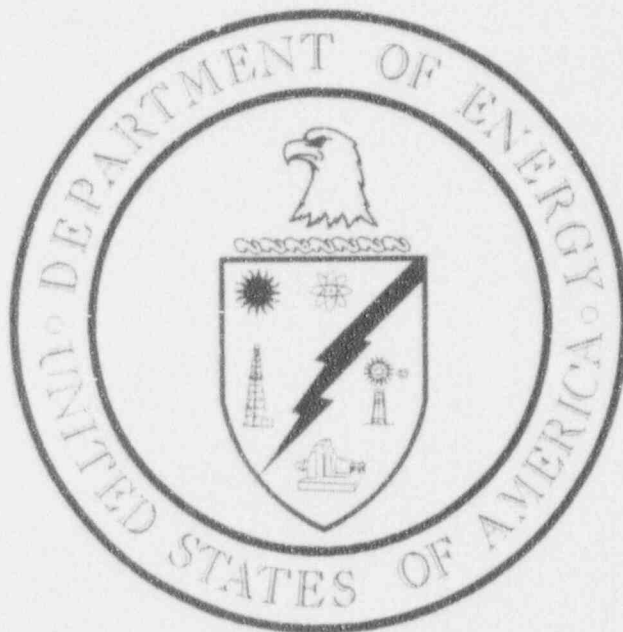


U.S. DEPARTMENT OF ENERGY



YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT EXPLORATORY STUDIES FACILITY

PACKAGE 2B



Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

D.I.E.
FOR 90% REVIEW
JANUARY 5, 1994

Design Analysis Cover Sheet

QA:	QA
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REMARKS:

1. This design analysis covers QA classification None items.

Interdiscipline review and concurrence by:

Performance Assessment for Waste Isolation consideration

Site Characterization for Test Interference consideration

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**DETERMINATION OF IMPORTANCE EVALUATION FOR
THE PROCUREMENT OF TEMPORARY ITEMS**

Note to reviewers: this evaluation is preliminary (i.e., has not been verified and approved in accordance with procedures) and refers to Rev 06 of QAP-2-3, which is currently in review. The fundamental format and content of QAP-2-3 does not change from Rev 05 (currently in place) and Rev 06 (pending).

1. PURPOSE

This Determination of Importance Evaluation (DIE) applies to the procurement of temporary items for Exploratory Studies Facility (ESF) construction and operation. "Temporary items" are those systems, structures, and components (SSCs) which will be removed prior to the pre-closure phase of a potential repository. The scope of this evaluation includes all temporary items associated with the construction and operation of the ESF.

The purpose of this evaluation is to determine whether any of the temporary items procured for the ESF are either Important to Radiological Safety (IRS) or Important to Waste Isolation (ITWI); to provide bases for these determinations; to classify items based on these determinations, as appropriate; to identify mitigating features associated with the designs, as appropriate; and to identify appropriate QA controls associated with their procurement. Procurements supported by this evaluation will not limit the QA controls applicable to the installation, construction, maintenance, modification or operation of these items. This evaluation does not apply to any construction activities.

2. QUALITY ASSURANCE

This evaluation is considered Quality Affecting since it determines the importance of design elements with respect to radiological safety and waste isolation.

3. METHOD

This evaluation was performed using QAP-3-9, Design Analysis, Rev. 03, in accordance with the methodology described in 8.1, "M&O Plan for Evaluating Items and Activities in the MGDS Program for Importance to Safety and Waste Isolation", Rev. 0 (the "DIE Plan"). Additional evaluation questions consider potential Waste Isolation functions of an item and

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take into account Site Characterization impacts of activities associated with items. All items evaluated herein are temporary, and are therefore not subject to classification requirements of QAP-2-3, Classification of Items, Rev. 06 (TBV).

This evaluation fulfills the requirements of QAP-2-0, Work Control, Rev. 01, to evaluate QA Program applicability to activities and to determine controls commensurate with the importance of the activity (i.e., procurement).

The responsibilities indicated in the DIE plan are currently fulfilled by the MGDS System Engineering Manager for overall responsibility of the preparation of this analysis.

In the absence of quantitative information, the basis for determination is frequently engineering judgement. Conservative assumptions are applied to bound reasonable scenarios, resulting in conservative control requirements and conclusions, thus providing a basis for applying the judgement.

4. CODES AND STANDARDS

NUREG-1318, Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to Quality Assurance Requirements (April 1988), as discussed in 8.1, is applicable to this evaluation.

5. DESIGN INPUTS

5.1 Exploratory Studies Facility Design Requirements, YMP/CM-0019, Rev. 0, July 14, 1993, as follows:

- a. 3.2.1.4 B.1.(a) - Limit potential for adverse impacts on the long-term performance of the potential repository in accordance with 10CFR60.15
- b. 3.2.1.4 B.1.(b) - Construction materials or substances to be used underground shall be reviewed for potential impacts

6. CRITERIA

6.1 10CFR60, 1-1-92 Edition

6.2 Quality Assurance Requirements and Description, DOE/RW/0333P, Rev. 0.

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7. ASSUMPTIONS

- 7.1 This evaluation applies only to the procurement of temporary items, and not to the installation, construction, modification, maintenance, or operation of these or any other items.
- 7.2 There are varying degrees of financial and schedule impact risk associated with procurements based on this evaluation. It is therefore assumed that engineering judgement will be applied so that this risk may be minimized. In order to minimize this risk, all procurement specifications should be reviewed by the DIE group prior to being issued to the field for possible inclusion of design features which will enable the application of construction or operational controls as a result of subsequent evaluations (see 7.3). It is assumed that the design of SSCs will incorporate features which minimize the usage and loss of tracers, fluids (including water), and materials to the extent practical.
- 7.3 Determination of Importance Evaluations will be performed which evaluate the installation, construction, and operation of all of the items evaluated herein. Controls pertaining to such activities as a result of these subsequent DIEs will be incorporated into the appropriate specifications and drawings. Such evaluations may result in limits on the use of temporary items procured based on this evaluation.

8. SOURCES OF INFORMATION

Sources of information in addition to the design inputs and regulatory criteria listed above include the following:

- 8.1 M&O Plan for Evaluating Items and Activities in the MGDS Program for Importance to Safety and Waste Isolation ("DIE Plan"), B00000000-AA-01-00002-00, Rev. 0, December 14, 1992.
- 8.2 Classification of Items Important to Safety and Waste Isolation, AP-6.17Q, Rev. 1, April, 1993.
- 8.3 Yucca Mountain Site Characterization Project Q-List, YMP/90-55, Rev. 2, November, 1993.

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8.4 Yucca Mountain Site Characterization Project Management Control List,
YMP/93-17, Rev. 1, November, 1993.

9. COMPUTER PROGRAMS

Not Applicable; no analytical computer programs were used in the preparation of this DIE.

10. BODY OF ANALYSIS

10.1 Summary

For a full discussion of the results of this evaluation, refer to Sections 10.6, 10.7 and 11.0. In summary, none of the items evaluated herein have been determined to be Important to Radiological Safety (IRS) or Important to Waste Isolation (ITWI) with respect to procurement. All of the items evaluated herein may be procured as conventional quality. This conclusion does not limit any QA controls which may be required for installation, construction, modification, maintenance, or operation of these items.

10.2 Description of Items

The scope of this evaluation includes procurement of temporary SSCs associated with the ESF, along with procurement of items or materials for their installation, construction, modification, maintenance, or operation.

10.3 Intended Use of Item(s)

The temporary items procured for the construction and operation of the ESF will be used primarily to support excavation, installation of ground support, and site characterization activities. Some categories of these general end uses include tunnel boring, rock bolt installation, air and water tagging, fire protection, etc.

10.4 Permanence

This evaluation applies only to temporary items. If any temporary items are incorporated into a permanent SSC, they will no longer be within the scope of this evaluation, and will require reevaluation as part of that permanent SSC.

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10.5 Design Events

The following events were considered with respect to radiological safety and waste isolation: normal system operation and failures, earthquake, rockfall, intrusion of groundwater, inadvertent spills of oil or other fluid from construction equipment, fires, explosions, and use of construction and dust suppression water during tunnel construction. For each of these design events and during normal construction and operation, questions are considered in Sections 10.6 and 10.7 to determine the importance of temporary items with respect to procurement.

10.6 Evaluation of Importance to Radiological Safety

During normal construction or use of the temporary items procured for the ESF, or during any of the design events discussed in Section 10.5, the following questions are considered with respect to the procurement of these items:

1. Is the item required:
 - a. To prevent or mitigate the effects of a credible accident which could directly or indirectly result in a release of radioactive materials which would result in a dose on or beyond the nearest unrestricted area boundary of ≥ 0.5 REM whole body or any organ until completion of permanent closure?
 - b. To monitor and/or control QA Classification 1 sections of IRS SSCs?
 - c. For functioning of any equipment required to mitigate the effects of a credible design event?
2. Can failure or use of the item:
 - a. Directly cause a credible release of radioactive materials which would result in a dose on or beyond the nearest unrestricted area boundary of ≥ 0.5 REM whole body or any organ until completion of permanent closure?
 - b. Initiate a credible accident which would result in a dose on or beyond the nearest unrestricted area boundary of ≥ 0.5 REM whole body or any organ until completion of permanent closure without considering mitigating features?

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3. Is the item a consumable/expendable item which is part of, or contained within, and affects the safety function of any component identified in 1 or 2 above?
4. Are there other factors, such as previous analyses, a body of consensus, or direct inclusion, that lead to the conclusion that the item is Important to Radiological Safety?

The scope of this evaluation includes procurement of all temporary SSCs associated with the ESF, as well as any SSCs associated with their installation, construction, modification, maintenance, or operation. No permanent items are included. It is therefore judged that none of the items within the scope of this evaluation are required in a pre-closure repository to: mitigate the effects of a credible accident resulting in a release of ≥ 0.5 rem at the nearest unrestricted area boundary, monitor and/or control QA SSCs, or function for any equipment which is required to mitigate the effects of an accident with credible radiological consequences.

The failure of none of these items could initiate an accident resulting in a release of ≥ 0.5 rem at the nearest unrestricted area boundary, nor directly cause a credible release of radioactive materials resulting in a dose of ≥ 0.5 rem at the nearest unrestricted area boundary. None of these items are a part of, or contained within components which are important to radiological safety, and there are no other factors that lead to the conclusion that any of these items are important to radiological safety. All of these items are temporary, and will be removed prior to the operation of a potential repository. There are, therefore, no credible scenarios in which they would be relied upon to prevent or mitigate a radiological release. All temporary SSCs associated with the ESF are therefore judged to not be important to radiological safety, although there may, in subsequent evaluations, be QA controls placed on their installation or operation to limit adverse impacts to the potential repository to the extent practical.

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10.7 Evaluation of Importance to Waste Isolation

During normal construction or use of the temporary items procured for the ESF, or during any of the design events discussed in Section 10.5, the following questions are considered with respect to the procurement of these items:

1. Does the item perform a waste isolation function by:
 - a. forming part of natural or engineered barriers subject to the requirements of 10 CFR 60.112 or .113?
 - b. inhibiting water or radionuclide transport within the extent of the natural barriers (as indicated on the Q-List)?
 - c. inhibiting degradation of the engineered barrier?
 - d. preventing or discouraging human intrusion into the engineered barrier?
2. Can construction, use, or failure of the item:
 - a. result in changes to hydrological characteristics of natural barriers (as indicated on the Q-List) by creating significant ponding or the possibility for drainage into the underground facility?
 - b. result in the introduction of fluids or other materials that might affect geochemical characteristics of natural barriers (as indicated on the Q-List)?
 - c. affect geomechanical characteristics of natural barriers (as indicated on the Q-List)?
3. Can construction, use, or failure of the item:
 - a. impact or bias required site characterization tests in an unpredictable way?
 - b. impact or bias required site characterization tests that cannot be repeated?
4. Can construction, use, or failure of the item otherwise compromise the ability of the natural or engineered barriers to isolate waste?

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5. Are there other factors, such as previous analyses, a body of consensus, or direct inclusion, that lead to the conclusion that the item is Important to Waste Isolation?

The scope of this evaluation includes procurement of all temporary SSCs associated with the ESF, as well as any SSCs associated with their installation, construction, modification, maintenance, or operation. No permanent items are included.

It is judged that temporary SSCs to be procured for ESF construction or operation will not: form part of the natural or engineered barrier subject to the requirements of 10CFR Part 60.112 or Part 60.113, inhibit water or radionuclide transport as part of a post-closure repository within the extent of the natural barrier, prevent or discourage human intrusion into the engineered barrier, or inhibit degradation of the engineered barrier. This determination is based on the fact that these items will not be present during the operation of a potential repository.

It is further judged that QA controls on the operation or installation of temporary items will be adequate to prevent construction, use, or failure of any of the temporary items from resulting in: changes to the hydrological characteristics of natural barriers by creating significant ponding or the possibility for drainage into the underground facility; the introduction of fluids or other materials that might affect the geochemical characteristics of natural barriers; effects on the geomechanical characteristics of natural barriers; impact to or biasing of required site characterization tests in an unpredictable way; or impacts to required site characterization tests that cannot be repeated. Since controls applied to the activities associated with these temporary items are judged to be adequate to limit these potential impacts to the extent practical, QA controls on the procurement of these items is not required; that is, these items may be procured as conventional quality.

It is judged that neither construction, use, nor failure of any temporary item procured for construction, maintenance, modification or operation of the ESF can otherwise compromise the ability of natural or engineered barriers to isolate waste, assuming that appropriate controls are applied to their installation, construction, or operation. No other factors have been identified, such as previous analyses, a body of consensus, or direct inclusion, that otherwise lead to the conclusion that any of these items is ITWI.

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The above determinations are based in part on the assumptions that these items will not be in use either during the pre- or post-closure operation of a potential repository, and that appropriate controls will be applied during the installation, construction, modification, maintenance, or operation of these SSCs.

11. CONCLUSIONS

11.1 Classification of Permanent Items

All of the items herein evaluated are temporary and are to be removed prior to repository operation. As such, QAP-2-3, Classification of Items, does not apply, and no QA classifications are appropriate for these items.

11.2 Importance of Activities

It has also been concluded by the evaluation in 10.6 and 10.7 that procurement of temporary items for construction, modification, maintenance, or operation of the ESF is neither IRS nor ITWI. This conclusion is based on the assumptions that these items will not be in operation during the waste emplacement phase of a potential repository, or following closure, and that appropriate controls will be applied during the installation, construction, modification, maintenance, and operation of these SSCs, based on subsequent evaluations of the potential impact of these activities.

All temporary items associated with the construction, maintenance, modification, or operation of the ESF may be procured as conventional quality, at minimal risk.

11.3 Inclusion on Q-List or MC-List

No permanent items are evaluated herein, therefore, there are no recommended changes to the Q-List or MC-List.

11.4 M&O Design Product Controls

There are no M&O design product controls as a result of this evaluation. However, it is assumed that the design of SSCs will incorporate, to the extent practical, measures to minimize the usage and loss of tracers, fluids (including water), and materials.

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11.5 Removal Requirements

The importance of all items within the scope of this evaluation is predicated in part on these being temporary items. Any incorporation of these items or their constituents into the permanent repository will require a new DIE as part of the design of permanent SSCs.

11.6 Other Controls

None

12. ATTACHMENTS

Attachment 1: List of Acronyms

ATTACHMENT 1

List of Acronyms

DIE	Determination of Importance Evaluation
ESF	Exploratory Studies Facility
IRS	Important to Radiological Safety
ITWI	Important to Waste Isolation
M&O	Civilian Radioactive Waste Management System Management and Operating Contractor
MC	Management Control
MGDS	Mined Geologic Disposal System
PMF	Probable Maximum Flood
QA	Quality Assurance
QAP	M&O Quality Assurance Procedure(s)
SSC	structure, system, or component
TBM	Tunnel Boring Machine
TBV	To Be Verified
TFM	Tracers, Fluids, and Materials
YMP	Yucca Mountain Project
YMPO	Department of Energy Yucca Mountain (Site Characterization) Project Office
10CFR60	Title 10 Code of Federal Regulations Chapter 60