

**COMPLIANCE DETERMINATION METHOD FOR REVIEW PLAN NO. 6.3
ASSESSMENT OF COMPLIANCE WITH THE
GROUND-WATER PROTECTION REQUIREMENTS**

3.0 REVIEW PROCEDURES AND ACCEPTANCE CRITERIA

3.1 Acceptance Review

In conducting the Acceptance Review for docketing, the staff will compare information in the License Application (LA) concerning assessment of compliance with the ground-water protection requirements (henceforth referred to only as "ground-water protection requirements") with the corresponding section of the FCRG and with the staff's resolution status of objections to the LA submittal in the Open Item Tracking System (OITS) and determine if this information meets the following criteria.

- (1) The information presented in the LA is clear, is completely documented consistent with the level of detail presented in the corresponding section of the FCRG, and the proper references have been provided.
- (2) DOE has either resolved, at staff level, the NRC objections to LA submittal that apply to this regulatory requirement topic, or provided all information requested in Section 1.6 of the FCRG for unresolved objections, namely, DOE has:
 - identified all unresolved objections
 - explained the differences between NRC and DOE positions that have precluded resolution of each objection
 - described all attempts to achieve resolution
 - explained why resolution has not been achieved
 - described the effects of the different positions on demonstrating compliance with 10 CFR Part 60
- (3) In addition, unresolved objections, individually or in combination with others, will not prevent either the reviewer from conducting a meaningful Compliance Review and the Commission from making a decision regarding construction authorization within the 3-year statutory period.

3.2 Compliance Reviews

The compliance determinations undertaken by NRC staff will consider whether Acceptance Criteria specified for the following Compliance Review have been met. Results of the compliance determinations should be documented by the staff to provide the basis for actual Evaluation Findings in the Safety Evaluation Report (SER).

3.2.1 Safety Review of 10 CFR 60.21(c)(1)(ii)(C), (D), and (F), 10 CFR 60.112, and 10 CFR 60.122(a)

The staff will determine whether the assessment of ground-water protection requirements has been accomplished in an acceptable manner, and whether the description of the hydrogeology of the site properly supports the assessments required by 10 CFR 60.21(c)(1)(ii)(C), (D), and (F), as they relate to 10 CFR 60.112 and 10 CFR 60.122(a). For 10 CFR 60.21(c)(1) specifically, the staff will review and evaluate information provided by DOE in the LA to support DOE's analysis of the characteristics of the site as related to assessment of ground-water protection requirements and determine whether the analysis has been conducted in a manner acceptable for supporting review of 10 CFR 60.112.

The overall system performance objective (10 CFR 60.112) stipulates that DOE provide, through tests, data, and analyses, reasonable assurance that the overall repository system (i.e., the geologic barrier provided by the site, together with the engineered barriers incorporated in the system by design) will meet the "... generally applicable standards for protection of the general environment from off-site releases from radioactive material in repositories," as set forth by the U.S. Environmental Protection Agency (EPA) in 40 CFR Part 191 (Code of Federal Regulations, Title 40, "Protection of the Environment"). The ground-water protection portion of this overall system performance requirement focuses on the radionuclide concentration in a "special source of ground water."

To make the necessary compliance determinations, the staff must review the program of site characterization and analysis implemented by DOE. This review is discussed below under Subsections 3.2.1.1 and 3.2.1.2 of this review plan. These subsections present review procedures and Acceptance Criteria related to the assessment of compliance with the ground water-protection requirements.

3.2.1.1 Hydrologic Characteristics and Features

To begin the *Safety Review*, staff must be familiar with basic information on the hydrologic characteristics and features of the site. This information is described below, and provided from those parts of the LA listed in Section 4.2.1 of this review plan:

- Description of the subsurface hydrogeology at the site, specifically the identification of aquifers that are suitable as sources of municipal drinking water.
- Maps, drawings, or aerial photographs showing the location of the geologic repository operations area (GROA) and the controlled-use area in relation to the subsurface hydrogeology, described above.

In reviewing this information, the staff must confirm that the extent of site characterization is sufficient to demonstrate the absence of special sources of ground water.

3.2.1.2 Review Procedure for the Confirmation of the Existence of No Special Sources of Ground-Water

The following review procedure will be used by the staff to perform the *Safety Review* of this regulatory requirement topic. As noted above, the staff anticipates that DOE will provide information in the LA to support the conclusion that no special sources of ground water exist at Yucca Mountain and, therefore, the section of the EPA standard regarding ground-water protection would not be applicable. If this

assumption is not met, then a review procedure different from that described in this section of the review plan would be needed. Such a review would require independent staff evaluations of compliance with the ground-water protection requirements. However, based on its pre-licensing consultations, the staff is expected to know well in advance of the LA submittal whether there are special sources of ground water.

DOE can show whether there are special sources of ground water if it uses, as Acceptance Criteria, the definition of special sources of ground water currently defined by EPA (see EPA, 1985; 50 FR 38086). Special sources are "those Class I ground waters... that

- (1) are within the controlled area encompassing a disposal system or are less than five kilometers beyond the controlled-use (sic) area;
- (2) are supplying drinking water for thousands of persons as of the date that the Department [DOE] chooses a location within that area for detailed characterization as a potential site for a disposal system (e.g., in accordance with Section 112(b)(1)(B) of the Nuclear Waste Policy Act [of 1982, as amended]; and
- (3) are irreplaceable in that no reasonable alternative source of drinking water is available to that population."

EPA defines Class I groundwaters to be those that are highly vulnerable to contamination because of the hydrologic characteristics of the areas under which they occur and that are characterized by either of the following two factors:

- a. Irreplaceable, in that no reasonable alternative source of drinking water is available to substantial populations
- b. Ecologically viable, in that the aquifer provides the base flow for a particularly sensitive ecological system that, if polluted, would destroy a unique habitat (EPA 1985; 50 FR 38079)

All of the Acceptance Criteria described above must be met in order to demonstrate that special sources of ground water do not exist at Yucca Mountain. In reviewing DOE's demonstration, the staff will confirm that the results of DOE's investigations are not in conflict with the published results from other investigations. If conflicts with the published record do exist, then the conflicts must be adequately explained by DOE.

3.3 Rationale For Review Procedures and Acceptance Criteria

3.3.1 Rationale for Safety Review of 10 CFR 60.21(c)(1)(ii)(C), (D), and (F), 10 CFR 60.112, and 10 CFR 60.122(a)

A letter report by Nuclear Waste Consultants, Inc. (see Lodsdon, 1987) to the NRC staff and a draft report by Adrian Brown Consultants (1989) to the Center for Nuclear Waste Regulatory Analyses concluded that, for the Yucca Mountain site, no special sources of ground water exist, because the aquifers within five kilometers (3.9 miles) of the controlled-use (sic) area do not presently supply drinking water to thousands of people. If this assessment about the lack of such special sources is correct, the section of the EPA standard regarding ground-water protection would not be applicable for the proposed site. It is anticipated that DOE will provide information in the LA to support the conclusion that no

special sources of ground water exist at Yucca Mountain and, therefore, the section of the EPA standard regarding ground-water protection would not be applicable. The staff will need to review and evaluate this information and assess DOE's demonstration regarding the absence of a special source of ground water below or adjacent to the site.

The selected Compliance Review Procedure depends on the assumption that no special sources of ground water exist below or adjacent to the site. Should this assumption later be found to be incorrect, a higher level of review may be required for this regulatory requirement topic. In addition, the current level of review depends on the concept of a "special source of ground water" as defined in the existing 1985 EPA standard. It must be noted that, if the "special source of ground water" portion of the standard were modified, the level of review for this regulatory requirement topic may change. For example, in the existing Waste Isolation Pilot Project (WIPP) standard, as published in the Federal Register (EPA, 1993), the concept of a "special source of ground water" has been changed to the concept of an "underground source of drinking water." An "underground source of drinking water" is defined (see 58 FR 66415) as an aquifer or its portion that:

- (1) Supplies any public water system; or
- (2) Contains a sufficient quantity of water to supply a public water system; and
 - (i) Currently supplies drinking water for human consumption; or
 - (ii) Contains fewer than 10,000 milligrams of total dissolved solids per liter.

Furthermore, a public water system is defined as:

A system for the provision to the public of piped water for human consumption, if such a system has at least 15 service connections or regularly serves at least 25 individuals. Such a term includes:

- (1) Any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and
- (2) Any collection or pretreatment storage facilities not under such control that are used primarily in connection with such system.

If the existing standard for Yucca Mountain were changed to match that which is used for the WIPP, DOE would have to demonstrate that the extent of characterization is sufficient to determine the absence or presence of an underground source of drinking water. Also, the Compliance Review Procedure would then be dependent on the assumption that no underground sources of drinking water exist below or adjacent to the site. Should that assumption later be found to be incorrect, a higher level of review would be required for this regulatory requirement topic.

4.0 IMPLEMENTATION

4.1 Review Responsibilities

The review responsibilities for this review plan are as follows:

Lead:	DWM/PAHB Hydrologic Transport Section
Support:	DWM/PAHB Performance Assessment and Health Physics Section

4.2 Interfaces

The degree of applicability of the input/output information cited below will depend upon how DOE organizes the information contained in its LA, and how this information is cross-referenced.

4.2.1 Input Information

To properly review this regulatory requirement topic, the staff will require information from other sections of DOE's LA. The needed information is shown in the following table.

Input Information	From Review Plan Nos.
Groundwater quality and hydrologic conditions at the Yucca Mountain site	3.1.2 and 3.1.3
Population demographics at the Yucca Mountain site	3.2.1.3
Water wells near the Yucca Mountain site (number and yield)	3.2.1.13
Drawings and photographs showing the GROA and the controlled-use area	4.1.1
Current land-use patterns at or near the Yucca Mountain site	9

4.2.2 Output Information

Output from activities associated with this review plan will not provide specific information to any other review plan.

5.0 EXAMPLE EVALUATION FINDINGS

The staff should consider the Example Evaluation Findings presented below together with the Acceptance Criteria set forth in Section 3.0 when making the actual Evaluation Findings resulting from the

Acceptance Review for docketing and the Compliance Reviews. The actual Evaluation Findings resulting from the Compliance Reviews, and the supporting basis for these findings, should be documented by the staff in the SER.

5.1 Finding for Acceptance Review

The NRC staff finds that the information presented by DOE concerned with the assessment of the ground-water protection requirements is acceptable (not acceptable) for docketing and a Compliance Review.

5.2 Findings for Compliance Reviews

5.2.1 Finding for 10 CFR 60.21(c)(1)(ii)(C), (D), and (F), 10 CFR 60.112, and 10 CFR 60.122(a)

The NRC staff finds that the applicant (DOE) has demonstrated that special sources of ground-water as defined in 40 CFR Part 191 are absent and that ground-water protection requirements in 40 CFR Part 191 do not apply to the proposed geologic repository.

6.0 REFERENCES

Adrian Brown Consultants and M.P. Miklas, Jr., "Ground Water Classification: "Significant" and "Special" Sources and the Individual and Ground Water Protection Requirements of 40 CFR Part 191 at Yucca Mountain, May 30, 1990. [Center for Nuclear Regulatory Waste Analyses, Final Report 3702-002-305-602]

Lodsdon, M.J./Nuclear Waste Consultants, Inc., Letter Report to J.A. Pohle/Division of Waste Management/U.S. Nuclear Regulatory Commission [Subject: Significant and Special Sources of Groundwater (#009/5/NWC.010)], October 23, 1987.

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.]

U.S. Code of Federal Regulations, "Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," Part 191, Chapter I, Title 40, "Protection of the Environment."

U.S. Environmental Protection Agency, "Environmental Standards for the Management of Spent Nuclear Fuel, High-Level and Transuranic Wastes [Final Rule]," Federal Register, September 19, 1985, vol. 50, no. 182, pp. 38066-38089.

U.S. Environmental Protection Agency, "Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes [Final Rule]," Federal Register, Dec. 20, 1993, vol. 58, no. 242, pp. 66398-66416.