



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Grayson

MEMORANDUM FOR: Larry White
FROM: Wm. Mark Grayson
SUBJECT: REVIEW OF PART 60 SUBPART B

General Comments

Structure: I recommend that all discussion of objectives be located prior to the criteria such as in the current section 60.111. This section should be expanded to reflect objectives of:

- . siting
- . waste form performance
- . facility design
- . repository performance objectives
 - . repository development
 - . operational phase performance
 - . isolational phase performance
- . retrieval
- . facility decommissioning and more closure

Design objectives are discussed in two places in 60.131, and 60.111 while no siting objectives, waste form objectives or retrieval objectives are clearly spelled out. Many of the things under design objectives could be restructured as general design criteria improving the organization of this subpart.

Completeness: This subpart is incomplete and doesn't reflect insights gained from our technical program. Additional criteria which should be evaluated for inclusion in this subpart include criteria for:

1. Inventory control and accountability.
2. Criteria which identify which surface and subsurface systems should be considered important to safety.
3. Criteria for fire prevention and use of flammable materials.
4. Criterion for control of explosions.
5. Criteria requiring that shafts be capable of man access and be lined to control rockfall and facilitate decommissioning.
6. Criteria which address quality assurance requirements.
7. Criteria requiring separation of ventilation systems for mining and waste emplacement.

8. Criteria requiring that boreholes be located at future shaft locations or be located in large unmined salt pillars. This criteria could also discuss minimizing the number of boreholes which penetrate the barrier layers and aquifers by emphasizing down hole site characterization.
9. Criteria which addresses the use of on-site versus off-site emergency services such as fire, police and ambulance.
10. Criteria requiring contingency plans during the operational phase should retrieval become necessary.

Specific comments on this subpart are as follows:

page 1, paragraph 3--The last sentence states that only criteria which relate to shaft seals and stability of the geologic environment will be necessary to the closure decision. I don't feel we should say this at this time, additional requirements for backfill performance, or engineered barriers or others may be required.

page 1, paragraph 4--This paragraph adds nothing and confuses the reader as to the organization of this subpart. This subpart isn't structured by those categories. It also states in the last sentence of this page that criteria for the following are considered to be of major importance; we don't have specific criteria which address those topics. If we did they should be in the appropriate technical subpart. Much of what is discussed here could be covered in an expanded discussion of objectives covered prior to the technical criteria. (See comments on structure.)

page 2, paragraph 3, under 60.111--The comment is made that the objective of the repository is the isolation of wastes until they have decayed or been diluted to background levels. My comment is that this isn't what the EPA, Part 20, or our R.P.O.'s use?

page 2, paragraph 4, under 60.111, Part (a)--States that repositories shall be designed and operated to assure that releases are within the limits set forth in part 20 of this chapter. My comment is which part 20; 10 CFR part 20 or 60.20, etc. It is also confusing in that in the next paragraph the EPA standards are referenced as a performance objective.

page 6, section 60.131--As mentioned previously, the design objectives need to be redone and moved up front.

page 7, section b--What is the definition of the repository system? Barriers to waste migration? This list is incomplete and may be interpreted as what the NRC feels the important facets of this system are. Also, why are we telling the applicant what the repository system is under design objectives? Other things which might be part of this

list include hoisting systems, decontamination facilities, radwaste systems, and ventilation systems.

page 7, section b (6)--Surface and subsurface structures systems and components type language usually refers to systems important to safety, (i.e., public health and safety versus operational health and safety) is this the intent here?

page 7, section c--The design objectives discussed here, add little to the criteria which follow. Any ideas here should be incorporated into the criteria or moved to the front and discussed with other objectives. This section is sketchy and the objectives need significant expansion. Example: under excavations and shafts other objectives exist such as control of water inflow, be designed to facilitate sealing and decommissioning, be designed to permit man access, permit testing and inspection, and be designed to control rockfall and to maximize structural stability. This is true of many of the other objectives as well as they could be expanded to include information derived from our technical support programs. Another example in (3) is that under waste, no discussion of retrieval requirements for the waste form is provided.

page 7, section (4)--Under backfill design and emplacement, the statement is made that backfill materials shall be chosen to (i) provide structural support as needed to roofs and walls of excavations and shafts. This is a partial truth; the TASC BOA states in Volume 5, page 5-8 "it is unrealistic to use backfill to stabilize pillars." Backfill materials will minimize but cannot by themselves eliminate deformation. It is clear that confidence should not be placed on currently envisioned backfill materials for structural support.

page 8, section (5)--States that shaft seals shall be designed to provide as much a barrier to waste migration as the undisturbed geologic and hydrologic environment. Studies supporting repository design indicate that seals will likely be somewhat permeable even at sealing and that our confidence in predicting the performance of those seals past about 50 years will be low. It is unlikely that you can seal boreholes over the time spans that containment is important and less likely that you can prove or demonstrate their performance or reliability. This doesn't mean that they are or considered at this time to be significant hazard to containment as they must be evaluated from a overall systems perspective prior to making such a statement. This will be analyzed in detail in ongoing design performance modeling efforts.

page 5, section 7--This objective should be part of a monitoring criteria and be reworded to reflect that radiological monitoring, structural monitoring, and hydrological monitoring be performed to evaluate the repository systems response to waste emplacement.

page 8, under 60.132--The statement is made that the final repository design shall be the result of a systems analysis which optimizes the isolation of the waste. Optimization of repository performance is a design objective not a general design criteria. It should be moved up front and discussed with the objectives of other facets of the repository system. If it is to be a criteria of repository design then it should be referenced as a specific criteria.

page 9--These criteria are not as general as the quote specific criteria which follow in section 60.133 they are specifically for systems important to safety. To be consistent in format with the rest of the subpart B the criteria for design should be reorganized under one heading, (i.e., general design criteria) as we really don't have any specific or numerical criteria. This would improve the readability and consistency of the document. The level of detail to describe each of the criteria should also be made consistent throughout this subpart.

page 9--The examples of engineered barriers to waste migration is incomplete and could be improved by expanding this list to include the following: the primary waste form and container, secondary and/or tertiary encapsulation, ion exchange media, engineered plugs, backfill design, shaft and bore hole seals, and repository design variances to maximize the performance of the natural geologic environment, (i.e., varying geometries, depths, and room and shaft sizes and orientations).

page 10, section 60.133 (a)--Geologic and hydrologic system as a title is inappropriate for inclusion under design criteria. Criteria one and two under (a) should be combined into one criterion on depth.

page 10, section 60.133 (b) (1)--The title of excavations and shafts doesn't match the text which discusses engineered systems to control thermal loading. Secondly, engineered systems don't control thermal loading. You can control the effects of thermal loading by reducing canister or areal loadings and by ventilation.

page 10, section 60.133 (b) (2)--This criterion should be titled "Water Control" and be reworked as a separate criterion.

page 11 (c)—The importance of the waste form as the primary barrier to waste migration should be specifically spelled out versus talking about the leachability and solubility.

page 11, (c) (2)—The emplacement of wastes in a natural in-situ environment will lead to chemical, thermal and radiolytic effects on the waste form and its surrounding environment. These effects will generally decrease the performance of the waste form and the natural environment as barriers to radionuclide migration. This criterion isn't obtainable and should be reworded.

page 11, (5)—Critically should be separated out as a separate criterion and should be expanded to include the prevention of criticality during storage, handling and emplacement under normal and accident conditions.

page 12, (e) (1)—States that bore hole and shaft seals be designed to provide a barrier to radionuclide migration equivalent to the undisturbed geologic and hydrologic systems, this isn't possible. Borehole seals will be permeable even initially and will degrade with time such that that proving their effectiveness past 50 years will be difficult.

page 12, (e) (2)—States that "Seals will be of proven design by analysis and testing or through experience or prior use, e.g., oil or gas wells. This sentence is awkward and should be reworded in that most experience is through that obtained in sealing oil or gas wells. It isn't clear that experience in sealing oil or gas wells is directly applicable to sealing bore holes associated with repositories. Much of this data isn't relevant due to the lack of information on, control of placement techniques, information on the nature of the environment at sealing, poor records, and different sealing objectives. As such relevance should not be placed on sealing data from prior use in oil or gas wells.

page 12 (f)—As mentioned previously, it isn't clear whether this is intended the way the Commission usually uses these words; (i.e., for structures systems and components important to safety) or some other use.

page 13 (g)—Not discussed in the criteria on monitoring systems is the potential impact monitoring systems could have on repository containment capabilities, both cables used to connect monitoring systems to the surface or their power supplies or the bore holes in which monitors are placed could create additional pathways for radionuclide release.

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page 14, under 60.41--Depending on the Commissions waste classification system and the degree to which facility structures can be decontaminated surveillance and security may not be appropriate decommissioning alternatives. Furthermore, the licensing of this will require that it be decommissioned by methods acceptable to the Commission not the Department.

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