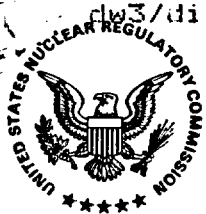


dw3/disk13/qlster 167/Browning/LV



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D. C. 20555

WM DOCKET CONTROL  
CENTER

86 DEC 15 A11:50

Reply to:  
1050 East Flamingo Rd.  
Suite 319  
Las Vegas, Nevada 89119  
Tel: (702) 388-6125  
FTS: 598-6125

TO: Mr. Robert E. Browning, Director  
Division of Waste Management

FROM: Paul T. Prestholt, Sr. On-Site Licensing Representative

DATE: December 11, 1986

SUBJECT: Initial Q-List for The Prospective Yucca Mountain  
Repository Based on Items Important to Safety and Waste  
Isolation, by T. W. Laub and L. J. Jardine

PTP

Please find enclosed the above-referenced information.  
It was inadvertently left out of the Monthly Report prepared by  
Paul T. Prestholt, dated December 8, 1986, and is not listed on  
the enclosure list.

PTP:nan

cc: J. J. Linehan  
K. Stablein  
S. Wastler

WM Record File	WM Project	11
102	Docket No.	
	PDR	✓
	LPDR	✓
Distribution:	Coplan	5/11
REB MJD	Kennedy	5/16
JDB RDM	ETana	
(Return to WM, 623-88)	Justus	A

8702130069 861211  
PDR WASTE  
WM-11 PDR

Sandia National Laboratories

Albuquerque, New Mexico 87185

SEP 10 1986

D. L. Vieth, Director  
Waste Management Project Office  
U. S. Department of Energy  
Nevada Operations Office  
P.O. Box 14100  
Las Vegas, Nevada 89114-4100

Dear Don:

Enclosed is SAND86-1965A entitled, "Initial Q-List for The Prospective Yucca Mountain Repository Based on Items Important to Safety and Waste Isolation," by T. W. Laub (6311) and L. J. Jardine (ENI).

We have examined the publication and determined that it does not have direct application to, or impact upon, other NNWSI project participant organizations. No information copies have been distributed.

Please review the document for policy compliance.

Sincerely,

Thomas O. Hunter, Manager  
NNWSI Projects Department 6310

sj  
Encl.

Copy to: w/o encl.  
L. P. Skousen, USDOE/NVO/WMPO w/encl.  
C. Jonson, SAIC  
6310 T. O. Hunter  
6310 E. W. Shepherd  
6311 C. Mora  
6311 T. W. Laub  
M. Blanchard, USDOE/NVO/WMPO w/encl.

ACTION LOP/113  
ACTION ADJUDICATION  
CC: BLANCHARD  
CC: SKOUSEN  
CC: \_\_\_\_\_  
CC: \_\_\_\_\_  
CC: \_\_\_\_\_

ACTION u n i t o  
INFO \_\_\_\_\_  
R.F. \_\_\_\_\_  
AMA \_\_\_\_\_  
AME & S  \_\_\_\_\_  
AMO \_\_\_\_\_

RECORD COPY

REC'D IN WMPO

Initial Q-List For The Prospective Yucca Mountain Repository  
Based on Items Important to Safety and Waste Isolation

T.W. Laub  
Sandia National Laboratories  
Division 6311, Nuclear Waste Engineering Projects  
Albuquerque, New Mexico

L.J. Jardine  
Bechtel National Incorporated  
Advanced Technology Division  
San Francisco, California

SUMMARY

On the basis of the Repository Conceptual Design in Support of Site Characterization (RCD-SC) for the Yucca Mountain repository, we conducted a study to determine which items (i.e. systems, structures, and components) and activities are important to safety or to waste isolation and should be placed on the Q-list. The Q-list contains those items and activities that prevent accidents or mitigate accident consequences during the preclosure operations phase of a repository when waste is being emplaced. The Q-list also contains those items and activities (both preclosure and postclosure) that are important to isolating waste after permanent closure. Items on the Q-list are subjected to Quality Level I QA requirements. These items and activities include both natural (specific geologic units of the site itself) and engineered barriers, and are classified as to whether or not they contribute to meeting the numerical performance criteria in the proposed 10 CFR 60 which incorporate the 40 CFR 191 requirements for radioactive releases to the environment.

Items considered in this study were limited to major structures, systems, and components for the preclosure period. For the postclosure period, the site and engineered barriers were assessed. Activities such as site characterization, facility operations or procedures, and performance confirmation were not included in this initial study. As the repository design progresses, site characterization activities proceed, regulatory positions develop, performance assessment methodologies evolve, and more information becomes available, the initial Q-list will be updated, refined, and enhanced in a continuing assessment program.

This paper summarizes methodologies developed, and the conclusions reached in identifying items in the RCD-SC that are important to safety or important to waste isolation. In order to develop the needed methodologies, we required criteria and definitions commensurate with the available design and site details and consistent with NRC regulations. This paper discusses these criteria and definitions.

Items important to safety were identified using a methodology that was based on the definition in 10 CFR 60.2 and a

complete preliminary preclosure safety analysis performed for the Yucca Mountain repository using a probabilistic risk assessment (PRA) approach. The credible accident scenarios (those with a frequency of occurrence greater than  $10^{-5}$ /yr as defined by DOE guidance) at Yucca Mountain did not result in any doses greater than 500 mrem at or beyond the nearest boundary of the unrestricted area; therefore, no items were found to be important to safety. However, pending further analysis, several items associated with cask handling in the receiving portion of the waste-handling building were found to be "potentially" important to safety. Items found to be potentially important to safety are not on the Q-list but will receive a quality level I QA assignment. The level I QA program satisfies the 10 CFR 60 Subpart G QA requirements for items important to safety and are the same as those required in 10 CFR 50 Appendix B.

Since 10 CFR 60 and other NRC documents provide no explicit guidance for the definition of items important to waste isolation, the development of a definition of "important to waste isolation" and numerical criteria to identify specific items as important to waste isolation were required. This paper takes the position that items important to waste isolation are those items and activities required to demonstrate compliance with the overall system performance objective of 10 CFR 60.112. This differs from the recent NRC position [Draft Generic Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to 10 CFR Part 60 Quality Assurance Requirements, NRC, July 1986] that items important to waste isolation include the engineered barriers used to demonstrate compliance with the three numerical criteria for containment or geologic setting of 10 CFR 60.113 (i.e. waste package lifetime, allowable release rate, and pre-emplacement groundwater travel time).

Using this paper's definition, the methodology for the determination of items important to waste isolation consisted of procedures to: (1) screen initiating processes and events applicable to Yucca Mountain during the 10,000-year postclosure period of interest, (2) develop scenarios potentially resulting in significant postclosure radioactive releases for anticipated and unanticipated processes and events, (3) assign estimated frequencies of occurrence to these scenarios, and (4) assess the consequences of radioactive releases to the accessible environment. When these procedures were carried out, the overall system performance objective was satisfied by reliance only on specific geologic units at the site and only on specific characteristics of those units. Those units and characteristics were therefore judged to be important to waste isolation and were placed on the Q-list.

The engineered barriers were not required to demonstrate compliance with the overall system performance objective of 60.112; therefore, the engineered barriers are neither important to waste isolation nor on the initial Q-list for the Yucca Mountain repository. However, the engineered barriers contribute to defense-in-depth for waste isolation and are subject to a quality level I QA program. If future analysis shows that

engineered barriers are necessary to demonstrate compliance with the overall system performance objective of 10 CFR 60.112, they will be placed on the Q-list.