CNWRA 89-002

ANALYSIS OF REGULATORY UNCERTAINTIES RELATED TO THE SITE CHARACTERIZATION PLAN AND THE EXPLORATORY SHAFT FACILITY

Prepared for

Nuclear Regulatory Commission
Contract NRC-02-88-005

Prepared by

Center for Nuclear Waste Regulatory Analyses

April 1989

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1.0 EXECUTIVE SUMMARY

1.1 Purpose of the Analysis

The Center for Nuclear Waste Regulatory Analyses (CNWRA) has conducted a preliminary regulatory analysis of Subparts B and E of 10CFR60. As a result, approximately eighty regulatory uncertainties were identified. The severity of these uncertainties varies: some are critical to implementation of the regulation, others are less significant, and some are of minor importance. Moreover, some uncertainties are critical to the site characterization plan (SCP) review, some to the exploratory shaft facility (ESF), and some to the site characterization process itself. The present analysis was undertaken in order to identify all of these, and to differentiate between them with respect to importance and desired timeliness of resolution. The Nuclear Regulatory Commission (NRC) staff requested identification of those uncertainties which would relate either to potential NRC objections to the SCP or to potential NRC comments on the ESF, so that both of these categories of uncertainties could be addressed in staff review.

All uncertainties related to site characterization could, in theory, be considered during the review of the SCP. However, the timing of the staff review dictated that only those uncertainties related to either potential NRC objections on the SCP or NRC comments on the ESF could be addressed at this time. Other uncertainties related to the site characterization process can be addressed in subsequent reviews. Therefore, a primary objective of this report is the differentiation between these two sets of uncertainties: those related to the objections to the SCP and to the ESF comments, and those related to the site characterization process and the comments on the SCP.

1.2 Summary of the Report

Section 1 of the report is an executive summary: the purpose of the study is reviewed, the sections of the report are summarized, and the results of the analysis and the recommendations suggested by these results are reported.

Section 2 briefly describes the identification or elucidation of the uncertainties and the ranking method. Section 3 discusses the regulatory uncertainties in their relationship to attributes particularly related to site characterization, the site characterization plan (SCP), and the exploratory shaft facility, respectively. Each attribute is given, and accompanied by a list of uncertainties in descending rank with respect to that attribute. Subsection 3.3.4 considers combinations of attributes in order to refine the priorities developed for each attribute by itself.

Section 4 of the report relates regulatory uncertainties to NRC objections to the Consultation Draft of the Site Characterization Plan (CDSCP); Section 5, to NRC comments on the CDSCP. Section 6 relates regulatory uncertainties to NRC comments on the Exploratory Shaft Facility (ESF). Section 7 provides a correlation between the uncertainties identified and the pertinent sections of the DOE SCP for ease of use by SCP reviewers. Section 8 contains the recommendations for the uncertainties which are judged most important to address.

1.3 Results of the Analysis

The purpose of this study was to identify the uncertainties which are most closely related to the site characterization plan, the process of site characterization, and the exploratory shaft facility (ESF), and to differentiate between them with respect to importance and desired timeliness of resolution. A subsequent goal was to prioritize the identified uncertainties with respect to importance and desired timeliness of resolution.

The following recommendations and conclusions resulted from this analysis:

Recommendation 1: Expeditious resolution of the regulatory uncertainties of 10CFR60.122(a) and 10CFR60.122(c), which affect all 24 of the potentially adverse conditions at the repository would benefit the repository program.

The uncertainties are embodied in the following phrases in 10CFR60.122:

- " . . . taking into account the degree of resolution achieved by the investigations . . ."
- " . . . not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste . . ."

and include the most important uncertainties for site characterization and site characterization plan review. The degree of resolution to be taken into account in determining whether hydrological characteristics of the site were acceptable was particularly prominent in this analysis.

Recommendation 2: Several areas of concern ancillary to radiological health and safety, which were not identified in the NRC objections to the site characterization plan, merit some attention in site characterization plan review. These concerns include the retrievability option, the environmental report to be included in the license application, the question of land jurisdiction, application of ALARA, and several potentially adverse conditions. A number of uncertainties in regulations dealing with these areas ranked high or very high in their relationship to the criteria for NRC objections but were not identified in the NRC point papers.

Recommendation 3: Five potentially adverse conditions - water table rise, frequency and magnitude of earthquakes, geomechanical properties, possible perched water and oxidation potential of the groundwater - and structures, systems and components important to safety, merit careful consideration with respect to site characterization, although they were not identified in the NRC point papers. Uncertainties in regulations related to these ranked very high in their relationship to the criteria for NRC comments, as did the section of 10CFR60.122: ". . . not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste . . ." as applied to a number of adverse conditions, and structures, systems, and components important to safety.

Conclusion 1: The uncertainties in 10CFR60.122 cited in Recommendation 1, above, as applied to movement of gaseous radionuclides, flooding, and design for safe underground operations are also the most important uncertainties related to the exploratory shaft facility (ESF).

Conclusion 2: The time required to complete the rulemakings currently in process should not prove to be a constraint, except for the ongoing rulemaking on "anticipated/unanticipated processes and

events." This is the only rulemaking currently underway which has critical application to site characterization.

Conclusion 3: NRC Objection 1 to the Site Characterization Plan, which dealt with alternate conceptual models, recognized the subjects of the regulatory uncertainties in 10CFR60.122(a) and 10CFR60.122(c), cited in Recommendation 1.

Conclusion 4: The relationship of NRC comment point papers to the uncertainties cited in Recommendation 1, above, was adequately recognized for Comments 1, 6, 10, 13, 22, 26, 29, 38, 46, 59, 70, and 90 through 94.

The degree of resolution to be taken into account in determining whether hydrological characteristics of the site were acceptable was particularly prominent in this analysis and was related to a large fraction of the NRC "comment" point papers.

2.0 INTRODUCTION – ELUCIDATION OF REGULATORY UNCERTAINTIES

2.1 Background of the Project

The present analysis results from an acceleration of the Program Architecture development. This acceleration was designed not only to provide an early "proof of system" but also to provide particular analyses for use by Center and NRC staff. The Program Architecture, shown in the process diagram in Figure 1, provides a systematic basis for analyzing regulations. The acceleration was structured as follows:

- Subparts B and E of 10CFR60 were selected for analysis.
- Regulations incorporated by reference in Subparts B and E were included in the analysis to the extent practicable.
- Regulations of other agencies dealing with high-level radioactive waste, analogous non-high-level waste NRC regulations, and enabling statutes were included in the analytical base.
- Seventy-five candidate regulatory requirements were identified by a process controlled by a technical operating procedure (TOP) and evaluation by independent Program Architecture Review Committees (PARCs).
- A total of 78 regulatory uncertainties were identified during this analysis. The sections of the TOP which govern the identification of regulatory uncertainties are given in Appendix A.

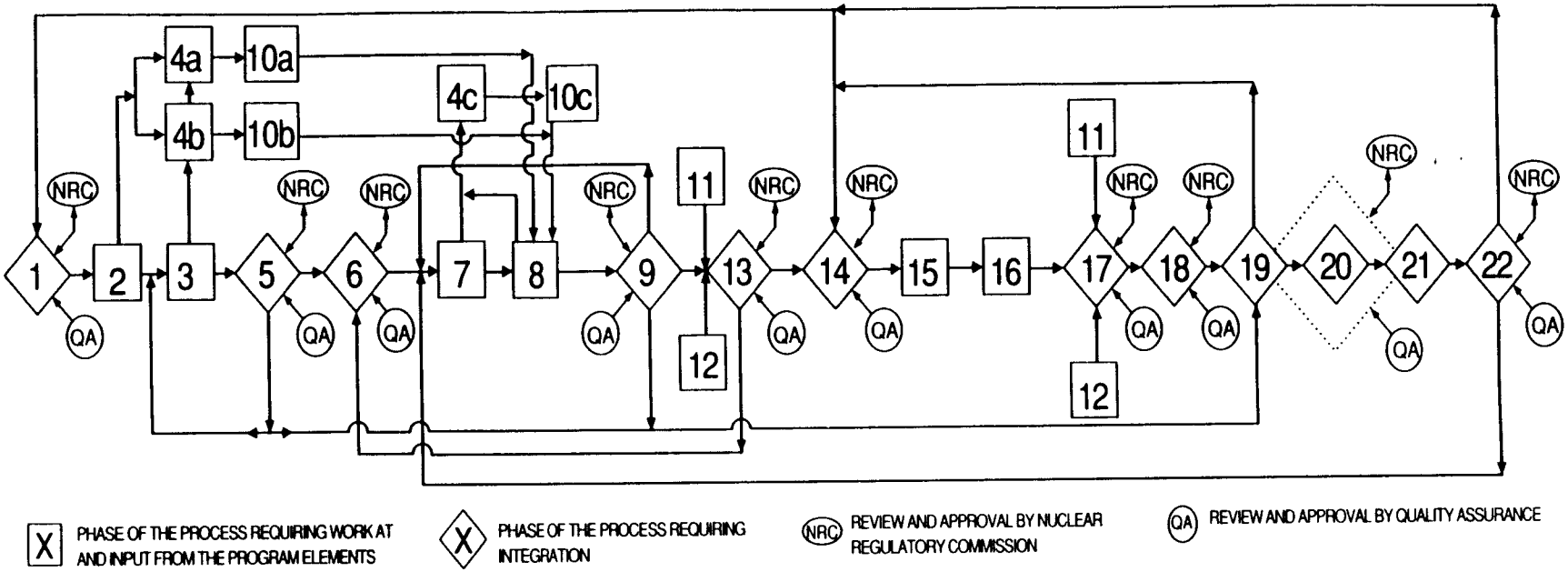
The acceleration of the Program Architecture analysis resulted in a modified analytical strategy. Moreover, time for analysis was limited not only by the acceleration of the Program Architecture, but by the timetable for Site Characterization Plan review. This report is, therefore, based on a preliminary examination of 10CFR60: what could be considered as an analytical "first cut", and should be read with this in mind. Only Subparts B and E were included, no regulation was addressed in depth except 10CFR60, and the results of the uncertainty analyses were "frozen" as of January 3, 1989. Thus, all of the uncertainties were not reviewed completely by the PARC process. Furthermore, technical uncertainties, uncertainty reduction methods and, more crucially, elements of proof have not been considered.

2.2 Identifying the Uncertainties

The definition of "regulatory uncertainty" in the TOP is as follows: a regulation is said to contain an uncertainty when there is lack of clarity in the quoted statement, when an essential requirement has been omitted from the legislation, or when requirements which either detract from the regulatory program or do not contribute to the regulatory program are included in the regulation. In general terms, a regulatory uncertainty is present when one or both of the following questions cannot be answered:

- Does DOE know what to do in order to comply with the regulation?
- Does NRC know what to do to determine compliance with the regulation?

Although virtually all of the uncertainties identified are valid, they are not equally important, nor is the need for their reduction equally pressing. Moreover, they do not all bear equally on the site characterization plan review, site characterization, or the ESF. The purpose of this particular study is twofold:



1. IDENTIFY POTENTIALLY APPLICABLE REGULATIONS
2. ANALYZE REGULATORY REQUIREMENTS
3. IDENTIFY AND LIST ELEMENTS OF PROOF

4a. IDENTIFY AND DESCRIBE INSTITUTIONAL UNCERTAINTIES
4b. IDENTIFY AND DESCRIBE REGULATORY UNCERTAINTIES
4c. IDENTIFY AND DESCRIBE TECHNICAL UNCERTAINTIES

5. INTEGRATE AND REVIEW REGULATORY REQUIREMENTS; AND INTEGRATE, REVIEW, AND REVISE ELEMENTS OF PROOF
6. SELECT SUBSET OF REGULATIONS FOR FURTHER ANALYSIS BASED ON TIME-CRITICAL NATURE
7. IDENTIFY BASIC APPROACH FOR COMPLIANCE DETERMINATION METHODS (REVISE AT SUBSEQUENT ITERATIONS)
8. IDENTIFY INFORMATION REQUIREMENTS
9. INTEGRATE, REVIEW, AND REVISE COMPLIANCE DETERMINATION METHODS, ELEMENTS OF PROOF, AND INFORMATION REQUIREMENTS

10a. IDENTIFY INSTITUTIONAL UNCERTAINTY QUESTIONS
10b. IDENTIFY REGULATORY UNCERTAINTY QUESTIONS
10c. IDENTIFY TECHNICAL UNCERTAINTY QUESTIONS

11. OBTAIN DOE "ISSUES", INFORMATION NEEDS AND UNCERTAINTIES
12. OBTAIN STATE, TRIBE, AND OTHER AFFECTED PARTIES "ISSUES", INFORMATION NEEDS AND UNCERTAINTIES
13. INTEGRATE, CONSOLIDATE, AND RANK UNCERTAINTIES AND UNCERTAINTY QUESTIONS (INCLUDING DOE AND STATE ITEMS)
14. IF UNCERTAINTY, UNCERTAINTY QUESTION, OR INFORMATION REQUIREMENT IS UNRESOLVED, FLAG AS OPEN ITEM; SELECT ITEMS FOR NRC ACTION; IDENTIFY OTHER ACTION PARTIES

15. IDENTIFY UNCERTAINTY REDUCTION METHODS AND RELATED INFORMATION REQUIREMENTS; SPECIFY ALTERNATE NRC PROGRAMS FOR UNCERTAINTY REDUCTION
16. DEVELOP COSTS, SCHEDULES, AND LEAD TIMES FOR NRC PROGRAMS
17. ANALYZE ALTERNATIVES AND NRC PROGRAM TRADEOFFS
18. RECOMMEND NRC PROGRAM INCLUDING OVERALL RESEARCH PROGRAM PLAN
19. DEVELOP AND DISPLAY NETWORK AND CRITICAL PATH FOR EACH REGULATORY REQUIREMENT
20. DEVELOP AND DISPLAY NETWORK FOR TOTAL PROGRAM
21. CONTROL AND DOCUMENT PROGRAM STRUCTURE AND CHANGES
22. CONDUCT NRC PROGRAM

PROCESS DIAGRAM FOR DEVELOPING AND MAINTAINING THE PROGRAM ARCHITECTURE

Figure 1. Process Diagram for the Program Architecture

to identify the regulatory uncertainties which are closely related to site characterization, site characterization plan review and the ESF, and to prioritize the uncertainties with respect to these particulars.

Statements of the currently identified uncertainties are given in Appendix B. It should be noted that more than half of the uncertainties arise in 10CFR60.122(c): the regulation which lists twenty-four potentially adverse conditions. For each adverse condition, there are two uncertainties: what the degree of resolution or precision of the investigation of the condition should be, and what is meant, for the particular condition, by "significant effect on repository performance." (In Appendix B, these two uncertainties are stated once each, rather than repeated for each of the twenty-four potentially adverse conditions.) Although only two phrases in the regulation are uncertain, the resolution of the uncertainty for each of these two is somewhat different for each of the 24 conditions to which it applies. It may, however, be practical and efficient to reduce all 48 of these uncertainties in a single action (as discussed later).

2.3 Method of Ranking or Prioritizing the Uncertainties

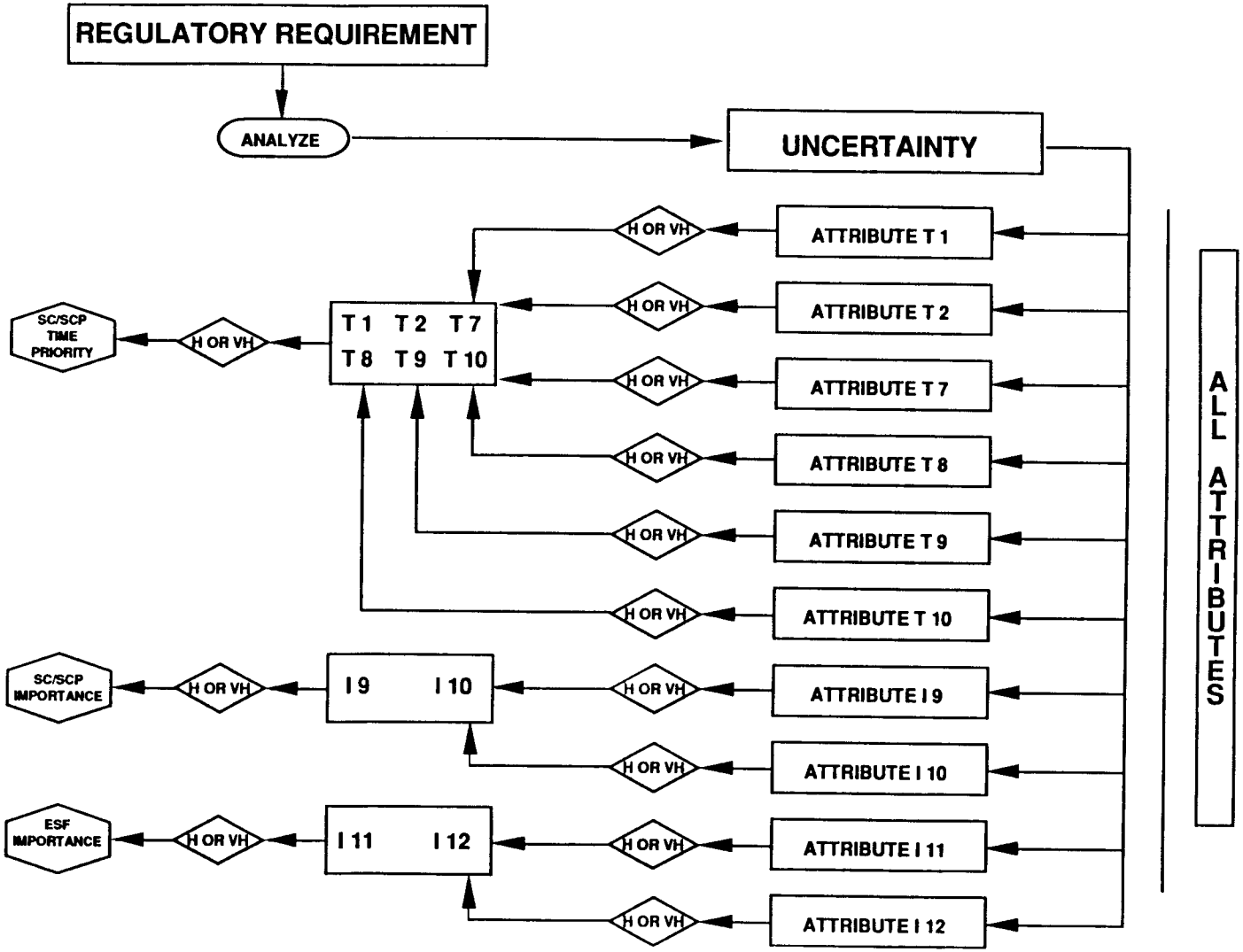
All regulatory uncertainties are not equally important, nor is their resolution equally urgent. Moreover, they are related in differing degrees to the site characterization plan review, the exploratory shaft facility construction, and the site characterization process. A method for sorting out these differences and prioritizing reduction of the uncertainties was therefore developed, using the multi-attribute utility analysis method of Keeney and Raiffa (R. L. Keeney and H. Raiffa, *Decisions with Multiple Objectives: Preferences and Value Tradeoffs*, New York, 1976).

A total of 26 attributes was developed, and the uncertainties were ranked against these attributes, which are given in Appendix C. A flow diagram for the ranking analysis is shown in Fig. 2. The present report considers only ranks with respect to those attributes which relate to site characterization, the site characterization plan, and the exploratory shaft facility. The ranking and prioritization of the uncertainties with respect to all attributes will be discussed in a forthcoming report.

Ranking with respect to each attribute was done by CNWRA personnel, using a six-step ranking system with numerical analogs; numerical analogs allow development of composite rankings. The numerical analogs are:

Very high	=	9
High	=	7
Moderate	=	5
Low	=	3
Very low	=	1
NA	=	not applicable: no numerical analog
DEF	=	consideration of the uncertainty was deferred

The order or priority in which the resolution of the uncertainties should be addressed can be inferred from this type of analysis, but *only* with the consideration that all attributes in the analysis have equal weight. Giving some attributes a higher or lower weight than others (i.e., considering some attributes more important than others) is the prerogative of the decision maker - the NRC in this case - and not the purview of the decision analyst. Differential weighting may well yield a different set of priorities. While the prioritization might bring to mind or suggest methods for uncertainty reduction such as staff technical positions or rulemaking, it *does not* recommend any particular method - a recommendation which is the prerogative of the decision maker.


REGULATORY REQUIREMENT
ANALYZE
UNCERTAINTY
ATTRIBUTE T 1
ATTRIBUTE T 2
ATTRIBUTE T 7
ATTRIBUTE T 8
ATTRIBUTE T 9
ATTRIBUTE T 10
ATTRIBUTE I 9
ATTRIBUTE I 10
ATTRIBUTE I 11
ATTRIBUTE I 12
H OR VH
T 1 T 2 T 7
T 8 T 9 T 10
SC/SCP TIME PRIORITY
I 9 I 10
SC/SCP IMPORTANCE
I 11 I 12
ESF IMPORTANCE
ALL ATTRIBUTES

3.0 THE RELATIONSHIP OF THE ATTRIBUTES TO THE UNCERTAINTIES

3.1 Selecting Appropriate Attributes

Regulatory uncertainties will need to be resolved or reduced eventually. However, almost eighty uncertainties were developed in Subparts B and E of 10 CFR 60, and there will doubtless be more when the entire regulation has been considered. Since all uncertainties cannot be considered at the same time, a method is needed to determine which uncertainties are most important, and which should be addressed first. Attributes were thus developed in order to provide a basis for prioritizing the reduction or resolution of regulatory uncertainties, so that DOE could receive early feedback on the most important uncertainties.

How is the need for resolution or the need for timely resolution, prioritized? To say that an uncertainty is "important" or that "timely resolution is desirable" is not precise enough for an outside observer to follow the logic of such a decision. Writing attributes of the decision, however, allows the decision logic to be made explicit. Attributes are statements answering the questions "why is reduction of this uncertainty important?" and "why is its timely resolution desirable?"

3.2 Relationship of the Attributes to NRC Staff Review

All uncertainties related to site characterization could, in theory, be considered during the review of the SCP. However, the timing of the staff review dictated that only those uncertainties related to either potential NRC objections or NRC comments on the ESF could be addressed at this time. Other uncertainties related to the site characterization process can be addressed in subsequent reviews. Therefore, a primary objective of this report is the differentiation between these two sets of uncertainties: those related to the objections to the SCP and to the ESF comments, and those related to the site characterization process and the comments on the SCP.

The Site Characterization Plan Review Plan (SCPRP) reflects the priorities of NRC staff concerns with the DOE program. In Section 5.3.2, the SCPRP identifies parameters for NRC objections and for NRC comments on the Site Characterization Plan (SCP). These parameters were written as attributes against which an uncertainty could be ranked. Two additional attributes were written which describe the overall relation of an uncertainty to site characterization. Similarly, attributes were written which would allow ranking of the uncertainties with respect to the ESF.

3.3 Uncertainties and Attributes Related to Site Characterization and the Exploratory Shaft Facility: the Analysis

Since attributes are the basis for prioritization, and there are 78 uncertainties but only 10 attributes considered in this report, the report groups uncertainties by rank with the related attribute. Each attribute is identified by an alphanumeric designator. The alphabetic portion is either a "T" denoting a timeliness attribute or an "I" denoting an importance (other than, and distinct from, timeliness) attribute. Not all of the attributes developed were germane to site characterization, the site characterization plan review, or the ESF. Thus the alphanumeric indicators are neither complete nor contiguous.

In the following sections, the attribute itself is explained, then the ranking of the uncertainties with respect to the attribute is discussed. Within each ranking, the uncertainties are listed in the order of their identification numbers; the latter listing carries no implications of ranking.

3.3.1 Attributes Related to SCP Objections and Site Characterization

3.3.1.1 Expeditious Site Characterization

T1: Reducing the uncertainty will enable site characterization to be performed expeditiously: Table I.

This is a very broadly written attribute, and can best be thought of as a general screen for the relation of uncertainties to site characterization. Table I lists the regulatory uncertainties in rank order for this attribute, and will, as has been indicated, be used as a screen or refining tool for other ranking.

Three uncertainties were ranked "very high" with respect to this attribute, and two of these have to do with NRC jurisdiction over mine safety, which is important because of construction activities. However a large number of uncertainties (50) ranked "high," including the uncertainties in 10CFR60.122(c) regarding the degree of resolution and the significance of effect on repository performance. This attribute is thus closely related to uncertainties affecting the entire range of potentially adverse conditions.

3.3.1.2 Expansion of SCP Scope

T2: If the uncertainty is not resolved, there is potential for expansion of the scope of DOE's site characterization activities: Table II.

A ranking of "very high" with respect to this attribute signifies considerable, and undesirable, expansion of DOE's site characterization activities.

Table II, which gives the ranking of the uncertainties with respect to this attribute, contains seven uncertainties with a "very high" rank. These include the uncertainty pertaining to anticipated and unanticipated processes and events, uncertainties related to the degree of resolution of parameters pertinent to the design of the underground openings, possible rise of the water table and behavior of gaseous radionuclides, and uncertainties related to significant effects on repository performance of the potential extraction of naturally occurring materials, possible rise of the water table and behavior of gaseous radionuclides.

The uncertainties which rank very high, as well as some of the high-ranking uncertainties (significant effect on repository performance, as related to groundwater chemistry and groundwater movement) exhibit this ranking because of the large spectrum of possible investigations in this area open to DOE.

The rankings for this attribute, taken alone, are probably insufficient to suggest any particular priority or course of action. However, an uncertainty ranking high with respect to Attributes I9, I10 and T7 (the "SCP objection" attributes) merits close attention.

3.3.1.3 Significant Irreversible Adverse Effects on Repository Performance

I9: There is high potential for significant and irreversible adverse effects on repository performance (radiological safety and/or waste isolation) if this uncertainty is not reduced before site characterization begins: Table III.

This attribute reflects the first criterion (as given in Section 5.3.2 of the SCP Review Plan) for an NRC objection to the SCP. Prioritization of uncertainties with respect to this attribute is shown in Table III.

One uncertainty - the degree of resolution to which potential changes in hydrological conditions (10CFR60.122(c)(5)) should be determined - ranked "very high." One uncertainty - the degree of resolution needed to determine potentially adverse conditions of structural deformation affecting groundwater flow (10CFR60.122(c)(4) - ranked "high" with respect to both this attribute and the preceding one. These two uncertainties thus merit particular attention.

Three other uncertainties ranked "high": the degree of resolution needed to determine potentially adverse conditions of structural deformation during the Quaternary, possible water table rise, and geochemical processes affecting radionuclide sorption.

One may thus draw the preliminary conclusion that these uncertainties need to be resolved or reduced before site characterization begins (or, realistically, before characterization proceeds much further), particularly the first two.

3.3.1.4 Significant Irreversible Adverse Effects on Characterization

I10: There is high potential for significant and irreversible/unmitigable effects on characterization that would physically preclude obtaining the information necessary for licensing if this uncertainty is not reduced before site characterization begins: Table IV.

This attribute reflects the second criterion (as given in Section 5.3.2 of the SCP Review Plan) for an NRC objection to the SCP. Prioritization of uncertainties with respect to this attribute is shown in Table IV.

Two uncertainties ranked "high" with respect to this attribute; the remainder ranked so low that the attribute can, in effect, be considered not to apply to any other uncertainty. One of the two high-ranking uncertainties is the same as a high-ranking uncertainty for the last attribute: the degree of resolution needed to determine potentially adverse geochemical processes affecting radionuclide sorption. The need for a timely resolution of this uncertainty is thus reinforced.

The other high-ranking uncertainty is in the significant effect on repository performance objectives of possible water table rise.

3.3.1.5 Significant Redirection That Would Disrupt Schedules

T7: There is high potential for significant redirection of DOE's studies that would result in disruption to characterization schedules and sequencing of studies and would interfere with DOE's ability to obtain the information necessary for licensing if this uncertainty is not reduced before site characterization begins: Table V.

This attribute reflects the third criterion (as given in Section 5.3.2 of the SCP Review Plan) for an NRC objection to the SCP. Prioritization of uncertainties with respect to this attribute is shown in Table V.

Two uncertainties ranked "very high" with respect to this attribute and ten ranked "high." Of the two "very high" uncertainties, one dealt with taking into account the degree of resolution of potentially adverse changes in hydrology (10CFR60.122(c)(5); the other, with the significance of the effect on repository performance of possible water table rise (10CFR60.122(c)(22). These two uncertainties thus merit particular attention.

One of the uncertainties ranking "high" was that related to anticipated and unanticipated processes and events, and one was the uncertainty in DOE's control over the land (10CFR60.121(a). Four of the ten uncertainties which ranked "high" involved the degree of resolution for several potentially adverse conditions involving groundwater - both hydrology and groundwater conditions affecting the engineered barrier system. Three concerned significant effect on repository performance of several adverse conditions, and one was the meaning of "typical of the area" in 10CFR60.122(c)(14).

With this attribute, as with some of those already discussed, the uncertainties relating to degree of resolution and significant effect on repository performance, particularly in connection with groundwater conditions, emerge as meriting attention.

3.3.1.6 Inadequacies in QA Program

T8: There is high potential for inadequacies to arise in the QA program which must be resolved prior to commencement of site characterization schedules if this uncertainty is not reduced before site characterization begins: no table is presented.

This attribute reflects the fourth criterion (as given in Section 5.3.2 of the SCP Review Plan) for an NRC objection to the SCP. It was not found to be applicable to any of the regulatory uncertainties developed in Subparts B and E.

3.3.2 Attributes Related to the Exploratory Shaft Facility (ESF)

3.3.2.1 Misinterpretation or Misapplication of Standards – Radiological

I11: There is high potential for misinterpretation or misapplication of the pertinent 10CFR60 standards regarding radiological safety and/or waste isolation during ESF design, construction, and/or construction testing if this uncertainty is not reduced: Table VIII.

Prioritization of uncertainties with respect to this attribute is shown in Table VIII.

One uncertainty ranked "very high" with respect to this attribute: potential significant effect of the movement of gaseous radionuclides on repository performance. Twenty-seven uncertainties ranked "high."

3.3.2.2 Misinterpretation or Misapplication of Standards – Nonradiological

I12: There is high potential for misinterpretation or misapplication of the pertinent 10CFR60 standards other than those concerning radiological safety and/or waste isolation during ESF design, construction, and/or construction testing if this uncertainty is not reduced: Table IX.

Prioritization of uncertainties with respect to this attribute is shown in Table IX.

No uncertainties rank "very high" with respect to this attribute. Only three uncertainties rank "high": one is related to design and safe underground operations; the other two are uncertainties in significant effect on repository performance of potential flooding and the need for complex engineering measures. The last also related to the question of retrievability.

3.3.3 Attributes Related to SCP Comments on Site Characterization

3.3.3.1 Significant Effects on Licensing Process

T9: There is high potential for significant adverse effects on the repository licensing process (but not for irreparable damage to repository performance) if this uncertainty is not reduced before site characterization begins: Table VI.

This attribute reflects the first criterion (as given in Section 5.3.2 of the SCP Review Plan) for an NRC comment on the SCP. It is dominated by the attributes cited in 3.3.1.4 (significant irreversible effects on site characterization) and 3.3.1.5 (significant redirection/schedule disruption), so that it is not surprising that some uncertainties which rank high with respect to those attributes rank high with respect to this one also. Prioritization of uncertainties with respect to this attribute is shown in Table VI.

Five uncertainties rank "very high"; three of these relate to significance on repository performance of the potentially adverse conditions of possible extraction of naturally occurring materials, possible water table rise and movement of gaseous radionuclides. Again, the "anticipated and unanticipated processes and events" uncertainty ranks very high. The last "very high" uncertainty with respect to this attribute is the degree of resolution to which possible water table rise must be known.

As may be anticipated, a large number of uncertainties rank "high" with respect to this attribute; these could be further prioritized by considering several attributes in combination. However, their importance may be more efficiently assessed by finding the other attributes with which they rank high or very high.

3.3.3.2 Significant but Correctable Schedule Disruption

T10: There is high potential for significant but correctable or mitigable disruption to characterization schedules and sequencing of studies that would interfere with and/or delay DOE's schedule for obtaining the information necessary for licensing if this uncertainty is not reduced before site characterization begins: Table VII.

This attribute reflects the second criterion (as given in Section 5.3.2 of the SCP Review Plan) for an NRC comment on the SCP. It is dominated by the attribute cited in 3.3.1.5. Prioritization of uncertainties with respect to this attribute is shown in Table VII.

Six uncertainties rank "very high": one of these relates to projections of favorable conditions, one is the uncertainty in "anticipated and unanticipated processes and events," and four relate to potentially adverse conditions involving geochemistry, extractable naturally occurring materials, potential water table rise and movement of gaseous radionuclides. A large number of uncertainties rank "high," and these can be further prioritized by considering how they rank with respect to other attributes.

3.3.4 Combinations of Attributes

In some cases, a large number of uncertainties are ranked "high" with respect to an attribute, and the analysis to that point provides no way to differentiate within the "high" ranking. One method of differentiation is by combinations of attributes and summing or averaging of the rankings. This method has been applied to several combinations of the attributes analyzed in Sections 3.3.1, 3.3.2 and 3.3.3. These combinations, with the rationale and results for each, are given below.

The results of such averaging are meaningful only if they discriminate among a large number of uncertainties which rank "high" or "very high," and cull out some uncertainties as higher than others. Averaging which results in the rank of any uncertainty being lowered, in any case, to "moderate" or less, mean nothing to this analysis and are not included.

3.3.4.1 Site Characterization and Site Characterization Plan: Time Priority

The sixteen highest-ranking uncertainties, all but one of which concern significance of a potentially adverse effect on repository performance, were identified by the following method:

(1) The uncertainties were ranked against attributes related to time priority for site characterization and the SCP (Sections 3.3.1.1, 3.3.1.2, 3.3.1.5, 3.3.3.1 and 3.3.3.2).

(2) The rankings of the uncertainties with respect to all of the time-related site characterization attributes - T1, T2, T7, T9 and T10 - were averaged. The results of this averaging are given in Table XI.

Four uncertainties clearly ranked higher than the remainder: the uncertainty in "anticipated and unanticipated processes and events" and three uncertainties relating to significant effect on repository performance of several potentially adverse conditions. One of the latter ranked very high: the significance of effect on repository performance of possible water table rise (10CFR60.122(c)(22). All of the remaining twelve high-ranking uncertainties dealt with degree of resolution and significant effect on repository performance of potentially adverse conditions. Not surprisingly, most of the highest-ranked uncertainties were those related to changes in hydrologic and groundwater conditions.

The most direct way to identify the uncertainties is to cite the regulatory texts in which they occur. Therefore, the texts of the section of 10CFR60 containing the uncertainties are cited below in rank order; in cases where the ranks are the same, the texts are cited in the order that they appear in the regulatory text of 10CFR60. The statement of the regulatory text which is uncertain is given in bold-faced type.

3.3.4.1.1 Highest ranking uncertainty

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

> (UN60) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the saturated zone.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

3.3.4.1.2 Uncertainties ranked second, third, and fourth

(UN12) **10CFR60.112** . . . Assure that releases of radioactive materials to the accessible environment . . . conform to . . . general

standards . . . with respect to **anticipated and unanticipated processes and events.**

10CFR60.122(a)(i) The potentially adverse human activity or natural condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN50) **122(c)(17)** The presence of naturally occurring materials, whether identified or unidentified, within the site . . .

SCP Review Plan Sections: 3.3.5
Relevant SCP Sections: 1.7, 1.8.2.1, 8.3.1.5.2, 8.3.1.9, 8.3.1.16, 8.3.5.17, 8.3.5.18

(UN64) **122(c)(24)** Potential for the movement of radionuclides in the gaseous state . . . to the accessible environment.

SCP Review Plan Sections: 3.2.4, 3.3.5, 3.3.9-12, 3.3.14, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 4.1.3.5, 4.1.3.6, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

3.3.4.1.3 Remaining twelve high-ranked uncertainties

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN22) **122(c)(3)** Potential for natural phenomena . . . of such a magnitude that large-scale surface water impoundments could be created that could change the regional groundwater flow system . . .

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.3.2.1, 1.5.2.1, 1.8.2.1, 8.3.1.2, 8.3.1.5, 8.3.1.8, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN26) **122(c)(5)** Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN32)**122(c)(8)** Geochemical processes that would reduce sorption of radionuclides, result in degradation of rock strength, or adversely affect performance of the engineered barrier system.

SCP Review Plan Sections: 3.2.4, 3.3.9-12, 3.3.14, 3.3.21, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN40)**122(c)(13)** Indications . . . that either the frequency of occurrence or the magnitude of earthquakes may increase.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 4.1.2.7, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

(UN49) **122(c)(17)** The presence of naturally occurring materials, whether identified or unidentified, within the site . . . .

SCP Review Plan Sections: 3.3.5
Relevant SCP Sections: 1.7, 1.8.2.1, 8.3.1.5.2, 8.3.1.9, 8.3.1.16, 8.3.5.17, 8.3.5.18

(UN55)**122(c)(20)** Rock or groundwater conditions that would require complex engineering measures in the design and construction of the underground facility or in the sealing of the boreholes and shafts.

SCP Review Plan Sections: 3.2.1-3, 3.2.4.2, 3.2.4.10, 3.2.5, 3.3.1, 3.3.2, 3.3.4, 3.3.5, 3.3.11, 3.3.16, 3.3.20, 3.3.21
Relevant SCP Sections: 1.8.2.1, 2.2.2, 8.3.5.17, 8.3.5.18

(UN57)**122(c)(21)** Geomechanical properties that do not permit design of underground opening that will remain stable through permanent closure.

SCP Review Plan Sections: 3.2.4.2, 3.3.3, 3.3.4, 3.3.16, 3.3.17, 3.3.20, 3.3.22, 3.3.23
Relevant SCP Sections: 1.8.2.1, 2., 3.4.1.4, 8.3.1.14-15, 8.3.3.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN59) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the saturated zone.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN27) **122(c)(5)** Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN31) **122(c)(7)** Groundwater conditions in the host rock...that could increase the solubility or chemical reactivity of the engineered barrier system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3.
Relevant SCP Sections: 1.8.2.1, 3.7.3, 3.9.1.3, 4.1, 4.1.2, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

(UN33) **122(c)(8)** Geochemical processes that would reduce sorption of radionuclides, result in degradation of rock strength, or adversely affect performance of the engineered barrier system.

SCP Review Plan Sections: 3.2.4, 3.3.9-12, 3.3.14, 3.3.21, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN44) **122(c)(14)** More frequent occurrence of earthquakes or earthquakes of higher magnitude than is **typical of the area in which the geological setting is located.**

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17, 8.3.5.17, 8.3.5.18.

3.3.4.2 Site Characterization Plan: Importance

The uncertainties listed in this section are important, in the sense of needing resolution, but not necessarily as rapidly as possible. They are the uncertainties with the highest ranking in

Tables III and IV. The highest ranking uncertainties were determined by averaging the two site characterization attributes (I9 and I10) which give an indication of the importance of the uncertainty, as distinct from the desirability of a timely resolution. The results of this averaging are given in Table XII.

The three uncertainties which are of greatest importance to the site characterization plan are the degree of resolution of potentially adverse changes in hydrology and geochemistry, and the potential of significant effect on repository performance of a possible rise in the water table. The three next-highest-ranking uncertainties pertain to the potentially adverse conditions of structural deformations and water table rise; these are also important because they ranked high with respect to Attribute I9. (It may be noted that resolution of these two uncertainties for all of the potentially adverse conditions is relatively important, according to this analysis.) Comparison of the ranking in the Tables III, IV and XII yields only one uncertainty which ranks "very high" (UN26), and one which ranks "high" on both tables (UN32). These two uncertainties are thus at the head of the list below; the other high-ranking ones are listed below in the order in which they appear in the regulatory text of 10CFR60, not in the order of appearance in the tables. With respect to both attributes, the uncertainty in degree of resolution achieved by the investigations is apparently more important than the uncertainty in what constitutes a significant effect on repository performance.

3.3.4.2.1 Two highest-ranking uncertainties

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN26) **122(c)(5)** Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN32) **122(c)(8)** Geochemical processes that would reduce sorption of radionuclides, result in degradation of rock strength, or adversely affect performance of the engineered barrier system.

SCP Review Plan Sections: 3.2.4, 3.3.9-12, 3.3.14, 3.3.21, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

3.3.4.2.2 Four additional high ranking uncertainties

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN24) **122(c)(4)** Structural deformation that may adversely affect the regional groundwater flow system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

(UN36) **122(c)(11)** Structural deformation such as uplift, subsidence, folding and faulting during the Quaternary Period

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN59) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the saturated zone.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN59) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the saturated zone.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

3.3.4.3 Exploratory Shaft Facility (ESF):

One uncertainty (UN64: related to the potentially adverse conditions of gaseous radionuclide movement) ranked "very high" with respect to an ESF attribute: Attribute I11 (since it hardly pertains to Attribute I12, it does not rank high when averaged). This can thus be considered the most important uncertainty for the ESF. The next highest ranking three uncertainties, from Table X, are related to significant effects on repository performance of potential flooding and the need for complex engineering measures, and the design for safe underground operations (UN19, UN56, UN78). These three were identified by averaging the ranks for the two attributes dealing with the ESF (I11 and I12). This averaging procedure served to discriminate among the large number of uncertainties ranking "high" with respect to misapplication of radiological standards for the ESF. The averages are given in Table X.

3.3.4.3.1 Highest ranking uncertainty

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN64) **122(c)(24)** Potential for the movement of radionuclides in the gaseous state . . . to the accessible environment.

SCP Review Plan Sections: 3.2.4, 3.3.5, 3.3.9-12, 3.3.14, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 4.1.3.5, 4.1.3.6, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

3.3.4.3.2 Three next highest ranking uncertainties

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN56) **122(c)(20)** Rock or groundwater conditions that would require complex engineering measures in the design and construction of the underground facility or in the sealing of the boreholes and shafts.

SCP Review Plan Sections: 3.2.4, 3.3.9-12, 3.3.14, 3.3.21, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 2.2.2, 8.3.5.17, 8.3.5.18

(UN19) **122(c)(2)** Potential for foreseeable human activity to adversely affect the groundwater flow system . . .

SCP Review Plan Sections: 3.2.1, 3.2.3, 3.2.4.10, 3.3.6, 3.3.22, 3.3.23
Relevant SCP Sections: 1.8.2.1, 2.2.2, 3.7.1, 8.3.1.9, 8.3.1.16, 8.3.5.17, 8.3.5.18

(UN78) **10CFR60.133(e), 133(i)** Openings in the underground facility shall be designed **so that . . . the retrievability option can be maintained; . . . [and] so that performance objectives will be met . . .**

SCP Review Plan Sections: 3.2.1, 3.2.5, 3.3.23
Relevant SCP Sections: 6.1.1, 6.1.2, 8.3.2.2, 8.3.2.3, 8.3.2.5, 8.4.2.3, 8.4.3.2

4.0 UNCERTAINTIES CLOSELY CORRELATED TO NRC OBJECTIONS TO THE CDSCP

This section discusses a different analysis from that in the previous section. In the previous section, regulatory uncertainties were ranked against various attributes which had been constructed from the criteria for NRC objections, as these criteria are stated in the SCP Review Plan. In this section, the uncertainties were analyzed in their relationship to the NRC objections as actually stated in the NRC point papers.

In this and the following sections, the regulatory uncertainties are usually stated as part of the regulatory text - the uncertain phrase is emphasized in bold-faced type - and are listed in the order in which they occur in the regulation. Each uncertainty is also identified, in this and succeeding sections, by the alphabetic "UN" and the uncertainty number given in the tables and in Appendix B (e.g. UN23).

4.1 Correlation of Uncertainties to NRC Objection Point Papers

4.1.1 Objection 1: Alternative Conceptual Models

The only NRC objection which is related to any regulatory uncertainties is Objection 1: that the performance allocation process in the SCP does not directly address investigations needed to characterize the site with respect to the full range of alternative conceptual models. The related regulatory uncertainties would, therefore, be those which involve alternative models. The statement of the objection is sufficiently broad that one may assume that all models or areas where modeling is used are included. The related uncertainties (shown in bold-face type below) which rank "high" or "very high" with respect to any criterion for an objection and/or would involve consideration of alternative models are:

4.1.1.1 Anticipated and Unanticipated Processes and Events

(UN 12) **10CFR60.112** . . . Assure that releases of radioactive materials to the accessible environment . . . conform to . . . general standards . . . with respect to **anticipated and unanticipated processes and events.**

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 8.3.2.5.10, 8.3.3.1, 8.3.5.13, 8.4.2.3.3, 8.4.3.3.1

4.1.1.2 Typical of the Area in Which the Geological Setting is Located

(UN44) **10CFR60.122(c) Potentially Adverse Conditions.** The following conditions are potentially adverse conditions. . . .

122(c)(14) More frequent occurrence of earthquakes or earthquakes of higher magnitude than is **typical of the area in which the geological setting is located.**

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

4.1.1.3 Taking Into Account the Degree of Resolution Achieved by the Investigation

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the

condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**
10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN24) **122(c)(4)** Structural deformation . . . that may adversely affect the regional groundwater flow system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

(UN26) **122(c)(5)** Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.5.2.1, 1.8.2, 2.2.2, 3.7.1, 3.9.2, 8.3.5, 8.3.5.17-18

(UN32) **122(c)(8)** Geochemical processes that would reduce sorption of radionuclides, result in degradation of rock strength, or adversely affect performance of the engineered barrier system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN34) **122(c)(9)** Groundwater conditions in the host rock that are not reducing.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN36) **122(c)(11)** Structural deformation such as uplift, subsidence, folding, and faulting during the Quaternary Period.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN40) **122(c)(13)** Indications . . . that either the frequency of occurrence or the magnitude of earthquakes may increase.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17-18

(UN42) **122(c)(14)** More frequent occurrence of earthquakes or earthquakes of higher magnitude than is typical of the area

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17-18

(UN59) **122(c)(22)** Potential for the water able to rise sufficiently so as to cause saturation of an underground facility located within the unsaturated zone.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 8.3.1.2, 8.3.1.3, 8.3.5.17-18

(UN61) **122(c)(23)** Potential for . . . future perched water bodies . . . that may provide a faster flow path . . . t o the accessible environment.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 8.3.1.2, 8.3.1.3, 8.3.5.17-18

4.1.1.4 Not to Affect Significantly the Ability of the Repository to Meet the Performance Objectives Relating to Isolation of the Waste.

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN25) **122(c)(4)** Structural deformation . . . that may adversely affect the regional groundwater flow system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

(UN27) **122(c)(5)** Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN29) **122(c)(6)** Potential for changes in hydrologic conditions resulting from reasonably foreseeable climate changes.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.1, 1.8.2.1, 2.9.3.3, 5.1-5.2, 5.2.2, 8.3.1.2.1, 8.3.1.5.1, 8.3.1.5.2, 8.3.1.12.1, 8.3.5.17, 8.3.5.18.

(UN31) **122(c)(7)** Groundwater conditions in the host rock . . . that could increase the solubility or chemical reactivity of the engineered barrier system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.7.3, 3.9.1.3, 4.1, 4.1.2, 8.3.1.2.2, 8.3.1.2.2.8, 8.3.1.3, 8.3.5.17, 8.3.5.18

(UN33) **122(c)(8)** Geochemical processes that would reduce sorption of radionuclides, result in degradation of rock strength, or adversely affect performance of the engineered barrier system.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5.

(UN35) **122(c)(9)** Groundwater conditions in the host rock that are not reducing.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN37) **122(c)(11)** Structural deformation much as uplift, subsidence, folding, and faulting during the Quaternary Period

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 8.3.5.17, 8.3.5.18

(UN41) **122(c)(13)** Indications. . .that either the frequency of occurrence or the magnitude of earthquakes may increase.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

(UN43) **122(c)(14)** More frequent occurrence of earthquakes or earthquakes of higher magnitude than is typical of the area in which the geological setting is located.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

(UN46) **122(c)(15)** Evidence of igneous activity since the start of the quaternary period.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.3.2.1, 1.8.2.1, 8.3.1.8, 8.3.5.17, 8.3.1.5.18

(UN48) **122(c)(16)** Evidence of extreme erosion during the Quaternary period.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.1.3.2, 1.8.2.1, 8.3.1.6, 8.3.5.17, 8.3.1.5.18

(UN60) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the unsaturated zone.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

(UN62) **122(c)(23)** Potential for . . . future perched water bodies . . . that may provide a faster flow path . . . to the accessible environment.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

(UN64) **122(c)(24)** Potential for the movement of radionuclides in the gaseous state . . . to the accessible environment.

SCP Review Plan Sections: 3.2.4 and virtually all of 3.3
Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 4.1.3.5, 4.1.3.6, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

4.2 Uncertainties Related To Objections But Not Identified in CDSCP Point Papers

Uncertainties leading or related to NRC objections, as these objections were stated in the point papers, but which were not themselves identified in the NRC CDSCP point papers, and which rank "very high" or "high" with respect to any of the four criteria defining an objection, are those where modeling plays at best a secondary role, and may not be considered at all. These are:

4.2.1 An Environmental Report

(UN2) **10CFR21(a) . . . An environmental report shall be prepared in accordance with Part 51 of this Chapter and shall accompany this application . . . [how is this ER related to the EIS required by statute?]**

No relevant SCP sections

4.2.2 Land Acquisition

(UN15) **10CFR60.121(a)** . . . **lands that are either acquired lands under jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use. [when and how are such lands to be acquired and/or withdrawn?]**

Relevant SCP section: 8.3.1.11.1

4.2.3 Degree of Resolution Achieved by Investigation

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN36) **122(c)(11)** Structural deformation . . . during the quaternary period.

Relevant SCP sections: 1.8.2.1, 8.3.5.17, 8.3.5.18

(UN57) **122(c)(21)** Geomechanical properties that do not permit design of underground opening that will remain stable through permanent closure.

Relevant SCP sections: 1.8.2.1, 2., 8.3.1.14, 8.3.1.15, 8.3.3.2, 8.3.5.12 8.3.5.17, 8.3.5.18

4.2.4 Not to Affect Significantly Repository Performance

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN50) **122(c)(17)** The presence of naturally occurring materials, whether identified or undiscovered, within the site . . .

Relevant SCP sections: 1.7, 1.8.2.1, 8.3.1.5.2, 8.3.1.9, 8.3.1.16, 8.3.5.17, 8.3.5.18

5.0 UNCERTAINTIES CLOSELY CORRELATED TO NRC COMMENTS ON THE CDSCP

This section, like Section 4.0, discusses an analysis in which the uncertainties were considered in their relationship to the actual NRC comments stated in the NRC point papers, rather than the relationship of the uncertainties to the attributes derived from NRC comment criteria.

In correlating regulatory uncertainties to NRC CDSCP point papers, it should be remembered that ranking of an uncertainty with respect to an "objection" attribute dominates the ranking with respect to a "comment" attribute. The "comment" attributes are less exacting than the "objection" attributes, and can often be considered to be subsumed. Thus, if an uncertainty ranks high for an "objection" attribute, it may not be ranked high for a "comment" attribute because of the dominance relationship. Particularly relevant sections of the SCP and the SCP Review Plan are listed where appropriate.

5.1 Correlation of Uncertainties to NRC Comment Point Papers

The overall correlation of uncertainties to NRC comment point papers is given in Table XIII. In particular, the regulatory uncertainties which ranked "high" with respect to a site characterization attribute and which are related to comments, are listed below with the related comments.

5.1.1 Comment 1: Rationale for Specification of Information

Comment 1: The rationale for the specification of information needs does not appear to ensure completeness of those information needs. Furthermore, the integration of testing with design and performance assessment seems to be lacking.

Uncertainty (UN18-UN65):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

SCP Review Plan Sections: 3.2, 3.3
Relevant SCP Sections: 1.1, 1.5, 1.8, 2.2, 3.7, 3.8, 3.9, 4.1, 8.3

5.1.2 Comment 6: Prototype Percolation Tests

Comment 6: The SCP does not describe the prototype testing program . . . [for] . . . unsaturated zone percolation tests.

Uncertainty (UN20):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions. . . .

122(c)(2) Potential for foreseeable human activity to adversely affect the groundwater flow system. .

SCP Review Plan Sections: 3.2.4, 3.3.12, 3.3.16-18
Relevant SCP Sections: 1.8.2.1, 8.3.1.9, 8.3.1.16, 8.3.5.17-18

5.1.3 Comment 10: Influence of Past Drilling on Hydrologic and Geochemical Tests

Comment 10: Hydrologic and geochemical tests planned for the exploratory shaft may have been compromised by past drilling associated with USW G-4.

Uncertainty (UN53):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(19) Evidence of drilling for any purpose within the site.

SCP Review Plan Sections: 3.2.4.2, 3.3.5, 3.3.6, 3.3.17
Relevant SCP Sections: 1.8.2.1, 3.7, 8.3.5.17, 8.3.5.18

5.1.4 Comment 13: Saturated Zone Characterization

Comment 13: Activities presented . . . do not appear to be adequate for characterizing saturated zone hydrologic . . . conditions . . .

Uncertainty (UN26):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.2.4.2, 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

5.1.5 *Comment 22: Influence of Conceptual Model on Retardation Testing*

Comment 22: The conceptual model of matrix-dominated groundwater flow . . . drives the radionuclide retardation testing program . . . [thus] . . . the determination of some parameters important to site characterization are not planned.

Uncertainty (UN26):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions. . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

5.1.6 *Comment 26: Integration of Existing Geophysical Data*

Comment 26: Existing geophysical data. . .do not appear to have been integrated for the purpose of developing a coherent plan for future geophysical investigations.

Uncertainty (UN38, UN40, UN42):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(12) Earthquakes which have occurred historically that if they were to be repeated could affect the site significantly.

122(c)(13) Indications . . . that either the frequency of occurrence or the magnitude of earthquakes may increase.

122(c)(14) More frequent occurrence of earthquakes or earthquakes of higher magnitude than is typical of the area in which the geological setting is located.

SCP Review Plan Sections: 3.2.4, 3.3.1, 3.3.3
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

5.1.7 *Comment 27: Impacts of ESF Construction*

Comment 27: . . . The individual, cumulative and synergistic effects of . . . [planned] . . . holes have not been considered in evaluation of the potential impacts of exploratory shaft construction . . .

Uncertainty (UN53):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(19) Evidence of drilling for any purpose within the site.

SCP Review Plan Sections: 3.2.4.2, 3.3.5, 3.3.6, 3.3.17
Relevant SCP Sections: 1.8.2.1, 3.7, 8.3.5.17, 8.3.5.18

5.1.8 *Comment 29: Resolution of Fractal Analysis*

Comment 29: SCP's approach to characterizing the . . . fracture systems appears to rely on fractal analysis of outcrop exposures and geologic mapping of ES-1, drifts, and boreholes . . . the approach . . . described . . . may not lead to sufficient descriptions of the fracture networks.

Uncertainty (UN26):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

5.1.9 *Comment 38: Human Intrusion and Natural Resources*

Comment 38: The program of investigations . . . appears to be unsatisfactory for consideration of potential natural resources and natural resource models . . . and appears insufficient to assess the performance of the repository with respect to human intrusion.

Uncertainty (UN20):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(2) Potential for foreseeable human activity to adversely affect the groundwater flow system . . .

SCP Review Plan Sections: 3.2.4, 3.3.12, 3.3.16-18
Relevant SCP Sections: 1.8.2.1, 8.3.1.9, 8.3.1.16, 8.3.5.17-18

5.1.10 *Comment 46: Margin of Safety for Retrievability*

Comment 46: In order to examine the [engineered] margin of safety . . . from the standpoint of retrievability . . . the heater experiment needs to be run beyond the average design heat load.

Uncertainty (UN11):

10CFR60.111(b)(1-3) The geologic repository operations area **shall be designed to preserve the option of waste retrieval** . . . shall be **designed so that . . . emplaced waste could be retrieved on a reasonable schedule** . . .

SCP Review Plan Sections: 3.2.1, 3.2.3, 3.2.4.10, 3.3.6, 3.3.22, 3.3.23
Relevant SCP Sections: 8.3.5.2

5.1.11 *Comment 50: Rationale and Conservativeness of Fault Displacements*

Comment 50: . . . the basis and rationale for the design and performance parameters proposed . . . for fault displacement . . . represent reasonable conservative goals which reflect the uncertainty in the understanding of faulting within the geologic setting.

Uncertainty (UN24):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(4) Structural deformation . . . that may adversely affect the regional groundwater flow system

SCP Review Plan Sections: 3.2.4, 3.3.1, 3.3.4, 3.3.16
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

5.1.12 Comment 52: Estimation Techniques for Earthquake Magnitudes

Comment 52: When the definition of 10,000-year cumulative slip earthquakes for Quaternary faults is applied to . . . Yucca Mountain-vicinity faults, the results yield magnitudes that are significantly lower than those derived from accepted fault rupture ... relationships.

Uncertainty (UN40):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(13) Indications . . . that either the frequency of occurrence or the magnitude of earthquakes may increase.

SCP Review Plan Sections: 3.2.4.1-3, 3.3.3,
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

5.1.13 Comment 59: Thermally Induced Movement Along Faults

Comment 59: The description of far field analysis in the SCP does not address potential for thermally induced movement along faults or fractures.

Uncertainty (UN26):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

5.1.14 Comment 70: Conservativeness of Backfill Hydraulic Conductivity

Comment 70: It is unclear whether a reasonably conservative design approach has been used to determine required backfill hydraulic conductivity.

Uncertainty (UN26):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18

5.1.15 Comments 90-94: Scenario Development and Probabilistic Analysis

Comments 90-94: . . . the SCP [implies] that

- in developing a CCDF to demonstrate compliance with the total system performance standard . . . it will be permissible to exclude the effects of certain significant scenarios or scenario "classes". . . in particular . . . those . . . involving human intrusion.

- conceptual model uncertainty can be dealt with . . . by developing more that one scenario class for undisturbed performance or . . . additional disturbed-case scenario classes.

- [the interpretation of] the significance of a scenario class to the CCDF . . . is inconsistent with how the NRC staff interprets the EPA standard.

- [and] no basis has been provided . . . for the use of a "waiting time". . . for . . . scenario screening [and] several potentially significant scenario classes have not been presented . . . thus, the performance allocation inadequately addresses Issue 1.1, and the site characterization program may have substantial gaps.

Uncertainty (UN20):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(2) Potential for foreseeable human activity to adversely affect the groundwater flow system . . .

SCP Review Plan Sections: 3.2.4, 3.3.12, 3.3.16-18
Relevant SCP Sections: 1.8.2.1, 8.3.1.9, 8.3.1.16, 8.3.5.17-18

5.2 Uncertainties Related To Comments But Not Identified in CDSCP Point Papers

A total of 55 regulatory uncertainties have been identified, which are related to NRC comment point papers but are not identified in the point papers. These uncertainties are listed in rank order in Tables XIV and XV. Table XIV lists the regulatory uncertainties ranked with respect to attribute T9 - Adverse Effects on the Licensing Process - and Table XV lists the regulatory uncertainties ranked with respect to attribute T10 - Significant but Correctable Schedule Disruption. There is considerable overlap between the two tables among the higher-ranked uncertainties.

Altogether, eight uncertainties ranked "very high" with respect to one or the other of these attributes. These are given below:

5.2.1 Degree of Resolution Achieved by Investigations

Uncertainties (UN34, UN59):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN34) **122(c)(9)** Groundwater conditions in the host rock that are not reducing.

SCP Review Plan sections: 3.2.4.2, 3.3.9-12, 3.3.14, 3.3.26
Relevant SCP sections: 1.8.2.1, 4.1.2.7, 4.1.3, 7.4, 8.3.1.3, 8.3.4.3, 8.3.5

(UN59) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the unsaturated zone.

SCP Review Plan Sections: 3.2.4.2, 3.3.9-12, 3.3.14, 3.3.26

Relevant SCP Sections: 1.8.2.1, 3.6 to 3.9, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

5.2.2 *Not to Affect Significantly Repository Performance*

Uncertainties (UN41, UN58, UN62):

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions. . . .

(UN41) **122(c)(13)** Indications. . .that either the frequency of occurrence or the magnitude of earthquakes may increase.

SCP Review Plan Sections: 3.2.4.2, 3.3.3, 3.3.4, 3.3.16, 3.3.17, 3.3.20, 3.3.22, 3.3.23
Relevant SCP Sections: 1.4, 1.5.2.1, 1.8.2.1, 8.3.1.8, 8.3.1.17, 8.3.5.17, 8.3.5.18

(UN58) **122(c)(21)** Geomechanical properties that do not permit design of underground opening that will remain stable through permanent closure.

SCP Review Plan Sections: 3.2.4.2, 3.3.3, 3.3.4, 3.3.16, 3.3.17, 3.3.20, 3.3.22, 3.3.23
Relevant SCP Sections: 1.8.2.1, 2., 3.4.1.4, 8.3.1.14-15, 8.3.3.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

(UN62) **122(c)(23)** Potential for . . . future perched water bodies . . . that may provide a faster flow path . . . to the accessible environment.

SCP Review Plan Sections: 3.2.4.2, 3.3.3, 3.3.4, 3.3.16, 3.3.17, 3.3.20, 3.3.22, 3.3.23
Relevant SCP Sections: 1.8.2.1, 2., 3.4.1.4, 8.3.1.14-15, 8.3.3.2, 8.3.5.12, 8.3.5.17, 8.3.5.18
UN62: 1.8.2.1, 3.6 to 3.9, 8.3.1.2, 8.3.1.3, 8.3.5.17, 8.3.5.18

5.2.3 *Radiation Exposure Within Operations Area*

Uncertainty (UN10):

10CFR60.111(a) The geologic repository operations area shall be designed so that . . . radiation exposures and . . . levels and releases . . . to unrestricted areas will **at all times** be maintained within limits specified in Part 20 . . .

SCP Review Plan Section: 3.2.4.10
Relevant SCP Sections: 8.3.2.3, 8.3.5.3, 8.3.5.5, 8.3.5.14

5.2.4 *Projection of Quaternary Processes*

Uncertainty (UN16):

10CFR60.122(b)(1) The nature and rates of . . . processes operating within the geologic setting during the Quaternary Period, **when projected**, would not affect or would favorably affect the ability . . . to isolate waste. **[How far into the future?]**

SCP Review Plan Sections: 3.2.4, 3.3.1-4, 3.3.6, 3.3.8-19, 3.3.24, 3.3.26
Relevant SCP Sections: 1.8.2.1, 3.6-9, 8.3.1.2, 8.3.1.10, 8.3.1.12, 8.3.1.17, 8.3.1.18

5.2.5 *Protection Against Fires and Explosions*

Uncertainty (UN66):

10CFR60.131(b)(3) Protection against fires and explosions **[Requirements for provisions and means of protection are not clear]**

SCP Review Plan Sections: 3.2.4.2, 3.2.4.10, 3.3.23
Relevant SCP Sections: 6.1.2, 8.3.1.13, 8.3.2.3-4, 8.3.5.4-5

6.0 UNCERTAINTIES CLOSELY CORRELATED TO NRC COMMENTS ON THE ESF

This section, like Section 4.0, discusses an analysis in which the uncertainties were considered in their relationship to the actual NRC comments stated in the NRC point papers, rather than the relationship of the uncertainties to the attributes derived from NRC comment criteria.

6.1 Comment 10: Influence of Past Drilling on Hydrologic and Geochemical Tests

Comment 10: Hydrologic and geochemical tests planned for the exploratory shaft may have been compromised by past drilling associated with USW G-4.

Uncertainty (UN53):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(19) Evidence of drilling for any purpose within the site.

SCP Review Plan Sections: 3.2.1-3, 3.2.4.2, 3.2.4.10, 3.2.5, 3.3.1, 3.3.2, 3.3.4, 3.3.5, 3.3.11, 3.3.16, 3.3.20, 3.3.21
Relevant SCP Sections: 1.8.2.1, 3.7, 8.3.5.17, 8.3.5.18

6.2 Comment 12: Capillary Effects on Diffusion Tests

Comment 12: Diffusion tests in the exploratory shaft may be affected by capillary effects in the unsaturated zone.

Uncertainty (UN27):

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

6.3 Comment 27: Impacts of ESF Construction

Comment 27: . . . The individual, cumulative and synergistic effects of . . . [planned] . . . holes have not been considered in evaluation of the potential impacts of exploratory shaft construction . . .

Uncertainty (UN53):

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(19) Evidence of drilling for any purpose within the site.

SCP Review Plan Sections: 3.2.1-3, 3.2.4.2, 3.2.4.10, 3.2.5, 3.3.1, 3.3.2, 3.3.4, 3.3.5, 3.3.11, 3.3.16, 3.3.20, 3.3.21
Relevant SCP Sections: 1.8.2.1, 3.7, 8.3.5.17, 8.3.5.18

6.4 Comments 63-67: Sealing and Depth of ESF

Comment 63-67: The last tentative goal on page 8.3.2.5-21 indicates that high confidence is needed that the ES-1 shaft will terminate no less than 150 m. above ground-water table, and

- The CDSCP does not include details of the in situ testing of the proposed seal design concepts, and
- No evidence or substantiation is presented for the statement that neither operational nor permanent seals will be required, and
- The CDSCP . . . appears to imply that it is a straightforward matter to remove a shaft liner and that such a procedure has no implications for the isolation capability of the site, and
- Statement . . . that "boreholes that are upgradient or long distances from the repository may not require sealing" . . . does not represent a conservative sealing approach.

Uncertainty (UN27):

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

6.5 Comment 69: Consideration of Anticipated/Unanticipated Processes and Events in Seal Design

Comment 69: The performance and design goals for the sealing subsystem do not consider a comprehensive set of anticipated processes and events and unanticipated processes and events.

Uncertainty (UN12):

10CFR60.112 The geologic setting shall be selected . . . to . . . conform . . . with respect to both **anticipated processes and events and unanticipated processes and events.**

SCP Review Plan Sections: 3.2.4.2, virtually all of 3.3
Relevant SCP Sections: 8.3.2.5, 8.3.3.1, 8.3.5.13, 8.4.2.3, 8.4.3.3

6.6 Comment 97: Persistent Geologic Features – Preferential Pathways

Comment 97: Plans should be made to correlate persistence of geologic features from ES-1 to ES-2 which might provide preferential pathways and to develop a photographic record of ES-2 for possible future use.

Uncertainty (UN27):

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

> **122(c)(5)** Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

SCP Review Plan Sections: 3.3.4, 3.3.6, 3.3.14, 3.3.16, 3.3.19
Relevant SCP Sections: 1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2, 8.3.5.12, 8.3.5.17, 8.3.5.18

7.0 CORRELATION OF UNCERTAINTIES TO SCP SECTIONS

Table XVI lists the regulatory uncertainties in order of rank determined by averaging all attributes related to site characterization and the Site Characterization Plan, and Table XVII correlates the regulatory uncertainties with sections of the Site Characterization Plan. The "important" (or relatively high-ranking) uncertainties and the related sections of the SCP may be culled from the combination of these two tables. The text of the seven highest ranking uncertainties are correlated below with the abbreviated titles of the related sections of the SCP.

7.1 Not to Affect Significantly Repository Performance – Water Table Rise: UN60

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(22) Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the unsaturated zone.

Related SCP Sections:

1.8.2.1	Relation of geology to repository design
3.6	Regional hydrogeologic reconnaissance of site
3.7	Regional groundwater flow system
3.8	Groundwater uses
3.9	Site hydrogeologic system
8.3.1.2	Overview of the geohydrology program
8.3.1.3	Overview and investigation of the geochemistry program
8.3.5.17	Issue resolution strategy: can demonstrations for favorable and potentially adverse conditions be made as required by 10CFR60.122?
8.3.5.18	Issue resolution strategy: can findings required by 10CFR960 be made for the qualifying condition of the postclosure system guideline . . . and can the comparative evaluations required by 960.3-1-5 be made? Required by 10CFR60.122?

7.2 Degree of Resolution Achieved by Investigations – Geochemical Conditions: UN32

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN32) **122(C)(8)** Geochemical processes that would reduct sorption of radionuclides, result in degradation of rock strength, or adversely affect performance of the engineered barrier system.

Related SCP Sections:

1.8.2.1	Relation of geology to repository design
4.1.2	Ground-water chemistry
4.1.3	Geochemical retardation processes
7.4	Waste Package research and development status
8.3.1.3	Overview of geochemistry program
8.3.4.3	Issue resolution strategy: . . . waste package . . . information for the resolution of performance issues.
8.3.5	Performance assessment program

7.3 Degree of Resolution Achieved by Investigations – Hydrologic Conditions: UN26

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(5) Potential for changes in hydrologic conditions that would affect the migration of radionuclides to the accessible environment . . .

Related SCP Sections:

1.5.2.1	Effects of faulting
1.8.2.1	Relation of geology to repository design
2.2.2	Mechanical properties of discontinuities in rocks at the site
3.7.1	Identification of recharge and discharge areas
3.9.2.2.2	Transmissivity and hydraulic conductivity
8.3.5.12	Issue resolution strategy: will the site meet the performance objective for pre-waste-emplacement groundwater travel time?
8.3.5.17	Issue resolution strategy: can demonstrations for favorable and potentially adverse conditions be made as required by 10CFR60.122?
8.3.5.18	Issue resolution strategy: can findings required by 10CFR960 be made for the qualifying condition of the postclosure system guideline . . . and can the comparative evaluations required by 960.3-1-5 be made? Required by 10CFR60.122?

7.4 Not to Affect Significantly Repository Performance – Natural Resources: UN50

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(17) The presence of naturally occurring materials, whether identified or undiscovered, within the site . . .

Related SCP Sections:

1.7	Mineral and hydrocarbon resources
1.8.2.1	Relation of geology to repository design
8.3.1.5	Investigation: potential effect of future climatic conditions on hydrologic characteristics
8.3.1.9	Overview of the human interference program
8.3.1.16.2	Investigation: location of adequate water supply
8.3.5.17	Issue resolution strategy: can demonstrations for favorable and potentially adverse conditions be made as required by 10CFR60.122?
8.3.5.18	Issue resolution strategy: can findings required by 10CFR960 be made for the qualifying condition of the postclosure system guideline . . . and can the comparative evaluations required by 960.3-1-5 be made? Required by 10CFR60.122?

7.5 Anticipated Processes and Events and Unanticipated Processes and Events: UN12

10CFR60.112 The geologic setting shall be selected . . . to . . . conform . . . with respect to both **anticipated processes and events and unanticipated processes and events.**

Related SCP Sections:

8.3.2.5.1	Site and performance assessment information needed
8.3.3.1	Overview of the seal program

7.6 Degree of Resolution Achieved by Investigations – Water Table Rise: UN59

10CFR60.122(a)(i) The potentially adverse human activity or natural condition on the site has been adequately investigated, including the extent to which the condition may be present and still undetected **taking into account the degree of resolution achieved by the investigations.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

(UN59) **122(c)(22)** Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located within the saturated zone.

Related SCP Sections:

1.8.2.1	Relation of geology to repository design
3.6	Regional hydrogeologic reconnaissance of site
3.7	Regional groundwater flow system
3.8	Groundwater uses
3.9	Site hydrogeologic system
8.3.1.2	Overview of geohydrology program
8.3.1.3	Overview of geochemistry program

8.3.5.17	Issue resolution strategy: Can the demonstrations for favorable and potentially adverse conditions be made as required by 10CFR60.122?
8.3.5.18	Issue resolution strategy: Can . . . findings required by 10CFR960 be made . . . can the comparative evaluations required by 10CFR960.3-1-5 be made?

7.7 Not to Affect Significantly Repository Performance – Gaseous Transport: UN64

10CFR60.122(a)(iii)(A) The potentially adverse . . . condition . . . is shown **not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste.**

10CFR60.122(c) Potentially Adverse Conditions. The following conditions are potentially adverse conditions . . . .

122(c)(24) Potential for the movement of radionuclides in the gaseous state . . . to the accessible environment.

Related SCP Sections:

1.8.2.1	Relation of geology to repository design
3.6	Regional hydrogeologic reconnaissance of site
3.7	Regional groundwater flow system
3.8	Groundwater uses
3.9	Site hydrogeologic system
4.1.3.5	Matrix diffusion
4.1.3.6	Radionuclide transport
8.3.1.2	Overview of the geohydrology program
8.3.1.3	Overview and investigation of the geochemistry program
8.3.5.17	Issue resolution strategy: can demonstrations for favorable and potentially adverse conditions be made as required by 10CFR60.122?
8.3.5.18	Issue resolution strategy: can findings required by 10CFR960 be made for the qualifying condition of the postclosure system guideline . . . and can the comparative evaluations required by 960.3-1-5 be made? Required by 10CFR60.122?

8.0 RECOMMENDATIONS AND CONCLUSIONS

The purposes of this study were to (a) identify the the uncertainties which are most closely related to the site characterization plan, the process of site characterization, and the exploratory shaft facility (ESF), and (b) prioritize these uncertainties with respect to their reduction or resolution. Various sets of priorities were addressed; as a result, the uncertainties can be grouped into three categories:

- The uncertainties related to site characterization and SCP review which are most important (and independent of a time requirement).
- The uncertainties related to site characterization and SCP review which require the most timely or expeditious resolution.
- The uncertainties related to the ESF which are most important.

As these priorities and the results of the analysis are reviewed, several recommendations and conclusions suggest themselves:

Recommendation 1: Expeditious resolution of the regulatory uncertainties of 10CFR60.122(a) and 10CFR60.122(c), which affect all 24 of the potentially adverse conditions at the repository would benefit the repository program.

The uncertainties are embodied in the following phrases in 10CFR60.122:

- ". . . taking into account the degree of resolution achieved by the investigations . . ."
- ". . . not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste . . ."

and include the most important uncertainties for site characterization and site characterization plan review. The degree of resolution to be taken into account in determining whether hydrological characteristics of the site were acceptable was particularly prominent in this analysis.

Recommendation 2: Several areas of concern ancillary to radiological health and safety, which were not identified in the NRC objections to the site characterization plan, merit some attention in site characterization plan review. These concerns include the retrievability option, the environmental report to be included in the license application, the question of land jurisdiction, application of ALARA, and several potentially adverse conditions. A number of uncertainties in regulations dealing with these areas ranked high or very high in their relationship to the criteria for NRC objections but were not identified in the NRC point papers. **These areas of concern are important to site characterization and, ultimately, to the repository licensing procedure, although they may be ancillary to radiological health and safety.**

Recommendation 3: Five potentially adverse conditions - water table rise, frequency and magnitude of earthquakes, geomechanical properties, possible perched water and oxidation potential of the groundwater - and structures, systems and components important to safety, merit careful consideration with respect to site characterization, although they were not identified in the NRC point papers. Uncertainties in regulations related to these ranked very high in their relationship to the criteria for NRC comments, as did the section of 10CFR60.122: ". . . not to affect significantly the ability of the repository to

meet the performance objectives relating to isolation of the waste . . ." as applied to a number of adverse conditions, and structures, systems, and components important to safety.

Conclusion 1: The uncertainties in 10CFR60.122 cited in Recommendation 1, above, as applied to movement of gaseous radionuclides, flooding, and design for safe underground operations are also the most important uncertainties related to the exploratory shaft facility (ESF).

Conclusion 2: The time required to complete the rulemakings currently in process should not prove to be a constraint, except for the ongoing rulemaking on "anticipated/unanticipated processes and events". This is the only rulemaking currently underway which has critical application to site characterization.

Conclusion 3: NRC Objection 1 to the Site Characterization Plan, which dealt with alternate conceptual models, recognized the subjects of the regulatory uncertainties in 10CFR60.122(a) and 10CFR60.122(c), cited in Recommendation 1.

Conclusion 4: The relationship of NRC comment point papers to the uncertainties cited in Recommendation 1, above, was adequately recognized for Comments 1, 6, 10, 13, 22, 26, 29, 38, 46, 59, 70, and 90 through 94.

The degree of resolution to be taken into account in determining whether hydrological characteristics of the site were acceptable was particularly prominent in this analysis and was related to a large fraction of the NRC "comment" point papers.

Uncertainties which ranked very high in their relationship to the criteria for NRC comments but were not identified in the NRC point papers included several dealing with potentially adverse conditions - water table rise, potential changes in hydrologic conditions, frequency and magnitude of potential earthquakes and oxidation potential of the groundwater.

TABLE Ia. EXPEDITE SITE CHARACTERIZATION (ATTRIBUTE T1)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T1 EXPEDITE SITE CHAR.
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	9
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	9
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	9
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	7
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	7
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	7
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	7
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	7
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	7
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	7
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	7
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	7
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	7
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	7
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	7
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	7
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	7
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	7
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	7
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	7
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	7
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	7
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	7
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	7
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	7
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	7
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	7
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	7
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	7
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	7
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	7
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	7

TABLE Ib. EXPEDITE SITE CHARACTERIZATION (ATTRIBUTE T1)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T1 EXPEDITE SITE CHAR.
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	7
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	7
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	7
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	7
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	7
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	7
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	7
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	7
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	7
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	7
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	7
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	5
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	5
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	5
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	5
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	3
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	3
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	1
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	1
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	1
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	1
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	1
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	NA
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	NA
8	License termination	52*	Can license be terminated if DOE has spent fuel?	NA

TABLE IIa. EXPAND SCOPE OF SITE CHARACTERIZATION ACTIVITY (ATTRIBUTE T2)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T2 EXPAND SC ACTIV. SCOPE
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	9
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	9
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	9
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	9
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	9
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	9
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	9
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	7
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	7
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	7
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	7
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	7
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	7
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	7
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	7
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	7
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	7
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	7
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	7
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	7
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	5
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	5
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	5
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	5
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	5
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	5
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	5
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	5
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	5
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	5
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	5
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	5

TABLE IIb. EXPAND SCOPE OF SITE CHARACTERIZATION ACTIVITY (ATTRIBUTE T2)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T2 EXPAND SC ACTIV. SCOPE
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	5
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	5
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	5
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	5
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	5
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	5
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	5
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	5
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	3
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	3
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	3
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	3
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	3
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	3
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	3
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	1
8	License termination	52*	Can license be terminated if DOE has spent fuel?	1
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	1
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	1

TABLE IIIa. IRREVERSIBLE EFFECT ON REPOSITORY PERFORMANCE (ATTRIBUTE I9)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I9 SCP OBJ. 1
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	9
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	7
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	7
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	5
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	5
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	5
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	5
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	5
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	5
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	3
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	3
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	3
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	3
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	3
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	3
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	3
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	3
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	3
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	3
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	3
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	3
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	3
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	3
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	3
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	3
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	3
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	3
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	3
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	3
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	3
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	3
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	3

TABLE IIIb. IRREVERSIBLE EFFECT ON REPOSITORY PERFORMANCE (ATTRIBUTE I9)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I9 SCP OBJ. 1
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	3
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	3
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	3
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	3
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	3
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	3
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	3
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	3
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	3
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	3
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	3
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	1
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	1
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	1
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	1
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1
8	License termination	52*	Can license be terminated if DOE has spent fuel?	1
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	1
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	1
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	1
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	1
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	1
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	1

TABLE IVa. PRECLUDE INFORMATION GATHERING (ATTRIBUTE I10)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I10 SCP OBJ. 2
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	3
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	3
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	3
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	3
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	3
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	3
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	3
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	3
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	3
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	3
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	3
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	3
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	3
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	3
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	3
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	3
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	3
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	3
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	3
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	3
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	3
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	3
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	3
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	1
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	1
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	1
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	1
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	1
8	License termination	52*	Can license be terminated if DOE has spent fuel?	1
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	1
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	1
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1

TABLE IVb. PRECLUDE INFORMATION GATHERING (ATTRIBUTE I10)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I10 SCP OBJ. 2
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	1
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	1
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	1
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	1
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	1
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	1
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	1
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	1
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	1
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	1
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	1
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	1
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	1
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	1
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	1
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	1
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	1
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	1
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	1
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	1
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	1
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	1
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	1
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	1
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	1

TABLE Va. SIGNIFICANT REDIRECTION OF DOE ACTIVITIES (ATTRIBUTE T7)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T7 SCP OBJ. 3
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	9
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	9
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	7
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	7
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	7
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	7
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	7
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	7
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	7
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	5
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	5
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	5
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	5
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	5
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	5
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	5
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	5
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	5
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	5
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	5
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	5
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	5
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	5
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	3
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	3
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	3
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	3
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	3
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	3
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	3
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	3
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	3
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	3

TABLE Vb. SIGNIFICANT REDIRECTION OF DOE ACTIVITIES (ATTRIBUTE T7)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T7 SCP OBJ. 3
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	3
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	3
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	3
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	3
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	3
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	3
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	3
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	3
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	3
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	3
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	3
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	3
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	3
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	1
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	1
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1
8	License termination	52*	Can license be terminated if DOE has spent fuel?	1
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	1
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	1
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	1
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	1
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	1
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	1

TABLE VIa. ADVERSE EFFECTS ON LICENSING PROCESS (ATTRIBUTE T9)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T9 SCP COMMENT 1
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	9
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	9
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	9
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	9
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	9
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	7
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	7
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	7
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	7
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	7
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	7
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	7
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	7
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	7
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	7
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	7
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	7
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	7
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	7
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	7
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	7
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	7
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	7
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	7
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	5
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	5
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	5
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	5
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	5
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	5
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	5

TABLE VIb. ADVERSE EFFECTS ON LICENSING PROCESS (ATTRIBUTE T9)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T9 SCP COMMENT 1
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	5
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	5
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	5
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	5
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	5
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	3
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	3
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	3
8	License termination	52*	Can license be terminated if DOE has spent fuel?	3
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	3
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	3
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	3
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	3
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	3
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	3
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	3
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	3
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	3
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	3
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	3
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	3
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	3
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	3
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	3
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	3
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	3
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	3
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	3
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	3
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	1
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	1
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1

TABLE VIIa. SIGNIFICANT BUT CORRECTABLE SCHEDULE DISRUPTION (ATTRIBUTE T10)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T10 SCP COMMENT 2
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	9
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	9
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	9
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	9
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	9
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	9
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	7
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	7
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	7
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	7
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	7
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	7
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	7
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	7
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	7
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	7
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	7
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	7
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	7
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	7
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	7
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	7
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	7
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	7
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	7
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	7
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	7
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	7
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	7
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	7
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	7

TABLE VIIb. SIGNIFICANT BUT CORRECTABLE SCHEDULE DISRUPTION (ATTRIBUTE T10)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T10 SCP COMMENT 2
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	7
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	7
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	5
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	5
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	5
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	5
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	5
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	5
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	5
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	5
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	5
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	5
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	5
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	3
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	3
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	3
8	License termination	52*	Can license be terminated if DOE has spent fuel?	3
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	3
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	3
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	3
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	3
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	3
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	3
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	3
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	3
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	3
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	3
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	3
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	3
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	3
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1

TABLE VIIIa. ESF - RADIOLOGICAL SAFETY AND/OR WASTE ISOLATION (ATTRIBUTE I11)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I11 ESF COMMENT RADIOL.
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	9
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	7
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	7
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	7
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	7
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	7
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	7
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	7
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	7
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	7
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	7
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	7
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	7
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	7
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	7
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	7
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	7
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	7
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	7
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	5
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	5
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	5
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	5
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	5
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	5
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	5
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	5
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	3
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	3
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	3

TABLE VIIIb. ESF - RADIOLOGICAL SAFETY AND/OR WASTE ISOLATION (ATTRIBUTE I11)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I11 ESF COMMENT RADIOL.
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	3
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	3
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	3
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	3
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	3
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	3
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	3
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	3
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	3
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	3
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	3
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	3
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	3
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	1
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	1
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	1
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	1
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	NA
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	NA
8	License termination	52*	Can license be terminated if DOE has spent fuel?	NA
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	NA

TABLE IXa. ESF NON-RADIOLOGICAL SAFETY AND ENVIRONMENTAL (ATTRIBUTE I12)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I12 ESF COMMENT NON-RADIOL.
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	7
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	7
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	5
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	5
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	5
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	5
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	5
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	5
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	5
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	5
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	5
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	5
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	3
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	3
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	3
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	3
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	3
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	3
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	3
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	3
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	3
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	3
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	3
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	3
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	3
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	3
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	3
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	3
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	3
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	3
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	3
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	3
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	3
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	3

TABLE IXb. ESF NON-RADIOLOGICAL SAFETY AND ENVIRONMENTAL (ATTRIBUTE I12)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I12 ESF COMMENT NON-RADIOL.
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	3
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	3
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	3
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	1
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	1
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	1
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	1
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	1
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	1
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	1
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	1
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	1
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	1
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	1
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	1
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	1
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	1
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	1
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	1
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	1
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	1
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	1
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	NA
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	NA
8	License termination	52*	Can license be terminated if DOE has spent fuel?	NA
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	NA
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	NA

TABLE Xa. ESF RADIOLOGICAL AND NON-RADIOLOGICAL (AVERAGE OF ATTRIBUTES I11 AND I12)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I11+I12 ESF AVERAGE
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	7.00
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7.00
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	7.00
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	6.00
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	6.00
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	6.00
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	6.00
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	6.00
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	6.00
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	6.00
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	6.00
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	6.00
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	6.00
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	5.00
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	5.00
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	5.00
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	5.00
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	5.00
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	5.00
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	5.00
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	5.00
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	5.00
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	5.00
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	5.00
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	5.00
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	5.00
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	5.00
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	5.00
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	5.00
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	4.00
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	4.00
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	4.00
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	4.00
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	4.00
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	4.00
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	3.00
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	3.00
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3.00
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3.00

TABLE Xb. ESF RADIOLOGICAL AND NON-RADIOLOGICAL (AVERAGE OF ATTRIBUTES I11 AND I12)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I11+I12 ESF AVERAGE
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	3.00
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	3.00
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	3.00
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3.00
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	3.00
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	2.00
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	2.00
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	2.00
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	2.00
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	2.00
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	2.00
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	2.00
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	2.00
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	2.00
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	2.00
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	2.00
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	2.00
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	2.00
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1.50
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	1.00
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	1.00
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1.00
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1.00
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	1.00
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	1.00
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	1.00
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	1.00
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1.00
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	1.00
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1.00
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1.00
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1.00
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1.00
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1.00
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1.00
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	0.00
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	0.00
8	License termination	52*	Can license be terminated if DOE has spent fuel?	0.00
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	0.00

TABLE XIa. OVERALL RANK FOR TIMELINESS OF SCP (ATTRIBUTES T1, T2, T7, T9, AND T10)

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T1 EXPEDITE SITE CHAR.	RANK FOR T2 EXPAND SC ACTIV. SCOPE	RANK FOR T7 SCP OBJ. 3	RANK FOR T9 SCP COMMENT 1	RANK FOR T10 SCP COMMENT 2	RANK FOR AVG T1+T2+T7+T9+T10 SCP/TIME
60	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7	9	9	9	9	8.60
12	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	7	9	7	9	9	8.20
50	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	7	9	7	9	9	8.20
64	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	7	9	7	9	9	8.20
26	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	7	7	9	7	7	7.40
32	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7	7	7	7	9	7.40
44	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	9	7	7	7	7	7.40
59	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	7	9	5	9	7	7.40
22	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	7	7	7	7	7	7.00
31	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7	7	7	7	7	7.00
49	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	7	7	7	7	7	7.00
27	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	7	7	5	7	7	6.60
33	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	7	7	5	7	7	6.60
40	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	7	7	5	7	7	6.60
55	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	7	9	3	7	7	6.60
57	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	7	9	3	7	7	6.60
2	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	5	7	5	7	7	6.20
7	51*	"Substantially increase difficulty of retrieval"	5	7	5	7	7	6.20
15	121(a)*	When and how does DOE guarantee "control"of land?	7	3	7	7	7	6.20
16	122(a)(1), 122(b)*	How far into the future must projections be?	3	7	5	7	9	6.20
24	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7	7	7	3	7	6.20
36	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	7	7	5	5	7	6.20
37	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7	7	3	7	7	6.20
54	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7	7	3	7	7	6.20
1	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	7	3	5	7	7	5.80
14	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	7	7	3	5	7	5.80
23	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	7	5	5	5	7	5.80
25	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	7	5	5	5	7	5.80
39	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7	5	3	7	7	5.80
41	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	7	5	3	7	7	5.80
42	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	7	5	3	7	7	5.80
46	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	7	5	3	7	7	5.80
56	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7	5	3	7	7	5.80
62	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	7	5	3	7	7	5.80
11	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	1	7	5	7	7	5.40
18	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	7	7	3	3	7	5.40
30	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	7	7	5	3	5	5.40
45	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	7	5	3	5	7	5.40
19	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	7	3	3	7	5	5.00

TABLE XIb. OVERALL RANK FOR TIMELINESS OF SCP (ATTRIBUTES T1, T2, T7, T9, AND T10)

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T1 EXPEDITE SITE CHAR.	RANK FOR T2 EXPAND SC ACTIV. SCOPE	RANK FOR T7 SCP OBJ. 3	RANK FOR T9 SCP COMMENT 1	RANK FOR T10 SCP COMMENT 2	RANK FOR AVG T1+T2+T7+T9+T10 SCP/TIME
21	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	7	3	3	5	7	5.00
28	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	7	5	5	3	5	5.00
29	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	7	3	3	5	7	5.00
48	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	7	5	3	5	5	5.00
53	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	7	5	3	5	5	5.00
61	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	7	5	3	5	5	5.00
43	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	7	5	3	7	7	4.80
47	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	7	5	3	3	5	4.60
58	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	7	5	3	3	5	4.60
63	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	7	5	3	3	5	4.60
3	32*	Construction auth. conditions for H&S unspecified	5	5	3	3	3	3.80
17	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	3	3	3	5	5	3.80
35	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	7	3	3	3	3	3.80
52	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	7	3	3	3	3	3.80
9	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	1	3	1	5	7	3.40
51	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	7	3	1	3	3	3.40
75	131(b)(9)	Reg doesn't include procedures, only design	9	1	1	3	3	3.40
77	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	9	1	1	3	3	3.40
13	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	1	5	3	1	5	3.00
6	51*	Monuments "as permanent as practicable"	1	5	1	3	3	2.60
20	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	7	1	1	3	1	2.60
78	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	5	1	1	3	3	2.60
34	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	7	1	1	1	1	2.20
38	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	7	1	1	1	1	2.20
65	131(b)(3)*	Does redundancy permit failure of some systems?	1	3	1	3	3	2.20
70	131(b)(6)	"Design to permit periodic inspection"	1	3	1	3	3	2.20
74	131(b)(8)	ID of I&C systems not required by reg	1	3	1	3	3	2.20
5	51*	Archives consultation likely/potential intruders	NA	3	1	3	3	2.00
10	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1	1	1	3	3	1.80
66	131(b)(3)*	Provisions and means of protection unclear	1	1	1	3	3	1.80
67	131(b)(3)*	Should explosion suppression be included?	1	1	1	3	3	1.80
68	131(b)(4)*	Does reg preclude aid in emergency response?	1	1	1	3	3	1.80
69	131(b)(5)*	Design all utility systems for essential function	1	1	1	3	3	1.80
71	131(b)(7)	Reg provides no methods for criticality control	1	1	1	3	3	1.80
72	131(b)(7)	Difference in safety margin from 10CFR72 analog	1	1	1	3	3	1.80
73	131(b)(7)	Reg allows 2-event criticality	1	1	1	3	3	1.80
8	52*	Can license be terminated if DOE has spent fuel?	NA	1	1	3	3	1.60
76	131(b)(9)	Reg references surface mining regs	1	1	1	1	1	1.00
4	32*	Reg. reads protect H&S, security or env. values	NA	1	1	1	1	0.80

TABLE XIIa. RANK FOR IMPORTANCE TO SCP (ATTRIBUTES I9 AND I10)

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I9 SCP OBJ. 1	RANK FOR I10 SCP OBJ. 2	RANK FOR AVG I9+I10 SCP IMPORTANCE
32	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7	7	7.00
26	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	9	3	6.00
60	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	5	7	6.00
24	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	7	3	5.00
36	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	7	3	5.00
59	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	7	3	5.00
1	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	5	3	4.00
46	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	5	3	4.00
50	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	5	3	4.00
55	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	5	3	4.00
57	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	5	3	4.00
11	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	3	3	3.00
12	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	3	3	3.00
14	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	3	3	3.00
15	121(a)*	When and how does DOE guarantee "control"of land?	3	3	3.00
16	122(a)(1), 122(b)*	How far into the future must projections be?	3	3	3.00
18	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	3	3	3.00
27	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	3	3	3.00
28	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	3	3	3.00
34	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	3	3	3.00
39	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	3	3	3.00
40	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	3	3	3.00
42	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	3	3	3.00
49	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	3	3	3.00
62	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	3	3	3.00
63	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	3	3	3.00
64	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	3	3	3.00
78	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	3	3	3.00
7	51*	"Substantially increase difficulty of retrieval"	3	1	2.00
13	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	3	1	2.00
19	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	3	1	2.00
21	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	3	1	2.00
22	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	3	1	2.00
23	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	3	1	2.00
25	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	3	1	2.00
29	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3	1	2.00
30	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	3	1	2.00
31	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	3	1	2.00
33	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	3	1	2.00

TABLE XIIb. RANK FOR IMPORTANCE TO SCP (ATTRIBUTES I9 AND I10)

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR I9 SCP OBJ. 1	RANK FOR I10 SCP OBJ. 2	RANK FOR AVG I9+I10 SCP IMPORTANCE
35	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3	1	2.00
37	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	3	1	2.00
41	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	3	1	2.00
43	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	3	1	2.00
44	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	3	1	2.00
45	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	3	1	2.00
48	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	3	1	2.00
52	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3	1	2.00
53	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	3	1	2.00
54	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	3	1	2.00
56	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	3	1	2.00
58	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	3	1	2.00
61	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	3	1	2.00
2	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	1	1	1.00
3	32*	Construction auth. conditions for H&S unspecified	1	1	1.00
4	32*	Reg. reads protect H&S, security or env. values	1	1	1.00
5	51*	Archives consultation likely/potential intruders	1	1	1.00
6	51*	Monuments "as permanent as practicable"	1	1	1.00
8	52*	Can license be terminated if DOE has spent fuel?	1	1	1.00
9	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	1	1	1.00
10	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1	1	1.00
17	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1	1	1.00
20	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1	1	1.00
38	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1	1	1.00
47	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	1	1	1.00
51	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1	1	1.00
65	131(b)(3)*	Does redundancy permit failure of some systems?	1	1	1.00
66	131(b)(3)*	Provisions and means of protection unclear	1	1	1.00
67	131(b)(3)*	Should explosion suppression be included?	1	1	1.00
68	131(b)(4)*	Does reg preclude aid in emergency response?	1	1	1.00
69	131(b)(5)*	Design all utility systems for essential function	1	1	1.00
70	131(b)(6)	"Design to permit periodic inspection"	1	1	1.00
71	131(b)(7)	Reg provides no methods for criticality control	1	1	1.00
72	131(b)(7)	Difference in safety margin from 10CFR72 analog	1	1	1.00
73	131(b)(7)	Reg allows 2-event criticality	1	1	1.00
74	131(b)(8)	ID of I&C systems not required by reg	1	1	1.00
75	131(b)(9)	Reg doesn't include procedures, only design	1	1	1.00
76	131(b)(9)	Reg references surface mining regs	1	1	1.00
77	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	1	1	1.00

TABLE XIII. RELATIONSHIP BETWEEN UNCERTAINTIES AND NRC "POINT PAPER" COMMENTS

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	NRC COMMENT NUMBER
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	46
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	2,36,69,72,73
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	3,68,109
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	57,86,87,88
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	6,38,90-94
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	51,90-95
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	50,53
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	13,22,29,59.70
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	31-33,40,41
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	16-19,21,23-25,71,89
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	15,20,71,89
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	26,37,50,53,62
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	26
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	26,52
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	26,52
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	52
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	51
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	34,35
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	38,39
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	10,27
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	64-69
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	43,44,47,48,55,56,58
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	96

TABLE XIVa. UNCERTAINTIES NOT IDENTIFIED IN COMMENTS BUT WHICH MAY ADVERSELY EFFECT LICENSING PROCESS (ATTRIBUTE T9)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T9
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	9
41	Adverse cond:earthquakes/tectonic proces	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	9
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	9
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	7
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	7
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	7
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(	Is ALARA properly applicable?	7
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	7
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	7
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	7
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	7
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	7
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	7
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	7
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7
56	Adverse cond:complex engineering measure	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	5
68	Imp. to safety:emergency capability	131(b)(4)8	Does reg preclude aid in emergency response?	5
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	5
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	5
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	5
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii	Any release of radionuclides must be gradual	5
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	5
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	5
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	5
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	3
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(	What does "at all times" mean here?	3
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	3
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	3
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	3
8	License termination	52*	Can license be terminated if DOE has spent fuel?	3
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	3
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	3
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	3

TABLE XIVb. UNCERTAINTIES NOT IDENTIFIED IN COMMENTS BUT WHICH MAY ADVERSELY EFFECT LICENSING PROCESS (ATTRIBUTE T9)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR T9
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	3
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	3
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	3
29	Adverse cond:hydrol.change-climate chang	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	3
1	Site characterization plan	16*, 17*,23	Retrivability/tracers (redone 2/7/89)	3
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	3
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	3
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	3
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	3
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	3
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	3
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	1
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	1

TABLE XVa. UNCERTAINTIES NOT IDENTIFIED IN COMMENTS BUT WHICH MAY CAUSE SIGNIFICANT/CORRECTABLE SCHEDULE DISRUPTION (ATTRIBUTE T10)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	T10 RANK
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	9
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	9
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	9
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	9
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	9
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	7
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	7
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	7
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	7
8	License termination	52*	Can license be terminated if DOE has spent fuel?	7
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	7
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	7
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	7
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	7
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	7
68	Imp. to safety:emergency capability	131(b)(4)8	Does reg preclude aid in emergency response?	7
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	7
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	7
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	7
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	7
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	7
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	7
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	7
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	7
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	7
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	7
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	7
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	7
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	7
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	5
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	5
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	5
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	5
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	5
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	5
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	5
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	3
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	3

TABLE XVb. UNCERTAINTIES NOT IDENTIFIED IN COMMENTS BUT WHICH MAY CAUSE SIGNIFICANT/CORRECTABLE SCHEDULE DISRUPTION (ATTRIBUTE T10)

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	T10 RANK
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	3
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	3
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	3
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	3
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	3
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	3
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	3
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	3
1	Site characterization plan	16*, 17*,23	Retrivability/tracers (redone 2/7/89)	3
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	3
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	3
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	1
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	1
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	1

TABLE XVIa. RANK FOR AVERAGE OF ALL ATTRIBUTES RELATED TO SITE CHARACTERIZATION AND THE SCP

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR AVG OF SCP
60	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	7.86
32	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	"Taking into account the degree of resolution"	7.29
26	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	"Taking into account the degree of resolution"	7.00
50	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	7.00
12	System perf. after permanent closure	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	6.71
59	Adverse condition:water table rise	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	6.71
64	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	6.71
24	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	"Taking into account the degree of resolution"	5.86
36	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	"Taking into account the degree of resolution"	5.86
44	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	5.86
49	Adverse cond:nat. occurring materials	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	5.86
55	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	5.86
57	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	5.86
22	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	5.57
27	Adverse cond: changes to hydrology	122(a)(2)*, 122(c)(5)	Performance objectives not significantly affected	5.57
31	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	Performance objectives not significantly affected	5.57
40	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	5.57
1	Site characterization plan	16*, 17*,23	Retrievability/tracers (redone 2/7/89)	5.29
15	Ownership/control of land	121(a)*	When and how does DOE guarantee "control"of land?	5.29
16	Favorable conditions	122(a)(1), 122(b)*	How far into the future must projections be?	5.29
33	Adverse condition - geochemical	122(a)(2)*, 122(c)(8)	Performance objectives not significantly affected	5.29
46	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	5.29
7	License amendment/permanent closure	51*	"Substantially increase difficulty of retrieval"	5.00
14	EBS Radionuclide release/postclosure	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	5.00
37	Adverse condition:structural deformation	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	5.00
39	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	5.00
42	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	5.00
54	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	5.00
62	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	5.00
2	Environmental report	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	4.71
11	Retrieval of waste	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	4.71
18	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	4.71
23	Adverse cond:nat. phenom. & groundwater	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	4.71
25	Adverse cond: deform. affecting gdwater	122(a)(2)*, 122(c)(4)	Performance objectives not significantly affected	4.71
41	Adverse cond:earthquakes/tectonic processes	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	4.71
43	Adverse condition - higher earthquakes	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	4.71
56	Adverse cond:complex engineering measures	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	4.71
28	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	"Taking into account the degree of resolution"	4.43
30	Adverse cond:gdwater cond affecting EBS	122(a)(2)*, 122(c)(7)	"Taking into account the degree of resolution"	4.43

TABLE XVIb. RANK FOR AVERAGE OF ALL ATTRIBUTES RELATED TO SITE CHARACTERIZATION AND THE SCP

ID NO.	GENERAL SUBJECT OF REGULATION	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	RANK FOR AVG OF SCP
45	Adverse condition - igneous activity	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	4.43
19	Adverse condition - flooding	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	4.14
21	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	4.14
29	Adverse cond:hydrol.change-climate change	122(a)(2)*, 122(c)(6)	Performance objectives not significantly affected	4.14
48	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	4.14
53	Adverse condition - drilling	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	4.14
61	Adverse condition:perched water	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	4.14
63	Adverse condition: gaseous radionuclides	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	4.14
58	Adverse cond:geomech/undrgrd opening	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	3.86
47	Adverse condition - extreme erosion	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	3.57
35	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	Performance objectives not significantly affected	3.29
52	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	3.29
3	Conditions/construction authorization	32*	Construction auth. conditions for H&S unspecified	3.00
17	Favorable conditions	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	3.00
9	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	2.71
13	EBS performance after permanent closure	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	2.71
51	Adverse cond:mining for resources	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	2.71
75	Imp. to safety: mining regulations	131(b)(9)	Reg doesn't include procedures, only design	2.71
77	Imp. to safety: mining regulations	131(b)(9)	NRC jurisdiction vis-a-vis MSHA unclear	2.71
78	Design - safe undergrd ops/rock movement	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	2.71
34	Adverse cond: groundwater not reducing	122(a)(2)*, 122(c)(9)	"Taking into account the degree of resolution"	2.43
6	License amendment/permanent closure	51*	Monuments "as permanent as practicable"	2.14
20	Adverse cond: human activity/groundwater	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	2.14
38	Adverse condition - earthquakes	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1.86
65	Imp. to safety:fires/explosions	131(b)(3)*	Does redundancy permit failure of some systems?	1.86
70	Imp. to safety:inspection/testing/maint.	131(b)(6)	"Design to permit periodic inspection"	1.86
74	Imp. to safety: instrumentation/control	131(b)(8)	ID of I&C systems not required by reg	1.86
5	License amendment/permanent closure	51*	Archives consultation likely/potential intruders	1.71
10	Radiation exposures/releases	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	1.57
66	Imp. to safety:fires/explosions	131(b)(3)*	Provisions and means of protection unclear	1.57
67	Imp. to safety:fires/explosions	131(b)(3)*	Should explosion suppression be included?	1.57
68	Imp. to safety:emergency capability	131(b)(4)*	Does reg preclude aid in emergency response?	1.57
69	Imp. to safety: utility services	131(b)(5)*	Design all utility systems for essential function	1.57
71	Imp. to safety: criticality control	131(b)(7)	Reg provides no methods for criticality control	1.57
72	Imp. to safety: criticality control	131(b)(7)	Difference in safety margin from 10CFR72 analog	1.57
73	Imp. to safety: criticality control	131(b)(7)	Reg allows 2-event criticality	1.57
8	License termination	52*	Can license be terminated if DOE has spent fuel?	1.43
76	Imp. to safety: mining regulations	131(b)(9)	Reg references surface mining regs	1.00
4	Conditions/construction authorization	32*	Reg. reads protect H&S, security or env. values	0.86

TABLE XVIIa. RELATIONSHIPS BETWEEN UNCERTAINTIES AND SCP SECTIONS

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	SCP SECTION CROSS REFERENCE
1	16*, 17*,23	"Hot" testing:reg doesn't reflect statute precision	1. to 5.,8.3.1,8.4.2
2	21(a), 51, 23, 24(a)	How does license app. ER relate to statutory EIS?	
3	32*	Construction auth. conditions for H&S unspecified	
4	32*	Reg. reads protect H&S, security or env. values	
5	51*	Archives consultation likely/potential intruders	
6	51*	Monuments "as permanent as practicable"	
7	51*	"Substantially increase difficulty of retrieval"	
8	52*	Can license be terminated if DOE has spent fuel?	
9	111(a)*, 132(a)*, 132(b)*	Is ALARA properly applicable?	8.3.2.3, 8.3.5.3, 8.3.5.5, 8.3.5.14
10	111(a)*, 132(a)*, 132(b)*	What does "at all times" mean here?	8.3.2.3, 8.3.5.3, 8.3.5.5, 8.3.5.14
11	111(b)(1)-(3)	Design to permit or not to preclude retrieval?	8.3.5.2
12	112, 113(c), 133(f)	"Anticipated and unanticipated processes/events"	8.3.2.5.10, 8.3.3.1, 8.3.5.13, 8.4.2.3.3, 8.4.3.3 8.4.3.3.1
13	113(a)(1)(i)(A),(1)(ii)(A)	"Substantially complete containment"	7.2.2, 7.4., 7.4.1, 8.3.2.1.2, 8.3.4.1, 8.3.4.3 8.3.5.9, 8.4.3.3.2
14	113(a)(1)(i)(B),(1)(ii)(B)	Any release of radionuclides must be gradual	6.4, 7.4.1, 7.4.2.3, 8.3.2.1.2, 8.3.4.1, 8.3.4.2.2 8.3.5.9, 8.3.5.10,8.3.5.13, 8.3.5.13.2, 8.3.5.13.5 8.3.5.14, 8.4.3
15	121(a)*	When and how does DOE guarantee "control"of land?	8.3.1.11.1.2
16	122(a)(1), 122(b)*	How far into the future must projections be?	1.8.2.1, 3.6 to 3.9, 3.9.4, 8.3.1.2, 8.3.1.2.2.1 8.3.1.10, 8.3.5.12, 8.3.5.17, 8.3.5.18
17	122(a)(1), 122(b)*	GWTT along "fastest path of radionuclide travel"	1.8.2.1, 3.6 to 3.9, 3.9.4, 8.3.1.2, 8.3.1.2.2.1 8.3.1.10, 8.3.5.12, 8.3.5.17, 8.3.5.18
18	122(a)(2)*, 122(c)(1)	"Taking into account the degree of resolution"	1.1.3.2, 3.1, 3.2.1, 8.2.1, 8.3.1.2.1, 8.3.1.6 8.3.1.6.2.1, 8.3.1.14.2, 8.3.1.16.1, 8.3.5.17 8.3.5.18
19	122(a)(2)*, 122(c)(1)	Performance objectives not significantly affected	1.1.3.2, 3.1, 3.2.1, 8.2.1, 8.3.1.2.1, 8.3.1.6 8.3.1.6.2.1, 8.3.1.14.2, 8.3.1.16.1, 8.3.5.17 8.3.5.18
20	122(a)(2)*, 122(c)(2)	"Taking into account the degree of resolution"	1.8.2.1, 8.3.1.9.3, 8.3.1.16.2, 8.3.5.17, 8.3.5.18
21	122(a)(2)*, 122(c)(2)	Performance objectives not significantly affected	1.8.2.1, 8.3.1.9.3, 8.3.1.16.2, 8.3.5.17, 8.3.5.18
22	122(a)(2)*, 122(c)(3)	"Taking into account the degree of resolution"	1.3.2.1, 1.5.2.1, 1.8.2.1, 8.3.1.2.1.3.2 8.3.1.1.2.3.1.2, 8.3.1.5.2.2, 8.3.1.8.1.2 8.3.5.17, 8.3.5.18
23	122(a)(2)*, 122(c)(3)	Performance objectives not significantly affected	1.3.2.1, 1.5.2.1, 1.8.2.1, 8.3.1.2.1.3.2
24	122(A)(2)*, 122(C)(4)	"Taking into account the degree of resolution"	1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18
25	122(A)(2)*, 122(C)(4)	Performance objectives not significantly affected	1.5.2.1, 1.8.2.1, 8.3.5.17, 8.3.5.18
26	122(A)(2)*, 122(C)(5)	"Taking into account the degree of resolution"	1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2.2, 8.3.5.12.3 8.3.5.17, 8.3.5.18
27	122(A)(2)*, 122(C)(5)	Performance objectives not significantly affected	1.5.2.1, 1.8.2.1, 2.2.2, 3.7.1, 3.9.2.2.2 8.3.5.12.3, 8.3.5.17, 8.3.5.18
28	122(A)(2)*, 122(C)(6)	"Taking into account the degree of resolution"	1.1, 1.8.2.1, 3.9.3.3, 5.1 TO 5.2, 5.2.2, 8.3.1.2.1 8.3.1.5.1, 8.3.1.5.2, 8.3.1.12.1, 8.3.5.17 8.3.5.18
29	122(A)(2)*, 122(C)(6)	Performance objectives not significantly affected	1.1, 1.8.2.1, 3.9.3.3, 5.1 TO 5.2, 5.2.2, 8.3.1.2.1 8.3.1.5.1, 8.3.1.5.2, 8.3.1.12.1, 8.3.5.17 8.3.5.18
30	122(A)(2)*, 122(C)(7)	"Taking into account the degree of resolution"	1.8.2.1, 3.7.3, 3.9.1.3, 4.1, 4.1.2, 8.3.1.2.2 8.3.1.2.2.8, 8.3.1.3, 8.3.5.17, 8.3.5.18

TABLE XVIIb. RELATIONSHIPS BETWEEN UNCERTAINTIES AND SCP SECTIONS

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	SCP SECTION CROSS REFERENCE
31	122(A)(2)*, 122(C)(7)	Performance objectives not significantly affected	1.8.2.1, 3.7.3, 3.9.1.3, 4.1, 4.1.2, 8.3.1.2.2 8.3.1.2.2.8, 8.3.1.3, 8.3.5.17, 8.3.5.18
32	122(A)(2)*, 122(C)(8)	"Taking into account the degree of resolution"	1.8.2.1, 4.1.2.7, 4.1.3.3, 4.1.3.5, 7.4, 8.3.1.2.2 8.3.1.3.2, 8.3.1.3.2.1, 8.3.1.3.4.1, 8.3.4.2, 8.3.4.3 8.3.5.17, 8.3
33	122(A)(2)*, 122(C)(8)	Performance objectives not significantly affected	1.8.2.1, 4.1.2.7, 4.1.3.3, 4.1.3.5, 7.4, 8.3.1.2.2 8.3.1.3.2, 8.3.1.3.2.1, 8.3.1.3.4.1, 8.3.4.2, 8.3.4.3 8.3.5.17, 8.3
34	122(A)(2)*, 122(C)(9)	"Taking into account the degree of resolution"	1.8.2.1, 4.1.2.7, 4.1.3.3, 4.1.3.5, 7.4, 8.3.1.2.2 8.3.1.3.2, 8.3.1.3.2.1, 8.3.1.3.4.1, 8.3.4.2, 8.3.4.3 8.3.5.17, 8.3
35	122(A)(2)*, 122(C)(9)	Performance objectives not significantly affected	1.8.2.1, 4.1.2.7, 4.1.3.3, 4.1.3.5, 7.4, 8.3.1.2.2 8.3.1.3.2, 8.3.1.3.2.1, 8.3.1.3.4.1, 8.3.4.2, 8.3.4.3 8.3.5.17, 8.3
36	122(A)(2)*, 122(C)(11)	"Taking into account the degree of resolution"	1.8.2.1, 8.3.5.17, 8.3.5.18
37	122(a)(2)*, 122(c)(11)	Performance objectives not significantly affected	1.8.2.1, 8.3.5.17, 8.3.5.18
38	122(a)(2)*, 122(c)(12)	"Taking into account the degree of resolution"	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
39	122(a)(2)*, 122(c)(12)	Performance objectives not significantly affected	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
40	122(a)(2)*, 122(c)(13)	"Taking into account the degree of resolution"	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
41	122(a)(2)*, 122(c)(13)	Performance objectives not significantly affected	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
42	122(a)(2)*, 122(c)(14)	"Taking into account the degree of resolution"	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
43	122(a)(2)*, 122(c)(14)	Performance objectives not significantly affected	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
44	122(a)(2)*, 122(c)(14)	Meaning of "typical of the area"	1.4, 1.4.1.5, 1.5.2.1, 1.8.2.1, 8.3.1.8.2, 8.3.1.17 8.3.1.17.2, 8.3.1.17.3, 8.3.1.17.4.1, 8.3.5.17 8.3.5.18
45	122(a)(2)*, 122(c)(15)	"Taking into account the degree of resolution"	1.3.2.1, 1.8.2.1, 8.3.1.8.1.2, 8.3.5.17, 8.3.5.18
46	122(a)(2)*, 122(c)(15)	Performance objectives not significantly affected	1.3.2.1, 1.8.2.1, 8.3.1.8.1.2, 8.3.5.17, 8.3.5.18
47	122(a)(2)*, 122(c)(16)	"Taking into account the degree of resolution"	1.7, 1.8.2.1, 8.3.1.5.2, 8.3.1.9.2, 8.3.1.9.2.1 8.3.1.9.3, 8.3.1.16.2, 8.3.5.17, 8.3.5.18
48	122(a)(2)*, 122(c)(16)	Performance objectives not significantly affected	1.7, 1.8.2.1, 8.3.1.5.2, 8.3.1.9.2, 8.3.1.9.2.1 8.3.1.9.3, 8.3.1.16.2, 8.3.5.17, 8.3.5.18
49	122(a)(2)*, 122(c)(17)	"Taking into account the degree of resolution"	1.8.2.1, 8.3.1.9.3, 8.3.5.17, 8.3.5.18
50	122(a)(2)*, 122(c)(17)	Performance objectives not significantly affected	1.8.2.1, 8.3.1.9.3, 8.3.5.17, 8.3.5.18
51	122(a)(2)*, 122(c)(18)	"Taking into account the degree of resolution"	1.8.2.1, 8.3.1.9.3, 8.3.5.17, 8.3.5.18
52	122(a)(2)*, 122(c)(18)	Performance objectives not significantly affected	1.8.2.1, 8.3.1.9.3, 8.3.5.17, 8.3.5.18

TABLE XVIIc. RELATIONSHIPS BETWEEN UNCERTAINTIES AND SCP SECTIONS

ID NO.	PRIMARY 10 CFR 60 CITATION	ABBREVIATED UNCERTAINTY STATEMENT	SCP SECTION CROSS REFERENCE
53	122(a)(2)*, 122(c)(19)	"Taking into account the degree of resolution"	1.8.2.1, 3.7, 8.3.5.17, 8.3.5.18
54	122(a)(2)*, 122(c)(19)	Performance objectives not significantly affected	1.8.2.1, 3.7, 8.3.5.17, 8.3.5.18
55	122(a)(2)*, 122(c)(20)	"Taking into account the degree of resolution"	1.8.2.1, 2.2.2, 8.3.5.17, 8.3.5.18
56	122(a)(2)*, 122(c)(20)	Performance objectives not significantly affected	1.8.2.1, 2.2.2, 8.3.5.17, 8.3.5.18
57	122(a)(2)*, 122(c)(21)	"Taking into account the degree of resolution"	1.8.2.1, 2., 3.4.1.4, 8.3.1.14.2, 8.3.1.15, 8.3.3.2 8.3.5.12.3, 8.3.5.17, 8.3.5.18
58	122(a)(2)*, 122(c)(21)	Performance objectives not significantly affected	1.8.2.1, 2., 3.4.1.4, 8.3.1.14.2, 8.3.1.15, 8.3.3.2 8.3.5.12.3, 8.3.5.17, 8.3.5.18
59	122(a)(2)*, 122(c)(22)	"Taking into account the degree of resolution"	1.8.2.1, 3.6 TO 3.9, 8.3.1.2, 8.3.1.3.1, 8.3.5.17 8.3.5.18
60	122(a)(2)*, 122(c)(22)	Performance objectives not significantly affected	1.8.2.1, 3.6 TO 3.9, 8.3.1.2, 8.3.1.3.1, 8.3.5.17 8.3.5.18
61	122(a)(2)*, 122(c)(23)	"Taking into account the degree of resolution"	1.8.2.1, 3.6 TO 3.9, 8.3.1.2, 8.3.1.2.2.3, 8.3.1.2.2.4 8.3.1.3.1, 8.3.5.17, 8.3.5.18
62	122(a)(2)*, 122(c)(23)	Performance objectives not significantly affected	1.8.2.1, 3.6 TO 3.9, 8.3.1.2, 8.3.1.2.2.3, 8.3.1.2.2.4 8.3.1.3.1, 8.3.5.17, 8.3.5.18
63	122(a)(2)*, 122(c)(24)	"Taking into account the degree of resolution"	1.8.2.1, 3.6 TO 3.9, 4.1.3.5 TO 4.1.3.6, 8.3.1.2 8.3.1.3.1, 8.3.1.3.8.1, 8.3.5.17, 8.3.5.18
64	122(a)(2)*, 122(c)(24)	Performance objectives not significantly affected	1.8.2.1, 3.6 TO 3.9, 4.1.3.5 TO 4.1.3.6, 8.3.1.2 8.3.1.3.1, 8.3.1.3.8.1, 8.3.5.17, 8.3.5.18
65	131(b)(3)*	Does redundancy permit failure of some systems?	6.1.2, 8.3.1.13.2, 8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
66	131(b)(3)*	Provisions and means of protection unclear	6.1.2, 8.3.1.13.2, 8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
67	131(b)(3)*	Should explosion suppression be included?	6.1.2, 8.3.1.13.2, 8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
68	131(b)(4)*	Does reg preclude aid in emergency response?	8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
69	131(b)(5)*	Design all utility systems for essential function	8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
70	131(b)(6)*	"Design to permit periodic inspection"	8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
71	131(b)(7)*	Reg provides no methods for criticality control	7.2.2, 8.3.4.2, 8.3.2.4, 8.3.4.3.2, 8.3.5.4, 8.3.5.5
72	131(b)(7)*	Difference in safety margin from 10CFR72 analog	7.2.2, 8.3.4.2, 8.3.2.4, 8.3.4.3.2, 8.3.5.4, 8.3.5.5
73	131(b)(7)*	Reg allows 2-event criticality	7.2.2, 8.3.4.2, 8.3.2.4, 8.3.4.3.2, 8.3.5.4, 8.3.5.5
74	131(b)(8)*	ID of I&C systems not required by reg	8.3.2.3, 8.3.2.4, 8.3.5.4, 8.3.5.5
75	131(b)(9)*	Reg doesn't include procedures, only design	8.3.2.3, 8.3.2.4, 8.3.5.2.9, 8.3.5.4, 8.3.5.5
76	131(b)(9)*	Reg references surface mining regs	8.3.2.3, 8.3.2.4, 8.3.5.2.9, 8.3.5.4, 8.3.5.5
77	131(b)(9)*	NRC jurisdiction vis-a-vis MSHA unclear	8.3.2.3, 8.3.2.4, 8.3.5.2.9, 8.3.5.4, 8.3.5.5
78	133(e)*, 133(i)	Will NRC regulate non-radiological safety?	6.1.1, 6.1.2, 8.3.2.2, 8.3.2.3, 8.3.2.5, 8.3.2.5.3 8.3.2.5.9, 8.4.2.3, 8.4.2.3.3, 8.4.2.3.4 8.4.2.3.6.3, 8.4.3.2.1.4

APPENDIX A

APPENDIX A

PERTINENT DEFINITIONS FROM

"TOP-001-02 PROGRAM ARCHITECTURE RELATIONAL DATABASE WORK INSTRUCTION, ATTACHMENT A," DATED, AUGUST 15, 1988

29. UNCERTAINTY TOPIC

Content - This field contains the general subject and keywords of the UNCERTAINTY in the next field. It is intended as a vehicle for consistent identification and consolidation of items related to a given topic. (See Field 8 content description.)

Format - Field size: TBD characters.

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

Definitions:

Regulatory Uncertainty - Lack of certitude as to what is meant by the REGULATORY REQUIREMENT or with its 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.

Technical Uncertainty - Lack of certitude as to how to demonstrate (DOE action) or determine (NRC action) compliance and/or obtain the requisite information.

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, NRC UNCERTAINTY QUESTIONS, UNCERTAINTY REDUCTION METHODS and INFORMATION REQUIREMENTS.

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

Uncertainty, in all cases, is associated with a perceived insufficiency in a specific item. This 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 selecting 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 method may be the subject of an uncertainty. Or, if the work is completed and the results will not support a useable conclusion, the conclusion 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. Together, these provide the basis for the identification of detailed corrective methods, information needs and plans in subsequent steps of the Program Architecture process.

Content - This field will contain, in full or in abstract form, the UNCERTAINTIES put forth by the NRC, DOE, States, Tribes and other affected parties. In all cases, such UNCERTAINTIES shall include reference(s) to magnetic or hard copy source(s) of the information.

DOE UNCERTAINTIES will be entered in this field as described above until the LSS becomes operational. From that point, DOE UNCERTAINTIES will be identified by an appropriate reference to the LSS; that is, the field will contain the identifier or code to be used to obtain this information from the LSS.

For each NRC UNCERTAINTY, a brief statement will 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 would include:

a. A term requires further definition to avoid . . .
b. The applicability of a theory needs to be demonstrated to provide the basis for . . .
c. Bounds must be established in order to . . .
d. Jurisdiction must be established so that . . .

Note that these statements imply action but are not in themselves action statements. Action statements will be developed in Field 37, DOE Uncertainty Reduction Methods, and in Field 39, NRC Uncertainty Reduction Methods.

Format - Field size: Variable length up to 32K characters.

31. UNCERTAINTY SOURCE
(PAPD Step 4 and part of Steps 11 and 12)

Content - This field will identify the source(s) of the UNCERTAINTY or set of UNCERTAINTIES in the preceding field. A "source" is an agency that presented or identified the UNCERTAINTY for resolution or reduction. (The agency with action responsibility is identified in Field 34.) Potential sources include the NRC, DOE, States, Tribes and other affected parties.

Format - Field size: TBD characters.

32. UNCERTAINTY TYPE CODE
(PAPD Step 4 and part of Steps 11 and 12)

Content - This field will contain a code that identifies that each UNCERTAINTY is either Regulatory, Technical or Institutional.

Format - Field size: TBD characters.

33. SITE DEPENDENCY (PAPD Step 4 and part of Steps 11 and 12)

Content - This field will contain a code that identifies that each UNCERTAINTY is either Site Constrained, Site Specific or Generic (site independent).

Format - Field size: TBD characters.

34. UNCERTAINTY ACTION AGENCY
(PAPD Step 4 and part of Steps 11 and 12)

Content - This field will identify the government agency(ies) responsible for resolving/reducing each 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.

Format - Field size: TBD characters.

35. NRC UNCERTAINTY QUESTIONS (PAPD Step 10)

Definition - A component of an uncertainty -- An expression of inquiry that calls for a reply.

To resolve a specific TECHNICAL, REGULATORY, or INSTITUTIONAL UNCERTAINTY, one or more questions will arise that require information to obtain an answer or make a reply. The resolution of uncertainty is dependent upon the answer(s) to the question(s) which, in turn, is dependent on the specific information.

Content - UNCERTAINTY QUESTIONS are developed by breaking an UNCERTAINTY into its constituent elements and phrasing each element as a question. If the UNCERTAINTY is not divisible, enter "DNA" (for "Does Not Apply").

The UNCERTAINTY QUESTIONS may relate to one or more of several factors involved in responding to the UNCERTAINTY. For REGULATORY and INSTITUTIONAL UNCERTAINTIES these factors, in general, are derived directly from the uncertainty. For TECHNICAL UNCERTAINTIES the factors are taken from a variety of applicable technical concerns. Examples include, but are by no means limited to:

a. How well must the parameter of interest be known (i.e., what is the required accuracy/precision or statistical confidence)?
b. Is applicable theory available?
c. What level of acceptance is there in the technical community for the applicability of the theory to the conditions/processes of concern?
d. Can the process/phenomenon be acceptably modeled/ simulated?
e. Can causal factors be identified with acceptable certitude?
f. Can the local environment be acceptably analysed/ simulated?
g. Can the variables of interest (e.g., frequency, duration, limits, properties) be identified and quantitatively described with acceptable accuracy?
h. Can the needed data be obtained with sufficient accuracy?
i. What statistical confidence or safety margin is acceptable?

Format - Field size: Variable length up to 32K characters.

36. DOE UNCERTAINTY REDUCTION METHOD TOPIC (PAPD Step 22)

Content - This field contains the general subject and keywords of the DOE UNCERTAINTY REDUCTION METHOD in the next field. It is intended as a vehicle for consistent identification and consolidation of items related to a given topic. (See Field 8 content description.)

Format - Field size: TBD characters.

37. DOE UNCERTAINTY REDUCTION METHODS (PAPD Step 22)
[NOTE: When the LSS comes on-line, this field may be reduced to the identifier or code to be used to obtain this information from the LSS.]

Content - This field will contain a summary of (and, if published, a reference to) how DOE plans to reduce each REGULATORY, TECHNICAL, and INSTITUTIONAL UNCERTAINTY related to their demonstration of compliance. Contingency, backup or other alternative methods under serious consideration shall also be described.

Format - Field size: Variable length up to 32K characters.

38. NRC UNCERTAINTY REDUCTION METHOD TOPIC (PAPD Step 15)

Content - This field contains the general subject and keywords of the NRC UNCERTAINTY REDUCTION METHOD in the next field. It is intended as a vehicle for consistent identification and consolidation of items related to a given topic. (See Field 8 content description.)

Format - Field size: TBD characters.

39. NRC UNCERTAINTY REDUCTION METHODS (PAPD Step 15)

Definition - How the TECHNICAL, INSTITUTIONAL or NRC REGULATORY UNCERTAINTY will be reduced.

Content - This field contains a summary description of how the NRC plans to reduce each NRC UNCERTAINTY. This abbreviated plan will include:

a. Responsible Organization(s): The organization(s) within the NRC and, as applicable, its contractors assigned to the task of reducing the UNCERTAINTY (the lead organization is to be clearly identified),

b. Summary of Approach: A summary of the approach to be used (for example, staff technical position, NRC counsel legal opinion, rulemaking, memorandum of understanding),

c. Required Tasks: The tasks presently considered necessary for reduction of the UNCERTAINTY to an acceptable level (NOTE: These tasks are above the level of satisfaction of INFORMATION REQUIREMENTS; i.e., INFORMATION REQUIREMENTS will be derived from the identified tasks.),

d. Interactions: The interactions between the above tasks and/or between these tasks and other activities (inputs from, outputs to, coordination with),

e. Schedule Constraints: The project milestones and the key uncertainty reduction method lead times (e.g., 3-year rulemaking) that dictate the schedule for (1) completion of the above tasks and/or (2) interim milestones for reviews, deliverables and interactions. The rationale behind the Field 47 schedule and network for the subject NRC UNCERTAINTY REDUCTION METHOD is to be summarized here.

f. CPM Code: The reference code to the top-level CPM network of the NRC UNCERTAINTY REDUCTION METHOD,

g. Uncertainty Reduction Method Reference(s): Reference(s) to more complete presentation of the NRC UNCERTAINTY REDUCTION METHOD,

h. Postulated Elements of Proof: In cases where INSTITUTIONAL and/or REGULATORY UNCERTAINTY exists, the ELEMENTS OF PROOF for the REGULATORY REQUIREMENT as they are presumed to be after the subject UNCERTAINTY is resolved. Those Postulated ELEMENTS OF PROOF whose wording may be affected by (i.e., is sensitive to) the resolution of the subject UNCERTAINTY are to be entered in upper case (all-cap) letters. In the Uncertainty Reduction Method Notes an explanation will be provided of all such verbal dependencies and any logical dependencies that may exist. If the logical and verbal construction of the ELEMENTS OF PROOF is insensitive to the UNCERTAINTY, an explanation will be provided in the Uncertainty Reduction Method Notes. The Postulated ELEMENTS OF PROOF are to be provided in this field in the text hierarchical format. A hard-copy of the graphic ELEMENTS OF PROOF hierarchical format will be retained in the permanent hard-copy file for the subject UNCERTAINTY REDUCTION METHOD. (See Field 15, Attachment B and TOP-001-03.)

Contingency, backup or other alternative methods under serious consideration for reduction of the subject UNCERTAINTY shall also be summarized in this field.

Format - Field size: Variable length up to 32K characters.

40. NRC UNCERTAINTY REDUCTION METHOD CODE (PAPD Step 15)

Content - This field will contain a code that, based on the description in the preceding field, identifies the basic method to be used to reduce the NRC UNCERTAINTY. The available codes for each type of UNCERTAINTY are as follows:

REGULATORY

INT	NRC to provide an interpretation
DEF	NRC to provide a definition
RG-R	NRC to issue a Regulatory Guide (Regulatory)
MOU-R	Memorandum of Understanding (Regulatory)
CLA	NRC to clarify regulatory intent
OGC	NRC OGC to provide legal opinion
RUL-R	Rulemaking (Regulatory)

TECHNICAL

RES-D	DOE to conduct research
SDY-D	DOE to conduct study(ies)
MTD-D	DOE to develop and demonstrate method
RES-N	NRC to conduct research
SDY-N	NRC to conduct study(ies)
DAA-N	NRC to define acceptable approach(es)
RG-T	NRC to issue a Regulatory Guide (Technical)
GTP	NRC to write a Generic Technical Position

INSTITUTIONAL

MOU-I	Memorandum of Understanding (Institutional)
RUL-I	Rulemaking (Institutional)

Format - Field size: TBD characters.

APPENDIX B

APPENDIX B

REGULATORY UNCERTAINTIES

>>>UNCERTAINTY_NUMBER:

1

>>>IDENTIFICATION_NUMBER:

RR52/UN1

>>>PRIMARY_CITATION:

10CFR60.16*
10CFR60.17*
10CFR60.23

>>>UNCERTAINTY_TEXT:

The nature of the uncertainty is that the regulation does not specify whether, or what criteria, testing with radioactive materials is or is not necessary. Until this determination is made, the Regulatory Requirement is incomplete, since neither site characterization planning that involves the use of radioactive material nor the related site characterization is complete and meets statutory requirements given in 42USC10133(c)(2).

10CFR60 only includes the requirement that DOE demonstrate the need to use radioactive materials in testing, and that the NRC rule on that justification.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

A Regulatory Uncertainty exists because 10CFR60 does not specify whether, or by what criteria, the Commission will determine that testing with radioactive materials is or is not necessary, nor does it specify limits and restrictions for use of radioactive material. 10CFR60.17(a)(2)(ii) requires only that plans for testing with radioactive materials be included in the site characterization plan. 10CFR60.18(e) is related to 17(a)(2)(ii) in that it reflects the requirement for a Commission determination of need for testing with radioactive materials. Until this determination is made, the Regulatory Requirement is incomplete, since statutorily neither site characterization planning nor the site characterization program itself is fully compliant.

>>>FILE_NAME:

R52UN1.1

>>>UNCERTAINTY_NUMBER:

2

>>>IDENTIFICATION_NUMBER:

RR74/UN1

>>>PRIMARY_CITATION:

10CFR60.21(a)
10CFR60.51
10CFR60.23
10CFR60.24(a)

>>>UNCERTAINTY_TEXT:

There is currently uncertainty stemming from the language in 10 CFR 60.21(a) which requires the preparation of an environmental report which "shall accompany" the license application and the juxtaposition of that language contained in 42 USC 10134(f)(4) of the Nuclear Waste Policy Act, as amended, which states "(4) Any environmental impact statement prepared in connection with a repository proposed to be constructed by the Secretary under this subtitle shall, to the extent practicable, be adopted by the Commission in connection with the issuance by the Commission of a construction authorization and license for such repository. To the extent such statement is adopted by the Commission, such adoption shall be deemed to also satisfy the responsibilities of the Commission under the National Environmental Policy Act of 1969 (42 U.S.C. 4321, et seq." What is required (environmental report or environmental impact statement) and its role in the licensing process needs clarification. Clearly, the law (statute) must control the regulation. 10 CFR 60.21 and related sections are currently the subject of a rulemaking.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

Inconsistency (or at least the potential thereof) between the regulation and NWPA.

>>>FILE_NAME:

R74UN1.2

>>>UNCERTAINTY_NUMBER:

3

>>>IDENTIFICATION_NUMBER:

RR62/UN1

>>>PRIMARY_CITATION:

10CFR60.32*

>>>UNCERTAINTY_TEXT:

10CFR60.32(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, RR62/UN1, 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.

The uncertainty can be removed by changing the word "or" in "or environmental values" to "and".

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

10CFR60.32(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, RR62/UN1, 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, yet this is clearly the meaning of the regulation as it is written.

>>>FILE_NAME:

R62UN1.3

>>>UNCERTAINTY_NUMBER:

4

>>>IDENTIFICATION_NUMBER:

RR62/UN2

>>>PRIMARY_CITATION:

10CFR60.32*

>>>UNCERTAINTY_TEXT:

10CFR60.32(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, RR62/UN2, lies in the lack of definition of "such conditions". Although the regulation clearly assigns the responsibility of defining the necessary 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 parameters for the conditions necessary to protect health and safety, common defense and security, and environmental values while still leaving the Commission some discretion in the definition.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

10CFR60.32(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, RR62/UN2, lies in the lack of definition of "such conditions". Although the regulation clearly assigns the responsibility of defining the necessary 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 parameters for the conditions necessary to protect health and safety, common defense and security, and environmental values while still leaving the Commission some discretion in the definition. Until this is done, however, DOE cannot know how to proceed to meet the regulations governing application for a license and for construction authorization.

>>>FILE_NAME:

R62UN2.4

>>>UNCERTAINTY_NUMBER:

5

>>>IDENTIFICATION_NUMBER:

RR71/UN3

>>>PRIMARY_CITATION:

10CFR60.51*

>>>UNCERTAINTY_TEXT:

The uncertainty text in question is embodied in 10CFR60.52(a)(2)(ii), which requires placement of records in archives "... that would be likely to be consulted by potential human intruders..."

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

There is no way of identifying "potential human intruders" nor of projecting the likelihood of "potential human intruders" consulting an archive in the United States or anywhere in the world in the future after permanent closure.

>>>FILE_NAME:

R71UN3.5

>>>UNCERTAINTY_NUMBER:

6

>>>IDENTIFICATION_NUMBER:

RR71/UN2

>>>PRIMARY_CITATION:

10CFR60.51*

>>>UNCERTAINTY_TEXT:

The uncertainty text in question is embodied in 10CFR60.51(a)(2)(i), which requires monuments marking the repository after closure to be "as permanent as practicable".

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The rationale for the uncertainty is that the phrase "as permanent as practicable" is meaningless. If the instruction is to erect a permanent monument, than the builders will make it permanent inasmuch as they are able to judge its permanence - or, in other words, as permanent as they can. Is anything less warranted or desirable?

>>>FILE_NAME:

R71UN2.6

>>>UNCERTAINTY_NUMBER:

7

>>>IDENTIFICATION_NUMBER:

RR71/UN1

>>>PRIMARY_CITATION:

10CFR60.51*

>>>UNCERTAINTY_TEXT:

The uncertainty text in question is embodied in 10CFR60.46(a)(1), which states that a licnse amendment shall be required with respect to any action which "...would substantially increase the difficulty of retrieving..emplaced waste".

10CFR60.111(b) includes a related uncertainty - "...to preserve the option of waste retrieval..." which drives the uncertainty in 10CFR60.46(a)(1), since it is not clear whether "preserve the option" means to permit waste retrieval or not to preclude waste retrieval. If the latter were to be the final interpretation, the phrase "subtantially increase the difficulty of retrieving..." is meaningless. Thus, increasing the difficulty of waste retrieval can be characterized only after the uncertainty in 60.111(b) is resolved.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The rationale for the uncertainty is given in the uncertainty text. If retaining the retrieval option means only not precluding it and the repository is designed accordingly, there is no way to determine what would "substantially increase" its "difficulty". If retaining the retrieval option means designing the repository to permit retrieval, the word "substantially" needs definition, so the regulation is uncertain in either case.

>>>FILE_NAME:

R71UN1.7

>>>UNCERTAINTY_NUMBER:

8

>>>IDENTIFICATION_NUMBER:

RR72/UN1

>>>PRIMARY_CITATION:

10CFR60.52*

>>>UNCERTAINTY_TEXT:

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. (emphasis added)

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 (sic) 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 raise, in this analysts mind, the question 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 "byproduct 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.

The uncertainty could be resolved through either legislation or perhaps some Commission action related to the following language

> ....The Commission is authorized to establish classes of material and to exempt certain classes or quantities of material or kinds of uses or users from the requirements for a license set forth in this section when it makes a finding that the exemption of such classes or quantities of such material or such kinds of uses or users will not constitute an unreasonable risk to the common defense and security and to the health and safety of the public.

This language occurs in sections 51, 62 and 81.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

None

>>>FILE_NAME:

R72UN1.8

>>>UNCERTAINTY_NUMBER:

9

>>>IDENTIFICATION_NUMBER:

RR4/UN1

>>>PRIMARY_CITATION:

10CFR60.111(a)*
10CFR60.132(a)*
10CFR60.132(b)*

>>>UNCERTAINTY_TEXT:

10CFR60.111(a) does not have a reference to ALARA such as 10CFR72.67(b) has. This omission should be resolved.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The absence of ALARA in RR4 and the presence of it in 10CFR72.67(b) should be evaluated by the NRC, since it could pose problems during the licensing process.

>>>FILE_NAME:

R4UN1.9

>>>UNCERTAINTY_NUMBER:

10

>>>IDENTIFICATION_NUMBER:

RR4/UN2

>>>PRIMARY_CITATION:

10CFR60.111(a)*
10CFR60.132(a)*
10CFR60.132(b)*

>>>UNCERTAINTY_TEXT:

An uncertainty exists in the phrase "at all times" found in 10CFR60.111(a). The intent could refer to (1) normal operations during all preclosure times, such as operations, storage, performance testing, retrieval, decontamination and decommissioning or (2) during times of normal operation, off normal operation, and times of accidents. The second interpretation would force EPA limits on releases during and after an accident, which may not be the intent of the NRC.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The phrase "at all times" in 10CFR60.111(a) could be interpreted in two ways.

>>>FILE_NAME:

R4UN2.10

>>>UNCERTAINTY_NUMBER:

11

>>>IDENTIFICATION_NUMBER:

RR2/UN1

>>>PRIMARY_CITATION:

10CFR60.111(b)(1)
10CFR60.111(b)(2)
10CFR60.111(b)(3)

>>>UNCERTAINTY_TEXT:

The perceived insufficiency in the text of the Regulatory Requirement, covered in 10CFR60.111(b), 132(a), 133(c), and 133(e) (1), is that the intent of the Regulatory Requirement requires clarification as to whether the Geologic Repository Operations Area, surface facilities, underground facility, and underground openings must be designed specifically to permit waste retrieval or only that the design of these items does not preclude waste retrieval.

This perceived insufficiency needs to be corrected so that DOE understands what design action is required by the intent of this regulation and so that NRC can effectively evaluate DOE's compliance demonstration.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The current Regulations 10CFR60.111(b), 132(a), 133(c), and 133(e)(1) leave the intent of the Regulatory Requirement open to various interpretations, some of which may not satisfy the intent of the Regulatory Requirement. It is necessary to clarify the meaning of the Regulatory Requirement so that uniform interpretation and compliance can be achieved.

There is a difference between "To permit waste retrieval" versus that "The Geologic Repository Operations Area be designed for waste retrieval", but the Regulation as it is currently written presents the impression that the Geologic Repository Operations area shall be designed for waste retrieval. Therefore there is a regulatory uncertainty that should be resolved.

One interpretation would allow compliance with the Regulatory Requirement intent by making sure that the Geologic Repository Operations Area does not prohibit the retrieval of waste, if necessary (10CFR60.111(b)(1) and 133(e)(1) retrievability option maintained).

Another interpretation of the requirement would allow compliance only if the design of the Geologic Repository Operations Area included provisions specifically for the retrieval of waste (10CFR60.111(b)(2) and 133(c), design for retrievability). The range of interpretations possible can greatly impact the cost of the Geologic Repository Operations Area design and construction.

The intent of the waste retrieval Regulatory Requirement is discussed and clarified in NUREG 0804, 1983. In NUREG 0804, NRC adheres to its original 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 idea 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, but does not require the repository to be designed specifically for waste retrieval.

One Postulated Elements of Proof Hierarchy (Chart 1), presented in the uncertainty reduction methodology (RR2/UN1/QU1/NR1), illustrates those elements that can be derived when the text is conservatively interpreted. The Postulated Elements of Proof Hierarchy (Chart 2), presented in the same uncertainty reduction methodology, for this Regulatory Requirement consider that the repository design does not preclude (make impossible) the option to retrieve waste.

>>>FILE_NAME:

R2UN1.11

>>>UNCERTAINTY_NUMBER:

12

>>>IDENTIFICATION_NUMBER:

RR1001/UN1

>>>PRIMARY_CITATION:

10CFR60.112
10CFR60.113(c)
10CFR60.133(f)

>>>UNCERTAINTY_TEXT:

The terms "anticipated processes and events" and "unanticipated processes and events" require further definition to permit uniform interpretation of the regulatory requirement. In the definition in 10CFR60.2, the distinction between anticipated and unanticipated processes and events is differentiated by whether or not it is "...reasonably likely to occur...". In NUREG-0804, December 1983, p. 19, it is noted that "...the distinction between anticipated and unanticipated processes and events relates solely to natural processes and events affecting the geologic setting...." 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...." Without clarification, disagreement will likely develop concerning which events or processes are "reasonably likely to occur", and it will not be possible to clearly identify which processes and events are anticipated and which are unanticipated.

A draft generic technical position, "Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events", February 1988, has been reviewed but does not completely clarify the required definition.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

In NUREG-0804, further discussion of this subject notes "...that the distinction between anticipated and unanticipated processes and events relates solely to natural processes and events affecting the geologic setting...." It further 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...." Although this discussion expounds on the subject, the determination of what is "reasonably likely" (as a criterion for an anticipated process or event) is not clear.

The DRAFT GENERIC TECHNICAL POSITION-GUIDANCE FOR DETERMINATION OF ANTICIPATED PROCESSES AND EVENTS AND UNANTICIPATED PROCESSES AND EVENTS provides the guidance and methodologies that NRC considers necessary to evaluate both anticipated and unanticipated processes and events. NRC requested public comment on the draft GTP, and the comments NRC received indicated that, while they were proceeding in the right direction, several questions in the draft GTP remain to be addressed.

Without clarification, disagreement will likely develop concerning which events or processes are "reasonably likely to occur", and it will not be possible to clearly identify which processes and events are anticipated and which are unanticipated.

>>>FILE_NAME:

R1001UN1.12

>>>UNCERTAINTY_NUMBER:

13

>>>IDENTIFICATION_NUMBER:

RR1002/UN1

>>>PRIMARY_CITATION:

10CFR60.113(a)(1)(i)(A)
10CFR60.113(a)(1)(ii)(A)

>>>UNCERTAINTY_TEXT:

The term "substantially complete" used in 10CFR60 E 113 (a) (1) (i) (A) and 10CFR60 E 113 (a) (1) (ii) (A) requires further definition. The NRC needs to define what is meant by "substantially complete" as related to containment of radionuclides. This term needs to be defined so that designers of containers will have a quantitative specification, or the basis for developing a quantitative specification, for container design, and so that the NRC will have criteria by which to determine if the design is acceptable.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The term "substantially complete" is not adequately defined. In NUREG 0804, the Commission recognized the statistical probability of some percentage of containers failing, and so revised the original wording "containing all radionuclides" to "substantially complete" containment.

>>>FILE_NAME:

R1002UN1.13

>>>UNCERTAINTY_NUMBER:

14

>>>IDENTIFICATION_NUMBER:

RR1003/UN3

>>>PRIMARY_CITATION:

10CFR60.113(a)(1)(i)(B)
10CFR60.113(a)(1)(ii)(B)

>>>UNCERTAINTY_TEXT:

10CFR60.135 (c) (1) states that "all such radioactive wastes shall be in solid form".The regulatory intent of 10CFR60.135 (c) (1) needs to be clarified relative to fission product gases contained in spent fuel rods.

It is necessary to clarify the meaning of the regulatory requirement so that uniform interpretation and compliance can be achieved.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

From the current wording of 10CFR60.135 (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. This may be more difficult than proving that gases will be contained within the fuel rod, the waste container, and the engineered barrier system. If the interpretation requires processing or treatment, the maximum allowable limit of radioactive gases must be determined, since radioacitive gases may permeate even a "solid" waste form. (E. Tschoepe, 4 November 1988, 16 December 1988)

A second 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. (R. Wilbur, 1 December 1988)

>>>FILE_NAME:

R1003UN3.14

>>>UNCERTAINTY_NUMBER:

15

>>>IDENTIFICATION_NUMBER:

RR55/UN1

>>>PRIMARY_CITATION:

10CFR60.121(a)*

>>>UNCERTAINTY_TEXT:

The requirement for ownership and control should contain a milestone reference by which the requirement is to have been met. The only opportunity for NRC review of compliance with this requirement is during evaluation of DOE's license application. Control must be established (or assured) prior to license application and DOE must exercise some control during site characterization. The exact nature and extent of the control needed prior to actual operation at the repository site is not clear.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The only indication of the time at which control must be established that currently exists is implied by the term "location". This implies that the lands where the repository and controlled area are to be located must be owned or controlled and unencumbered prior to construction authority.

>>>FILE_NAME:

R55UN1.15

>>>UNCERTAINTY_NUMBER:

16

>>>IDENTIFICATION_NUMBER:

RR2001/UN1

>>>PRIMARY_CITATION:

10CFR60.122(a)(1)
10CFR60.122(b)*

>>>UNCERTAINTY_TEXT:

The intended meaning of the phrase "when projected" found in 10CFR60.122(b)(1), Favorable Conditions, is uncertain.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The period of time into the future in which the geologic processes are to be predicted can affect the expected conditions at the repository site. The few million years in the Quaternary is too long a period to project in to the future, for example, since the site is to be deemed secure for only 10,000 years. If a one-in-a-million year earthquake is "projected", its probability of affecting the repository is quite small, however, the damage associated with such an earthquake would be expected to be catastrophic to the geologic repository. The timing to be considered proper is a crucial element of the effects analysis, and subsequent design, and, thus, needs to be clarified and justified for each of the elements to be considered.

>>>FILE_NAME:

R2001UN1.16

>>>UNCERTAINTY_NUMBER:

17

>>>IDENTIFICATION_NUMBER:

RR2001/UN2

>>>PRIMARY_CITATION:

10CFR60.122(a)(1)
10CFR60.122(b)*

>>>UNCERTAINTY_TEXT:

Contradiction in terms between 10CFR60.122 (b)(7) and 10CFR60.113(a)(2).

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

In 10CFR60.122(b)(7) the ground water travel time is discussed and the statement "substantially exceeds 1000 years" is used to describe the travel time "fastest path." This statement is in contradiction with the statement in 10CFR60.113(a)(2) that the time of travel along the fastest path is to be <u>at least</u> 1000 years or such other travel time as may be approved by the Commission. One thousand and one years would qualify under 113(a)(2) while it is probable that some considerably longer period would be described as "substantially exceed(ing)" 1000 years. This inconsistency in definition should be resolved; and the term "substantially exceeds 1000 years" should be clarified as to what number (per cent) of 1000 years is deemed substantial.

>>>FILE_NAME:

R2001UN2.17

NOTE: The following uncertainties, RR2002/UN1 (Uncertainty #18) and RR2002/UN2 (Uncertainty #19) are representative of UN1 and UN2 in RR2002 through RR2025. The subject of these uncertainties is the need for clarification of the statements "take into account the degree of resolution" for the UN1s, and "not to affect significantly" for the UN2s. The only differences being the different Regulatory Requirements which are addressed. These Regulatory Requirements are listed in a table following RR2002/UN2 (Uncertainty #19).

>>>UNCERTAINTY_NUMBER:

18

>>>IDENTIFICATION_NUMBER:

RR2002/UN1

>>>PRIMARY_CITATION:

10CFR60.122(a)(2)*
10CFR60.122(c)(1)

>>>UNCERTAINTY_TEXT:

The intended meaning of the phrase "take into account the degree of resolution" needs to be clarified in order to allow the DOE to adequately investigate the potentially adverse human activity or natural conditions. An adequate investigation is one that provides reasonable assurance that the potentially adverse human activities or natural conditions have been thoroughly and correctly studied.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

In 60.122(a)(2)(i) "take into account" could imply that some evaluatory weight be placed upon 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" could mean that some scale of numerical assessment of resolution be accomplished such that the relative importance of differing types of evaluations can be assessed and the relative correctness of each determined so that potentially adverse conditions might be rated. Or, it could mean, the evaluations recognize the uncertainties in any geologic investigations. A third interpretation, might be that the means of measurement of the adverse factor be used to assess the relative importance of the values attained and their implications to the overall assessment.

The following paragraphs are a compilation of the discussion of other aspects of the regulation which were considered during the process of identifying uncertainty. The items found below were considered not to produce regulatory or institutional uncertainty.

10CFR60.122(a)(2) states the following: "If any of the potentially adverse conditions specified in paragraph (c) of this section is present, it may compromise the ability of the geologic repository to meet the performance objectives relating to isolation of the waste. In order to show that a potentially adverse condition does not so compromise the performance of the geologic repository the following must be demonstrated:"

The wording of this portion of the siting criteria is not ambiguous. The following parts of the regulation define the way in which a given potentially adverse condition must be considered in order to satisfy the requirement that the performance of the repository not be compromised.

10CFR60.122(a)(2)(ii) is as follows: "The effect of the potentially adverse human activity or natural condition on the site has been adequately evaluated, using analyses which are sensitive to the potentially adverse human activity or natural condition and assumptions which are not likely to underestimate its effect; and"

There is no uncertainty in this requirement. The analyses are to use techniques which are judged to have a sensitivity appropriate to the evaluation task, and the evaluations are to be conservative in order to not underestimate a given effect.

If both conditions have been met then the adverse condition is deemed to have been adequately considered.

10CFR60.122(a)(2)(iii)(C) is as follows: "The potentially adverse human activity or natural condition can be remedied."

This portion of the regulation is straightforward. It implies that "if it can be fixed", or its adverse effects corrected in some other way, then, the potentially adverse condition will be treated as a benign operator.

10CFR60.122(a)(2)(iii)(B) is as follows: "The effect of the potentially adverse human activity or natural condition is compensated by the presence of a combination of the favorable characteristics so that the performance objectives relating to isolation of the waste are met, or..."

The term "compensated by the presence of a combination of the favorable characteristics" is understandable. The acceptable "combination" which can be considered compensatory is defined on the basis of the performance objectives. If unfavorable and adverse conditions are present, they may be negated or their adversity reduced by favorable conditions which cause the overall performance evaluation of the repository to remain within the numerical bounds established by the performance objectives.

>>>FILE_NAME:

R2002UN1.18

>>>UNCERTAINTY_NUMBER:

19

>>>IDENTIFICATION_NUMBER:

RR2002/UN2

>>>PRIMARY_CITATION:

10CFR60.122(a)(2)*
10CFR60.122(c)(1)

>>>UNCERTAINTY_TEXT:

The meaning of the phrase "not to affect significantly" in 60.122(a)(2)(iii)(A) needs to be clarified, in order for the DOE to determine what level of effect is to be considered not important to the ability of a geologic repository to meet the performance objectives. For additional information look at NUREG-0804, page 56.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The term "not to affect significantly", see 60.122(a)(2)(iii)(A), needs to be clarified because it could be interpreted in several ways. Relative to the performance objectives, the term could be applied such that the effect of a given adverse condition was termed significant only when it caused the performance objectives to be breached. Or an adverse condition could be termed significant when some to-be-decided level of effect was attained which was less than that required to breach the performance objectives but did represent a seeming threat to the objectives. Similarly, an adverse condition effect could be considered a significant threat based on a probable change in ambient conditions to some to-be-identified alarm level of the adverse condition itself and/or its components.

60.112 defines postclosure performance objectives for the system. These objectives inherently limit the aggregate effects of whatever combination of favorable and adverse conditions exists. That is, given a set of favorable conditions that permit the system to satisfy 60.112, the net effect of all adverse conditions may not cause the system to exceed 60.112 release rates.

In contrast, 60.122(a)(2)(iii)(A) requires examination of the effect of individual adverse conditions on system performance and requires that each condition is "not to affect significantly the ability of the geologic repository to meet the performance objectives relating to the isolation of the waste" (ie. 60.112). Clearly, if the effects of one or more of the individual conditions each cause system performance to even approach 60.112 limits, the aggregate effects are likely to breach those limits. (This apparent inconsistency needs to be clarified to provide the basis for a uniform approach to the analysis of the effects of adverse conditions on system performance.)

The following paragraphs are a compilation of the discussion of other aspects of the regulation which were considered during the process of identifying uncertainty. The items found below were considered not to produce regulatory uncertainty.

10CFR60.122(a)(2) states the following: "If any of the potentially adverse conditions specified in paragraph (c) of this section is present, it may compromise the ability of the geologic repository to meet the performance objectives relating to isolation of the waste. In order to show that a potentially adverse condition does not so compromise the performance of the geologic repository the following must be demonstrated:"

The wording of this portion of the siting criteria is not ambiguous. The following parts of the regulation define the way in which a given potentially adverse condition must be considered in order to satisfy the requirement that the performance of the repository not be compromised.

10CFR60.122(a)(2)(ii) is as follows: "The effect of the potentially adverse human activity or natural condition on the site has been adequately evaluated, using analyses which are sensitive to the potentially adverse human activity or natural condition and assumptions which are not likely to underestimate its effect; and"

There is no uncertainty in this requirement. The analyses are to use techniques which are judged to have a sensitivity appropriate to the evaluation task, and the evaluations are to be conservative in order to not underestimate a given effect.

If both conditions have been met then the adverse condition is deemed to have been adequately considered.

10CFR60.122(a)(2)(iii)(C) is as follows: "The potentially adverse human activity or natural condition can be remedied."

This portion of the regulation is straightforward. It implies that "if it can be fixed", or its adverse effects corrected in some other way, then, the potentially adverse condition will be treated as a benign operator.

10CFR60.122(a)(2)(iii)(B) is as follows: "The effect of the potentially adverse human activity or natural condition is compensated by the presence of a combination of the favorable characteristics so that the performance objectives relating to isolation of the waste are met, or..."

The term "compensated by the presence of a combination of the favorable characteristics" is understandable. The acceptable "combination" which can be considered compensatory is defined on the basis of the performance objectives. If unfavorable and adverse conditions are present, they may be negated or their adversity reduced by favorable conditions which cause the overall performance evaluation of the repository to remain within the numerical bounds established by the performance objectives.

>>>FILE_NAME:

R2002UN2.19

REGULATORY REQUIREMENT # - RRxxxxx	REGULATORY TEXT IDENTIFIERS
RR2002	10CFR60.122(a)(2) * 10CFR60.122(c) 10CFR60.122(c)(1)
RR2003	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(2)
RR2004	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(3)
RR2005	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(4)
RR2006	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(5)
RR2007	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(6)
RR2008	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(7)
RR2009	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(8)

RR2010	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(9)
RR2011	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(10)
RR2012	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(11)
RR2013	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(12)
RR2014	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(13)
RR2015	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(14)
RR2016	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(15)
RR2017	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(16)
RR2018	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) R60.122(c)(17)

RR2019	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(18)
RR2020	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(19)
RR2021	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(20)
RR2022	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(21)
RR2023	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(22)
RR2024	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(23)
RR2025	10CFR60.122(a)(2) * 10CFR60.122(b) * 10CFR60.122(c) 10CFR60.122(c)(24)

>>>UNCERTAINTY_NUMBER:

65

>>>IDENTIFICATION_NUMBER:

RR88/UN1

>>>PRIMARY_CITATION:

10CFR60.131(b)(9)

>>>UNCERTAINTY_TEXT:

One perceived insufficiency is the text of the Regulatory Requirement - RR88, covered in 10CFR60.131(b)(3). This text gives the impression that the Regulatory Requirement requires that **all** the structures, systems, and components important to safety should perform their safety functions during and after credible fires or explosions. Could some of the structures, systems, and components important to safety **fail** but the safety of the geologic repository operations area still be maintained by, for example, making some systems and/or components redundant.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The current Regulation Requirement - RR88, 10CFR60.131(b)(3) as it is written presents the impression that all the structures, systems and components important to safety should perform their safety functions regardless of the location and severity of a credible fire or explosion. It is conceivable and credible that a fire could break out in a system due to, say, an electrical fire, and could cause the failure of a component or even a system. Making all the structures, systems, and components important to safety 100% fire- and explosion-proof may not be practicable. Adequate compliance with the subject Requirement - RR88, may be very difficult to achieve.

>>>FILE_NAME:

R88UN1.65

>>>UNCERTAINTY_NUMBER:

66

>>>IDENTIFICATION_NUMBER:

RR88/UN3

>>>PRIMARY_CITATION:

10CFR60.131(b)(3)

>>>UNCERTAINTY_TEXT:

In 72.72(c), "the design of ISFSI shall include provisions to protect" versus "the GROA area shall be designed to include means to protect", in the 60.131(b)3(iv). Although the meaning of the two above regulatory texts is basically the same, neither one identifies the provisions or means to protect against adverse effects.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

It is uncertain in both 60.131(b03(iv) and 72.72(c) what the means or provisions against adverse effects are.

>>>FILE_NAME:

R88UN3.66

>>>UNCERTAINTY_NUMBER:

67

>>>IDENTIFICATION_NUMBER:

RR88/UN2

>>>PRIMARY_CITATION:

10CFR60.131(b)(3)*

>>>UNCERTAINTY_TEXT:

The item that may be insufficient in 10CFR60.131(b)(3)(iv) is whether the omission of the protection requirement from the adverse effects of either the operation or failure of an explosion suppression systems is intentional.

This needs to be clarified so that RR88 covered in 10CFR60.131(b)(3), is complete and self-consistent and so that DOE clearly understands the intent of the subject regulations.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

10CFR60.131(b)(3)(iii) requires that the geologic repository operations areas be designed to include appropriate suppression systems to reduce the adverse effects of fires and explosions on structures, systems, and components important to safety.

10CFR60.131(b)(3)(iv) deals with means of protecting structures, systems, and components important to safety against adverse effects of either the operation or failure of the fire suppression systems only. No mention is made on the adverse effects of either the operation or failure of the explosion suppression systems.

>>>FILE_NUMBER:

R88UN2.67

>>>UNCERTAINTY_NUMBER:

68

>>>IDENTIFICATION_NUMBER:

RR89/UN3

>>>PRIMARY_CITATION:

10CFR60.131(b)(4)*

>>>UNCERTAINTY_TEXT:

The item that is deficient is the text of the Regulatory Requirement covered in 10CFR60131(b)(4)(ii). The deficiency in the text of the regulatory requirement is that the use of "available offsite services (such as fire, police, medical and ambulance service)" is restricted to "aid in recovery from emergencies". This appears to preclude their use to aid in responding to emergencies. If the use of available offsite services is restricted in this manner, then the GROA should include sufficient onsite resources to not require the use of those offsite services during an emergency.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The wording of 10CFR60.131(b)(4)(ii) directly links the use of available offsite services only to the purpose of aiding in recovery from emergencies. It would appear that such services, if available, could also be used to respond to emergencies for which they have been trained and are allowed access to.

>>>FILE_NAME:

R89UN3.68

>>>UNCERTAINTY_NUMBER:

69

>>>IDENTIFICATION_NUMBER:

RR90/UN3

>>>PRIMARY_CITATION:

10CFR60.131(b)(5)*

>>>UNCERTAINTY_TEXT:

The deficiency is that the text of the Regulatory Requirement covered in 10CFR60.131(b)(5) does not require that the emergency utility services be designed to permit testing of the service system in order to ensure functionality. The deficiency in the text of the regulatory requirement was found through a comparison to text contained in 10CFR72.72(k)(2). There is no similar text contained in 10CFR60.131(b)(5).

This deficiency needs to be corrected so that no argument can be presented claiming that the GROA was not designed adequately (to the same standards as a similar facility with similar functions and activities).

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The text of 10CFR60.131(b)(5) is inadequate because it does not require a design feature which is important to the geologic repository operations area's safety function.

>>>FILE_NAME:

R90UN3.69

>>>UNCERTAINTY_NUMBER:

70

>>>IDENTIFICATION_NUMBER:

RR91/UN1

>>>PRIMARY_CITATION:

10CFR60.131(b)(5)*

>>>UNCERTAINTY_TEXT:

The 10CFR60.131(b)(6) text includes the term "periodic" and a phrase "as necessary, to ensure their continued functioning and readiness" which may improve or decrease the clarity, inclusiveness, or conservativeness of the regulatory requirement.

Therefore, this requirement does not require designing for testing and maintenance that is non-periodic, which may be essential for safety. Also preventative testing and maintenance and other testing and maintenance is not required either.

By eliminating this potential uncertainty, clearer guidance could be provided to DOE as to the specific actions required in the design of structures, systems and components important to safety.

Except for the authorizing statute, only items in the Regulatory Requirement can be involved in a Regulatory or Institutional Uncertainty. 10CFR72 is not a part of this Regulatory Requirement and is not applicable to a repository. While it might be desirable to have identical requirements in the two regulations, if these regulations serve different purposes, it is neither necessary nor, in all cases, practical. In the case of these two sections, 60.131(b)(6) is more specific than 72.72(f) but it is not clear that there is any inconsistency in terms of regulatory intent or the design responses necessary to satisfy the requirements.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

Comparison of the text in 60.131(b)(6) to 72.72(f) raised the question of regulatory insufficiencies for facilities which could have very similar functions and activities. This leads to the argument that 10CFR60.131(b)(6) is not inclusive enough in its requirement.

>>>FILE_NAME:

R91UN1.70

>>>UNCERTAINTY_NUMBER:

71

>>>IDENTIFICATION_NUMBER:

RR92/UN3

>>>PRIMARY_CITATION:

10CFR60.131(b)(7)

>>>UNCERTAINTY_TEXT:

Regulatory requirements defining methods of criticality control:

-10CFR60.131(b)7 provides no regulatory requirements for methods of criticality control.

-10CFR72.73(b) provides regulatory requirements for methods of criticality control.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

72.73(b) specifies methods of criticality control, versus, nothing in 60.131(b)7.

>>>FILE_NAME:

R92UN3.71

>>>UNCERTAINTY_NUMBER:

72

>>>IDENTIFICATION_NUMBER:

RR92/UN2

>>>PRIMARY_CITATION:

10CFR60.131(b)(7)

>>>UNCERTAINTY_TEXT:

Regulatory requirement for margin of safety value, calculation conditions and operational applicability.

10CFR60.131(b)(7) provides an explicit margin of safety value (Keff 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.

10CFR72.73(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 (no reference to normal conditions is included).

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

It appears that different margin of safety values and calculation considerations are presented in 60.131(b)7 and 72.73. This may possibly reflect specific differences between ISFSI and repository facilities, functions, and activities.

Both the repository and ISFSI facilities should be designed for criticality safety under normal, off-normal, and accident conditions.

>>>FILE_NAME:

R92UN2.72

>>>UNCERTAINTY_NUMBER:

73

>>>IDENTIFICATION_NUMBER:

RR92/UN1

>>>PRIMARY_CITATION:

10CFR60.131(b)(7)

>>>UNCERTAINTY_TEXT:

10CFR60.131(b)(7) states that the previously referenced systems 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 in the conditions essential to nuclear criticality safety.

10CFR72.73 (a) states that the previously referenced systems shall be designed to be maintained subcritical and to prevent a nuclear criticality accident.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The 10CFR72.73 (a) regulatory requirement appears to be more stringent in two ways. First, a requirement is specified which requires the systems to be maintained subcritical [no corresponding requirement in 10CFR60.131(b)(7)]. Secondly, no "unless" condition is specified regarding the requirement to design systems so that a nuclear criticality accident is not possible. The 10CFR60.131(b)(7) regulatory requirement specifies an "unless" condition implying that under the stated conditions a nuclear criticality accident is possible. This further implies that it is acceptable to design systems complying with this regulatory requirement which could/would cause a nuclear criticality accident under the stated conditions. In effect, the 10CFR60.131(b)(7) regulatory requirement appears to define conditions under which a nuclear criticality accident is possible, and (should such an event occur) is acceptable.

>>>FILE_NAME:

R92UN1.73

>>>UNCERTAINTY_NUMBER:

74

>>>IDENTIFICATION_NUMBER:

RR93/UN3

>>>PRIMARY_CITATION:

10CFR60.131(b)(8)

>>UNCERTAINTY_TEXT:

Those instrument and control systems that must remain operational under accident conditions shall be identified in the Safety Analysis Report [10CFR72.72(i)], versus, nothing in 10CFR60.131(b)(8).

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

Since the same or similar activities will/could be conducted at a repository, an MRS, or an ISFSI, the regulatory text of the corresponding regulations should have the same context. In 10CFR72.72(i), the instrument and control systems that must remain operational under accident conditions are required to be identified in the Safety Analysis Report, while there is no such requirement in 10CFR60.131(b)(8).

>>>FILE_NAME:

R93UN3.74

>>>UNCERTAINTY_NUMBER:

75

>>>IDENTIFICATION_NUMBER:

RR80/UN3

>>>PRIMARY_CITATION:

10CFR60.131(b)(9)

>>>UNCERTAINTY_TEXT:

The text of the regulation implies that only **design requirements** in 30CFR57, as they apply to worker protection, need to be considered in the design of the underground facility. This requirement is incomplete, since 30CFR57 also includes **procedures** regarding activities in the underground facility, which were developed specifically to protect workers.

The regulation needs to make reference to the procedures as well as the design requirements of 30CFR57 that may apply to protect the workers in the underground facility.

The potential insufficiency in the regulation needs to be corrected because, as it stands, the regulation appears to be incomplete in its requirement for worker protection, and may fail in its intent to provide reasonable assurance that all structures, systems, and components important to safety can perform their intended functions.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The regulatory text is specific in its requirement to consider the **design requirements** of 30CFR57 as they apply to worker protection, in order to assure that structures, systems, and components important to safety can perform their intended functions. However, 30CFR57 also addresses **procedures** regarding activities in the underground facility. The procedures are developed specifically to assure the protection of workers. It is conceivable that by not following procedures in the performance of an underground activity, an accident could occur that would adversely affect the intended functions of structures, systems and components important to safety. Since it is the intent of the regulation to assure that structures, systems, and components important to safety can perform their intended functions, the regulation appears to be incomplete in its requirement, without also specifying that the regulations for procedures in 30CFR57 should be considered as part of the requirements for the underground facility.

>>>FILE_NAME:

R80UN3_75

>>>UNCERTAINTY_NUMBER:

76

>>>IDENTIFICATION_NUMBER:

R80/UN2

>>>PRIMARY_CITATION:

10CFR60.131(b)(9)

>>>UNCERTAINTY_TEXT:

The second perceived insufficiency in 10CFR60.131(b)(9) is the need to clarify the reference to 30CFR57, and not to reference Chapter I, Subchapter D,E,and N, which includes 30CFR56 and two reserved subchapters (D & E). Specifically, 10CFR60.131(b)(9) references Chapter I, Subchapter N which invokes 30CFR56, "Surface Mining Regulations". This is redundant with but not as inclusive as 30CFR57, "Deep Surface Mining Regulations".

By eliminating this perceived insufficiency, guidance is provided to DOE as to the jurisdiction of regulations dealing with worker protection, and to the design requirements and procedures in 30CFR57, which must be applied to the geologic repository operations area design, construction, and operation.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

The uncertainty is that 10CFR60.131(b)(9) makes reference to Subchapter N and thus invokes 30CFR56, "Surface Mining Regulations" which is not as inclusive as 30CFR57, "Deep Surface Mining Regulations".

>>>FILE_NAME:

R80UN2.76

>>>UNCERTAINTY_NUMBER:

77

>>>IDENTIFICATION_NUMBER:

RR80/UN1

>>>PRIMARY_CITATION:

10CFR60.131(b)(9)

>>>UNCERTAINTY_TEXT:

The first perceived insufficiency in 10CFR60.131(b)(9) is that since DOE is not subject to MSHA regulatory jurisdiction, and the wording in 10CFR60.131(b)(9), uncertainty arises in the determination of the regulatory role of NRC in enforcement of the worker protection provisions of 30CFR57.

By eliminating this perceived insufficiency guidance is provided to DOE as to the jurisdiction of regulations dealing with worker protection, and to the design requirements and procedures in 30CFR57, which should be applied to the geologic repository operations area design, construction, and operation.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

There seems to be some uncertainty over NRC's role in regulating worker safety covered by 30CFR57.

>>>FILE_NAME:

R80UN1.77

>>>UNCERTAINTY_NUMBER:

78

>>>IDENTIFICATION_NUMBER:

RR3/UN1

>>>PRIMARY_CITATION:

10CFR60.133(e)*
10CFR60.133(i)

>>>UNCERTAINTY_TEXT:

The perceived insufficiency is the intent of the term "safely" in the regulatory text of RR3. [10CFR60.133(e)(1)]

The requirement for safe operations in the design of the underground opening includes aspects related to mine worker safety and mining safety, exclusive of radiation safety. The Mine Safety and Health Administration (MSHA) has provided 30CFR57 for regulating safety of metal and non-metal underground mines and mine workers. The uncertainty in 10CFR60.133(e)(1), is whether NRC will regulate worker safety totally unrelated to radiological safety. By eliminating this uncertainty, guidance is provided to DOE as to the intent and thus the specific actions required in the design of the underground facility, in order to comply with RR3.

>>>UNCERTAINTY_NOTES:

1. UNCERTAINTY NOTES:

1.1 RATIONALE FOR THE PRESENCE OF AN UNCERTAINTY:

10CFR60.133(e)(1) addresses specifically the design of the underground openings. The design is directly related to the aspect of safety in the underground operation. "Safety" in design and underground operations includes mine worker safety, which is covered in 30CFR57. The reference to "safety" in the current Regulation (10CFR60.133(e)(1)) may bring confusion to the process of complying with the regulation, as well as to the process of compliance determination.

>>>FILE_NAME:

R3UN1.78

APPENDIX C

APPENDIX C

ATTRIBUTES USED FOR RANKING UNCERTAINTIES

>>>STATEMENTS RELATED TO IMPORTANCE OF AN UNCERTAINTY:

I1. It appears that technology for testing and analytical methods for obtaining information and/or data needed to reduce the uncertainty will not be obtainable in a timely manner, so that data needed to reduce the uncertainty cannot be collected.

I2. Reducing this uncertainty has a pervasive effect on the repository program, in that more than one phase of the program will be affectd.

I3. Reducing the uncertainty displays a high potential for avoiding or mitigating adverse non-radiological health and safety effects in the operational phase.

I4. Reducing the uncertainty displays a high potential for avoiding or mitigating adverse effects on radiological safety and/or waste isolation.

I5. Reducing the uncertainty displays a high potential for avoiding or mitigating chemical contamination problems.

I6. Reducing the uncertainty displays a high potential for avoiding or /mitigating irreversible environmental disturbance.

I7. Reduction of other uncertainties is highly dependent on reduction of this one: i.e., when this one is reduced, others will either be reduced more easily or will no longer exist.

I8. Reducing the uncertainty has a significant impact on the waste confidence decision.

>>>THE FOLLOWING ATTRIBUTES IDENTIFY POSSIBLE SCP OBJECTIONS

I9. There is a high potential for significant and irreversible adverse effects on repository performance (radiological safety and/or waste isolation) if this uncertainty is not reduced before site characterization proceeds.

I10. There is a high potential for significant and irreversible/unmitigable effects on characterization that would physically preclude obtaining the information necessary for licensing if this uncertainty is not reduced before site characterization proceeds.

>>>THE FOLLOWING ATTRIBUTES IDENTIFY POSSIBLE ESF COMMENTS

I11. There is a high potential for misinterpretation or misapplication of the pertinent 10CFR60 standards regarding radiological safety and/or waste isolation during

Exploratory Shaft Facility (ESF) design, construction, and/or construction testing if this uncertainty is not reduced.

I12. There is a high potential for misinterpretation or misapplication of the pertinent 10CFR60 standards other than those concerning radiological safety and/or waste isolation during Exploratory Shaft Facility (ESF) design, construction, and/or construction testing if this uncertainty is not reduced.

>>>STATEMENTS RELATED TO TIME CONSTRAINTS AND DESIRED TIMING OF AN UNCERTAINTY REDUCTION:

T1. Reducing the uncertainty will enable site characterization to be performed expeditiously.

T2. If the uncertainty is not resolved there is potential for expansion of the scope of DOE's site characterization activities.

T3. Reduction of this uncertainty can proceed without prior reduction of other uncertainties or prior NRC rulemaking.

T4. It is desirable to reduce this uncertainty relatively quickly because DOE needs guidance with respect to the uncertainty.

T5. A long time will not be needed to come to closure on reduction of the uncertainty.

T6. The statutory licensing review will be expedited in the course of reducing the uncertainty because the potential for protracted litigation will have been avoided.

>>>THE FOLLOWING ATTRIBUTES IDENTIFY POSSIBLE SCP OBJECTIONS

T7. There is a high potential for significant redirection of DOE's studies that would result in disruption to characterization schedules and sequencing of studies and would interfere with DOE's ability to obtain the information necessary for licensing if this uncertainty is not reduced before site characterization proceeds.

T8. There is a high potential for inadequacies to arise in the QA program which must be resolved prior to commencement of site characterization if this uncertainty is not reduced before site characterization proceeds.

>>>THE FOLLOWING ATTRIBUTES IDENTIFY POSSIBLE SCP COMMENTS

T9. There is high potential for significant adverse effects on the repository licensing process (but not for irreparable

damage to repository performance) if the uncertainty is not reduced before site characterization proceeds.

T10. There is high potential for significant but correctable or mitigable disruption to characterization schedules and sequencing of studies that would interfere with and/or delay DOE's schedule for obtaining the information necessary for licensing if the uncertainty is not reduced before site characterization proceeds.

>>>STATEMENTS RELATED TO DURABILITY OF AN UNCERTAINTY REDUCTION:

D1. A high level of stakeholder involvement is desirable in reducing this uncertainty - it is the sort of uncertainty in which the stakeholders are judged to be appropriately involved. (Stakeholders include the public, utilities, interest groups, Tribes.)

D2. A high level of State of Nevada involvement is desirable in reducing this uncertainty - it is the sort of uncertainty in which the the State of Nevada is judged to be appropriately involved.

D3. A high level of Federal agency involvement is desirable in reducing this uncertainty.

D4. It is desirable that the reduction of this uncertainty be durable, that the reduction would stand the test of time well, and would not be likely to be countermanded by subsequent events, such as advances in technology or new siting information.