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Review of:

"Tectonics Guidance Strategy
for a High-Level Radioactive Waste Repository"

By

Center for Nuclear Waste Regulatory Analyses (CNWRA)

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1. General Comments

- a. The concepts and information in the document are extensive. Limiting the scope of subject matter could provide a more focused document.
- b. Simplified language and use of numbered lists would help to improve clarity.
- c. In an attempt to obtain a better understanding of the structure of this document, CNWRA staff prepared a condensed outline, (Appendix A). Because of the nature of reducing a document, as complex as this one, to a one page outline some subjectivity is unavoidable. Comments concerning this outline follow. It is suggested that DHLWM staff also prepare a very brief outline of this document, decide what the important points are in each subsection and move ancillary material to other or new sections, and review the new outline to be sure it contains pertinent material and does not contain surplus information that gets in the way of a clear exposition.

Staff comments regarding the CNWRA condensed outline:

- i) This outline is likely to result in a lengthy document that is not concise.
- ii) Subsections IV, A and E - F are appropriate for a project plan but not for a strategy.
- iii) The outline gives an extremely limited view of the purpose/objectives of having a strategy.

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iv) The outline does little to encourage development of a strategy (i.e. what needs to be done to achieve the objectives), rather it emphasizes the "5 elements" which are an historical assessment of ongoing activities.

d. A concise statement of "what the strategy is" is needed. An alternative would be to retitile the document, e.g.,:

"Components of the DHLWM Tectonic Guidance Strategy" or

"An Approach to Development of the DHLWM Tectonics Guidance Strategy"

As a minimum, there should be an introductory statement, e.g.,:

"The strategy of the Division of High Level Waste Management to provide regulatory guidance in tectonics is:

Identify areas of uncertainty in 10 CFR Part 60 and clarify them through the use of Systematic Regulatory Analysis and supporting technical research.

Make recommendations for rulemaking, staff technical position subjects, the License Application Regulatory Plan, the License Application Format and Content Guide and other documents.

Acquire requisite technical skills through staff training, participation in technical meetings and through the staff of the Center for Nuclear Waste Regulatory Analyses."

2. Comments regarding Section I Overview

All items concerning historical or present efforts that are germane to the strategy could be included in one section, the "Overview" or perhaps a more succinct and descriptive title would be "Background". Some of the statements currently in the Overview section could be put in the Regulatory Basis Section or Objectives. The Regulatory Basis section could be divided into Regulatory Authority and Technical Regulatory Framework subsections which are primarily lists of the supporting statutes or regulations.

3. Comments regarding Section II Objectives

"Objectives" should follow the introductory statement. They should be concise, preferably in a numbered list. Comments regarding the content of the objectives section follow.

- a. Are the objectives proper ones? Systematic analysis of regulations related to tectonics should be a identified or used as a means to identify objectives.
- b. The guidance elements of Section IV imply an interim strategy. The objectives should encompass both a short and long term strategy.
- c. Guidance should not only be provided on information gathering but on its analysis, interpretation, utilization, incorporation in scenario development, etc. Development of siting criteria pertinent to tectonic processes should also be an objective.
- d. Suggest that the first sentence, which attempts to summarize what comprises the strategy, be written more concisely, e.g.,:

"The objectives of the DHLWM's strategy are to help ensure that DOE's site characterization program is sufficient for the following tasks:

- (1) Early identification of ...
- (2) Provide appropriate input to ...
- (3) Provide baseline data and information on monitoring needs for ..."

- e. Lines 7-12. This sentence repeats the same idea presented under Sect I, Para 2, Lines 3-7. They could be combined or one sentence eliminated.
- f. The objectives of the tectonic guidance strategy need to be carefully reviewed for consistency with the regulations.

4. Comments regarding Section III Regulatory Basis

- a. The Regulatory Basis Section of the document is a fairly extensive listing of apparently pertinent regulations. However, are the tectonics guidance objectives well founded in the regulatory basis?
- b. The third full paragraph on page 2 regarding 60.122 attempts to combine too many thoughts and concepts into

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a single sentence. For example, it conveys the erroneous notion that "their [tectonic processes] presence will provide necessary waste isolation." As a minimum, this important discussion on the regulatory basis should clearly address the following points:

- Tectonic processes are considered as both favorable (60.122(b)) and potentially adverse conditions (60.122(c)) in the regulation.
- The role of favorable conditions is to "Provide reasonable assurance that the performance objectives ... will be met" (60.122(a)(1)). (Note that this is distinct from the provisions for potentially adverse conditions: the rule does not expressly describe the manner in which the favorable conditions are to be investigated or evaluated.)
- Potentially adverse conditions may compromise the performance of the site (60.122(a)(2)). Consequently, such conditions must be "adequately investigated" and "adequately evaluated" as part of the assessment of whether they do compromise the performance of the site.
- Several of the siting criteria address what might be characterized as 'direct effects' of tectonics, e.g., 60.122(c)(11), (c)(12), (c)(13), (c)(14) and (c)(15). However, others are concerned with the potential impacts of tectonics on the hydrogeologic regime, e.g., 60.122(c)(3) and (c)(4). Some discussion of this point would be appropriate.

c. The fourth paragraph of page 2 incorrectly states that "the postclosure performance objectives require ... that tectonics be categorized into ... anticipated processes and events and those that are unanticipated." The engineered barriers subsystem performance objectives require that only "anticipated processes and events" be considered (this would require categorization). However, since the overall system performance objective requires that both categories be considered (but does not indicate that they are to be treated in a particular or different way), there is no requirement for categorization.

5. Comments regarding Section IV Tectonics Strategy Elements

a. Despite the title "Tectonics Guidance Strategy Elements," Section IV (pages 3 through 7) contains essentially no

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information of a 'strategic' nature. Rather, it provides a fairly detailed accounting of the historical development and current status of various staff technical positions under development.

- b. Paragraph 1, lines 2 and 5. Statements are made about "... programs will develop the information needed ..." and "... documents designed to obtain needed information ...". Programs do not develop information and documents do not obtain information. Programs should be "organized to assure that information needed will be developed", and documents should be "designed to assure that needed information is obtained". Such points are raised in a constructive attempt to make this document as concise and precise as possible.
- c. The second paragraph on page 3 addresses the "five basic elements" of the tectonics strategy. These are fine as far as they go. They provide a good overview of the means by which the strategy will be implemented, e.g., identification of uncertainties, staff reviews, research, etc. However, these elements are of little help in defining what topical areas are anticipated to require guidance. It would seem appropriate for a strategy to be built around topical areas that have been identified to date and that may be identified through the implementation of the systematic regulatory analysis (SRA). Topical areas might include guidance on investigative techniques, evaluation methods, siting criteria (both pre- and postclosure), design criteria, tectonic effects of regulatory interest (e.g., shaking, rupture, changes in hydrogeologic regime, etc.), use of tectonics information in performance assessment, etc.
- d. The Tectonics Guidance Strategy Elements need to be reviewed for consistency with the objectives. Will the elements of strategy satisfy, or accomplish, the stated objectives? As currently implemented, the staff technical positions (STP's) do not appear to accomplish the guidance objective. However, as noted in Comment 3, the objectives may also be incomplete.
- e. Reference to the two STP's in lines 9 and 10 of paragraph 2, is presented as if the reader already knew these documents. Suggest adding after "... investigations and analysis ...", "discussed below under Items 1 and 2".
- f. Under 'A', Subsections 1, 2 and 3, the status of each STP should be stated (and preferably placed in a background

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section with a brief reference to it here). In lines 7-8, reference is made to "... severe earthquakes and accompanying fault displacements ...". This could be restated to address the concept of "fault displacements (causative) and accompanying earthquakes (results)". Perhaps analysis of fault displacements that are not accompanied by earthquakes should be addressed. On line 3, the statement is made that "Models drive performance allocations and performance assessments...". This could be restated to indicate the more cooperative and iterative relationship that exists between geo-modeling and performance assessment.

- g. The first paragraph on page 4 indicates that this document is, at best, a partial strategy, since it omits aspects of tectonics which may influence engineering design. To be effective, a strategy should be topically based and must span the various organizational entities that may participate in its implementation. To do otherwise introduces artificial interface points, an unnecessary burden for coordination of separate (potentially competing) sub-strategies, and a high degree of risk of inconsistent guidance being developed by NRC and provided to DOE.
- h. On pages 4 and 5, the term "models" is used rather loosely. Clarification is needed to distinguish among conceptual models, mathematical models, computer models and the like.
- i. Despite the title, Section B (pages 5 and 6) does little to discuss SRA in the context of how it should be used as an integral part of the strategy. Instead, the section on "Rulemakings" is primarily an historical perspective on what has been developed to date outside of the SRA process. Although the section on "Regulatory Guides" hints at integration (an important aspect of the SRA approach), it commits to nothing more than providing input to various studies and/or documents. This situation recurs in the second paragraph of Section V (page 8) where the focus is on CDMs.
- j. In section C, subsection 1, a lead-in sentence is suggested that qualifies what the listing (a) through (c) is about, e.g. "Examples of the past 10 years of progress are documented in:".
- k. In Section D, the tone of the discussion appears to be focused more on which organization is anticipated to

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perform the work rather than on what is to be done and how the accomplishment of the work will lead to better and/or more timely guidance to the DOE. Suggest that this section be reworked to provide proper focus.

1. In subsection D, paragraph 1, lines 8-9, hydrology and rock stability are referred to as "repository systems". More precisely, these aspects are part of the natural system in which the repository exists - i.e. - a part of the repository environment.
 - m. Paragraph 2, line 8, CNWRA's 3-D modeling efforts are noted but not the on-going 2-D efforts which are regarded as an important step in the modeling process. 3-D modeling or the extension of 2-D to 3-D modeling, if described in the future tense, may be a part of strategy. Otherwise it is really background information.
6. Comments regarding Section V Programmatic Priorities

Clarification is needed in the first subsection regarding the meaning of "acceptance criteria." In the context provided, it is not clear whether these are criteria for accepting (a) the site, (b) the resolution of NRC comments and concerns, or (c) something else. If the intent is that the term apply to siting, development of siting criteria should be added to the objectives in Section II of this document. If the intent is that the term apply to comment resolution, it is suggested that a different term be used to avoid confusion.

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APPENDIX A

CNWRA: Condensed Outline of the Reviewed
Tectonics Guidance Strategy

I. Overview

- A. Outlines HLWMS Program - What it does.
- B. Outlines HLWMS approach, in this document, to titles or subjects of effort.

II. Objectives

Outlines what HLWM will ensure re. DOE's technical efforts.

III. Regulatory Basis

- A. Lists documents which provide regulatory authority
- B. Lists regulations to be followed by DOE
- C. Lists subsections of 10 CFR Part 60 pertaining to tectonics

IV. Tectonic Guidance Strategy Elements

- A. Lists milestones accomplished by DOE and DLWM
- B. Lists 5 elements of the strategy
- C. Describes each of the 5 elements or sub-objectives
- D. Lists activities or products to meet each of the 5 sub-objectives, e.g.:
 - 1. Identify and recommend resolution to uncertainties through preparation of STPs
 - 2. Perform Systematic Regulatory Analysis of 10 CFR Part 60 and recommend:
 - i) rulemaking to conform it to the EPA standard and identify pre- and post-closure criteria
 - ii) STP subjects
 - 3. Investigate uncertainties in:
 - i) models
 - ii) data
 - iii) use of expert judgment
 - 4. The first activity to be undertaken will concern volcanism

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- E. Lists area of expertise of DHLWM and CNWRA
- F. Lists of DOE documents reviewed
- G. Lists research areas identified by DHLWM
- H. Lists CNWRA roles
- I. Lists 1991 CNWRA tasks
- J. Identifies what DHLWM staff are doing re. DOE's QA program

V. Programmatic Priorities

- A. #1 Priority is Interim Guidance re.:
 - 1. Significant faults to be investigated
 - 2. Regulatory uncertainties (provide stop-gap measures to fix?)
- B. List of other prioritized DHLWM activities
- C. List non-prioritized DHLWM activities