions.

D. S. Moulton, 2/20/1989

Since DOE was developing a formal procedure for defining hypothetical 'worst-case' accidents for a design basis, and had initiated petition for different limits or guidelines in 10 CFR 60 for them, the issue is uncertain. If "at all times" means during the operations and closure phases under normal (non-accident) conditions, exposures, radiation levels, and releases to the uncontrolled environment under accident conditions need to be defined and the phrase "at all times" needs to be clarified. If "at all times" means under ALL conditions, use of an accident design basis that is the same as the dose limit prescribed for normal conditions would be inconsistent with previous Commission practice.

D. S. Moulton, 12/20/1989

References for Exclusion Rationale

(20) 48 FR 28202 & 28211, June 21, 1983, U. S. Nuclear Regulatory Commission, Final Rule, "Disposal High-Level Radioactive Wastes in Geologic Repositories Technical Criteria", 10 CFR Part 60.

(30) Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191.04(a)(1), July 1, 1987 edition.

(40) U. S. Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada", Volume VII, Part B, Chapter 8, Section 8.3.5.5, Dec. 1988.

(50) U. S. Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada", Volume VII, Part B, Dec. 1988, p 8.3.5.5-29

(60) U. S. Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada", Volume VII, Part B, Dec. 1988, p 8.3.5.5-1

REGULATORY REQUIREMENT RR0004: RADIATION EXPOSURES AND RELEASES

Primary Regulatory Text Citation

10CFR60 111 (a) January 1, 1989

Associated Regulatory Text Citations

10CFR60 130 January 1, 1989
See Regulatory Requirement RR0034

10CFR60 131 (a) * January 1, 1989
See Regulatory Requirement RR0035

10CFR60 131 (b) (1) January 1, 1989
See Regulatory Requirement RR0001

10CFR60 131 (b) (2) January 1, 1989
See Regulatory Requirement RR0037

10CFR60 131 (b) (3) * January 1, 1989
See Regulatory Requirement RR0088

10CFR60 131 (b) (4) * January 1, 1989
See Regulatory Requirement RR0089

10CFR60 131 (b) (5) * January 1, 1989
See Regulatory Requirement RR0090

10CFR60 131 (b) (6) January 1, 1989
See Regulatory Requirement RR0091

10CFR60 131 (b) (7) January 1, 1989
See Regulatory Requirement RR0092

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Reference Clarification

Parent Record: 10 CFR 60.111(b)

Text of the Potential Uncertainty

Criteria are needed to determine the lowest level of referenced regulations which are to be incorporated in order to determine the extent of applicability of referenced regulations.

Rationale for Inclusion

If one were to list the regulations incorporated by reference in one regulation, then add to the list those additional regulations incorporated by reference in those referenced regulations, etc., very few levels of references would, in general, produce a very large list of regulations. In the absence of specific citations of applicable sections, descriptions of limited applications of the references, or similar criteria, the user of the regulation has no guidance for determining the extent of applicability of referenced regulations.

D. T. Romine, 2/8/1990

Following chains of references frequently leads to regulations which are not intended to apply, and it is uncertain what actions are required for compliance. 10 CFR 60.111(a) references 10 CFR 20, without citation to a specific applicable section. The wording of the reference in 111(a) ("...radiation exposures and radiation levels, and releases of radioactive materials to unrestricted areas, will at all times be maintained within the limits specified in Part 20 of this chapter ...") would apparently delimit the sections of 10 CFR 20 which apply. Interpretation of which sections of Part 20 which apply is unclear, however, for certain specific cases. For example,10 CFR 20.405(c) requires a report if limits specified in 40 CFR 190 are exceeded. The limits in 40 CFR 190 are not specified as applicable to the geologic repository operations area, however. It is, therefore, unclear as to which sections of 40 CFR 190 are applicable.

It should be noted that the NRC policy that is the subject of this uncertainty would also apply to referenced regulations in 10 CFR 20, 10 CFR 51, and any EPA standards to be cited (e.g., the revised 40 CFR 191).

R. L. Wilbur and D. S. Moulton, 12/20/1989;
E. Tschoepe, 2/10/1990

REGULATORY REQUIREMENT RR0004: RADIATION EXPOSURES AND RELEASES

Primary Regulatory Text Citation

10CFR60 111 (a)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 130 See Regulatory Requirement RR0034	January 1, 1989
10CFR60 131 (a) * See Regulatory Requirement RR0035	January 1, 1989
10CFR60 131 (b) (1) See Regulatory Requirement RR0001	January 1, 1989
10CFR60 131 (b) (2) See Regulatory Requirement RR0037	January 1, 1989
10CFR60 131 (b) (3) * See Regulatory Requirement RR0088	January 1, 1989
10CFR60 131 (b) (4) * See Regulatory Requirement RR0089	January 1, 1989
10CFR60 131 (b) (5) * See Regulatory Requirement RR0090	January 1, 1989
10CFR60 131 (b) (6) See Regulatory Requirement RR0091	January 1, 1989
10CFR60 131 (b) (7) See Regulatory Requirement RR0092	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0005 -- Design Radiation Dose Criteria

Parent Record: 10 CFR 60.111(a)

Text of the Potential Uncertainty

Regulations referenced by 10 CFR 60.111(a) provide different radiation dose criteria for both normal operations and accidents. These differences need to be reconciled to provide clear performance objectives for both conditions.

Rationale for Inclusion

10 CFR 60.111(a) states that radiation exposures, levels, and releases to unrestricted areas will be maintained "...within the limits specified in Part 20 of this chapter and such generally applicable standards for radioactivity as may have been established by the Environmental Protection Agency." This statement leads the reader to a number of sources which cite different values for these limits for both normal operations and accident conditions.

The first of these is found in the statement of the Commission in the currently applicable source for 10 CFR Part 60, Subpart E (Reference 20), to wit: "There must be an 'unrestricted area' to which releases of radioactive materials will be maintained within the limits specified in 10 CFR Part 20 (10 CFR 60.111(a)). The establishment of this unrestricted area must also take accidents into consideration, since structures, systems, and components 'important to safety,' as defined in 10 CFR 60.2, must be designed so as to limit radiation doses under accident conditions to 0.5 rem at the boundary of the unrestricted area." The Part 20 limit is the same as that established by the EPA as an alternative standard for "infrequent exposure" of "any member of the public". (Reference 30)

The EPA has promulgated a different standard for exposure of "any member of the general public" to doses from the management and storage of spent nuclear fuel or high-level or transuranic radioactive wastes. 40 CFR 191.03 states that the "...combined annual dose to any member of the general public in the general environment resulting from ... discharges of radioactive material and direct radiation from such management and storage ... shall not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other critical organ." This reference is not specific regarding its applicability but silence on this subject implies it could apply to both normal operations and accident conditions. (Reference 40)

Other pertinent passages from the published criteria for the final rule (Reference 20) state that structures, systems, and components important to safety, in the event they fail to perform their intended function, will comply with 10 CFR 20.105(a). This latter regulation states that the anticipated dose from an accident may not exceed 0.5 rem to the whole body or any organ of an individual in an unrestricted area in any one calendar year. 10 CFR 20.105(b) further specifies dose limits in unrestricted areas of 2 millirems in any one hour and 100 millirems in any seven consecutive days. 10 CFR 20.105 does not refer to normal or off-normal operations or accident conditions.

10 CFR Part 72, which is applicable to surface storage facilities with functions similar to a repository, adopts the EPA standard maximum dose to the general public - 25 millirems to the whole body, 75 millirems to the thyroid - "During normal operations and anticipated occurrences..." (10 CFR 72.104(a)), but sets the design basis accident dose criteria to any individual on or beyond the controlled area boundary at 5 rem to the whole body (10 CFR 72.106(b)).

These citations show that the phrase "...within the limits specified in Part 20 of this chapter and such generally applicable standards for radioactivity as may have been established by the Environmental Protection Agency" in 10 CFR 60.111(a) encompasses a wide range of possible dose criteria. Thus, 10 CFR 60.111(a) is not sufficiently specific to determine design basis dose criteria for normal and accident conditions, and needs further clarification or interpretation.

Ruth F. Weiner, 2/19/1990

References for Inclusion Rationale

(10) NUREG-0804 "Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, 'Disposal of High-Level Radioactive Wastes in Geologic Repositories'" U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Dec. 1983, pp 14-15.

(20) 48 FR 28202 & 28211, June 21, 1983, U. S. Nuclear Regulatory Commission, Final Rule, "Disposal High-Level Radioactive Wastes in Geologic Repositories Technical Criteria", 10 CFR Part 60.

(30) Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191.04(a)(1), July 1, 1987 edition.

(40) Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191.03(a), July 1, 1987 edition.

REGULATORY REQUIREMENT RR0002: RETRIEVABILITY OF WASTE

Primary Regulatory Text Citation

10CFR60 111 (b) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 111 (b) (3)	January 1, 1989
10CFR60 131 (b) (7)	January 1, 1989
10CFR60 132 (a)	January 1, 1989
10CFR60 133 (c)	January 1, 1989
10CFR60 133 (e) (1)	January 1, 1989
10CFR60 133 (i)	January 1, 1989
10CFR60 135 (b) (3)	January 1, 1989
10CFR60 135 (b) (4)	January 1, 1989
10CFR60 21 (c) (12)	January 1, 1989
10CFR60 46 (a) (1)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Facilitate Versus not Prevent Waste Retrieval

Parent Record: 10 CFR 60.111(b)(1)

Text of the Potential Uncertainty

The NRC intent needs to be clarified as to whether the geologic repository is to be designed to facilitate waste retrieval, or only that the design must not preclude waste retrieval (i.e., not make retrieval impossible). DOE needs to provide guidance regarding what design action, if any, is intended by the regulation, particularly with respect to the waste package and its handling equipment, in order to respond with an acceptable design and to permit NRC to evaluate the DOE compliance demonstration effectively.

Rationale for Inclusion

Several phrases are used in 10 CFR Part 60 to describe retrievability. These include "...designed to preserve the

option of waste retrieval...", "...designed so that...waste could be retrieved..." (60.111(b)(1)), and "...designed to permit retrieval..." (60.133(c)). Although these phrases seem to be consistent, a question arises regarding whether the design process and the resulting facility and equipment designs should (1) make provisions for and, to some degree, facilitate retrieval, or (2) simply not do anything to prevent retrieval.

The intent of the waste retrieval regulatory requirement as discussed in NUREG-0804 (Reference 10) supports the "not precluded" interpretation. In Reference 10, NRC adheres to the position that retrievability is an important design consideration, but rephrases the requirement in functional terms. NRC recognizes that any actual retrieval would be an unusual event and may be expensive. The expressed intent is that it should not be made impossible or impractical to retrieve the waste if such retrieval turns out to be necessary to protect the public health and safety.

The language of the NWPAA (Reference 20), 10 CFR 60.111(b)(1), and the requirement on underground openings (10 CFR 60.133(e)(1)) do not seem to support this interpretation. The NWPAA reads "...any repository constructed on a site approved under this part shall be designed and constructed to permit the retrieval of any spent nuclear fuel placed in such repository, during an appropriate period of operation of the facility, for any reason pertaining to the public health and safety, or the environment, or for the purpose of permitting the recovery of the economically valuable contents of such spent fuel." 10 CFR 60.111(b)(1) requires that the repository "...be designed to preserve the option of waste retrieval..."; and 10 CFR 60.133(e)(1) specifies that "Openings ... shall be designed so that ... the retrievability option (is) maintained." The structure and wording of all of these requirements would in the engineering context of "design and construct" be interpreted to require specific action. Such action would typically include explicit consideration of retrieval needs and features in design criteria, equipment designs, and design reviews. In contrast, a requirement that retrieval simply not be made impossible or impractical requires no active attention in design. This is because, from an engineering perspective, it is entirely possible and practical if necessary to remove the entire mountain from around the waste in significantly less than the time presently planned for construction and emplacement.

D. S. Moulton, 12/21/1989;
E. Tschoepe & D. T. Romine, 2/15/1990

As a practical matter, the range of possible interpretations can have an impact on the schedule and cost of the geologic repository operations area functions, particularly in relation to equipment design. For example, a vehicle designed to

transport waste packages to their position in the repository and emplace them could be fitted with a means of waste package retrieval as part of its initial design. Such a design which would comply with a 'facilitate' requirement, would require only a slight difference in schedule, if any. To not make the vehicle capable of retrieval initially, which would comply with a 'not prevent' requirement, could result in a major delay for designing and constructing a modification, or even another vehicle, should retrieval be required later.

Similarly, design of the waste package from the beginning to facilitate retrieval, consistent with the first interpretation, would have little impact on the schedule, but it could prevent a lengthy program to develop a means of retrieving packages not made with a convenient means of interfacing to the retrieving vehicle.

D. S. Moulton, 12/21/1989;
E. Tschoepe, 2/15/1990

The minimum degree to which the design must "facilitate" the act of waste retrieval seems to be specified in 10 CFR 60.111(b)(1), 10 CFR 60.111(b)(3), 10 CFR 60.133(c), 10 CFR 60.133(e)(1) and 10 CFR 60.133(i). However the interpretation provided in NUREG 0804 (Reference 10) seems to run counter to requirements such as 10 CFR 60.133(e)(1) and 10 CFR 60.133(i) in that it is possible and practical to cut rock from around the waste package. There could, of course, be an associated increase in risk of accidental loss of containment.

D. T. Romine, 2/8/1990

The foregoing highlights an additional potential uncertainty relative to the meaning of the second of two phrases in 10 CFR 46(a)(1): "Any action... which would substantially increase the difficulty of retrieving such emplaced waste." This potential uncertainty is treated in depth in RR0070/UN001. Use of the term 'permit' in several of the texts tends to preserve the uncertainty because it does not make the commitment that either 'facilitate' or 'not prevent' would make.

D. S. Moulton, 12/21/1989;
D. T. Romine, 2/8/1990

References for Inclusion Rationale

(10) "Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, 'Disposal of High-Level Radioactive Wastes in Geologic Repositories'" NUREG-0804, Section 2.2 p 11, December 1983.

(20) Nuclear Waste Policy Act, as Amended (NWPAA), 42 USCS 10142.

REGULATORY REQUIREMENT RR0002: RETRIEVABILITY OF WASTE

Primary Regulatory Text Citation

10CFR60 111 (b) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 111 (b) (3)	January 1, 1989
10CFR60 131 (b) (7)	January 1, 1989
10CFR60 132 (a)	January 1, 1989
10CFR60 133 (c)	January 1, 1989
10CFR60 133 (e) (1)	January 1, 1989
10CFR60 133 (i)	January 1, 1989
10CFR60 135 (b) (3)	January 1, 1989
10CFR60 135 (b) (4)	January 1, 1989
10CFR60 21 (c) (12)	January 1, 1989
10CFR60 46 (a) (1)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0002 -- Subject of Thermomechanical Response

Parent Record: 10 CFR 60.133(i)

Excluded Uncertainty Text

The NRC intent concerning identification of the groundwater system is unclear. The DOE needs guidance concerning the extent of the groundwater system for which the thermomechanical response must be accounted in the design of the underground facility.

Rationale for Exclusion

It has been reported by NRC staff that 10 CFR 60.133(i) "...contains a typographical error. The final phrase of that paragraph should read ' ...thermomechanical response of the host rock, surrounding strata, and groundwater system.'" While the phrase should be corrected, there is no uncertainty associated with the phrase relative to which groundwater system was intended to be considered (see previous rationale below). In accordance

with the definition of groundwater in 10 CFR 60.2, the groundwater system includes "all water which occurs below the land surface". The extent of "land surface" which bounds the groundwater system is uncertain, and that uncertainty is identified in RR2004/UN0018, "Regional Groundwater Flow System" (Parent record: 10 CFR 60.122(c)(3) and 10 CFR 60.122(c)(4)).

E. Tschoepe, 2/15/1990

The previous rationale for the inclusion of this uncertainty may be stated as follows. The phrasing of the last part of 10 CFR 60.133(i) might be taken as referring to two different groundwater systems: the host rock groundwater system or the groundwater system of the surrounding strata. It also could refer to two classes of geologic structures and a single groundwater system: the host rock, the surrounding strata, and the surrounding groundwater system. The first interpretation (two groundwater systems), is indicated by the grammatical construction, but the second interpretation agrees with the fact that the thermomechanical response of the host rock and surrounding strata are of concern. Some clarification is needed to avoid two different interpretations of the underground facility design requirements.

D. S. Moulton, 12/21/1989

REGULATORY REQUIREMENT RR1001: SYSTEM PERFORMANCE AFTER PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 112	January 1, 1989

Associated Regulatory Text Citations

10CFR60 101 (a) (2)	January 1, 1989
10CFR60 113 (c)	January 1, 1989
10CFR60 133 (a)	January 1, 1989
10CFR60 133 (a) (1)	January 1, 1989
10CFR60 133 (f)	January 1, 1989
10CFR60 133 (h)	January 1, 1989
10CFR60 133 (i)	January 1, 1989
10CFR60 134 *	January 1, 1989

Referenced Regulatory Text Citations

40CFR191 13 (a) *	November 18, 1985
40CFR191 15	November 18, 1985
40CFR191 16 *	November 18, 1985
40CFR191 APPENDIX A *	November 18, 1985

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Anticipated & Unanticipated Processes and Events

Parent Record: 10 CFR 60.112

Text of the Potential Uncertainty

The terms "anticipated processes and events" and "unanticipated processes and events" require further definition to permit uniform interpretation of the regulatory requirement.

Rationale for Inclusion

A clear basis for distinguishing between these categories of processes and events is required because of their key position in the design and evaluation processes. Specifically,

> (1) Anticipated Processes and Events (APEs) provide the primary design basis for the waste package and the balance of the engineered barriers (References 10 and 20);
>
> (2) APEs, together with Unanticipated Processes and Events (UPEs), provide the basis for determination of compliance with the overall system performance objective of 10 CFR 60.112.

This uncertainty has been addressed previously. Initial criteria for identifying anticipated and unanticipated events appear in a Draft Technical Position entitled "Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events" (Reference 30). Clarification of these terms is necessary to determine if the natural barriers, waste package, or engineered barrier system are sufficient to comply with the required performance objectives of 10 CFR Part 60. (Reference 40)

R. L. Wilbur, 2/10/1990

In the definition in 10 CFR 60.2, the distinction between anticipated and unanticipated processes and events is differentiated by whether or not it is "...reasonably likely to occur..." and "...sufficiently credible to warrant consideration...". In NUREG-0804 (Reference 10), it is noted that "...the distinction between anticipated and unanticipated processes and events relates solely to natural processes and events affecting the geologic setting...". This excludes anticipated and unanticipated events as part of the Engineered Barrier System analysis unless the projected change is related to an external natural occurrence (unexpected fatigue failure or unexpected change in microstructure of materials could not be considered, for example). It also excludes human activities when evaluating the engineered system except under the specific conditions in the 60.2 definition of UPEs. From the same reference, unanticipated processes and events are those which "...include processes and events which are not evidenced during the Quaternary Period or which, though evidenced during the Quaternary, are not likely to occur during the relevant time frame...". The criteria for "likely to occur" need to be defined to avoid inappropriate responses by DOE. Additionally, the Commission viewed the proposed Environmental Protection Agency (EPA) standard (40 CFR Part 191) as being directed to the evaluation of releases arising out of the categories that have been defined as "anticipated processes and events" and "unanticipated processes and events."

NUREG-0804 states that "...Such processes or events would not be anticipated unless they were reasonably likely, assuming that processes operating in the geologic setting during the Quaternary Period were to continue to operate but with the perturbations caused by the presence of emplaced waste superimposed thereon. Unanticipated processes and events would include those that are judged not to be reasonably likely to occur during the period the intended performance objective must be achieved, but which nevertheless are sufficiently credible to warrant consideration..." (Reference 10).

R. F. Weiner, May 1989

References for Inclusion Rationale

(10) Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories", NUREG-0804, December 1983, page 19-20.

(20) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Description of Uncertainties being Addressed by the U.S. Nuclear Regulatory Commission Staff, SECY-89-339, NRC, 31 October 1989.

(30) Draft Generic Technical Position, Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events, Div. of High-Level Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, February 1988.

(40) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Report to the Commissioners from the General Counsel, SECY-88-285, NRC, 5 October 1988.

REGULATORY REQUIREMENT RR1001: SYSTEM PERFORMANCE AFTER PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 112	January 1, 1989

Associated Regulatory Text Citations

10CFR60 101 (a) (2)	January 1, 1989
10CFR60 113 (c)	January 1, 1989
10CFR60 133 (a)	January 1, 1989
10CFR60 133 (a) (1)	January 1, 1989
10CFR60 133 (f)	January 1, 1989
10CFR60 133 (h)	January 1, 1989
10CFR60 133 (i)	January 1, 1989
10CFR60 134 *	January 1, 1989

Referenced Regulatory Text Citations

40CFR191 13 (a) *	November 18, 1985
40CFR191 15	November 18, 1985
40CFR191 16 *	November 18, 1985
40CFR191 APPENDIX A *	November 18, 1985

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0002 -- Amendments to 10 CFR 60.112 to conform to EPA Standard

Parent Record: 10 CFR 60.112

Text of the Potential Uncertainty

It is uncertain what amendments will have to be made to 10 CFR 60.112 to conform to the forthcoming revision of the EPA Standard, 40 CFR Part 191. Since 10 CFR 60.112 refers to conformation to EPA Standards, any changes in those Standards must be addressed to ensure that performance objectives of 10 CFR 60.112 are met.

Rationale for Inclusion

10 CFR 60.112 refers to but does not further specify the standards established by the EPA. The Nuclear Waste Policy Act requires that the U.S. Nuclear Regulatory Commission (NRC) requirements and criteria not be inconsistent with any comparable standards promulgated by the Environmental Protection Agency (EPA), (Reference 10). Once the final EPA Standard is promulgated, certain amendments to 10 CFR Part 60, particularly 10 CFR 60.112, may be needed to achieve the consistency required by the Act.

In discharging its statutory responsibility, NRC must conform 10 CFR Part 60 to the EPA standard. Provided EPA does not make significant changes in subparts of 40 CFR Part 191 that were not cited by the court on remand, possible conforming amendments are not expected to have significant impact on the U.S. Department of Energy (DOE) site characterization program (Reference 20).

R. L. Wilbur, 12/11/1989

References for Inclusion Rationale

(10) Nuclear Waste Policy Amendment Act (NWPAA), Section 10141 (b)(1)(C), 42 U.S.C. 10101 as amended, December 1987.

(20) Regulatory Strategy and Schedules for the High-Level Waste Repository Program, SECY-88-285, Report to the Commissioners from General Counsel, NRC, 5 October 1988.

REGULATORY REQUIREMENT RR1001: SYSTEM PERFORMANCE AFTER PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 112	January 1, 1989

Associated Regulatory Text Citations

10CFR60 101 (a) (2)	January 1, 1989
10CFR60 113 (c)	January 1, 1989
10CFR60 133 (a)	January 1, 1989
10CFR60 133 (a) (1)	January 1, 1989
10CFR60 133 (f)	January 1, 1989
10CFR60 133 (h)	January 1, 1989
10CFR60 133 (i)	January 1, 1989
10CFR60 134 *	January 1, 1989

Referenced Regulatory Text Citations

40CFR191 13 (a) *	November 18, 1985
40CFR191 15	November 18, 1985
40CFR191 16 *	November 18, 1985
40CFR191 APPENDIX A *	November 18, 1985

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- Method for Determination of Compliance with EPA Standard

Parent Record: 10 CFR 60.112 and 40 CFR Part 191

Excluded Uncertainty Text

The standard promulgated by the EPA for high-level radioactive waste disposal is presented in 40 CFR Part 191 as a complementary cumulative probability distribution function (CCDF) which incorporates the probabilities of releases of varying amounts of a number of actinides. No standard or generally recognized method now exists for determining compliance with this CCDF throughout the 10,000-year period

after permanent closure required by 40 CFR Part 191 and 10 CFR 60.112.

Rationale for Exclusion

Implementation of EPA standards and determination of compliance with such standards is not possible until appropriate methods are promulgated (Reference 10). Methods for determining compliance with a regulation over a 10,000-year period are only now under development and will take considerable time to perfect and meet general acceptance. Development of these methods should be as complete as possible before the licensing process begins.

R. L. Wilbur, 2/13/1990

Clearly, the uncertainty entails the development of acceptable technical methods for determining compliance with the EPA standards. Since the timely development of these methods is most important to the establishment of compliance determination methods, this uncertainty is identified as a high-order technical uncertainty and will be included in future analyses of Technical Uncertainties.

R. L. Wilbur, 2/14/1990

Reference for Exclusion Rationale

(10) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Description of Uncertainties to be Addressed by the U.S. Nuclear Regulatory Commission Staff, SECY-89-339, NRC, 31 October 1989.

REGULATORY REQUIREMENT RR1002: EBS PERFORMANCE AFTER PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 113 (a) (1) (i) (A) January 1, 1989

Associated Regulatory Text Citations

10CFR60 113 (a) (1) (ii) (A) January 1, 1989

10CFR60 113 (b) * January 1, 1989

10CFR60 133 (a) (1) January 1, 1989

10CFR60 133 (f) January 1, 1989

10CFR60 133 (h) January 1, 1989

10CFR60 133 (i) January 1, 1989

10CFR60 135 January 1, 1989

10CFR60 135 (a) (1) January 1, 1989

10CFR60 135 (a) (2) January 1, 1989

10CFR60 135 (b) (1) January 1, 1989

10CFR60 135 (b) (2) January 1, 1989

10CFR60 135 (b) (4) January 1, 1989

10CFR60 135 (c) (1) January 1, 1989

10CFR60 135 (c) (2) January 1, 1989

10CFR60 135 (c) (3) January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainties

UN0001 -- Substantially Complete Containment

Parent Record: 10 CFR 60.113(a)(1)(i)(A)

Text of the Potential Uncertainty

The term "substantially complete containment" needs interpretation and clarification that is sufficiently specific to permit Engineered Barrier System (EBS) designers to respond with an acceptable design, and to provide NRC technical

reviewers with a clear-cut basis for the development of EBS evaluation criteria.

Rationale for Inclusion

In NUREG-0804, the Commission recognized the statistical probability that some percentage of containers would fail, and so revised the original phrase "containing all radionuclides" to "substantially complete" containment (Reference 10 and 20). The original wording "containing all radionuclides" was too restrictive (given the technological limitations) because realistic design criteria could not be formulated considering the extended time required for containment. Changing the terminology to "substantially complete" allowed DOE latitude in proposing EBS designs but (1) did not provide a clear standard or criterion for determining compliance and (2) did not consider whether such containment could be predicted with a high level of confidence. This terminology needs to be supplemented by, at a minimum, high-order decision criteria in order to provide a basis both for design and for demonstration/determination of compliance.

R. L. Wilbur, 8/2/1989
W. Patrick, 12/19/1989

References for Inclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 13.

(20) Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Waste in Geologic Repositories", NUREG-0804, NRC, TDI #T198811040003, pages 23 & 24.

REGULATORY REQUIREMENT RR1003: EBS RELEASE OF RADIONUCLIDES AFTER PERMANENT CLOSURE

Primary Regulatory Text Citation

10CFR60 113 (a) (1) (i) (B) January 1, 1989

Associated Regulatory Text Citations

10CFR60 113 (a) (1) (ii) (B) January 1, 1989

10CFR60 113 (b) * January 1, 1989

10CFR60 133 (a) (1) January 1, 1989

10CFR60 133 (e) (2) January 1, 1989

10CFR60 133 (f) January 1, 1989

10CFR60 133 (h) January 1, 1989

10CFR60 135 (a) * January 1, 1989

10CFR60 135 (b) (1) January 1, 1989

10CFR60 135 (b) (2) January 1, 1989

10CFR60 135 (b) (4) January 1, 1989

10CFR60 135 (c) * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Solid Waste Form

Parent Record: 10 CFR 60.135 (c) (1)

Text of the Potential Uncertainty

It is uncertain if the statement in the above regulation, "all such radioactive wastes shall be in solid form", applies to spent fuel rods where fission product gases are contained and generated.

Clarification of the Commission's intent regarding permanent disposal of the radioactive gases contained in spent fuel rods is needed to achieve consistent interpretation and compliance.

Rationale for Inclusion

It has been argued that (1) Congress established in the NWPA that spent fuel is to be disposed of in a deep geologic repository, (2) the Commission, which is well aware that spent fuel contains gaseous fission products, chose not to raise the existence of such gases as a concern, and (3) this is an implied Commission approval of the disposal of such gases as part of the spent fuel. However, there appears to be no written evidence that this was the Commission intent. The presumption of approval would be difficult to substantiate in the absence of a record in the rulemaking.

In this case, there are (1) an explicit regulatory requirement that "All ... wastes shall be in solid form ...", (2) the known presence of radioactive gases in the wastes, and (3) open questions regarding the migration and release of gaseous nuclides in a fractured, unsaturated medium. Due to the specificity of the existing regulatory provision and the apparent inconsistency with the actual state of the waste, this perceived uncertainty regarding the NRC's intent remains.

D. T. Romine, 2/7/1990

From the current wording of 10 CFR 60.135(c)(1), it could be concluded that spent fuel rods, which contain radioactive gases, must be processed or treated so that no radioactive gases are left. If processing or treatment is required, consideration must be given to the containment of such radioactive gases during processing or treatment. (Reference 10).

E. Tschoepe, 11/4/1988, 12/16/1988

Another interpretation might be that spent fuel rods meet the requirement as a solid waste form, since radioactive gases are contained within the solid boundary of each fuel rod. This shows that the current wording allows a broad range of interpretation so that completely opposite meanings can be derived from the same text (Reference 10).

R. L. Wilbur, 12/1/1988

The Nuclear Waste Policy Act, as Amended, (Reference 20), is explicit in its intent that spent nuclear fuel from nuclear reactors be disposed of in the repository. However, 10 CFR 60.135(c)(1) states that "All such radioactive wastes shall be in solid form and placed in sealed containers." The fact that the "solid form" refers specifically to radioactive wastes implies that the irradiated reactor fuel itself (not the zircalloy tubing which contains it) must be of solid form.

E. Tschoepe, 2/15/1990

References for Inclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix, Uncertainty # 14.

(20) Nuclear Waste Policy Act, as Amended, (NWPAA), 42 USCS 10131, December 22, 1987.

REGULATORY REQUIREMENT RR2000: GROUNDWATER TRAVEL TIME

Primary Regulatory Text Citation

10CFR60 113 (a) (2) January 1, 1989

Associated Regulatory Text Citations

10CFR60 113 (b) * January 1, 1989

10CFR60 113 (c) January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0001 -- Fastest path of likely radionuclide travel

Parent Record: 10 CFR 60.113(a)(2) and 10 CFR 60.122(b)(7)

Excluded Uncertainty Text

The term "fastest path of likely radionuclide travel" was originally identified as a Regulatory Uncertainty because the fastest path of likely radionuclide travel could not be delineated with reasonable assurance given the state-of-the-knowledge of interactions in hydrologic systems. The Uncertainty was incorrectly identified as Regulatory rather than Technical.

Rationale for Exclusion

Relative to groundwater travel time the NRC has stated "...it is not certain that the fastest path of likely radionuclide travel" can be delineated with reasonable assurance in heterogeneous geologic materials present at real repository sites" (Reference 90). This statement correctly portrays the nature of the uncertainty associated with the GWTT portion of RR2000. Clearly the uncertainty in the statement concerns the technical feasibility of establishing the fastest path of radionuclide travel in rock present at a given site. Because the technical means of establishing the fastest path of likely radionuclide travel are not known at present, the original uncertainty is excluded as a Regulatory Uncertainty and is re-identified as a high-order Technical Uncertainty. This uncertainty will be included in future analyses of Technical Uncertainties.

Michael P. Miklas, Jr.
02/02/1990

Reference for Exclusion Rationale

(90) Regulatory Strategy and Schedules for the High-Level Waste Repository Program, SECY-88-285, Tana, E. T., Repository Licensing Project Directorate, U.S. Nuclear Regulatory Commission, October 1988, Enclosure 2.

REGULATORY REQUIREMENT RR2000: GROUNDWATER TRAVEL TIME

Primary Regulatory Text Citation

10CFR60 113 (a) (2) January 1, 1989

Associated Regulatory Text Citations

10CFR60 113 (b) * January 1, 1989

10CFR60 113 (c) January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0002 -- Disturbed zone

Parent Record: 10 CFR 60.113(a)(2), 10 CFR 60.122(b)(7) and 10 CFR 60.122(b)(5)

Excluded Uncertainty Text

The meaning and subsequent application of the term "disturbed zone" was thought to be unclear. It appears that the boundary of the disturbed zone must be understood before the disturbed zone can be defined, but in order to study and evaluate the disturbed zone the boundary of the disturbed zone must be defined.

Rationale for Exclusion

A potential Regulatory Uncertainty was identified dealing with the inability to clearly understand the meaning of the term "disturbed zone" as provided in the definitions in 10 CFR 60.2. Upon further review, it is evident that the uncertainty relative to the term "disturbed zone" exists because there is no current method which will allow establishment of the boundary of the disturbed zone in order to evaluate the effect of the disturbed zone on performance. This is a high-order Technical Uncertainty rather than a Regulatory Uncertainty. Coincidentally, the definition of "disturbed zone" is a part of the discussion of the GWTT concept and is, thus, also a part of the high-order Technical Uncertainty associated with that concept (see discussion of RR2001/UN0004 found in 10 CFR 60.122(b)(5)) and RR2002/UN0015 found in 10 CFR 60.122(b)(7), Favorable Conditions). This uncertainty will be included in future analyses of Technical Uncertainties.

Michael P. Miklas, Jr.
02/10/90

REGULATORY REQUIREMENT RR2000: GROUNDWATER TRAVEL TIME

Primary Regulatory Text Citation

10CFR60 113 (a) (2) January 1, 1989

Associated Regulatory Text Citations

10CFR60 113 (b) * January 1, 1989

10CFR60 113 (c) January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Anticipated processes and events

Parent Record: 10 CFR 60.113(b), 10 CFR 60.2, and 10 CFR 60.112

Text of the Potential Uncertainty

The term "anticipated processes and events" requires further definition to permit uniform interpretation of the regulatory requirement.

Rationale for Inclusion

A clear basis for distinguishing between the categories of anticipated and unanticipated processes and events is required because of their key position in the design and evaluation processes. Specifically,

(1) Anticipated Processes and Events (APEs) provide the primary design basis for the waste package and the balance of the engineered barriers (References 10 and 20);

(2) APEs, together with Unanticipated Processes and Events (UPEs), provide the basis for determination of compliance with the overall system performance objective of 10 CFR 60.112.

This uncertainty has been addressed previously. Initial criteria for identifying anticipated events appear in a Draft Technical Position entitled "Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events" (Reference 30). Clarification of the term is necessary to determine if the natural barriers, waste package, or engineered barrier system

are sufficient to comply with the required performance objectives of 10 CFR Part 60. (Reference 40)

R. L. Wilbur; M. P. Miklas, Jr.,
February 10, 1990

In the definition in 10 CFR 60.2, the distinction between anticipated and unanticipated processes and events is differentiated by whether or not it is "...reasonably likely to occur..." and "...sufficiently credible to warrant consideration...". In NUREG-0804 (Reference 10), it is noted that "...the distinction between anticipated and unanticipated processes and events relates solely to natural processes and events affecting the geologic setting...". This excludes anticipated and unanticipated events as part of the Engineered Barrier System analysis unless the projected change is related to an external natural occurrence (unexpected fatigue failure or unexpected change in microstructure of materials could not be considered, for example). It also excludes human activities when evaluating the engineered system except under the specific conditions in the 60.2 definition of UPEs. From the same reference, unanticipated processes and events are those which "...include processes and events which are not evidenced during the Quaternary Period or which, though evidenced during the Quaternary, are not likely to occur during the relevant time frame...". The criteria for "likely to occur" need to be defined to avoid inappropriate responses by DOE. Additionally, the Commission viewed the proposed Environmental Protection Agency (EPA) standard (40 CFR Part 191) as being directed to the evaluation of releases arising out of the categories that have been defined as "anticipated processes and events" and "unanticipated processes and events".

NUREG-0804 states that "...Such processes or events would not be anticipated unless they were reasonably likely, assuming that processes operating in the geologic setting during the Quaternary Period were to continue to operate but with the perturbations caused by the presence of emplaced waste superimposed thereon. Unanticipated processes and events would include those that are judged not to be reasonably likely to occur during the period the intended performance objective must be achieved, but which nevertheless are sufficiently credible to warrant consideration...." (Reference 10).

R. F. Weiner, May, 1989

References for Inclusion Rationale

(10) Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories", NUREG-0804, December 1983, Page 19-20.

(20) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Description of Uncertainties being Addressed by the U.S. Nuclear Regulatory Commission Staff, SECY-89-339, U.S. Nuclear Regulatory Commission, October 31, 1989.

(30) Draft Generic Technical Position, Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events, Div. of High-Level Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, February, 1988.

(40) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Report to the Commissioners from the General Counsel, SECY-88-285, U.S. Nuclear Regulatory Commission, October 5, 1988.

REGULATORY REQUIREMENT RR2000: GROUNDWATER TRAVEL TIME

Primary Regulatory Text Citation

10CFR60 113 (a) (2) January 1, 1989

Associated Regulatory Text Citations

10CFR60 113 (b) * January 1, 1989

10CFR60 113 (c) January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0004 -- Unanticipated processes and events

Parent Record: 10 CFR 60.113(c), 10 CFR 60.2, and 10 CFR 60.112

Text of the Potential Uncertainty

The term "unanticipated processes and events" requires further definition to permit uniform interpretation of the regulatory requirement.

Rationale for Inclusion

A clear basis for distinguishing between the categories of anticipated and unanticipated processes and events is required because of their key position in the design and evaluation processes. Specifically,

(1) Anticipated Processes and Events (APEs) provide the primary design basis for the waste package and the balance of the engineered barriers (References 10 and 20);

(2) APEs, together with Unanticipated Processes and Events (UPEs), provide the basis for determination of compliance with the overall system performance objective of 10 CFR 60.112.

This uncertainty has been addressed previously. Initial criteria for identifying unanticipated events appear in a Draft Technical Position entitled "Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events" (Reference 30). Clarification of the term is necessary to determine if the natural barriers, waste package, or engineered barrier system

are sufficient to comply with the required performance objectives of 10 CFR Part 60. (Reference 40)

R. L. Wilbur; M. P. Miklas, Jr.
February 10, 1990

In the definition in 10 CFR 60.2, the distinction between anticipated and unanticipated processes and events is differentiated by whether or not it is "...reasonably likely to occur..." and "...sufficiently credible to warrant consideration...". In NUREG-0804 (Reference 10), it is noted that "...the distinction between anticipated and unanticipated processes and events relates solely to natural processes and events affecting the geologic setting...". This excludes anticipated and unanticipated events as part of the Engineered Barrier System analysis unless the projected change is related to an external natural occurrence (unexpected fatigue failure or unexpected change in microstructure of materials could not be considered, for example). It also excludes human activities when evaluating the engineered system except under the specific conditions in the 60.2 definition of UPEs. From the same reference, unanticipated processes and events are those which "...include processes and events which are not evidenced during the Quaternary Period or which, though evidenced during the Quaternary, are not likely to occur during the relevant time frame...". The criteria for "likely to occur" need to be defined to avoid inappropriate responses by DOE. Additionally, the Commission viewed the proposed Environmental Protection Agency (EPA) standard (40 CFR Part 191) as being directed to the evaluation of releases arising out of the categories that have been defined as "anticipated processes and events" and "unanticipated processes and events".

NUREG-0804 states that "...Such processes or events would not be anticipated unless they were reasonably likely, assuming that processes operating in the geologic setting during the Quaternary Period were to continue to operate but with the perturbations caused by the presence of emplaced waste superimposed thereon. Unanticipated processes and events would include those that are judged not to be reasonably likely to occur during the period the intended performance objective must be achieved, but which nevertheless are sufficiently credible to warrant consideration..." (Reference 10).

R. F. Weiner, May, 1989

References for Inclusion Rationale

(10) Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories", NUREG-0804, December 1983, Page 19-20.

(20) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Description of Uncertainties being Addressed

by the U.S. Nuclear Regulatory Commission Staff, SECY-89-339, U.S. Nuclear Regulatory Commission, October 31, 1989.

(30) Draft Generic Technical Position, Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events, Div. of High-Level Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, February, 1988.

(40) Regulatory Strategy and Schedules for the High-Level Waste Repository Program: Report to the Commissioners from the General Counsel, SECY-88-285, U.S. Nuclear Regulatory Commission, October 5, 1988.

REGULATORY REQUIREMENT RR0055: LAND OWNERSHIP AND CONTROL

Primary Regulatory Text Citation

10CFR60 121 (a) * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Milestone for Land Ownership and Control

Parent Record: 10 CFR 60.121(a)(1)

Text of the Potential Uncertainty

The implied interpretation that land use and control need not be established until construction authorization has been granted needs clarification. The NRC review and approval of the construction authorization (license) application will provide the only opportunity to evaluate a demonstration of adequate land ownership and control.

Rationale for Inclusion

The requirement for unencumbered ownership and control must be established and demonstrated to the NRC, at the time of application of construction authorization to provide assurance that the applicant can both limit access and prevent intrusion during construction, operation and closure. A clarification to this effect in the public record and/or a milestone reference would eliminate any question as to the extent of control and the timing by which it must be accomplished.

J. Hageman, 2/9/90

REGULATORY REQUIREMENT RR2001: FAVORABLE CONDITIONS

Primary Regulatory Text Citation

10CFR60 122 (a) (1) January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) * January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0001 -- Quaternary Period

Parent Record: 10 CFR 60.122(b)(1), 10 CFR 60.122(c)(15), and 10 CFR 60.122(c)(16)

Excluded Uncertainty Text

The length of time to be included in the "Quaternary Period" is not defined in the regulation. The actual time span to be included in the Quaternary for purposes of site analysis needs to be clarified so that the appropriate time frame will be used in the DOE studies.

Rationale for Exclusion

The definition of the term "Quaternary Period" varies from author to author and organization to organization within the scientific literature. Since the calculation of rates of activity, periodicities, and absolute need for age consideration will vary with the different lengths of time that could be assigned to the Quaternary Period, the length of the time to be considered by the DOE for the Quaternary Period appears to need clarification.

However, in NUREG-0804 on page 373 (Reference 70), the NRC provides a definition of the Quaternary Period, as follows, "Although there is still debate in the geological community concerning the precise age of the Quaternary Period, the staff believes that for regulatory purposes an age of 2 million years is appropriate. This is because most geologists would assign an age of approximately 2 million years to the lower limit of the Quaternary Period (Plio/Pleistocene boundary), based upon results of investigations on deep sea cores and on the Calabria, Italy, section. The staff considers that it is not necessary to quantify or define the term 'Quaternary' [further]. However, in recognition of the lack of precision concerning the start of the Quaternary Period, staff has used the language 'during the Quaternary Period' rather than 'since

the start of the Quaternary Period' in revised Section 60.122."

Michael P. Miklas, Jr.
12/19/89

Reference for Exclusion Rationale

(70) Staff Analysis of Public Comments on Proposed Rule 10 CFR 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories" NUREG-0804, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, December 1983, Page 373

REGULATORY REQUIREMENT RR2001: FAVORABLE CONDITIONS

Primary Regulatory Text Citation

10CFR60 122 (a) (1) January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) * January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0002 -- Fastest path of likely radionuclide travel

Parent Record: 10 CFR 60.122(b)(7) and 10 CFR 60.113

Excluded Uncertainty Text

The term "fastest path of likely radionuclide travel" was originally identified as a Regulatory Uncertainty because the fastest path of likely radionuclide travel could not be delineated with reasonable assurance given the state-of-the-knowledge of interactions in hydrologic systems. The Uncertainty was incorrectly identified as a Regulatory Uncertainty rather than a Technical Uncertainty.

Rationale for Exclusion

Relative to groundwater travel time the NRC has stated "...it is not certain that the fastest path of likely radionuclide travel" can be delineated with reasonable assurance in heterogeneous geologic materials present at real repository sites" (Reference 90). This statement correctly portrays the nature of the uncertainty associated with the GWTT portion of RR2000. Clearly the uncertainty in the statement concerns the technical feasibility of establishing the fastest path of radionuclide travel in rock present at a given site. Because the technical means of establishing the fastest path of likely radionuclide travel are not known at present, the original uncertainty is excluded as a Regulatory Uncertainty and is re-identified as a high-order Technical Uncertainty. This uncertainty will be included in future analyses of Technical Uncertainties.

Michael P. Miklas, Jr.
02/02/1990

Reference for Exclusion Rationale

(90) Regulatory Strategy and Schedules for the High-Level Waste Repository Program, SECY-88-285, Tana, E. T., Repository Licensing Project Directorate, U.S. Nuclear Regulatory Commission, October 1988, Enclosure 2.

REGULATORY REQUIREMENT RR2001: FAVORABLE CONDITIONS

Primary Regulatory Text Citation

10CFR60 122 (a) (1) January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) * January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Geologic setting

Parent Record: 10 CFR 60.122(b)(1) -- (see note)

Text of the Potential Uncertainty

The definition of the term "geologic setting", as used throughout 10 CFR 60.122 and defined in 10 CFR 60.2, is ambiguous. A rulemaking (Generic Technical Position, Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events) is currently underway and will include clarification of the definition of the term.

Rationale for Inclusion

The NRC staff determined that the term "geologic setting contained ambiguity. The DOE, at a Tectonics Technical Exchange on October 31, 1989, questioned the meaning of "geologic setting" relative to the area which was supposed to be considered as a part of the "geologic setting." The DOE did not know how the setting was to be bounded and whether "geologic setting" would apply to different sized regions for the different types of geologic processes which might be found at a site.

Michael P. Miklas, Jr.
12/19/89

NOTE: The term "geologic setting" is identified as an Uncertainty in RR2001 and in RR2002 through RR2025 but it is not noted as an uncertainty in all other locations where it appears.

There are eighteen (18) occurrences of the term in the Regulation. The term is found in the following paragraphs: 10CFR60.2, 60.21(c)(1)(ii)(F), 60.21(c)(13), 60.32(c), 60.101(a)(2), 60.102(c), 60.102(e)(2), 60.112, 60.113(a)(1)(i)(B), 60.113(a)(2), 60.122(a)(1), 60.122(b)(1),

60.122(b)(6), 60.122(c)(14), 60.122(c)(17)(ii), 60.133(h), 60.135(a)(1), and 60.140(d)(2).

Because the uncertainty is based on the definition of the term, all occurrences are identified as Uncertainties but will be discussed in full only in RR2001 and RR2002 through RR2025 (the Potentially Adverse Conditions) which deal primarily with the "geologic setting" itself.

Michael P. Miklas, Jr.
02/14/90

REGULATORY REQUIREMENT RR2001: FAVORABLE CONDITIONS

Primary Regulatory Text Citation

10CFR60 122 (a) (1) January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) * January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0004 -- Disturbed zone

Parent Record: 10 CFR 60.122(b)(5), 10 CFR 60.122(b)(7), and 10 CFR 60.113

Excluded Uncertainty Text

The meaning and subsequent application of the term "disturbed zone" was thought to be unclear. It appears that the boundary of the disturbed zone must be understood before the disturbed zone can be defined, but in order to study and evaluate the disturbed zone the boundary of the disturbed zone must be defined.

Rationale for Exclusion

A potential Regulatory Uncertainty was identified dealing with the inability to clearly understand the meaning of the term "disturbed zone" as provided in the definitions in 10 CFR 60.2. Upon further review, it is evident that the uncertainty relative to the term "disturbed zone" exists because there is no current method which will allow establishment of the boundary of the disturbed zone in order to evaluate the effect of the disturbed zone on performance. This is a high-order Technical Uncertainty rather than a Regulatory Uncertainty. Coincidentally, the definition of "disturbed zone" is a part of the discussion of the GWTT concept and is, thus, also a part of the high-order Technical Uncertainty associated with that concept (see discussion of RR2000/UN0002 found in 10 CFR 60.113 and RR2002/UN0015 found in 10 CFR 60.122(b)(7), Favorable Conditions). This uncertainty will be included in future analyses of Technical Uncertainties.

Michael P. Miklas, Jr.
02/10/90

NOTE

UNCERTAINTIES IN 10 CFR 60.122(a)(2), 60.122(b), AND 60.122(c)

The following seven uncertainties are common to regulatory requirements RR2002 through RR2025. With the exception of UN0017, these uncertainties primarily involve clarification of the intent of the indicated phrases.

UN0001 "taking into account the degree of resolution" achieved by the investigations [60.122(a)(2)(i)],

UN0002 "not to affect significantly" the ability of the geologic repository to meet the performance objectives [60.122(a)(2)(iii)(A)],

UN0003 the effect . . on the site has been "adequately evaluated" [60.122(a)(2)(ii)],

UN0004 "not likely to underestimate [the] effect" on the site [60.122(a)(2)(ii)],

UN0005 potentially adverse . . condition has been "adequately investigated" [60.122(a)(2)(i)],

UN0012 "geologic setting" [60.122(b)(1) and 60.122(b)(6)],

UN0017 Inconsistency in treatment of combinations of potentially adverse conditions [60.122 and 60.21(c)(1)(ii)(C)]

In the interest of brevity, the complete descriptions of these seven uncertainties are included only with regulatory requirement RR2002, which treats the potentially adverse condition of 60.122(c)(1). Regulatory requirements RR2003 through RR2025 include the potentially adverse conditions of, respectively, 60.122(c)(2) through 60.122(c)(24). See Table 1 for a complete list of the regulatory texts that make up each of these regulatory requirements.

Please note that regulatory requirements RR2004, RR2005, RR2009, RR2011, RR2015, RR2016, RR2019, RR2020, and RR2025 each have one additional uncertainty. Regulatory requirement RR2017 has two additional uncertainties. These eleven additional uncertainties related to potential adverse conditions are discussed in order following RR2002.

TABLE 1

REGULATORY REQUIREMENT (RR) NO. (RRxxxx)	REGULATORY TEXTS OF EACH RR
RR2002	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(1)
RR2003	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(2)
RR2004	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(3)
RR2005	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(4)
RR2006	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(5)
RR2007	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(6)
RR2008	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(7)

TABLE 1
(Continued)

REGULATORY REQUIREMENT (RR) NO. (RRxxxx)	REGULATORY TEXTS OF EACH RR
RR2009	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(8)
RR2010	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(9)
RR2011	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(10)
RR2012	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(11)
RR2013	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(12)
RR2014	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(13)
RR2015	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(14)

TABLE 1
(Continued)

REGULATORY REQUIREMENT (RR) NO. (RRxxxx)	REGULATORY TEXTS OF EACH RR
RR2016	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(15)
RR2017	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(16)
RR2018	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(17)
RR2019	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(18)
RR2020	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(19)
RR2021	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(20)
RR2022	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(21)

TABLE 1
(Continued)

REGULATORY REQUIREMENT (RR) NO. (RRxxxx)	REGULATORY TEXTS OF EACH RR
RR2023	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(22)
RR2024	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(23)
RR2025	10 CFR 60.122(a)(2) 10 CFR 60.122(b) 10 CFR 60.122(c) 10 CFR 60.122(c)(24)

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Taking into account the degree of resolution

Parent record: 10 CFR 60.122(a)(2)(i)

Text of the Potential Uncertainty

The intended meaning of the phrase "taking into account the degree of resolution of the investigations" should be clarified so that the DOE has clear guidance on the NRC requirement to adequately investigate aspects of the given adverse condition necessary to support the license application.

Rationale for Inclusion

In 60.122(a)(2)(i) "take into account" could imply that some weighting should be applied to the possibility of undetected adverse conditions and the probability of their occurrence and possible effect on the performance expectations. It could also mean that a safety margin (large allowance for uncertainty) or high statistical confidence be applied to the evaluation of the adverse condition during the consideration process.

The "degree of resolution" may be interpreted as the precision (scale of numerical assessment) with which the potentially adverse condition is evaluated, or the relative importance of differing types of evaluations. Alternatively, "taking into account the degree of resolution" could mean that the evaluations recognize the uncertainties inherent in any

geologic investigations such as the resolution of exploratory seismic methods in detecting faults. Another interpretation might be that the accuracy of measurement of the potential adverse condition be used to assess the relative importance of the measured values and that this relative importance be used in the overall assessment.

Michael P. Miklas, Jr.
12/19/89

It has been suggested that the perceived uncertainty in the Regulation was intended. There would seem to be limited value in such regulatory flexibility in this instance when one considers the potential for License Application evaluation delays in which the alleged cause of unacceptable DOE investigations/analyses may be ambiguous NRC requirements. The NRC must at some point define the License Application evaluation criteria. It would appear to be advantageous to all parties if at least the generic, high-order decision criteria were developed prior to the start of or at the latest early in the conduct of the site characterization activities to which they apply. The NRC should clarify the meaning of the existing language "taking into account the degree of resolution achieved by the investigations" and define the criteria by which the adequacy of the "taking into account" will be judged.

D. Ted Romine
Michael P. Miklas, Jr.
02/10/90

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0002 -- Not to affect significantly

Parent record: 10 CFR 60.122(a)(2)(iii)(A)

Text of potential uncertainty

The meaning of the phrase "not to affect significantly" in 60.122(a)(2)(iii)(A) should be clarified in order for the DOE to demonstrate that the activity or condition in question does or does not exceed the level of effect considered important to the ability of a geologic repository to meet the performance objectives.

Rationale for Inclusion

The meaning of "not to affect significantly" is not clear even when the words of NUREG-0804 (Reference 40) are considered. It is not possible to determine if the Commission intends for "significant effects" to be those that imperil the performance objectives or whether the "significant effects" are those effects which are perceived as larger than normal and which might affect the geologic setting, though not egregiously, with respect to the performance objectives.

Michael P. Miklas, Jr. &
John T. O'Brien,
07/07/89

If the NRC intended the Regulation to be specific to the breaching of performance objectives but did not so state, there is the possibility that the DOE will incorrectly

consider some effects as significant even though the effects do not cause the performance objectives to be breached. The NRC needs to clarify the meaning of the existing language for DOE by identifying whether a significant effect is one which causes the performance objectives to be breached or is defined by some other criteria to be used to determine "significance."

Michael P. Miklas, Jr.
02/10/90

Reference for Inclusion Rationale

(40) Staff Analysis of Public Comments on Proposed Rule 10 CFR 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories" NUREG-0804, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, December 1983, Page 56.

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0003 -- Adequately evaluated

Parent Record: 10 CFR 60.122(a)(2)(ii)

Text of the Potential Uncertainty

The high-order criteria for adequacy of evaluations should be defined to guide the DOE in determining what types of evaluations are appropriate and how extensive and intensive they should be. Since the technical means of evaluating the 24 different potentially adverse conditions will vary considerably, evaluation criteria should specific to the particular adverse condition. The different evaluation criteria will be critical to the NRC assessment of the completeness of the individual technical evaluations which will be presented by DOE in the license submittal.

Rationale for Inclusion

A Workshop group on Extreme Erosion at NRC headquarters, June 20 - 24, 1989, decided that the Regulation was not clear as to what constitutes an "adequate evaluation." The only direction given in 10 CFR 60.122(a)(2)(ii) bearing on "adequate evaluation" refers to "analyses which are sensitive...and assumptions which are not likely to underestimate its (the condition's) effect." The definition of "adequately evaluated" will change with each adverse condition that is

considered and with each method of analysis used on the collected information.

Michael P. Miklas, Jr.
12/19/89

It has been suggested that the perceived uncertainty in the Regulation was intended. There would seem to be limited value in such regulatory flexibility in this instance when one considers the potential for License Application evaluation delays in which the alleged cause of unacceptable DOE investigations/analyses may be ambiguous NRC requirements. The NRC must at some point define the License Application evaluation criteria. It would appear to be advantageous to all parties if at least the generic, high-order decision criteria were developed prior to the start of or at the latest early in the conduct of the site characterization activities to which they apply. The NRC should clarify the meaning of the existing language "adequately evaluated" and define the criteria by which the adequacy of the "adequate evaluation" will be judged.

D. Ted Romine;
Michael P. Miklas, Jr.
02/10/90

It has been argued that the terms "adequately investigated" and "adequately evaluated" should not be identified as uncertainties because any uncertainty inherent within them would be subsumed by a Commission finding of "reasonable assurance" that the performance objectives would be met at a given site. It was argued that the relationship between these uncertainties and the establishment of "reasonable assurance" (explicitly called for in 60.122(a)(1) and required in order to adjudge performance in 60.112 and 60.113) is such that these uncertainties are resolved by a finding that the performance objectives will be met with "reasonable assurance."

An examination of this argument led to the following definition of the relationship of 60.112 and 60.122: 1) A complete understanding of one set of requirements is only possible in the context of the other however, the Regulatory Requirements of 60.122 are distinct from those of 60.112. Consequently, the uncertainties associated with those requirements are distinct from each other, 2) the subject uncertainties are Regulatory Uncertainties in as much as they address what must be done (as opposed to how it may be done) in investigating, and evaluating the Potentially Adverse Conditions, 3) assessments of compliance with 60.122 must be separate from assessments of compliance with 60.112, but must be done in the context of the performance objectives of 60.112, and 4) a determination that the subject condition was adequately investigated and adequately evaluated is an essential prerequisite to a determination of reasonable assurance.

More complete discussions and conclusions on each of these aspects follow.

1) RELATIONSHIPS OF THE BASIC REGULATORY REQUIREMENTS

The subsections of 60.122 comprise Regulatory Requirements, in and of themselves. These Regulatory Requirements are distinct from those in 60.112 but the associated compliance determinations are not independent. The bases for this conclusion are:

- The structure of the regulation at the highest level makes this distinction, i.e. the Regulatory Requirements of 60.122 are Siting Criteria whereas 60.112 (as well as 60.111 and 60.113) are Performance Objectives for the geologic setting and the engineered barrier systems;

- The need and general method for separate evaluations of compliance are stated explicitly within 60.122;

- The text of 60.101 explicitly requires evaluations of compliance with regard to both the "objectives" and the "criteria" of Subpart E.

Although the language and structure of 60.122(c) indicates that these are separate requirements, they logically "roll up": first to be combined with the Favorable conditions in 60.122(b) (in accordance with the provisions of 60.122(a)), and then to satisfy the Performance Objectives of 60.112. As noted above, the relationship between 60.122 and 60.112 may also exist with respect to 60.113 but was not addressed in this meeting.

2) RELATIONSHIPS OF THE UNCERTAINTIES

The noted terms are Regulatory Uncertainties inasmuch as neither DOE nor NRC knows what (or "how much") is needed to support a finding of "reasonable assurance" regarding the Performance Objectives. Technical Uncertainties arise when there are questions concerning methods, e.g. how one would conduct an investigation, perform an evaluation, obtain data, etc. There may also be Technical Uncertainties regarding, for example, the methodology that would produce an adequate investigation of a particular condition or parameter, but such uncertainties are separate from the uncertainties in the language or intent.

The uncertainties in the language of 60.122 are uncertainties in and of themselves. This follows directly from 1) above in that the Regulatory Requirements from which these uncertainties arise are themselves separate. As a consequence, the uncertainties in 60.122 require clarification separately from any uncertainties which may be present in 60.112.

An argument was made that the subject uncertainties do not exist because "adequately investigated" and "adequately evaluated" are defined in the context of the Performance Objectives. The principal points supporting this argument are as follows:

- If a finding is made in the affirmative regarding 60.112, then the investigation must have been "adequate" (for example).

- Conversely, it is impossible to make an affirmative finding (i.e. it is impossible to satisfy the Performance Objectives) without, for example, an "adequate investigation".

- Implicitly, DOE knows what to do regarding characterization simply by virtue of knowing that the Performance Objectives must be satisfied. Hence, DOE knows what the various terms such as "adequately evaluated" mean.

The argument that the Uncertainties accrue from 60.122 to 60.112 was not accepted for the following reasons:

- Performance Objectives can "appear" to be met or "be judged" to be satisfied, but an intervening party or the NRC could still question the "adequacy" of the investigation or evaluation that supported that judgment. For example, the argument could be made that the investigation was not "adequate" to support a finding with reasonable assurance.

- The accrual position must (of necessity) delay judging such matters as the "adequacy" of the investigation or evaluation until after a determination has been made regarding compliance with the Performance Objectives. This judgment would come very late in the process, almost certainly leading to delays in the license review process. Even taking into account the concept of iterative performance assessment, the process of coming to closure on such matters as the "adequacy" of investigation could be protracted because the finding of "reasonable assurance" comes at the end of the process. Such an approach would appear to be contrary to the goal of streamlining the licensing process.

- Several examples exist (including those arising during the Site Characterization Plan comment process) which suggest that DOE does not have a clear understanding of what constitutes, for example, an "adequate investigation". This suggests that simply knowing that the Performance Objectives must be met does not provide sufficient criteria for determining the operational meaning of such terms as "adequately investigate". (Note, however, that the pre-licensing consultative process may be an effective means

of providing such additional criteria and guidance as may be needed).

Wes Patrick;
D. Ted Romine;
Michael P. Miklas, Jr.,
2/11/90

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0004 -- Not likely to underestimate its effect

Parent record: 10 CFR 60.122(a)(2)(ii)

Text of the Potential Uncertainty

The meaning of the term "not likely to underestimate its effect" is unclear. The criteria for acceptability of a given estimated value, in order for the value to be judged acceptable within the definition "not likely to underestimate its effect", should be provided to DOE to allow an appropriate DOE assessment.

Rationale for Inclusion

The Erosion Workshop group in June, 1989 identified this portion of the requirement as an uncertainty because it was thought not possible to determine what level of estimation was sufficient to satisfy the requirement. That is, would a marginal estimation (i.e. one that barely crossed a preferred threshold) be considered as adequate as an estimation that provided a major margin of safety? Additionally, how would the DOE decide what was the threshold for estimations?

In NUREG-0804 (Reference 10) the following is found: "The wording 'conservative analyses and assumptions' has been replaced with 'assumptions which are not likely to underestimate its effect.' The staff considered this change to alleviate the concern expressed in the comment." The

original concern was expressed as follows: "This paragraph should be changed to read '...evaluated using realistic analyses and assumptions,...' The use of 'conservative analyses and assumptions' (originally proposed by the NRC) in analyzing potential events can result in a lack of balance in the evaluation of a site and the rejection of, what is in fact, a good site."

Michael P. Miklas, Jr.
12/19/89

It has been suggested that the perceived uncertainty in the Regulation was intended. There would seem to be limited value in such regulatory flexibility in this instance when one considers the potential for License Application evaluation delays in which the alleged cause of unacceptable DOE investigations/analyses may be ambiguous NRC requirements. The NRC must at some point define the License Application evaluation criteria. It would appear to be advantageous to all parties if at least the generic, high-order decision criteria were developed prior to the start of, or, at the latest, early in the conduct of, the site characterization activities to which they apply. The NRC should clarify the meaning of the existing language "not likely to underestimate its effect" and define the criteria by which the adequacy of the DOE "estimation of effect" will be judged.

D. Ted Romine
Michael P. Miklas, Jr.
02/10/90

Reference for Inclusion Rationale

(10) Staff Analysis of Public Comments on Proposed Rule 10 CFR 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories" NUREG-0804, Office of Nuclear Regulatory Research, U.S.Nuclear Regulatory Commission, December 1983, Page 393.

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0005 -- Adequately investigated

Parent Record: 10 CFR 60.122(a)(2)(i)

Text of the Potential Uncertainty

The criteria for "adequate investigation", should be defined sufficiently to guide the DOE in determining what types and scopes of investigations are appropriate.

Rationale for Inclusion

Since the precise technical nature of the different adverse conditions varies considerably, these criteria should include the factors specific to each adverse condition which will be viewed as critical in the NRC evaluation of the completeness of individual technical investigations presented by DOE in the license submittal. The NRC and Center attendees at the Erosion Workshop (06/19/89) agreed that the term requires clarification if DOE is to respond acceptably to the Regulation in their license application.

Michael P. Miklas, Jr.
12/19/89

It has been suggested that the perceived uncertainty in the Regulation was intended. There would seem to be limited value in such regulatory flexibility in this instance when one considers the potential for License Application evaluation delays in which the alleged cause of unacceptable DOE

investigations/analyses may be ambiguous NRC requirements. The NRC must at some point define the License Application evaluation criteria. It would appear to be advantageous to all parties if at least the generic, high-order decision criteria were developed prior to the start of or at the latest early in the conduct of the site characterization activities to which they apply. The NRC should clarify the meaning of the existing language "adequately investigated" and define the criteria by which the adequacy of the "investigation" will be judged.

D. Ted Romine;
Michael P. Miklas, Jr.
02/10/90

It has been argued that the terms "adequately investigated" and "adequately evaluated" should not be identified as uncertainties because any uncertainty inherent within them would be subsumed by a Commission finding of "reasonable assurance" that the performance objectives would be met at a given site. It was argued that the relationship between these uncertainties and the establishment of "reasonable assurance" (explicitly called for in 60.122(a)(1) and required in order to adjudge performance in 60.112 and 60.113) is such that these uncertainties are resolved by a finding that the performance objectives will be met with "reasonable assurance."

An examination of this argument led to the following definition of the relationship of 60.112 and 60.122: 1) A complete understanding of one set of requirements is only possible in the context of the other however, the Regulatory Requirements of 60.122 are distinct from those of 60.112. Consequently, the uncertainties associated with those requirements are distinct from each other, 2) the subject uncertainties are Regulatory Uncertainties in as much as they address what must be done (as opposed to how it may be done) in investigating, and evaluating the Potentially Adverse Conditions, 3) assessments of compliance with 60.122 must be separate from assessments of compliance with 60.112, but must be done in the context of the performance objectives of 60.112, and 4) a determination that the subject condition was adequately investigated and adequately evaluated is an essential prerequisite to a determination of reasonable assurance.

More complete discussions and conclusions on each of these aspects follow.

1) RELATIONSHIPS OF THE BASIC REGULATORY REQUIREMENTS

The subsections of 60.122 comprise Regulatory Requirements, in and of themselves. These Regulatory Requirements are distinct from those in 60.112 but the associated compliance

determinations are not independent. The bases for this conclusion are:

- The structure of the regulation at the highest level makes this distinction, i.e. the Regulatory Requirements of 60.122 are Siting Criteria whereas 60.112 (as well as 60.111 and 60.113) are Performance Objectives for the geologic setting and the engineered barrier systems;

- The need and general method for separate evaluations of compliance are stated explicitly within 60.122;

- The text of 60.101 explicitly requires evaluations of compliance with regard to both the "objectives" and the "criteria" of Subpart E.

Although the language and structure of 60.122(c) indicates that these are separate requirements, they logically "roll up": first to be combined with the Favorable conditions in 60.122(b) (in accordance with the provisions of 60.122(a)), and then to satisfy the Performance Objectives of 60.112. As noted above, the relationship between 60.122 and 60.112 may also exist with respect to 60.113 but was not addressed in this meeting.

2) RELATIONSHIPS OF THE UNCERTAINTIES

The noted terms are Regulatory Uncertainties inasmuch as neither DOE nor NRC knows what (or "how much") is needed to support a finding of "reasonable assurance" regarding the Performance Objectives. Technical Uncertainties arise when there are questions concerning methods, e.g. how one would conduct an investigation, perform an evaluation, obtain data, etc. There may also be Technical Uncertainties regarding, for example, the methodology that would produce an adequate investigation of a particular condition or parameter, but such uncertainties are separate from the uncertainties in the language or intent.

The uncertainties in the language of 60.122 are uncertainties in and of themselves. This follows directly from 1) above in that the Regulatory Requirements from which these uncertainties arise are themselves separate. As a consequence, the uncertainties in 60.122 require clarification separately from any uncertainties which may be present in 60.112.

An argument was made that the subject uncertainties do not exist because "adequately investigated" and "adequately evaluated" are defined in the context of the Performance Objectives. The principal points supporting this argument are as follows:

- If a finding is made in the affirmative regarding 60.112, then the investigation must have been "adequate" (for example).

- Conversely, it is impossible to make an affirmative finding (i.e. it is impossible to satisfy the Performance Objectives) without, for example, an "adequate investigation".

- Implicitly, DOE knows what to do regarding characterization simply by virtue of knowing that the Performance Objectives must be satisfied. Hence, DOE knows what the various terms such as "adequately evaluated" mean.

The argument that the Uncertainties accrue from 60.122 to 60.112 was not accepted for the following reasons:

- Performance Objectives can "appear" to be met or "be judged" to be satisfied, but an intervening party or the NRC could still question the "adequacy" of the investigation or evaluation that supported that judgment. For example, the argument could be made that the investigation was not "adequate" to support a finding with reasonable assurance.

- The accrual position must (of necessity) delay judging such matters as the "adequacy" of the investigation or evaluation until after a determination has been made regarding compliance with the Performance Objectives. This judgment would come very late in the process, almost certainly leading to delays in the license review process. Even taking into account the concept of iterative performance assessment, the process of coming to closure on such matters as the "adequacy" of investigation could be protracted because the finding of "reasonable assurance" comes at the end of the process. Such an approach would appear to be contrary to the goal of streamlining the licensing process.

- Several examples exist (including those arising during the Site Characterization Plan comment process) which suggest that DOE does not have a clear understanding of what constitutes, for example, an "adequate investigation". This suggests that simply knowing that the Performance Objectives must be met does not provide sufficient criteria for determining the operational meaning of such terms as "adequately investigate". (Note, however, that the pre-licensing consultative process may be an effective means of providing such additional criteria and guidance as may be needed).

Wes Patrick;
D. Ted Romine;
Michael P. Miklas, Jr.
02/11/90

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0012 -- Geologic setting

Parent Record: 10 CFR 60.122(b) -- (see note)

Text of the Potential Uncertainty

The definition of the term "geologic setting", as used throughout 10 CFR 60.122 and defined in 10 CFR 60.2, is ambiguous. A rulemaking (Generic Technical Position, Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events) is currently underway which will include clarification of the definition of the term.

Rationale for Inclusion

The NRC staff determined that the term "geologic setting contained ambiguity. The DOE, at a Tectonics Technical Exchange on October 31, 1989, questioned the meaning of "geologic setting" relative to the area which was supposed to be considered as a part of the "geologic setting." The DOE did not know how the setting was to be bounded and whether "geologic setting" would apply to different sized regions for the different types of geologic processes which might be found at a site.

Michael P. Miklas, Jr.
12/19/89

NOTE: The term "geologic setting" is identified as an Uncertainty in RR2001 and in RR2002 through RR2025 but it is not noted as an uncertainty in all other locations where it appears.

There are eighteen (18) occurrences of the term in the Regulation. The term is found in the following paragraphs: 10CFR60.2, 60.21(c)(1)(ii)(F), 60.21(c)(13), 60.32(c), 60.101(a)(2), 60.102(c), 60.102(e)(2), 60.112, 60.113(a)(1)(i)(B), 60.113(a)(2), 60.122(a)(1), 60.122(b)(1), 60.122(b)(6), 60.122(c)(14), 60.122(c)(17)(ii), 60.133(h), 60.135(a)(1), and 60.140(d)(2).

Because the uncertainty is based on the definition of the term, all occurrences are identified as Uncertainties but will be discussed in full only in RR2001 and RR2002 through RR2025(the Potentially Adverse Conditions) which deal primarily with the "geologic setting" itself.

Michael P. Miklas, Jr.
02/14/90

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0014 -- Fastest path of likely radionuclide travel

Parent Record: 10 CFR 60.122(b)(7) and 10 CFR 60.113

Excluded Uncertainty Text

The term "fastest path of likely radionuclide travel" was originally identified as a Regulatory Uncertainty because the fastest path of likely radionuclide travel could not be delineated with reasonable assurance given the state-of-the-knowledge of interactions in hydrologic systems. The Uncertainty was incorrectly identified as a Regulatory Uncertainty rather than a Technical Uncertainty.

Rationale for Exclusion

Relative to groundwater travel time the NRC has stated "...it is not certain that the fastest path of likely radionuclide travel" can be delineated with reasonable assurance in heterogeneous geologic materials present at real repository sites" (Reference 90). This statement correctly portrays the nature of the uncertainty associated with the GWTT portion of RR2000. Clearly the uncertainty in the statement concerns the technical feasibility of establishing the fastest path of radionuclide travel in rock present at a given site. Because the technical means of establishing the fastest path of likely radionuclide travel are not known at present, the original uncertainty is excluded as a Regulatory Uncertainty and is re-identified as a high-order Technical Uncertainty. This

uncertainty will be included in future analyses of Technical Uncertainties.

Michael P. Miklas, Jr.
02/02/1990

Reference for Exclusion Rationale

(90) Regulatory Strategy and Schedules for the High-Level Waste Repository Program, SECY-88-285, Tana, E. T., Repository Licensing Project Directorate, U.S. Nuclear Regulatory Commission, October 1988, Enclosure 2.

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0015 -- Disturbed zone

Parent Record: 10 CFR 60.122(b)(7), 10 CFR 60.122(b)(5), and 10 CFR 60.113

Excluded Uncertainty Text

The meaning and subsequent application of the term "disturbed zone" was thought to be unclear. It appears that the boundary of the disturbed zone must be understood before the disturbed zone can be defined, but in order to study and evaluate the disturbed zone the boundary of the disturbed zone must be defined.

Rationale for Exclusion

A potential Regulatory Uncertainty was identified dealing with the inability to clearly understand the meaning of the term "disturbed zone" as provided in the definitions in 10 CFR 60.2. Upon further review, it is evident that the uncertainty relative to the term "disturbed zone" exists because there is no current method which will allow establishment of the boundary of the disturbed zone in order to evaluate the effect of the disturbed zone on performance. This is a high-order Technical Uncertainty rather than a Regulatory Uncertainty. Coincidentally, the definition of "disturbed zone" is a part of the discussion of the GWTT concept and is, thus, also a part of the high-order Technical Uncertainty associated with that concept (see discussion of

RR2000/UN0002 found in 10 CFR 60.113 and RR2001/UN0004 found in 10 CFR 60.122(b)(5), Favorable Conditions). This uncertainty will be included in future analyses of Technical Uncertainties.

Michael P. Miklas, Jr.
02/10/90

REGULATORY REQUIREMENT RR2002: ADVERSE CONDITION - FLOODING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (1)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0017 -- Treatment of combinations of potentially adverse conditions

Parent Record: 10 CFR 60.21(c)(1)(ii)(C) and 10 CFR 60.122

Text of the Potential Uncertainty

There is an inconsistency in the treatment of combinations of potentially adverse conditions between 10 CFR 60.21(c)(1)(ii)(C) and 10 CFR 60.122. The former allows combinations of adverse conditions to be used in scenario development while the latter allows only one adverse condition to be compared to a combination of favorable conditions. Thus, synergistic effects of adverse conditions would not be considered when evaluating the site during the site selection and validation process.

Rationale for Inclusion

During the review of the NRC scoping document for the proposed Technical Position on Scenario Identification and Screening, it became evident that the intent of the NRC staff regarding scenario development may not be consistent with the regulatory intent expressed in 10 CFR 60.122. Specifically, the Technical Position calls for combining events and processes to form scenarios for use in performance assessment. Although this is a logical and technically reasonable approach, it appears not to be supported by the provisions of 10 CFR 60.122 regarding potentially adverse conditions. This section of the regulation clearly requires that the potentially adverse

condition be addressed singly. It does not, however, forbid combining such conditions. (Note that 60.122 does allow combinations of favorable conditions.)

The language of 10 CFR 60.21(c)(1)(ii)(C) calls for two assessments of repository performance: one addressing anticipated processes and events, and one addressing unanticipated processes and events. Use of the plural form could imply that these are to be addressed in combination; although an alternative interpretation is that the regulation uses the plural because there would be several such analyses each of which would use a single potentially adverse condition and one or more of the favorable conditions. The inconsistency between the regulations is an uncertainty which should be clarified.

Wes Patrick, Ruth Weiner,
11/08/89
Michael P. Miklas, Jr.
12/19/89

Arguments have been made both for and against the inclusion as an uncertainty of the apparent inconsistency between 60.21(c)(1)(ii)(B) and 60.122(a)(2). One view is that no inconsistency exists because the objective of 60.122 is to assess individually the significance of the potentially adverse conditions present at the site (their presence alone causes a concern that the isolation capability of a site may be compromised) albeit in terms of site performance as a measure for judging the condition's "significance." That information is to be presented in the SAR. A technical reviewer needs to know the sensitivity of the site's performance to individual conditions present.

In contrast, the objective of analyses undertaken with respect to 60.112 and 60.21(c)(1)(ii)(C) is to determine the bottom-line performance of the repository with respect to the EPA standard. Whether this is done in one analysis where all conditions, processes, and events are combined or in a series of analyses of individual conditions, processes, and events with the results added together at the end is not a concern at the level of the rule, although it may be a technical concern with respect to the method employed (analyses of individual conditions, processes, and events could ignore potential coupling, synergism, or interrelationships between processes, for example). A second view discounting the identified inconsistency is that since the regulation does not forbid combining adverse conditions, it is not clear where the inconsistency lies.

10 CFR 60.122 provides criteria by which to judge the acceptability of a site, while 60.21(c)(1)(ii) focuses on evaluation of performance. Though related, the structure of the two regulatory requirements is quite different in that 60.122(a)(2) speaks of the adverse conditions entirely in the

singular while 60.21(c)(1)(ii) does not. The text of 60.21(c)(1)(ii)(B) is as follows "Analyses to determine the degree to which each of the favorable and potentially adverse conditions, if present, has been characterized and the extent to which it contributes to or detracts from isolation." The text of 60.21(c)(1)(ii)(C) is as follows: "An evaluation of the performance of the proposed geologic repository for the period after permanent closure, assuming anticipated processes and events, giving the rates and quantities of releases of radionuclides to the accessible environment as a function of time; and a similar evaluation which assumes the occurrence of unanticipated processes and events." Clearly, scenarios of different combinations of favorable and adverse conditions will be identified and evaluated in response to 60.21(c)(1)(ii)(C).

10 CFR 60.122 is written in the singular and does not refer to combinations of potentially adverse conditions implying that only a single adverse condition is to be evaluated against a multitude of the favorable conditions. Moreover, 10 CFR 60.122(b) specifically suggests that combinations of favorable conditions can offset any single potentially adverse condition. If the NRC intent is to allow combining adverse conditions, then the regulatory basis and the conditions and constraints for combinations of adverse conditions in response to 60.122 should be placed into the public record.

Michael P. Miklas, Jr.
02/10/90

REGULATORY REQUIREMENT RR2004: ADVERSE CONDITION - NATURAL PHENOMENA TO CHANGE SURFACE WATER AND GROUNDWATER SYSTEM

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (3)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0018 -- Regional groundwater flow system

Parent record: 10 CFR 60.122(c)(3) and 10 CFR 60.122(c)(4)

Text of the Potential Uncertainty

The term "regional groundwater flow system" can refer to differing geographical regions depending on the geologic process of interest and the intended breadth of an investigation. A clarification of the intended breadth of the investigations meant to consider "regional groundwater flow system" will allow the DOE to respond appropriately to the regulation in the License Application.

Rationale for Inclusion

The extent of the "regional groundwater flow system" can be different depending upon the geophysical, geochemical, and hydrological mechanisms of interest. For example, a "regional groundwater flow system" could refer to an entire basin and range province, to a basin or set of basins in that province, to the groundwater flow beneath a portion of a basin, to the groundwater system of a river valley, or to a single stream and its tributary drainage area. The NRC should clarify which of the "regional" systems are to be considered in any instance.

The uncertainty arises from the possible differing geographical extents assigned to various "regional groundwater flow systems." It is possible for an effect to be measured in the "regional flow system" down gradient from any location even though that effect is not measured at that location. Similarly, an effect could be measured or observed at a particular location that is not apparent in the larger regional system. The regulation may be intended to apply to any localized effect on the groundwater flow beneath the proposed repository as well as to the broader implications of a local effect on regional flow, and vice-versa.

Michael P. Miklas, Jr.
02/15/90

REGULATORY REQUIREMENT RR2005: ADVERSE CONDITION - DEFORMATION AFFECTING GROUNDWATER

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (4)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0018 -- Regional groundwater flow system

Parent record: 10 CFR 60.122(c)(4) and 10 CFR 60.122(c)(3)

Text of the Potential Uncertainty

The term "regional groundwater flow system" can refer to differing geographical regions depending on the geologic process of interest and the intended breadth of an investigation. A clarification of the intended breadth of the investigations meant to consider "regional groundwater flow system" will allow the DOE to respond appropriately to the regulation in the License Application.

Rationale for Inclusion

The extent of the "regional groundwater flow system" can be different depending upon the geophysical, geochemical and hydrological mechanisms of interest. For example, a "regional groundwater flow system" could refer to an entire basin and range province, to a basin or set of basins in that province, to the groundwater flow beneath a portion of the basin, to the groundwater system of a river valley, or to a single stream and its tributary drainage area. The NRC should clarify which of the "regional" systems are to be considered in any instance.

The uncertainty arises from the possible differing geographical extents assigned to various "regional groundwater flow systems." It is possible for an effect to be measured in the "regional flow system" down gradient from any location even though that effect is not measured at that location. Similarly, an effect could be measured or observed at a particular location that is not apparent in the larger regional system. The regulation may be intended to apply to any localized effect on the groundwater flow beneath the proposed repository as well as to the broader implications of a local effect on regional flow and vice-versa.

Michael P. Miklas, Jr.
02/15/90

REGULATORY REQUIREMENT RR2009: ADVERSE CONDITION - GEOCHEMICAL

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (8)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0018 -- Sorption of radionuclides

Parent Record: 10 CFR 60.122(c)(8)

Text of the Potential Uncertainty

The term "sorption of radionuclides" refers to only one of several possible geochemical processes. The regulatory intent needs to be clarified to ensure a complete and accurate assessment of all the geochemical conditions affecting radionuclide migration.

Rationale for Inclusion

During the Geochemistry Workshop, June 14-17, 1989, at NRC Headquarters the consensus of the assembled group was that 10 CFR 60.122(c)(8) was intended to include geochemical processes that would significantly inhibit radionuclide transport, not just sorption, in the geochemical conditions to be considered as potentially adverse. The DOE will not fully address the movement of radionuclides as a potentially adverse condition if they consider only the sorption portion of the entire transport scenario. In order to be complete, other aspects of transport such as colloidal suspension, gaseous transfer, and desorption must be a part of the DOE investigation and evaluation.

Michael P. Miklas, Jr.
12/19/89

It was also identified at the Geochemistry Workshop that the potentially adverse conditions listed in the siting criteria were inconsistent with corresponding favorable conditions. For example, precipitation of radionuclides is listed under favorable conditions but not under potentially adverse conditions. Consequently, the DOE could respond to the letter of the rule in determining only the conditions that would reduce sorption, and fail to characterize geochemical conditions that might increase transport of the radionuclides, a more inclusive measure of site suitability.

The accepted NRC definition of a Regulatory Uncertainty includes as criteria, in addition to the meaning of a Regulatory Requirement, the adequacy and completeness of the requirement, and the omission of an essential requirement. This definition as found in TOP-001-02, Page A98 (Reference 50), allows for the classification of "sorption of radionuclides" as a Regulatory Uncertainty because the existing language constrains the DOE study of the radionuclides as an adverse condition by identifying for study only one form of transport; i.e. sorption. In order to study all aspects of the radionuclide migration problem, the DOE must consider all the means which may affect radionuclide transport. The need to include all forms of transport in the evaluation of radionuclides in the adverse geochemical condition should be made clear to the DOE.

Michael P. Miklas, Jr.
02/5/90

Reference for Inclusion Rationale

(50) Technical Operating Procedure, TOP-001-02, Rev. 1, Program Architecture Relational Database Content and Development Instructions, Draft Document, Center for Nuclear Waste Regulatory Analyses, September 2, 1989.

REGULATORY REQUIREMENT RR2011: ADVERSE CONDITION - DISSOLUTIONING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (10)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0018 -- Evidence of

Parent Record: 10 CFR 60.122(c)(10), 10 CFR 60.122(c)(15), 10 CFR 60.122(c)(16), 10 CFR 60.122(c)(18), and 10 CFR 60.122(c)(19)

Excluded Uncertainty Text

The regulatory intent needs to be clarified because the condition of interest is not the "evidence of" dissolutioning but the implications which the evidence provides regarding the anticipated conditions expected during the lifetime of the geologic repository.

Rationale for Exclusion

The potential uncertainty was originally identified on the basis that a literal interpretation of the wording and construction of 60.122(c)(10), (15), (16), (18) and (19) in the context of 60.122(c) was inconsistent with the intention of the regulation. The potential adversity in these subsections is, in each case, literally identified as the "evidence of" some condition (e.g. dissolutioning). The intent of the regulation is that the condition itself is potentially adverse not the "evidence of" its existence. However, further deliberation has led to the view that the language of 60.122(a)(2) provides an adequate basis for

placing these rules in their proper context and, thus, no uncertainty is present.

Michael P. Miklas, Jr.
D. Ted Romine
02/11/90

REGULATORY REQUIREMENT RR2015: ADVERSE CONDITION - HIGHER MAGNITUDE EARTHQUAKES

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (14)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0018 -- Typical of the area in which the geologic setting is located

Parent Record: 10 CFR 60.122(c)(14)

Excluded Uncertainty Text

The phrase "typical of the area in which the geologic setting is located" needs to be clarified (especially the term "typical of the area"). Also, the "geologic setting" has a variable extent or area depending upon which of the geologic elements is being evaluated. The uncertainty related to "geologic setting" is described in RR2002/UN0012. Clarification of the phrase will eliminate the potential for inadequate DOE evaluation of the earthquakes which could affect the site.

Rationale for Exclusion

The term "typical" is defined by Webster's dictionary as "constituting or having the nature of a type"; "type" is defined as "qualities common to a number of individuals that distinguish them as an identifiable class" (Reference 60). It is probable that this commonly known definition is the one which the Commission intended to be used. Thus, there is no uncertainty. It is the responsibility of DOE to study the data for earthquakes that could affect the site and define the range of characteristics of earthquakes that are typical (i.e. representative) of the area in which those earthquakes occur,

then to evaluate the possibility that the earthquake rates of occurrence and/or magnitudes could increase.

The critical word to understand in this phrase is "area" relative to the geologic setting. The "geologic setting" has an areal component. The geologic setting as now defined in 10 CFR 60.2 is "the geologic, geochemical, and hydrologic systems of the region in which a geologic repository operations area is or may be located." The phrase "typical of the area in which the geologic setting is located", thus, includes that region which contains the physical systems which might affect the repository. The "region" of geologic importance may vary in size depending upon the geologic system being considered. For example, earthquakes of concern will be representative of the earthquakes of the tectonic/seismic region which is included as part of the geologic setting.

Michael P. Miklas, Jr.
02/23/90

Reference for Exclusion Rationale

(60) Webster's New Collegiate Dictionary, Merriam-Webster, G. & C. Merriam Company, Springfield, Massachusetts, Page 187

REGULATORY REQUIREMENT RR2016: ADVERSE CONDITION - IGNEOUS ACTIVITY

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (15)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0018 -- Evidence of

Parent Record: 10 CFR 60.122(c)(15), 10 CFR 60.122(c)(10), 10 CFR 60.122(c)(16), 10 CFR 60.122(c)(18), and 10 CFR 60.122(c)(19)

Excluded Uncertainty Text

The regulatory intent needs to be clarified because the condition of interest is not the "evidence of" igneous activity but the implications which the evidence provides regarding the anticipated conditions expected during the lifetime of the geologic repository.

Rationale for Exclusion

The potential uncertainty was originally identified on the basis that a literal interpretation of the wording and construction of 60.122(c)(10), (15), (16), (18) and (19) in the context of 60.122(c) was inconsistent with the intention of the regulation. The potential adversity in these subsections is, in each case, literally identified as the "evidence of" some condition (e.g. igneous activity). The intent of the regulation is that the condition itself is potentially adverse not the "evidence of" its existence. However, further deliberation has led to the view that the language of 60.122(a)(2) provides an adequate basis for

placing these rules in their proper context and, thus, no uncertainty is present.

Michael P. Miklas, Jr.
D. Ted Romine
02/11/90

REGULATORY REQUIREMENT RR2017: ADVERSE CONDITION - EXTREME EROSION

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (16)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0018 -- Evidence of

Parent Record: 10 CFR 60.122(c)(16), 10 CFR 60.122(c)(10), 10 CFR 60.122(c)(15), 10 CFR 60.122(c)(18), and 10 CFR 60.122(c)(19)

Excluded Uncertainty Text

The regulatory intent needs to be clarified because the condition of interest is not the "evidence of" extreme erosion but the implications which the evidence provides regarding the anticipated conditions expected during the lifetime of the geologic repository.

Rationale for Exclusion

The potential uncertainty was originally identified on the basis that a literal interpretation of the wording and construction of 60.122(c)(10), (15), (16), (18) and (19) in the context of 60.122(c) was inconsistent with the intention of the regulation. The potential adversity in these subsections is, in each case, literally identified as the "evidence of" some condition (e.g. extreme erosion). The intent of the regulation is that the condition itself is potentially adverse not the "evidence of" its existence. However, further deliberation has led to the view that the language of 60.122(a)(2) provides an adequate basis for

placing these rules in their proper context and, thus, no uncertainty is present.

Michael P. Miklas, Jr.
D. Ted Romine
02/11/90

REGULATORY REQUIREMENT RR2017: ADVERSE CONDITION - EXTREME EROSION

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (16)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0019 -- Extreme erosion

Parent Record: 10 CFR 60.122(c)(16)

Text of the Potential Uncertainty

The meaning of "extreme erosion" in this regulatory context needs to be clarified as to whether it means (1) the highest rate of erosion of a potential site area that might be anticipated based on the rates of erosion experienced within the area during the Quaternary Period, or (2) the rate, which, if it were to occur in the foreseeable future, would cause the performance objectives of the geologic repository to be breached and against which the projected erosion rates based on Quaternary data are to be evaluated.

Rationale for Inclusion

This uncertainty was identified by participants at the Erosion Workshop held at NRC headquarters on June 19-21, 1989.

Because of the ambiguity of the term "extreme erosion" the NRC staff has attempted to clarify the term. In NUREG-0804, p.382, (Reference 30) the NRC staff presents their definition of "extreme erosion" as follows: "The staff has used the term 'extreme erosion' to refer to the occurrence of substantial changes in land forms (as a result of erosion) over relatively short intervals of time." This definition includes two uncertainties in it, namely, what changes in a landform are

deemed "substantial" and what is a "relatively short interval of time?" It appears, based on these comments, that the NRC staff is viewing "extreme erosion" as a rate of change but the definition requires further clarification to establish an unambiguous measure of acceptability. This is necessary for DOE to assess the adverse condition appropriately and for NRC to objectively evaluate the DOE study.

Michael P. Miklas, Jr.
02/15/90

Reference for Inclusion Rationale

(30) Staff Analysis of Public Comments on Proposed Rule, 10 CFR 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," NUREG-0804, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, December 1983, Page 382.

REGULATORY REQUIREMENT RR2019: ADVERSE CONDITION - MINING FOR RESOURCES

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (18)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0018 -- Evidence of

Parent Record: 10 CFR 60.122(c)(18), 10 CFR 60.122(c)(10), 10 CFR 60.122(c)(15), 10 CFR 60.122(c)(16), and 10 CFR 60.122(c)(19)

Excluded Uncertainty Text

The regulatory intent needs to be clarified because the condition of interest is not the "evidence of" subsurface mining for resources but the implications which the evidence provides regarding the anticipated conditions expected during the lifetime of the geologic repository.

Rationale for Exclusion

The potential uncertainty was originally identified on the basis that a literal interpretation of the wording and construction of 60.122(c)(10), (15), (16), (18) and (19) in the context of 60.122(c) was inconsistent with the intention of the regulation. The potential adversity in these subsections is, in each case, literally identified as the "evidence of" some condition (e.g. subsurface mining for resources). The intent of the regulation is that the condition itself is potentially adverse not the "evidence of" its existence. However, further deliberation has led to the view that the language of 60.122(a)(2) provides an adequate

basis for placing these rules in their proper context and, thus, no uncertainty is present.

Michael P. Miklas, Jr.
D. Ted Romine
02/11/90

REGULATORY REQUIREMENT RR2020: ADVERSE CONDITION - DRILLING

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (19)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Potential Uncertainty

UN0018 -- Evidence of

Parent Record: 10 CFR 60.122(c)(19), 10 CFR 60.122(c)(10), 10 CFR 60.122(c)(15), 10 CFR 60.122(c)(16), and 10 CFR 60.122(c)(18)

Excluded Uncertainty Text

The regulatory intent needs to be clarified because the condition of interest is not the "evidence of" drilling for any purpose but the implications which the evidence provides regarding the anticipated conditions expected during the lifetime of the geologic repository.

Rationale for Exclusion

The potential uncertainty was originally identified on the basis that a literal interpretation of the wording and construction of 60.122(c)(10), (15), (16), (18) and (19) in the context of 60.122(c) was inconsistent with the intention of the regulation. The potential adversity in these subsections is, in each case, literally identified as the "evidence of" some condition (e.g. drilling for any purpose). The intent of the regulation is that the condition itself is potentially adverse not the "evidence of" its existence. However, further deliberation has led to the view that the language of 60.122(a)(2) provides an adequate basis for

placing these rules in their proper context and, thus, no uncertainty is present.

Michael P. Miklas, Jr.
D. Ted Romine
02/11/90

REGULATORY REQUIREMENT RR2025: ADVERSE CONDITION - GASEOUS RADIONUCLIDES

Primary Regulatory Text Citation

10CFR60 122 (a) (2) *	January 1, 1989
10CFR60 122 (c)	January 1, 1989
10CFR60 122 (c) (24)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 122 (b) *	January 1, 1989
10CFR60 122 (a) (2)	January 1, 1989
10CFR60 21 (c) (1) (ii) (C)	January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0018 -- Air-filled pore spaces

Parent Record: 10 CFR 60.122(c)(24)

Text of the Potential Uncertainty

Clarification needs to be provided as to whether "air-filled pore spaces" is meant to be interpreted literally as (1) those spaces filled with a mixture of nitrogen, oxygen, and other minor constituents, or (2)"gas-phase-filled pore spaces." The latter interpretation would require pores filled with methane, carbon dioxide, and various mixtures of earth-derived and barrier system-derived gases to be considered as potential transport mechanisms for the movement of radionuclides.

Rationale for Inclusion

"Air" has a specific meaning and composition, and the Commission may not have intended the regulation to be limited by this meaning. Also, air, per se, is found only within a few meters below the surface of the earth.

The Commission, in defining the unsaturated zone in 10CFR60.2, used the following words "...some of the voids may contain air or other gases at atmospheric pressure." The Commission clearly intended that the unsaturated zone be considered to have air and/or other gases as constituents of the pore spaces. That intent should be carried out uniformly in the implementation of the Regulation. Clarification of the term

"air-filled" in 60.122(c)(24) to the effect that the word "air" is intended to encompass any gas-phase would satisfy the regulatory intent by requiring the evaluation of unsaturated pore space which might contain any one or a combination of different gases.

Michael P. Miklas, Jr.
02/02/1990

REGULATORY REQUIREMENT RR0001: IMPORTANT TO SAFETY - NATURAL PHENOMENA AND ENVIRONMENTAL CONDITIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (1) January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- Anticipated Processes and Events

Parent Record: 10 CFR 60.131(b)(1)

Excluded Uncertainty Text

The term "anticipated processes and events" (APES) requires further definition to permit uniform interpretation of the regulatory requirement. In the definition in 10 CFR 60.2, the distinction between anticipated and unanticipated processes and events is differentiated by whether or not it is "...reasonably likely to occur..." and "...sufficiently credible to warrant consideration..." (Reference 10).

Rationale for Exclusion

10 CFR 60.131 addresses the general design criteria for the GROA and section (b)(1) of this regulation denotes the consideration of natural phenomena and environmental conditions anticipated at the GROA. These can be considered "anticipated processes and events" that could affect the geologic setting during construction, operation and closure. APES clearly applies to the overall system performance objective after permanent closure. However, no regulatory basis is found for applying APES to the much shorter time frame of construction through closure.

Therefore, the uncertainty entitled "Anticipated Processes and Events" will be addressed in RR1001 and RR2000 which cover the

performance of engineered and natural barriers after permanent closure. The uncertainty is excluded in this Regulatory Requirement.

R. L. Wilbur, 2/10/1990

Reference for Exclusion Rationale

(10) Code of Federal Regulations, 10 CFR 60.2, Definitions, page 63, January 1, 1989 edition.

REGULATORY REQUIREMENT RR0088: IMPORTANT TO SAFETY - FIRES AND EXPLOSIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (3) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- System Redundancy - Fires and Explosions

Parent Record: 10 CFR 60.131(b)(3)(i)

Excluded Uncertainty Text

From the text, it is uncertain whether it is permissible for some of the structures, systems, and components important to safety to fail provided the safety of the GROA could still be maintained with redundant systems.

The intent needs to be clarified to ensure that all systems important to safety remain functional during and after fires or explosions.

Rationale for Exclusion

The text, as written is clear as to the design criteria needed to ensure operation during adverse conditions. Provision of redundancy or auxiliary systems, where needed, is a technical design function and should be treated as such in the development of Technical Review Components and their complementary Compliance Determination Methods. Redundancy and backup requirements needed to achieve the performance objectives are implicit in 10 CFR 60.130. Thus, there is no regulatory uncertainty.

R. L. Wilbur, 2/15/1990

REGULATORY REQUIREMENT RR0088: IMPORTANT TO SAFETY - FIRES AND EXPLOSIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (3) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- Explosion Suppression Systems - Criteria

Parent Record: 10 CFR 60.131(b)(3)(iv)

Excluded Uncertainty Text

10 CFR 60.131(b)(3)(iii) requires that "the geologic repository operations area be designed to include explosion and fire detection alarm systems and appropriate suppression systems." 10 CFR 60.131(b)(3)(iv) only gives criteria for the design of the fire suppression system.

Regulatory guidance needs to be provided that addresses explosion suppression systems in the same manner as fire suppression systems.

Rationale for Exclusion

10 CFR 60.131(b)(3)(iii) requires that the geologic repository operations area be designed to include appropriate suppression systems to reduce the adverse effects of fires and explosions on structures, systems, and components important to safety (Reference 10).

A discussion of the potential explosive materials that would be present at a geologic repository follows to provide the rationale for exclusion.

I. CONSTRUCTION PHASE

A. High Explosives used in underground excavation

Surface Storage - Surface storage of explosives will be covered by regulations that apply to its handling and use. These include 30 CFR 57, OSHA regulations

and the state of Nevada regulations that apply to the handling, transportation and use of high explosives.

Underground Use - Explosive materials will be handled by construction personnel following a regulation such as 30 CFR 57.6000. Since NRC is concerned with radiological safety and during this time frame no HLW is present, NRC will not have to address this safety issue.

B. Gasoline, Diesel fuel and Propane for vehicular fuels

Surface Storage - Surface storage of flammable and combustible gases will be again covered by 30 CFR 57, OSHA, and the state of Nevada regulations. As no HLW is present, NRC will not have a regulatory role. See 30 CFR 57.4400 for handling of combustible fuels.

Underground Use - If diesel fuel is used in the excavation equipment underground, it can be assumed that 30 CFR Part 57 will cover the safety through the fire suppression systems (diesel fuel will ignite if the ignition temperature is reached, it doesn't explode).

Additionally, the monitoring equipment will detect dangerous levels of these gases and control the ventilation system to diffuse the gases.

II. OPERATIONS PHASE

A. High Explosives

Surface Facilities - High explosives can be present in the GROA during operations, but will be segregated in approved storage bunkers. These bunkers direct the effects of a detonation. Explosions are prevented or redirected. They do not lend themselves to suppression due to their instantaneous detonation.

Underground Use - High explosives used in the underground facility during operations will be subject to 30 CFR 57, OSHA and state of Nevada regulations that apply to underground use. NRC, through compliance determination methods, will ensure that radiation safety is maintained at all times.

B. Gasoline, Diesel fuel and Propane for vehicular fuel

Surface Storage - Surface storage of flammable and combustible fuels again will be covered by 30 CFR 57, OSHA, and any state of Nevada regulations. As HLW is

present, NRC will have through the regulatory agreement with OSHA and the state of Nevada, methods to determine the compliance of the GROA design and monitor the safety during operations. See 30 CFR 57.4400 for handling of combustible fuels and 10 CFR 60.131(b)(9).

Surface Use - Use of combustible fuels in the vehicles will be subject to DOT regulations that apply to the manufacture of industrial vehicles and heavy equipment. The fire load hazard is much less than that for storage facilities and would not directly involve NRC in terms of radiation safety except in the presence of high risk "secondary effect" hazards. If such is the case, the requirements of 10 CFR 60.131(b)(2) would apply.

Underground Use - Underground use of fuels that can create explosive mixtures is regulated by mining and OSHA regulations that forbid the use of highly volatile mixtures that would allow the accumulation of potentially explosive gases. Also, monitoring and control systems associated with the ventilation system would diffuse these gases. With no explosive mixtures present, there is no need for an explosion suppression system.

R. L. Wilbur, 2/20/1990

Reference for Exclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 67.

REGULATORY REQUIREMENT RR0088: IMPORTANT TO SAFETY - FIRES AND EXPLOSIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (3) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- Means or Provisions to Protect Against Adverse Effects

Parent Record: 10 CFR 60.131(b)(3)(iv)

Excluded Uncertainty Text

It is uncertain what "means to protect" against adverse effects are included in the regulatory requirement.

The uncertainty needs to be addressed so that guidance to DOE is explicit as to the design of the fire and explosion system for operation under adverse conditions.

Rationale for Exclusion

The means to protect against adverse conditions are technologically available and need only be identified as design criteria. These means should be treated as such in the development of Technical Review Components and their complementary Compliance Determination Methods. Additionally, the means (design criteria) needed to achieve the performance objectives are implicit in 10 CFR 60.130. Therefore, no regulatory uncertainty exists.

R. L. Wilbur, 2/23/1990

REGULATORY REQUIREMENT RR0089: IMPORTANT TO SAFETY - EMERGENCY CAPABILITY

Primary Regulatory Text Citation

10CFR60 131 (b) (4) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- Available Offsite Service Criteria

Parent Record: 10 CFR 60.131(b)(4)(ii)

Excluded Uncertainty Text

The regulatory intent relative to the use of offsite emergency services needs to be clarified.

Rationale for Exclusion

The text of 10 CFR 60.131(b)(4)(ii) appears to restrict the use of "available offsite services" to "aid in recovery from emergencies". This appears to preclude the provision of their use to aid in "responding to emergencies".

The regulation is clear that the design of those items important to safety include facilties and services that ensure a safe and timely response to emergency conditions. Available offsite services will be used as backup that will aid and assist in recovery.

Since a high-level radioactive waste repository is not likely to be located in a densely populated area, it is important that the primary onsite response to an emergency be adequate. Available offsite services will also be called on to respond. The regulation is adequately explicit; therefore, the uncertainty is excluded.

R. L. Wilbur, 2/23/1990

REGULATORY REQUIREMENT RR0090: IMPORTANT TO SAFETY - UTILITY SERVICES

Primary Regulatory Text Citation

10CFR60 131 (b) (5) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Utility Service Testing

Parent Record: 10 CFR 60.131(b)(5)

Text of the Potential Uncertainty

Additional guidance is needed regarding on-line operability testing of auxiliary and redundant systems. On-line operability testing should be explicitly required for redundant, auxiliary and backup elements of the utility systems. This uncertainty needs to be addressed to ensure adequacy of design and operation of systems important to safety under normal and accident conditions.

Rationale for Inclusion

Utility services important to safety are commonly designed with features that require periodic on-line testing to verify the functionality of each subsystem.

Periodic on-line testing of all critical utility systems should be required to ensure their continued operability at all times (Reference 10). Such testing is essential to ensure that each utility system will operate at full capacity, individually and in concert with the other utility services, under normal and accident conditions. This is particularly important for utility systems, but should also be required of any system important to safety that incorporates redundant or backup elements.

While redundant systems for utility services important to safety are specified, it is most important to specify the testing regimen since most redundant systems are rarely called upon to respond until an accident occurs. Most redundant systems are periodically inspected and tested off-line because of convenience. While 10 CFR 60.131(b)(6) specifies that the

systems must be designed to permit this periodic testing, it does not specify the requirement of operability testing or exercising the critical utility systems for full scale on-line response on a periodic basis. Critical utility systems would necessarily have a more rigid inspection and maintenance schedule.

R. L. Wilbur, 2/9/1990

10 CFR 60.21(c)(15)(v) addresses the "plans for periodic testing" for the structures, systems and components of the geologic repository operations area. However, this does not address exercising the critical utility systems on a regular basis to ensure timely operability under adverse conditions.

R. L. Wilbur, 12/1/1989

10 CFR 60.74(a)(4) was examined for its applicability to this uncertainty. While it addresses testing for the administration of the regulations in this part, it does not seem appropriate to rely on such a broad contingency provision for key design and operations requirements for crucial utility systems important to safety.

10 CFR 60.43(a) discusses license conditions to be derived from analyses and evaluations included in the license application. The conditions in the license would be an appropriate location for specific operability testing details for utility systems "important to safety". However, general testing requirements must be known early enough to be considered in the design process.

R. L. Wilbur, 2/15/1990

Reference for Inclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 69.

REGULATORY REQUIREMENT RR0091: IMPORTANT TO SAFETY - INSPECTION, TESTING AND MAINTENANCE

Primary Regulatory Text Citation

10CFR60 131 (b) (6) January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Nonperiodic Inspection, Testing and Maintenance

Parent Record: 10 CFR 60.131(b)(6)

Text of the Potential Uncertainty

10 CFR 60.131(b)(6) provides for designing "to permit periodic inspection, testing and maintenance as necessary, to ensure their continued functioning and readiness". Regulatory guidance needs to be provided to require designing for maintenance that is nonperiodic.

Guidance regarding nonperiodic (i.e., corrective) maintenance should clarify for DOE the overall maintainability required in the design of structures, systems and components important to safety.

Rationale for Inclusion

The regulatory text is clear as to designing to permit periodic inspection and testing of structures, systems and components important to safety. These items, once designated, will have associated preventive maintenance schedules generated to ensure their continued readiness.

The regulatory text does not require that the design provide for nonperiodic maintenance. The ability to rapidly repair random failures requires design for maintenance (maintainability) and the provision of qualified repair personnel, on-site replacement parts and operational plans to perform emergency repairs in-place to maintain the safety of personnel, short-term transit of waste packages, timely emplacement, etc. Requirements (design criteria) need to be provided to DOE that apply to items that fail randomly or prior to their scheduled maintenance. A key aspect of

"continued functioning and readiness" (or design for maintenance) is the ability to rapidly isolate, diagnose and repair/replace failed components or systems.

R. L. Wilbur, 2/9/1990

This crucial design criterion warrants specific treatment rather than being left to a broad, general provision such as 10 CFR 60.130. It is necessary to specify minimum design criteria for maintainability to ensure that the structures, systems and components will include the essential safety features to meet performance objectives.

R. L. Wilbur, 2/9/1990

This uncertainty, originally identified in CNWRA 89-003 (Reference 10) as Uncertainty # 70, has been modified to describe the topic more clearly.

R. L. Wilbur, 2/15/1990

Reference for Inclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 70.

REGULATORY REQUIREMENT RR0092: IMPORTANT TO SAFETY - CRITICALITY CONTROL

Primary Regulatory Text Citation

10CFR60 131 (b) (7) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- Nuclear criticality accident wording

Parent Record: 10 CFR 60.131(b)(7)

Excluded Uncertainty Text

The wording in 10 CFR 60.131(b)(7) pertaining to a criticality accident is different from the wording in 10 CFR 72.73(a), and may be less conservative.

Requirements pertaining to criticality control should be consistent regardless of the type of activities (including storage, handling, emplacement or retrieval). This uncertainty was presented in CNWRA 89-003 (Reference 20) as uncertainty #73 prior to the revisions to 10 CFR 72.73.

Rationale for Exclusion

The uncertainty was excluded because revisions to 10 CFR 72.73(a) made the text consistent with 10 CFR 60.131(b)(7). These revisions were effective on August 19, 1988 and 10 CFR 72.73 was renumbered as 10 CFR 72.124 (Reference 10).

The original comparison of the regulations was as follows:

> 10 CFR 72.73(a) states that spent fuel handling, transfer, and storage systems shall be designed to be maintained subcritical and to prevent a nuclear criticality accident. 10 CFR 60.131(b)(7) states that all systems for processing, transporting, handling, storage, retrieval, emplacement and isolation of radioactive waste shall be designed to ensure that a nuclear criticality accident is not possible unless at least two unlikely, independent, and concurrent or sequential changes have occurred.
>
> R. L. Wilbur, 2/19/1990

References for Exclusion Rationale

(10) 10 CFR Part 72 January 1, 1989

(20) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 73.

REGULATORY REQUIREMENT RR0092: IMPORTANT TO SAFETY - CRITICALITY CONTROL

Primary Regulatory Text Citation

10CFR60 131 (b) (7) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- Margin of Safety Value for Criticality Control

Parent Record: 10 CFR 60.131(b)(7)

Excluded Uncertainty Text

The design criteria for criticality control are significantly different in 10 CFR Part 60 and Part 72. Guidance provided for the same function in similar facilities and for the same waste form should differ only to the degree necessary to account for different conditions and/or time factors.

Rationale for Exclusion

Criticality control is a design function for solid waste that is achieved by appropriate geometry. The calculated effective multiplication factor must show at least 5% margin to allow for bias in the calculations and uncertainties. This requirement is far more stringent than 10 CFR 72.73(a) which only requires that the design be maintained subcritical. That increased stringency seems appropriate since repository design must consider post-containment conditions. On this basis, the uncertainty is excluded.

The original comparison of the regulations was as follows:

> 10 CFR 60.131(b)(7) provides an explicit margin of safety value ("K_{eff} must be sufficiently below unity to show at least a 5% margin") and requires a condition specifying allowance for the bias in the method of calculation and the uncertainty in the experiments used to validate the method of calculation. It further states that each system shall be designed for criticality safety under normal and accident conditions.
>
> R. L. Wilbur, 2/23/1990

REGULATORY REQUIREMENT RR0092: IMPORTANT TO SAFETY - CRITICALITY CONTROL

Primary Regulatory Text Citation

10CFR60 131 (b) (7) * January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- Definition of Methods for Criticality Control

Parent Record: 10 CFR 60.131(b)(7)

Excluded Uncertainty Text

10 CFR 60.131(b)(7) provides no regulatory requirements for methods of criticality control.

10 CFR 72.73(b) provides regulatory requirements for methods of criticality control.

It is uncertain if the methods for criticality control should be included in 10 CFR 60.131(b)(7). This uncertainty was presented in CNWRA 89-003 as uncertainty #71, (Reference 40).

Rationale for Exclusion

The uncertainty was excluded because revisions to 10 CFR 72.73(a) made the text consistent with 10 CFR 60.131(b)(7). These revisions were effective on August 19, 1988 and the referenced 10 CFR 72.73 was renumbered as 10 CFR 72.124 (Reference 10).

R. L. Wilbur, 2/22/1990

References for Exclusion Rationale

(10) 10 CFR Part 72 January 1, 1989

(40) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B.

10 CFR 72.73(a) does not specify an explicit margin of safety value but requires a condition for the nuclear criticality parameters to be commensurate with the uncertainties in the handling, transfer and storage conditions, in the data and methods used in calculations and in the nature of the immediate environment under accident conditions.

Reference for Exclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner and Patrick, Appendix B, Uncertainty # 72.

REGULATORY REQUIREMENT RR0093: IMPORTANT TO SAFETY - INSTRUMENTATION AND CONTROL

Primary Regulatory Text Citation

10CFR60 131 (b) (8) January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- Listing of Instruments & Control Systems

Parent Record: 10 CFR 60.131(b)(8)

Excluded Uncertainty Text

It is unclear whether 10 CFR 60.131(b)(8) is intended to require that the instruments and control systems important to safety be listed as is required in the Safety Analysis Report. There is a need to clarify the requirement for listing the instruments and control systems important to safety.

Rationale for Exclusion

It is important to provide a listing of instruments and control systems important to safety so that a determination can be made as to the completeness of the design analysis and whether the design criteria have been satisfied.

At present, no requirement exists in 10 CFR 60.131(b)(8) to generate a list of those instrumentation and control systems that are important to safety. A listing will have to be generated so that compliance can be ascertained. A list of those instrumentation and control systems important to safety is a design function and should be treated as such in the development of Technical Review Components and their complementary Compliance Determination Methods. It has been noted that an uncertainty exists when a comparison is conducted between 10 CFR 60.131(b)(8) and 10 CFR 72.122(i). In 10 CFR 72.122(i), listing of these instrumentation and control systems must appear in the Safety Analysis Report (Reference 10). 10 CFR 60.21(c)(1)(ii)(E) also requires that structures, systems and components important to safety be identified in an analysis which must be included in the Safety Analysis Report. It does not appear that there is any

inconsistency in the regulations of 10 CFR 60 and this uncertainty is excluded.

R. L. Wilbur, 2/23/1990

Reference for Exclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 74.

REGULATORY REQUIREMENT RR0080: IMPORTANT TO SAFETY - MINING REGULATIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (9)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E)	January 1, 1989
10CFR60 130	January 1, 1989

Referenced Regulatory Text Citations

30CFR, Chapter I, Subchapter D (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapter E (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapter N (Includes 30CFR56 and 30CFR57)	July 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Secondary Effects from Nonradiological Accidents

Parent Record: 10 CFR 60.131(b)(9)

Text of the Potential Uncertainty

It is uncertain how the NRC is going to determine compliance with mining regulations as they relate to nonradiological accidents whose secondary effects are radiological accidents.

The uncertainty needs to be addressed to ensure adequate oversight of all potential sources of radiological accidents as well as worker health and safety in the geologic repository operations area.

Rationale for Inclusion

Since DOE is not subject to MSHA regulatory jurisdiction by law, and worker protection provisions of 30 CFR Part 57 must be applied by reference in 10 CFR 60.131(b)(9), clarification of NRC's compliance determination strategy is needed to ensure worker protection (Reference 10).

The NRC OGC position (Memorandum to Robert M. Bernero from William C. Parler, General Counsel, 16 November 1989) is clear: 1) The HLW repository is not a mine, 2) 30 CFR Part 57 does not apply as a mining regulation, and 3) MSHA has no jurisdiction over the HLW repository.

The design provisions of 30 CFR Part 57 will apply and DOE has formulated a working agreement with the U.S. Department of Labor for technical support with MSHA (Reference 20).

NRC has formulated a Memorandum of Understanding with OSHA to cover nonradiological worker safety in their licensed facilities (Reference 30). If NRC licensees observe OSHA's standards and regulations, workplace accidents will be minimized. However, the question of how NRC determines compliance in the design phase for potential nuclear accidents which are a secondary effect of a nonradiological accident must be addressed.

R. L. Wilbur, 2/9/1990

References for Inclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty #77.

(20) Memorandum of Understanding between the U.S. Department of Energy and the U.S. Department of Labor, Zegeer, MSHA, & Rusche, DOE, 12/23/86, pages 1-4.

(30) Memorandum of Understanding between the U.S. Nuclear Regulatory Commission and the Occupational Safety and Health Administration, Stello-NRC & Pendergrass-OSHA, 10/21/88, pages 1-4.

REGULATORY REQUIREMENT RR0080: IMPORTANT TO SAFETY - MINING REGULATIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (9)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E)	January 1, 1989
10CFR60 130	January 1, 1989

Referenced Regulatory Text Citations

30CFR, Chapter I, Subchapter D (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapter E (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapter N (Includes 30CFR56 and 30CFR57)	July 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0002 -- Reference clarification of 30 CFR 57

Parent Record: 10 CFR 60.131(b)(9)

Excluded Uncertainty Text

It is uncertain to what level the inclusion of the referenced 30 CFR 57 is to be invoked. The NRC policy regarding such "subreferences" needs to be made clear. Criteria are needed to determine the lowest level of referenced regulations which are to be incorporated in order to determine the extent of applicability of referenced regulations. NRC must determine if compliance to 10 CFR 60.131(b)(9) and the referenced 30 CFR 57 will include compliance to the subreference to 30 CFR 56.

Rationale for Exclusion

10 CFR 60.131(b)(9) references 30 CFR Chapter I, Subchapters D, E, & N. Subchapter N invokes 30 CFR 56, "Surface Mining Regulations". This is not as inclusive as 30 CFR 57, "Deep Surface Mining Regulations" (Reference 10). The inclusion of 30 CFR 56 which is embedded in 30 CFR 57 as a reference creates an uncertainty as to the level of compliance determination. However, further review indicates that since (1) nothing envisioned at a geologic repository would resemble a surface mine and, (2) 30 CFR 57 is a referenced regulation

for design purposes only, this uncertainty does not exist in this regulatory requirement.

R. L. Wilbur, 2/23/1990

It should be noted that the NRC policy that is the subject of this uncertainty would also apply to referenced regulations in 10 CFR 20, 10 CFR 51, and any EPA standards to be cited (e.g., the revised 40 CFR 191). See RR0004/UN0003.

R. L. Wilbur, 12/13/1989

Reference for Exclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 76.

REGULATORY REQUIREMENT RR0080: IMPORTANT TO SAFETY - MINING REGULATIONS

Primary Regulatory Text Citation

10CFR60 131 (b) (9)	January 1, 1989

Associated Regulatory Text Citations

10CFR60 21 (c) (1) (ii) (E)	January 1, 1989
10CFR60 130	January 1, 1989

Referenced Regulatory Text Citations

30CFR, Chapter I, Subchapter D (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapter E (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapter N (Includes 30CFR56 and 30CFR57)	July 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0003 -- Scope of Regulation 10 CFR 60.131(b)(9)

Parent Record: 10 CFR 60.131(b)(9)

Excluded Uncertainty Text

It is uncertain whether or not the word "design" in 10 CFR 60.131 (b)(9) is intended to imply the inclusion of the word "procedures" that appears in the referenced text of 30 CFR Chapter I, Subchapter N, Part 57.

NRC needs to clarify whether the parent requirement which specifies design requirements for worker safety is also intended to include the procedural activities that are important to safety.

This uncertainty needs to be clarified so that the appropriate Technical Review Components and Compliance Determination Methods can be formulated to provide the proper and necessary guidance to DOE and planning base for NRC.

Rationale for Exclusion

The text of 30 CFR Chapter I, Subchapter N, Part 57 denotes that the "design" of the GROA shall include such provisions for worker protection as may be necessary to provide reasonable assurance that all structures, systems and components can perform their intended functions. It also

states that any deviation from design requirements in 30 CFR 57 will give rise to a rebuttable presumption that this requirement has not been met. 30 CFR 57 also includes "procedures" regarding activities in the underground facility that must be met to protect the workers (Reference 10). The uncertainty arises in the global definition of design. The designing of the GROA so that structures, systems and components can perform their intended functions implies that the operations area will be designed for worker protection as well as for operation. Because worker protection is an integral part of the design process, that process must include the appropriate procedures for safe operations in the GROA for all systems important to safety. Therefore, this uncertainty is excluded.

R. L. Wilbur, 2/23/1990

Reference for Exclusion Rationale

(10) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty # 75.

REGULATORY REQUIREMENT RR0081: IMPORTANT TO SAFETY - SHAFT CONVEYANCES

Primary Regulatory Text Citation

10CFR60 131 (b) (10) * January 1, 1989

Associated Regulatory Text Citations

10CFR21 (c) (1) (ii) (E) January 1, 1989

10CFR60 130 January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Conveyances used in radioactive waste handling

Parent Record: 10 CFR 60.131(b)(10) *

Text of the Potential Uncertainty

Additional or more generic guidance is needed for the design of waste conveyances to assure that the performance objectives will be met if the waste transfer system includes transfer methods other than shafts and hoists (e.g., ramps and vehicles).

Rationale for Inclusion

Four shafts and two ramps have been proposed by DOE for the underground facility at the GROA (Reference 10). If conditions are favorable, ramp access to the GROA may be acceptable for excavating and constructing the underground facility and for transporting waste. The use of a ramp with a 9% slope for waste transport, as has been proposed in the Site Characterization Plan (SCP) (Reference 20), presents passage and conveyance design considerations significantly different from those of shafts. In order to assure the safe transport of waste into or out of the repository, and preserve the performance objectives of the geologic repository, regulatory guidance is needed for the design of conveyance methods other than through shafts and hoists.

R. L. Wilbur, 11/17/1989, 2/15/1990

The Center agrees with the original NRC intent to provide specific safety-related requirements for crucial elements of waste handling subsystem design rather than relying upon a broad provision like 10 CFR 60.130. The uncertainty exists because 10 CFR 60.131(b)(10) refers specifically to vertical conveyance systems. This highly site/design-specific guidance

should be supplemented or made sufficiently generic to apply to ramps and vehicles.

R. L. Wilbur, 2/9/1990

References for Inclusion Rationale

(10) Site Characterization Plan - OVERVIEW; DOE/RW-0198, U.S. Department of Energy, December, 1988, pages 38-41.

(20) Site Characterization Plan, Volume III, Part A, Chapter 6.2.5, DOE/RW-0198, U.S. Department of Energy, December, 1988, pages 6-135 through 6-139.

REGULATORY REQUIREMENT RR0003: DESIGN FOR SAFE UNDERGROUND OPERATIONS AND ROCK MOVEMENT

Primary Regulatory Text Citation

10CFR60 133 (e) *	January 1, 1989

Associated Regulatory Text Citations

10CFR60 131 (b) (9)	January 1, 1989

Referenced Regulatory Text Citations

30CFR, Chapter I, Subchapters D (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapters E (Reserved)	July 1, 1989
30CFR, Chapter I, Subchapters N (Includes 30CFR56 and 30CFR57)	July 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Worker Safety, Mine Safety, and Nonradiological Safety

Parent Record: 10 CFR 60.133(e)(1)

Text of the Potential Uncertainty

The NRC intent needs to be clarified as to whether and to what extent, the term "safely" as used in this paragraph applies to:

1) radiological safety,
2) nonradiological "mining" safety (i.e., primarily personnel safety in overall construction and nonradiological operations),
3) nonradiological incidents that have the potential to cause radiological accidents, or
4) a combination of the above.

NRC needs to address the application of the term "safely" as applied to underground openings, deleterious rock movement and worker safety in the underground facility in order to provide guidance to DOE that will help ensure adequacy of design and operation in the underground facility at the geologic repository operations area.

Rationale for Inclusion

DOE implementation and NRC assessment of compliance with this Regulatory Requirement is dependent upon the intended scope of

the word "safely" as it appears in 10 CFR 60.133(e)(1). The term needs to be clarified to ensure that guidance to DOE is clear and that the process of compliance determination is well defined.

R. L. Wilbur, 2/15/1990

Provisions for nonradiological safety in the underground facility will both reduce the likelihood of accidents and generally contribute to radiological safety in the event of an accident (References 10 and 20). In the event of a failure of an opening because of rock movement in the underground facility (10 CFR 60.133(e)(2)), waste containment may fail, in which case a nonradiological incident in the underground facility could lead to a release of radioactive materials.

10 CFR 60.133(e)(1) addresses the safety-related design of all underground openings including the waste package emplacement openings. However, the intended scope of the term "safely" needs to be clarified relative to the areas identified in the uncertainty text above.

R. L. Wilbur, 2/15/1990

Safety in design and construction of underground openings includes worker safety, which is covered in 30 CFR Part 57 (Reference 30), and invoked by 10 CFR 60.131(b)(9). NRC is primarily concerned with radiological safety and DOE has the responsibility for nonradiological safety. Safety is addressed in part by Memorandum of Understanding (MOU) between the NRC and OSHA denoting general areas of responsibility of each agency (Reference 40), and between DOE and U.S. Department of Labor (Reference 50). The latter MOU outlines the working arrangement between MSHA and DOE for compliance with 30 CFR Part 57. Neither MOU addresses the safety issue of oversight of the potential radiological secondary effects of nonradiological incidents.

R. L. Wilbur, 2/15/1990

References for Inclusion Rationale

(10) Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, "Disposal of High-Level Radioactive Waste in Geologic Repositories", NUREG-0804, NRC, pages 26-27 & 66-67, December 1983.

(20) Analysis and Evaluation of Regulatory Uncertainties in 10 CFR 60 Subparts B and E, report to NRC by Center for Nuclear Waste Regulatory Analyses, May 1989, Weiner & Patrick, Appendix B, Uncertainty #78.

(30) 30 CFR 57--Safety and Health Standards--Underground Metal and Nonmetal Mines, Code of Federal Regulations, Mine Safety and Health Administration (MSHA), United States Department of Labor, pages 362-443, July 1, 1986.

(40) Memorandum of Understanding between the U.S. Nuclear Regulatory Commission and the Occupational Safety and Health Administration, Stello-NRC & Pendergrass-OSHA, 10/21/88, pages 1-4.

(50) Memorandum of Understanding between the U.S. Department of Energy and the U.S. Department of Labor, Zegeer-MSHA & Rusche-DOE, 12/23/86, pages 1-4.

REGULATORY REQUIREMENT RR3017: QA IMPLEMENTATION

Primary Regulatory Text Citation

10CFR60 152 January 1, 1989

Associated Regulatory Text Citations

10CFR60 150 January 1, 1989

Referenced Regulatory Text Citations

10CFR50 Appendix B * January 1, 1989

10CFR60 151 January 1, 1989

POTENTIAL UNCERTAINTIES

Excluded Uncertainty

UN0001 -- Special Processes

Parent Record: 10 CFR 50 Appendix B (IX)

Excluded Uncertainty Text

The term "special process" requires clarification to facilitate proper implementation of the regulation by the DOE. This will ensure that quality assurance activities in this regard will satisfy the regulatory intent of the Commission.

Rationale for Exclusion

The principles of ejusdem generis provide adequate guidance for the determination of what kinds of processes may be considered as "special processes." Ejusdem generis prevents the abuse (and, therefore, misinterpretation) of such a list by limiting its extrapolation in a controlled manner so that only items which are of like kind or class can be considered for inclusion. In this case, the list included in the statement "... special processes, including welding, heat treating, and nondestructive testing, ..." in 10 CFR 50, Appendix B, Section IX, gives reasonable direction in regard to those processes which are considered "special."

For purposes of background information, the original rationale for inclusion of this uncertainty is included below:

In ANSI/ASME NQA-1-1986, a "special process" is defined as a process, the results of which are highly dependent on the control of the process itself, or the skill of the operator, or both. The process results in a product where the specified

quality cannot be readily verified by inspection. (Reference 10) It is apparent that without this definition, there is a wide range of interpretations that can be given to what constitutes a "special process".

Mark V. Muller 2/20/89

Reference for Exclusion Rationale

(10) "A Comparison of 10CFR50, Appendix B and ANSI/ASME NQA-1-1986," 1987, Southwest Research Institute, page 7.

REGULATORY REQUIREMENT RR3021: EMERGENCY PLANNING CRITERIA

Primary Regulatory Text Citation

10CFR60 Subpart I January 1, 1989

POTENTIAL UNCERTAINTIES

Included Potential Uncertainty

UN0001 -- Unpublished Subpart I in 10 CFR 60

Parent Record: 10 CFR 60 Subpart I

Text of the Potential Uncertainty

10 CFR 60.31(a)(5) requires the NRC to ensure compliance of the DOE emergency plan with Subpart I of 10 CFR Part 60. 10 CFR 60.21(c)(9) requires the DOE to include plans for coping with radiological emergencies in the Safety Analysis Report. However, it is uncertain that this is possible, since Subpart I has not been published.

Rationale for Inclusion

The absence of criteria for emergency planning, which will be included in Subpart I, is an uncertainty that needs to be addressed so that a complete application can be prepared by the DOE. The Commission may issue a construction authorization if it determines that DOE's application includes an emergency plan which is compliant with Subpart I of 10 CFR Part 60. The Regulations of the Federal Emergency Management Agency (Reference 10) may be useful in the preparation of Subpart I.

M. V. Muller 2/8/1990

Reference for Inclusion Rationale

(10) Title 44 of the Code of Federal Regulations, Regulations of the Federal Emergency Management Agency

APPENDIX C

TABLE C1. GROUP I: CRITERIA FOR GENERAL ADEQUACY OF SITE CHARACTERIZATION

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERTAINTY IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
122(a)(1)	122(b)(1),others	RR2001	UN03	Favorable conditions	Clarification of "geologic setting"	1
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(iii)(A)	RR2002	UN02	Adverse condition - flooding and others	Performance objectives not significantly affected	1
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(ii)	RR2002	UN03	Adverse condition - flooding and others	Need of criteria for "adequately evaluated"	2
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN04	Adverse condition - flooding and others	Meaning of "not likely to underestimate effect"	1
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN01	Adverse condition - flooding and others	"Taking into account the degree of resolution"	1
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN05	Adverse condition - flooding and others	Need of criteria for "adequately investigated"	2
122(a)(2), 122(c)(1)-(c)(24)	122(b)	RR2002	UN12	Adverse condition - flooding and others	Definition of "geologic setting"	1
122(a)(2), 122(c)(1)-(c)(24)	21(c)(1)(ii)(C),122	RR2002	UN17	Adverse condition - flooding and others	Inconsistency in treating adverse conditions	3
122(a)(2), 122(c)(3)	122(c)(3)	RR2004	UN18	Adverse cond:nat. phenom. & groundwater	Meaning of "regional gdwater flow system"	1
122(a)(2), 122(c)(4)	122(c)(4)	RR2005	UN18	Adverse cond: deform. affecting gdwater	Meaning of "regional gdwater flow system"	1
122(a)(2), 122(c)(8)	122(c)(8)	RR2009	UN18	Adverse condition - geochemical	"Sorption" too constraining a term	2
122(a)(2), 122(c)(16)	122(c)(16)	RR2017	UN19	Adverse condition - extreme erosion	Clarification of "extreme erosion"	1
122(a)(2), 122(c)(24)	122(c)(24)	RR2025	UN18	Adverse condition:gaseous radionuclides	"Air-filled" not general enough	2

TABLE C2. GROUP II: ANTICIPATED AND UNANTICIPATED PROCESS AND EVENTS

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
112	112	RR1001	UN01	System perf. after permanent closure	"Anticipated and unanticipated processes/events"	1
113(a)(2)	113(b)	RR2000	UN03	Groundwater travel time	Meaning of "anticipated processes and events"	1
113(a)(2)	113(c)	RR2000	UN04	Favorable conditions	Meaning of "unanticipated processes and events"	1

TABLE C3. GROUP III: SYSTEMS, STRUCTURE, AND COMPONENTS IMPORTANT TO SAFETY--DESIGN CRITERIA AND DESIGN BASES

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
71(a)	72(b)(6)	RR3012	UN02	Construction problems	"Construction problems" need clarification	1
71(a)	72(b)(7)	RR3012	UN03	Construction problems	"Anomalous conditions" need clarification	1
73	73(a)	RR3013	UN01	Design/construction of GROA	Meaning of "substantial safety hazard"	1
73	73(b)	RR3013	UN02	Design/construction of GROA	Meaning of "significant deviation"	1
131(b)(10)	131(b)(10)	RR0081	UN01	Design: waste handling conveyances	Insufficient guidance in design criteria	2
131(b)(5)	131(b)(5)	RR0090	UN01	Imp. to safety: utility services	Design all utility systems for essential function	2
131(b)(6)	131(b)(6)	RR0091	UN01	Imp. to safety:inspection/testing/maint.	"Design to permit periodic inspection"	2

TABLE C4. GROUP IV: ENGINEERED BARRIER SYSTEM PERFORMANCE

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERTAINTY IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
113(a)(1)(i)(A)	113(a)(1)(i)(A)	RR1002	UN01	EBS performance after permanent closure	"Substantially complete containment"	1
113(a)(1)(i)(B)	135(c)(1)	RR1003	UN03	EBS Radionuclide release/postclosure	Clarification re gas fission products needed	2

TABLE C5. GROUP V: RADIOLOGICAL SAFETY CONSIDERATIONS

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
111(a)	111(b)	RR0004	UN03	Radiation exposures/releases	Reference clarificaton	2
111(a)	111(a)	RR0004	UN05	Radiation exposures/releases	Design radiation dose criteria	1

TABLE C6. GROUP VI: RETRIEVABILITY CONDITIONS

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERTAINTY IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
46	46(a)(1)	RR0070	UN01	License amendment/waste retrieval	Clarify "substantially incr. retrieval difficulty"	1
111(b)(1)	111(b)(1)	RR0002	UN01	Retrieval of waste	Design to permit or not to preclude retrieval?	1

TABLE C7. GROUP VII: CONDITIONS FOR CONSTRUCTION AUTHORIZATION, LICENSE AND LICENSE AMENDMENT

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
16	23	RR0052	UN01	Site characterization plan	"Environmental Report" vs. "EIS"	3
31	31	RR0061	UN01	Construction authorization	No consideration of performance confirmation plan	2
51	51(a)(2)(ii)	RR0071	UN01	License amendment/permanent closure	Archives consultation likely/potential intruders	1

TABLE C8. GROUP VIII: REGULATION OF MINING SAFETY AND NONRADIOLOGICAL SAFETY CONSIDERATIONS

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
131(b)(9)	131(b)(9)	RR0080	UN01	Imp. to safety: mining regulations	Secondary effects/non-radiological accidents	7
133(e)	133(e)(1)	RR0003	UN01	Design - safe undergrd ops/rock movement	Will NRC regulate non-radiological safety?	1

TABLE C9. GROUP IX: CONDITIONS OF LAND ACQUISITION AND CONTROL

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
121(a)*	121(a)(1)	RR0055	UN01	Ownership/control of land	When does DOE guarantee "control" of land?	2

TABLE C10. GROUP X: QUALITY ASSURANCE AND INFORMATION REQUIREMENTS

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
152	10 CFR 50 App. B	RR3017	UN01	QA implementation	Meaning of "special process"	1
10	10(b)	RR3006	UN01	Significant information implications	"Significant implications" need further clarificati	1
21	21	RR0074	UN01	License application: content	Information requirements for DOE unclear	1
22	22(d)	RR0073	UN03	License application: procedure	DOE responsibility cannot include NRC/PDR req.	7
21	24(a)	RR0074	UN02	License application: docketing criteria	License docketing criteria absent	2

TABLE C11. GROUP XI: COMPLIANCE WITH THE EPA STANDARD

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
112	112	RR1001	UN02	EPA standard:conforming amendments	Part 60 amendment need after issuance of EPA std.	2

TABLE C12. GROUP XII: EMERGENCY PLANNING CRITERIA

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	CATEGORY
31	31(a)(5)	RR0061	UN02	Construction authorization	Subpart I not published	2
Subpart I	Subpart I	RR3021	UN01	Emergency planning criteria	Subpart not published	2

TABLE C13. EXCLUDED REGULATORY AND INSTITUTIONAL UNCERTAINTIES

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCER IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT
15	15	RR0050	UN02	Use of radioactive materials in site char	Regulatory language inconsistent w. statute
16	17	RR0052	UN02	Use of radioactive tracers	Radioactive materials use in site characterization
31	31(c)	RR0061	UN03	Construction authorization	Supplemental information inconsistent with reg
32	32(a)	RR0062	UN01	Conditions/construction authorization	Reg. reads protect H&S, security or env. values
32	32(a)	RR0062	UN02	Conditions/construction authorization	Construction auth. conditions for H&S unspecified
51	51(a)(2)(i)	RR0071	UN02	License amendment/permanent closure	Monuments "as permanent as practicable"
51	51(b)	RR0071	UN03	License amendment/permanent closure	Inconsistency in environmental report reference
52(a)	52	RR0072	UN01	License termination	Can license be terminated if DOE has spent fuel?
111(a)	111(a)	RR0004	UN01	Radiation exposures/releases	Is ALARA properly applicable?
111(a)	111(a)	RR0004	UN02	Radiation exposures/releases	What does "at all times" mean here?
112	112	RR1001	UN03	EPA standard:implementation method	Need for CDM after issuance of EPA std
113(a)(2)	113(a)(2)	RR2000	UN02	Groundwater travel time	Clarification of "disturbed zone"
113(a)(2)	113(a)(2)	RR2000	UN01	Groundwater travel time	Fastest path of travel/favorable conditions
122(a)(1)	122(b)(1),(c)(15,16)	RR2001	UN01	Favorable conditions	Clarification of "Quaternary Period" in this contex
122(a)(1)	122(b)(7)	RR2001	UN02	Favorable conditions	GWTT along "fastest path of radionuclide travel"
122(a)(1)	122(b)(5,7)	RR2001	UN04	Favorable conditions	Clarification of "disturbed zone"
122(a)(2), 122(c)(1)-(c)(24)	122(b)(5,7)	RR2002	UN15	Adverse condition - flooding and others	Meaning of "disturbed zone"
122(a)(2), 122(c)(1)-(c)(24)	122(b)(7)	RR2002	UN14	Adverse condition - flooding and others	Meaning of "fastest path of radionuclide travel"
122(a)(2), 122(c)(10)	122(c)(10)	RR2011	UN18	Adverse cond:dissolutioning evidence	Focus should be on implications of "evidence"
122(a)(2), 122(c)(14)	122(c)(14)	RR2015	UN18	Adverse condition - higher earthquakes	Meaning of "typical of the area"
122(a)(2), 122(c)(15)	122(c)(15)	RR2016	UN18	Adverse condition - igneous activity	Focus should be on implications of "evidence"
122(a)(2), 122(c)(16)	122(c)(16)	RR2017	UN18	Adverse condition - extreme erosion	Focus should be on implications of "evidence"
122(a)(2), 122(c)(18)	122(c)(18)	RR2019	UN18	Adverse cond:mining for resources	Focus should be on implications of "evidence"
122(a)(2), 122(c)(19)	122(c)(19)	RR2020	UN18	Adverse condition - drilling	Focus should be on implications of "evidence"
131(b)(1)	131(b)(1)	RR0001	UN01	Imp. to safety:fires/explosions	"Anticipated Processes and Events" in GROA design
131(b)(3)	131(b)(3)(iv)	RR0088	UN02	Imp. to safety:fires/explosions	Should explosion suppression be included?
131(b)(3)	131(b)(3)(iv)	RR0088	UN03	Imp. to safety:fires/explosions	Provisions and means of protection unclear
131(b)(3)	131(b)(3)(i)	RR0088	UN01	Imp. to safety:fires/explosions	System redundancy - fires and explosions
131(b)(4)	131(b)(4)(ii)	RR0089	UN03	Imp. to safety:emergency capability	Does reg preclude aid in emergency response?
131(b)(7)	131(b)(7)	RR0092	UN02	Imp. to safety: criticality control	Difference in safety margin from 10CFR72 analog
131(b)(7)	131(b)(7)	RR0092	UN03	Imp. to safety: criticality control	Reg provides no methods for criticality control
131(b)(7)	131(b)(7)	RR0092	UN01	Imp. to safety: criticality control	Reg allows 2-event criticality
131(b)(8)	131(b)(8)	RR0093	UN01	Imp. to safety: instrumentation/control	Identification of I&C systems
131(b)(9)	131(b)(9)	RR0080	UN03	Imp. to safety: mining regulations	Reg doesn't include procedures, only design
131(b)(9)	131(b)(9)	RR0080	UN02	Imp. to safety: mining regulations	Applicability of secondary references
111(b)(1)	133(i)	RR0002	UN02	Retrieval of waste	Might refer to different groundwater system

TABLE C14. CATEGORY 1: NEED FOR CLARIFICATION

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCER IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	NEW GROUP
10	10(b)	RR3006	UN01	Significant information implications	"Significant implications" need further clarificati	X
21	21	RR0074	UN01	License application: content	Information requirements for DOE unclear	X
46	46(a)(1)	RR0070	UN01	License amendment/waste retrieval	Clarify "substantially incr. retrieval difficulty"	VI
51	51(a)(2)(ii)	RR0071	UN01	License amendment/permanent closure	Archives consultation likely/potential intruders	VII
71(a)	72(b)(6)	RR3012	UN02	Construction problems	"Construction problems" need clarification	III
71(a)	72(b)(7)	RR3012	UN03	Construction problems	"Anomalous conditions" need clarification	III
73	73(a)	RR3013	UN01	Design/construction of GROA	Meaning of "substantial safety hazard"	III
73	73(b)	RR3013	UN02	Design/construction of GROA	Meaning of "significant deviation"	III
111(a)	111(a)	RR0004	UN05	Radiation exposures/releases	Design radiation dose criteria	V
111(b)(1)	111(b)(1)	RR0002	UN01	Retrieval of waste	Design to permit or not to preclude retrieval?	VI
112	112	RR1001	UN01	System perf. after permanent closure	"Anticipated and unanticipated processes/events"	II
113(a)(1)(i)(A)	113(a)(1)(i)(A)	RR1002	UN01	EBS performance after permanent closure	"Substantially complete containment"	IV
113(a)(2)	113(b)	RR2000	UN03	Groundwater travel time	Meaning of "anticipated processes and events"	II
113(a)(2)	113(c)	RR2000	UN04	Favorable conditions	Meaning of "unanticipated processes and events"	II
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(iii)(A)	RR2002	UN02	Adverse condition - flooding and others	Performance objectives not significantly affected	I
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN04	Adverse condition - flooding and others	Meaning of "not likely to underestimate effect"	I
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN01	Adverse condition - flooding and others	"Taking into account the degree of resolution"	I
122(a)(2), 122(c)(1)-(c)(24)	122(b)	RR2002	UN12	Adverse condition - flooding and others	Definition of "geologic setting"	I
122(a)(1)	122(b)(1),others	RR2001	UN03	Favorable conditions	Clarification of "geologic setting"	I
122(a)(2), 122(c)(3)	122(c)(3)	RR2004	UN18	Adverse cond:nat. phenom. & groundwater	Meaning of "regional gdwater flow system"	I
122(a)(2), 122(c)(4)	122(c)(4)	RR2005	UN18	Adverse cond: deform. affecting gdwater	Meaning of "regional gdwater flow system"	I
122(a)(2), 122(c)(16)	122(c)(16)	RR2017	UN19	Adverse condition - extreme erosion	Clarification of "extreme erosion"	I
133(e)	133(e)(1)	RR0003	UN01	Design - safe undergrd ops/rock movement	Will NRC regulate non-radiological safety?	VIII
152	10 CFR 50 App. B	RR3017	UN01	QA implementation	Meaning of "special process"	X

TABLE C15. CATEGORY 2: OMISSION

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCER IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	NEW GROUP
21	24(a)	RR0074	UN02	License application: docketing criteria	License docketing criteria absent	X
31	31	RR0061	UN01	Construction authorization	No consideration of performance confirmation plan	VII
31	31(a)(5)	RR0061	UN02	Construction authorization	Subpart I not published	XII
111(a)	111(b)	RR0004	UN03	Radiation exposures/releases	Reference clarificaton	V
112	112	RR1001	UN02	EPA standard:conforming amendments	Part 60 amendment need after issuance of EPA std.	XI
121(a)	121(a)(1)	RR0055	UN01	Ownership/control of land	When does DOE guarantee "control" of land?	IX
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(ii)	RR2002	UN03	Adverse condition - flooding and others	Need of criteria for "adequately evaluated"	I
122(a)(2), 122(c)(1)-(c)(24)	122(a)(2)(i)	RR2002	UN05	Adverse condition - flooding and others	Need of criteria for "adequately investigated"	I
122(a)(2), 122(c)(8)	122(c)(8)	RR2009	UN18	Adverse condition - geochemical	"Sorption" too constraining a term	I
122(a)(2), 122(c)(24)	122(c)(24)	RR2025	UN18	Adverse condition:gaseous radionuclides	"Air-filled" not general enough	I
131(b)(5)	131(b)(5)	RR0090	UN01	Imp. to safety: utility services	Design all utility systems for essential function	III
131(b)(6)	131(b)(6)	RR0091	UN01	Imp. to safety:inspection/testing/maint.	"Design to permit periodic inspection"	III
131(b)(10)	131(b)(10)	RR0081	UN01	Design: waste handling conveyances	Insufficient guidance in design criteria	III
113(a)(1)(i)(B)	135(c)(1)	RR1003	UN03	EBS Radionuclide release/postclosure	Clarification re gas fission products needed	IV
Subpart I	Subpart I	RR3021	UN01	Emergency planning criteria	Subpart not published	XII

TABLE C16. CATEGORY 3: INCONSISTENCY

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERIDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	NEW GROUP
122(a)(2), 122(c)(1)-(c)(24)	21(c)(1)(ii)(C),122	RR2002	UN17	Adverse condition - flooding and others	Inconsistency in treating adverse conditions	I
16	23	RR0052	UN01	Site characterization plan	"Environmental Report" vs. "EIS"	VII

TABLE C17. CATEGORY 7: NEED FOR CLARIFICATION OF JURISDICTION

PRIMARY 10 CFR 60 CITATION	PARENT 10 CFR 60 CITATION	RR NO.	UNCERTAINTY IDENT	GENERAL SUBJECT OF REGULATION	ABBREVIATED UNCERTAINTY STATEMENT	NEW GROUP
22	22(d)	RR0073	UN03	License application: procedure	DOE responsibility cannot include NRC/PDR req.	X
131(b)(9)	131(b)(9)	RR0080	UN01	Imp. to safety: mining regulations	Secondary effects/non-radiological accidents	VIII