October 6, 1992

COMPLIANCE DETERMINATION STRATEGY

RR2019 POTENTIALLY ADVERSE CONDITION -- EVIDENCE OF MINING FOR RESOURCES [10 CFR 60.122(c)(18)]

PRIMARY REGULATORY CITATION:

10 CFR 60.21(c)(1)(ii)(B)

PASS ID OF THE COMPLIANCE DETERMINATION STRATEGY:

RR2019/NS0001

TYPES OF REVIEW:

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

RATIONALE FOR TYPES OF REVIEW:

Acceptance Review (Type 1) Rationale:

This regulatory requirement is License Application-related because, as specified in the License Application content requirements of 10 CFR 60.21 and the Format and Content Regulatory Guide (NRC, 1990), it must be addressed by DOE in its License Application. Therefore, the staff will conduct an Acceptance Review of the License Application for this regulatory requirement.

Safety Review (Type 3) Rationale:

This regulatory requirement is related to radiological safety and waste isolation. It is a requirement for which compliance is necessary to make a safety determination for construction authorization as defined in 10 CFR 60.31 (i.e., regulatory requirements in Subparts E, G, H, I and 10 CFR 60.21). Therefore, the staff will conduct a Safety Review of the License Application to determine compliance with the Regulatory Element of Proof for this regulatory requirement.

This regulatory requirement, concerning a potentially adverse condition (PAC), focuses on DOE's demonstration, through appropriate investigations, of the presence of (or conversely, the absence of) subsurface mining for natural resources within the site. In addition, such investigations are to include the area outside of the site if the presence of the PAC could affect isolation within the controlled area. These investigations are necessary because the existence of undiscovered mining activities could have important implications on the radiological safety and waste isolation potential of a candidate site. Such implications might include: (1) the creation of preferential pathways for infiltrating waters or for released gaseous radionuclides; and/or (2) the shortening of flow paths and

potential radionuclide transport pathways through the unsaturated zone below the repository horizon. As a post-closure consideration for another regulatory requirement (i.e., 10 CFR 60.122(c)(17) -- Naturally Occurring Materials), the presence of existing subsurface mining may be perceived by future explorationists as evidence of mineralization.

The scope of this regulatory requirement is limited to the consideration of evidence for supporting or negating existing (pre-site characterization) natural resources-related subsurface mining. This includes mineral prospects (lode claims) and mills (including reduction works) as well (see DOE, 1988, p. 1-255). This regulatory requirement does not include consideration of shafts, boreholes and other excavations resulting from DOE's site characterization activities. However, the staff recognizes that the presence of such site characterization excavations may increase the likelihood that future explorationists will investigate the area for natural resources. Staff concerns that such site characterization excavations may become pathways possibly compromising the ability of the repository to meet the performance objectives are to be considered under the design criteria for the Geologic Repository Operations Area (10 CFR 60.134 -- Design of Seals for Shafts and Boreholes).

DOE is required to examine the proposed site (and the region beyond the site, as appropriate) and examine appropriate documents (including mining claims, historical and other maps, and air photos) to determine if any subsurface mining for resources has occurred there. Based on the collected information, DOE is to either demonstrate that the potentially adverse condition is not present or is to provide information to determine to what degree the PAC is present, or present, but undetected.

Based on the above considerations, this Regulatory Requirement will be reviewed by the staff as a Type 3 (Safety Review). Should future analyses and/or data arise such that this initial assessment is questioned, the type of review this regulatory requirement should receive will be reassessed in light of the additional information (CNWRA, 1991).

The Regulatory Element of Proof (REOP) is considered to fall within the criteria for a Type 3 review because it represents a 10 CFR Part 60 citation which is related to radiological health and safety. For this REOP, the analysts drew the conclusion that a safety determination could be made by evaluating the technical information submitted by DOE in the License Application. Additionally, in the analysts' opinion, the information to be reviewed is available and would be such that no additional analyses or tests (Type 4 or 5 review) would be required because sufficient technical knowledge exists to allow for an adequate investigation and evaluation of the acquired information.

To summarize, the following statements and assumptions have been made in developing this CDS:

The proposed Yucca Mountain site is located in a natural resources-rich geologic setting that has included exploration/exploitation of precious metals and other valuable resources.

This Regulatory Requirement is limited to the consideration of evidence for supporting or negating existing (pre-site characterization) subsurface mining.

Boreholes, shafts and other site characterization-related activities (which may be perceived by some as constituting evidence of subsurface mining) are to be considered by the staff under other Regulatory Requirements.

REVIEW STRATEGY:

Acceptance Review (Type 1):

In conducting the acceptance review of this PAC [subsurface mining for resources - 10 CFR 60.122(c)(18)], the reviewer should determine if the information presented in the License Application and its references for demonstrating compliance with the subsurface mining for resources PAC requirement is complete in technical breadth and depth as identified in NRC (1990). All appropriate information necessary for the staff to review the evidence supporting the absence of (or conversely, the presence of) existing subsurface mining for resources within the site (and beyond the site, if considered necessary) should be presented.

The information in the License Application should be presented in a manner such that the assumptions, data, and logic leading to a demonstration of compliance with the requirement are clear and do not require the reviewer to make extensive analyses and literature searches. The reviewer should also determine that controversial information and appropriate alternative interpretations and models have been adequately described and considered.

Finally, the reviewer should determine if DOE has either resolved all the NRC staff objections to the License Application that apply to this requirement or provided all the information requested in Section 1.6 of NRC (1990) for unresolved objections. The reviewer should evaluate the effect 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) on the Commission's ability to make a decision regarding construction authorization within the three-year statutory period.

Safety Review (Type 3):

In conducting the Safety Review, the reviewer will, as a minimum, determine the adequacy of the data and analyses presented in the License Application to determine DOE's compliance with 10 CFR 60.122(c)(18). Specifically, DOE will need to: (1) provide information to determine whether and to what degree the PAC is present; (2) provide information to determine to what degree the PAC is present, but undetected; (3) assure

the sufficiency of the lateral and vertical extent of data collection; and (4) evaluate the information presented under items (1) and (2), with assumptions and analysis methods that adequately describe the presence of the PAC and ranges of relevant parameters.

The Acceptance Review criteria are identified in section 3 of the License Application Review Plan. If the License Application is found to be acceptable, those specific aspects of the License Application on which the reviewer will focus are discussed in NRC (1987 and 1990).

In order to conduct an effective review, the staff reviewer will rely on his own expertise and independently-acquired knowledge, information, and data in addition to that which may be provided by the applicant in its License Application. For example, historical mine location maps for Nevada [e.g., Clason Map Company (1907) and Nevada Bureau of Mines (1932)] are considered invaluable, and should be acquired by the staff. These maps show a mining camp on the eastern flank of Yucca Mountain. The presence of the mining camp could be perceived as an indication of the proximity of valuable mineral resources and may mean that an "unknown mine" is in the vicinity. Therefore, it is incumbent upon the staff reviewer to have personally acquired a body of mining-related knowledge in anticipation of conducting the Safety Review.

The staff reviewer should also have available specific documents (reports) bearing on this matter that were commissioned by the NRC -- see Raney (1989 and 1990). Other relevant documents, such as Castor, *et al.* (1990), Science Application International Corporation/The Desert Research Institute (1990), Cornwall (1972), Cornwall and Norberg (1978), Quade and Tingley (1983) have been commissioned by DOE (and others), and should also be acquired by the staff reviewer in anticipation of the License Application submittal.

Additional examples of specific review activities that will be required of the staff following receipt of DOE's License Application include: (1) confirmation that DOE has fully considered the most recent information regarding the existence of past subsurface mining-related activities that are appropriate for the analysis; and (2) confirmation that DOE's regional investigations for past subsurface mining activities, which have been limited to a 10-kilometer radius around the perimeter drift outline (DOE, 1988), are sufficient to assure that adequate information has been acquired to fully consider the presence, or absence, of such subsurface mining activities. DOE indicates, in its 1988 Site Characterization Plan (SCP), that its investigations relative to this subject are complete (DOE, 1988, p. 1-353). Accordingly, DOE has determined that no additional investigations are planned.

However, in its SCP, DOE has not provided the bases underlying its decision to limit its existing subsurface mining investigations to the area within 10 kilometers of the perimeter drift outline. If the controlled area is defined by DOE at its maximum extent of 10 kilometers from the outer boundary of the underground facility, then DOE's investigations of subsurface mining greater than 10 kilometers from the

geologic repository operations area would have to be presented in order to satisfy the requirement that the PAC "outside the controlled area" be investigated if it might affect waste isolation.

Contributing Analysts:

NRC Staff: Neil Coleman, Harold Lefevre, James Park

CNWRA Staff: Michael Miklas

Date of Analyses: July 17, 1992

RATIONALE FOR REVIEW STRATEGY (OPTIONAL):

Not applicable.

APPLICABLE REGULATORY ELEMENTS OF PROOF:

Type 3:

REOP

RR2019/EP0100

REFERENCES CITED:

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Clason Map Company, "[Map of] Nevada and the Southeastern Portion of California," Denver, Colorado, 1907.

Cornwall, H.R., "Geology and Mineral Deposits of Southern Nye County, Nevada," Nevada Bureau of Mines and Geology and the Mackay School of Mines, Bulletin No. 77, 1972. [Report prepared cooperatively by the Nevada Bureau of Mines and Geology, the Mackay School of Mines, and the U.S. Geological Survey.]

Cornwall, H.R. and Norberg, J.R., "Mineral Resources of the Nellis Air Force Range and the Nellis Bombing and Gunnery Range, Clark, Lincoln and Nye Counties, Nevada," U.S. Geological Survey/U.S. Bureau of Mines, 1978. [Report prepared for the Department of the Air Force.]

Nevada Bureau of Mines, "Prospectors' and Miners' Map of Nevada -- 1907," in "Map of Nevada Showing Locations of Mining Districts," The University of Nevada (Reno), Pacific Coast Blueprint Company, San Francisco, California, Bulletin Volume XVI, No. 4 [Plate 1], 1932.

Nuclear Regulatory Commission (NRC)/Office of Nuclear Regulatory Research, "Standard Format and Content of Site Characterization Plans for High-Level Waste Geological Repositories," Regulatory Guide 4.17 (Rev. 1), March 1987.

Nuclear Regulatory Commission (NRC)/Office of Nuclear Regulatory Research, "Draft Regulatory Guide DG-3003 -- Format and Content For the License Application for the High-Level Waste Repository," Regulatory Guide DG-3003, November 1990.

Raney, R.G., "Mines, Prospects, and Mineral Locations in Clark, Esmeralda, Lincoln, and Nye Counties, Nevada, Inyo County, California, and Portions of Mono and San Bernardino Counties, California," U.S. Bureau of Mines, 1989. [Report to the Nuclear Regulatory Commission.]

Raney, R.G., "Active Mines and Prospects Within a Thirty-Mile Radius of the Proposed High-level Repository Site at Yucca Mountain, Nye County, Nevada, Subsequent to January 1988 (As of July 1990)," U.S. Bureau of Mines, 1990. [Report to the Nuclear Regulatory Commission/Division of High-Level Waste Management.]

Quade, J., and Tingley, J.V., "A Mineral Inventory of the Nevada Test Site, and Portions of Nellis Bombing and Gunnery Range, Southern Nye County," Nevada Bureau of Mines and Geology/University of Nevada, Reno, 1983. [Report prepared for the U.S. Department of Energy.]

Science Application International Corporation/Desert Research Institute, "Nevada Draft Special Report,"Report No. DE-AC08-88NV10715, 1990. [Report prepared for the Department of Defense.]

U.S. Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," Office of Civilian Radioactive Waste Management, DOE/RW-0199, 9 Vols., December 1988.