COMPLIANCE DETERMINATION STRATEGY
RRT 7.10 SITE MARKERS

APPLICABLE REGULATORY REQUIREMENTS:

10 CFR 60.21(c)(8)
10 CFR 60.51(a)(2)(i)
10 CFR 60.121(b)

TYPES OF REVIEW:

Acceptance Review (Type 1)
Safety Review (Type 3)

RATIONALE FOR TYPES OF REVIEW:

Acceptance Review (Type 1) Rationale:

This regulatory requirement topic is considered to be license application-related because, as specified in the license application content requirements of 10 CFR 60.21(c) and the regulatory guide "Format and Content for the License Application for the High-Level Waste Repository" (FCRG), it must be addressed by the U.S. Department of Energy (DOE) in its license application. Therefore, the staff will conduct an Acceptance Review of the license application for this topic.

However, it should be noted that this regulatory requirement topic also has a postclosure aspect (10 CFR 60.51(a)(2)(i)) which will be addressed in the amendment for permanent closure.

Safety Review (Type 3) Rationale:

This regulatory requirement topic is considered to be related to containment and waste isolation. It concerns the use of site markers (including monuments), and focuses on those aspects of site marker design and placement that will affect access to the repository site, specifically the "controlled area," following permanent closure. It is a requirement for which compliance is necessary to make a safety determination for construction authorization as defined in 10 CFR 60.31(a) (i.e., regulatory requirements in Subparts E, G, H, and I). The requirement for site markers to control land use and control access to the site of the geologic repository following permanent closure will contribute to the repository's ultimate goal of isolating radioactive wastes and in doing so, assure public health and safety. Therefore, the staff will conduct a Safety Review of the license application to determine compliance with the applicable regulatory requirements.

Methodologies for reviewing site marker design are considered to be available because of the past and current engineering experience. No independent analysis of plans and data other than that presented in the license application is required to demonstrate compliance with this requirement; thus, a review type higher than Type 3 is not considered appropriate.

While there is confidence that any site markers, identifying the controlled area and controlling access thereto, can be built to serve their intended purpose with sufficient confidence, it can not be assumed that their significance would continue to be understood in the future (see NRC, 1983, p.17). Therefore, it is important that DOE's site marker design adequately convey a warning regarding the nature of the

underlying hazard.

REVIEW STRATEGY:

Acceptance Review:

In conducting the Acceptance Review, the reviewer should determine if the information presented in the license application and its references, for demonstrating compliance with the applicable regulatory requirements, is complete as specified in the FCRG.

The reviewer should determine that the information in this section of the license application is presented in such a manner that the assumptions, data and logic are clear and do not require the reviewer to conduct extensive independent analyses or literature searches. The reviewer should also determine that controversial information and appropriate alternative interpretations have been acceptably described and considered.

Finally, the reviewer should determine if DOE has either resolved all the NRC staff objections that apply to this requirement for further technical information or provided all the available information required in Section 1.6.2 of the FCRG, for unresolved objections. The reviewer should evaluate the effects of any unresolved objections, both individually and in combinations with others, on: (1) the reviewer's ability to conduct a meaningful and timely review; and (2) the Commission's ability to make a decision regarding construction authorization within the three-year statutory period.

Safety Review:

This regulatory requirement topic is limited to the review of DOE's plans and designs to use site markers (including monuments) to permanently identify the geologic repository and in doing so, prevent future human actions, following permanent closure, that could significantly reduce the ability of the geologic repository to isolate wastes. It is not concerned with the broad range of plans [10 CFR 60.121(b)] DOE will adopt to control land-use around and control access to the geologic repository during the post-closure phase. Moreover, the scope of this review plan topic is not concerned with those methods DOE intends to employ to ensure the physical security of geologic repository operations during the pre-closure phase of repository operations. The review of that information will be addressed in Sections 9.0 ("Land Ownership and Control") and 1.5 ("Physical Security Plan"), respectively, of the license application and its attendant review plans. The specific aspects of the license application on which a reviewer will focus are discussed below, and the *Acceptance Criteria* are identified in Section 3.0 of this Review Plan.

In conducting the Safety Review, the reviewer will, at a minimum, determine whether DOE has provided a description of the conceptual design of site markers (or monuments) which would be used to identify the location of and control access to, the controlled area.[1]

In order to conduct an effective review, the reviewer will rely on staff expertise and independently acquired knowledge in addition to that provided by DOE in its license application. It is incumbent upon the reviewer to have acquired a body of knowledge regarding these and other critical considerations in anticipation of conducting the review to ensure that the general description of the facility in the license application are sufficient in scope and depth.

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[1]The final design details will be found in any subsequent application to decommission and permanently close the geologic repository.

The reviewer should note that the performance of the physical controls (i.e., site markers), designed to minimize the potential for intrusion of the controlled area, is not intended to be limited to the period when the risk is primarily due to the decay of fission products. Rather, the site marker's service life is intended to cover that period when such intrusion may result in releases of radioactive material to the accessible environment which are still of regulatory concern (see NRC, 1983, pp. 135-136). In reviewing DOE's site marker design, DOE will need to discuss marker permanence and that the markers adequately convey a warning regarding the nature of the underlying hazard.

The reviewer should determine if DOE has provided its conceptual plans showing: (1) a general description and scaled drawings showing the location of the geologic repository operations area and the controlled area, including all permanent structures and engineered barriers, and roads on the site along with boundaries, both natural and man-made; (2) a general discussion of outstanding demographic and geographic features of the site and vicinity; and (3) scaled drawings showing the location of the site markers with respect to Items (1) and (2) above. To the extent that decisions regarding the placement of site markers might be influenced by future changes in the geomorphology of the site, DOE will need to consider the existing information that reflects consideration of this concern.

RATIONALE FOR REVIEW STRATEGY:

Not Applicable.

Contributing Analysts:

NRC: Kenneth L. Kalman, Michael P. Lee, Mysore Nataraja

CNWRA: Stephen H. Spector, Emil Tschoepe

Date of Analysis: 04/16/93

APPLICABLE REGULATORY REQUIREMENTS FOR EACH REVIEW TYPE:

<u>Type 1:</u>
10 CFR 60.21(c)(8)
10 CFR 60.51(a)(2)(i)
10 CFR 60.121(b)

<u>Type 3:</u>
10 CFR 60.51(a)(2)(i)
10 CFR 60.121(b)

REFERENCES:

Code of Federal Regulations, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," Part 60, Chapter I, Title 10, "Energy."

Nuclear Regulatory Commission, Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, 'Disposal of High-Level Radioactive Waste in Geologic Repositories', " Office of Nuclear Regulatory Research, NUREG-0804, December 1983.

Nuclear Regulatory Commission, "Format and Content For the License Application for the High-Level Waste Repository." Office of Nuclear Regulatory Research. [Refer to the "Products List" for the Division of High-Level Waste Management to identify the most current edition of the FCRG in effect.]

COMPLIANCE DETERMINATION STRATEGY

7.10 SITE MARKERS

APPLICABLE REGULATORY REQUIREMENTS:

10 CFR 60.21(c)(8)
10 CFR 60.51(a)(2)(i)
10 CFR 60.121(b)

TYPES OF REVIEW:

Acceptance Review (Type 1)
Safety Review (Type 3)

RATIONALE FOR TYPES OF REVIEW:

Acceptance Review (Type 1) Rationale:

This regulatory requirement topic is considered to be license application-related because, as specified in the license application content requirements of 10 CFR 60.21(c) and the regulatory guide "Format and Content for the License Application for the High-Level Waste Repository" (FCRG), it must be addressed by the U.S. Department of Energy (DOE) in its license application. Therefore, the staff will conduct an Acceptance Review of the license application for this topic.

INSERT → However, it should be noted that this regulatory requirement topic also has a postclosure aspect (10 CFR 60.51(a)(2)(i)) which will be addressed in the amendment for permanent closure.

Safety Review (Type 3) Rationale:

This regulatory requirement topic is considered to be related to containment and waste isolation. It concerns the use of site markers (including monuments), and focuses on those aspects of site marker design and placement that will affect access to the repository site, specifically the "controlled ~~use~~ area," following permanent closure. It is a requirement for which compliance is necessary to make a safety determination for construction authorization as defined in 10 CFR 60.31(a) (i.e., regulatory requirements in Subparts E, G, H, and I). The requirement for site markers to control land use and ~~restrict~~ control access to the site of the geologic repository following permanent closure will contribute to the repository's ultimate goal of isolating radioactive wastes and in doing so, assure public health and safety. Therefore, the staff will conduct a Safety Review of the license application to determine compliance with the applicable regulatory requirements.

Methodologies for reviewing site marker design/~~fabrication and installation plans~~ are considered

to be available because of the past and current engineering experience. No independent analysis of plans and data other than that presented in the license application is required to demonstrate compliance with this requirement; thus, a review type higher than Type 3 is not considered appropriate.

While there is confidence that any site markers, identifying the controlled ~~use~~ area and controlling ~~restricting~~ access thereto, can be built to serve their intended purpose with sufficient confidence, it can not be assumed that their significance would continue to be understood in the future (see NRC, 1983, p. 17). Therefore, it is important that DOE's site marker design adequately convey a warning regarding the nature of the underlying hazard.

REVIEW STRATEGY:

Acceptance Review:

In conducting the Acceptance Review, the reviewer should determine if the information presented in the license application and its references, for demonstrating compliance with the applicable regulatory requirements, is complete as specified in the FCRG.

The reviewer should determine that the information in this section of the license application is presented in such a manner that the assumptions, data and logic are clear and do not require the reviewer to conduct extensive independent analyses or literature searches. The reviewer should also determine that controversial information and appropriate alternative interpretations have been acceptably described and considered.

Finally, the reviewer should determine if DOE has either resolved all the NRC staff objections that apply to this requirement for further technical information or provided all the available information required in Section 1.6.2 of the FCRG, for unresolved objections. The reviewer should evaluate the effects of any unresolved objections, both individually and in combinations with others, on: (1) the reviewer's ability to conduct a meaningful and timely review; and (2) the Commission's ability to make a decision regarding construction authorization within the three-year statutory period.

Safety Review:

This regulatory requirement topic is limited to the review of DOE's plans and designs to use site markers (including monuments) to permanently identify the geologic repository and in doing so, prevent future human actions, following permanent closure, that could significantly reduce the ability of the geologic repository to isolate wastes. It is not concerned with the broad range of ~~those~~ plans DOE will adopt to control land-use around and control ~~restrict~~ access to the geologic repository during the post-closure phase. Moreover, the scope of this review plan topic is not concerned with those methods DOE intends to employ to ensure the physical security of geologic repository operations during the pre-closure phase of repository operations. The review of that information will be addressed in Sections 9.0 ("Land Ownership and Control") and 1.5 ("Physical Security Plan"),

respectively, of the license application and its attendant review plans. The specific aspects of the license application on which a reviewer will focus are discussed below, and the *Acceptance Criteria* are identified in Section 3.0 of this Review Plan.

In conducting the Safety Review, the reviewer will, at a minimum, determine whether DOE has provided a description of the conceptual design of site markers (or monuments) which would be used to identify the location of and ~~restrict~~ control access to, the controlled ~~use~~ area.[1] ~~In general, the conceptual marker design[1] should include a description of the materials used to fabricate site markers, fabrication techniques, and methods of emplacement.~~

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The reviewer should note that the performance of the physical controls (i.e., site markers), designed to minimize the potential for intrusion of the controlled ~~use~~ area, is not intended to be limited to the period when the risk is primarily due to the decay of fission products. Rather, the site marker's service life is intended to cover that period when such intrusion may result in releases of radioactive material to the accessible environment which are still of regulatory concern (see NRC, 1983, pp. 135-136). ~~Thus,~~ In reviewing DOE's site marker design, DOE will need to discuss how the markers ~~demonstrate~~ permanence and that ~~it is "permanent," to the extent practicable, and~~ adequately conveys a warning regarding the nature of the underlying hazard. ~~Moreover, DOE will also need to provide an explanation of the measures used to support analyses used to assess the permanence of site marker design. Analyses and models that will be used to predict permanence shall be supported by using an appropriate combination of such methods as field and laboratory tests that are representative of the conditions to which the site markers are likely to be exposed.~~

~~In addition,~~ The reviewer should determine if DOE has provided its conceptual plans showing: (1) a general description and scaled drawings showing the location of the geologic repository operations area and the controlled ~~use~~ area, including all permanent structures and engineered barriers, and roads on the site along with boundaries, both natural and man-made; (2) a general discussion of outstanding demographic and geographic features of the site and vicinity; and (3) scaled drawings showing the location of the site markers with respect to Items (1) and (2) above. To the extent that decisions regarding the placement of site markers might be influenced by future changes in the geomorphology of the site, DOE will need to ~~submit~~ consider the existing information an analysis that reflects consideration of this concern.

In order to conduct an effective review, the reviewer will rely on staff expertise and independently acquired knowledge in addition to that provided by DOE in its license application. It is incumbent upon the reviewer to have acquired a body of knowledge regarding these and other critical considerations in anticipation of conducting the review to ensure that the general description of the facility in the license application is sufficient in scope and depth.

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[1] The final design details will be found in any subsequent application to decommission and permanently close the geologic repository.

RATIONALE FOR REVIEW STRATEGY (OPTIONAL):

Not Applicable.

Contributing Analysts:

NRC: Kenneth L. Kalman, Michael P. Lee, Mysore Nataraja

CNWRA: Stephen H. Spector, Emil Tschoepe

Dates of Analyses: ~~03/12~~ 04/16/93

APPLICABLE REGULATORY REQUIREMENTS FOR EACH TYPE OF REVIEW:

Type 1:
10 CFR 60.21(c)(8)
10 CFR 60.51(a)(2)(i)
10 CFR 60.121(b)

Type 3:
10 CFR 60.51(a)(2)(i)
10 CFR 60.121(b)

REFERENCES CITED:

Code of Federal Regulations, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," Part 60, Chapter I, Title 10, "Energy."

Nuclear Regulatory Commission, Staff Analysis of Public Comments on Proposed Rule 10 CFR Part 60, 'Disposal of High-Level Radioactive Waste in Geologic Repositories', " Office of Nuclear Regulatory Research, NUREG-0804, December 1983.

Nuclear Regulatory Commission, "Format and Content For the License Application for the High-Level Waste Repository." Office of Nuclear Regulatory Research. [Refer to the "Products List" for the Division of High-Level Waste Management to identify the most current edition of the FCRG in effect.]