OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: L

Page: 1 of: 12

Complete Only Applicable Items

2. ☑ Analysis ☑ Engineering ☐ Performance Assessment ☐ Scientific

3. ☐ Model ☐ Conceptual Model Documentation ☐ Model Documentation ☐ Model Validation Documentation

4. Title:
Classification of the MGR Subsurface Facility System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-SFS-SE-000001 REV 00

6. Total Attachments:
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I-1, II-4, III-14

	Printed Name	Signature	Date
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12. Remarks:
This analysis contains To Be Verified (TBV) design input as follows: TBV-458, TBV-460

The Document Identifier for this document previously was BCA000000-01717-0200-00026 REV 00.

This analysis bases the classification of Monitored Geologic Repository structures, systems and components on the criteria of proposed rule 10 CFR 63 (64 FR 8640). A review has determined that the changes made to proposed rule 10 CFR 63 by *Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada* (Dyer 1999) do not impact the classifications made in this analysis.

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL REVISION RECORD

Complete Only Applicable Items

2. Analysis or Model Title:
Classification of the MGR Subsurface Facility System

3. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-SFS-SE-000001 REV 00

4. Revision/Change No.	5. Description of Revision/Change
00	Initial Issue. This system-specific analysis was performed to supersede the applicable portion of B00000000-01717-0200-00134 REV 01 (CRWMS M&O 1998d).

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TABLES

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1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) subsurface facility system structures, systems and components (SSCs) performed by the MGR Safety Assurance Department. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 1998). The Q-List identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 1998). This QA classification incorporates the current MGR design and the results of the *Preliminary Preclosure Design Basis Event Calculations for the Monitored Geologic Repository* (CRWMS M&O 1998a).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 1998) as determined by procedures QAP-2-0, *Conduct of Activities*, and NLP-3-18, *Documentation of QA Controls on Drawings, Specifications, Design Analyses, and Technical Documents. Design Basis Event Definition & Analysis/QA Classification Analysis (1.2.1.11) Activity Evaluation* (CRWMS M&O 1999a) presents the QAP-2-0 activity evaluation addressing the QA classification of MGR SSCs. This analysis is performed in accordance with procedures QAP-2-3, *Classification of Permanent Items*, and AP-3.10Q, *Analyses and Models*, and provides input to the design of SSCs included on the Q-List (YMP 1998). Unverified design inputs are identified and tracked in accordance with NLP-3-15, *To Be Verified (TBV) and To Be Determined (TBD) Monitoring System.*

3. COMPUTER SOFTWARE AND MODEL USAGE

This analysis uses no software which is required to be controlled in accordance with procedure AP-SI.1Q, *Software Management.*

4. INPUTS

4.1 PARAMETERS

The offsite radiological consequences of MGR Category 1 and 2 design basis events (DBEs), as calculated in *Preliminary Preclosure Design Basis Event Calculations for the Monitored Geologic Repository* (CRWMS M&O 1998a), are utilized in the QA classification of MGR SSCs. These results represent a conservative evaluation of MGR DBEs and the best information available. As discussed in Section 6.1 of this analysis, NUREG-1318, *Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to Quality Assurance Requirements* (NRC 1998, Section 4.2(a)) allows the use of engineering judgement and conservative bounding assumptions in the QA classification of facility SSCs when data sources are limited. Also, procedure YAP-2.7Q, *Item Classification and Maintenance of the Q-List* (Attachment 3, Section a), directs the use of the highest level of detail available to support the conclusion of the QA classification analysis.

Although the preliminary DBE calculation (CRWMS M&O 1998a) postulates a release of radioactive material associated with the subsurface facility system and performs subsequent consequence analysis, the incorporation of the MGR preclosure safety strategy prevents the breach of a waste package (WP) and the release of radioactive material. The MGR preclosure safety strategy is discussed in Sections 5.3 and 6.3.

4.2 CRITERIA

The criteria used in the QA classification of MGR SSCs are provided in procedure QAP-2-3 as discussed in Section 6.1. These criteria satisfy the requirement of Section 2.2.2, *Classifying Items*, of DOE/RW-0333P (DOE 1998).

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation. January 1, 1999.

64 FR 8640. Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada. Proposed rule 10 CFR 63. February 22, 1999.

5. ASSUMPTIONS

The following assumptions were made in the performance of this analysis.

5.1 This analysis assumes that system design, architecture and SSC functions are established by the *Subsurface Facility System Description Document* (CRWMS M&O 1998c). This analysis also assumes that the MGR architecture is established by *Monitored Geologic Repository Architecture* (CRWMS M&O 1999b) and that MGR operations are described by *Monitored Geologic Repository Concept of Operations* (CRWMS M&O 1998b). This assumption is utilized in Section 6.2 to define the system design configuration and system functions.

5.2 This analysis assumes that future DBE analysis will demonstrate that a rockfall in the MGR emplacement drifts of sufficient mass to breach the WP is not a credible event if credit is taken for ground support. This assumption is utilized in Section 6.5 for the classification of SSCs associated with the subsurface facility system. (TBV-458)

5.3 This analysis assumes modification of the MGR design configuration by the "Strategy to Mitigate Preclosure Offsite Exposure" (Hastings 1998, Attachment 2 [all]), hereafter referred to as the "safety strategy." The safety strategy proposes general design guidance focused on reducing the risks associated with the handling of spent nuclear fuel, high-level waste and the associated casks, canisters, and containers. This analysis assumes that the MGR design is changed to implement the safety strategy. This assumption is utilized in Section 6.5 for the classification of subsurface facility system exhaust air mains and raises and ventilation shafts. In the case of the exhaust air mains and raises and ventilation shafts, the safety

strategy assumes that design of the ex-container, subsurface emplacement transportation, and waste emplacement systems prevent impacts which exceed the WP design basis. As a result, the WP maintains primary confinement of radioactive material. (TBV-460)

6. ANALYSIS

6.1 METHOD

The basic process for classifying MGR permanent SSCs is provided by procedure QAP-2-3. Guidance provided by procedure YAP-2.7Q is also used in this analysis. The process consists of establishing the configuration and function of MGR SSCs and identifying the effect of the SSC on MGR radiological safety. This information is then evaluated against criteria provided in QAP-2-3 to determine the QA classification of the particular item. The classification criteria are provided in the form of checklists in procedure QAP-2-3. A copy of these criteria checklists is provided in Attachment II. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 1998).

Quality Level 1 (QL-1) Those SSCs whose failure could *directly* result in a condition adversely affecting public safety. These items have a high safety or waste isolation significance.

Quality Level 2 (QL-2) Those SSCs whose failure or malfunction could *indirectly* result in a condition adversely affecting public safety, or whose *direct* failure would result in consequences in excess of normal operational limits. These items have a low safety or waste isolation significance.

Quality Level 3 (QL-3) Those SSCs whose failure or malfunction would not significantly impact public or worker safety, including those defense-in-depth design features intended to keep doses ALARA (As Low As Reasonably Achievable). These items have a minor impact on public and worker safety and waste isolation.

Conventional Quality (CQ) Those SSCs not meeting any of the criteria for Quality Levels 1, 2, or 3. Conventional quality items are not subject to the requirements of the QARD.

This analysis method is based on an iterative design-classification process where each analysis iteration is considered a final product for that phase of design. In this case, the system design and the DBE analysis are evaluated to determine which of the system's SSCs require design control under the QA program. The analysis presented in this document, therefore, will be reevaluated as necessary using a methodology appropriate to the level of DBE analysis and system design detail. This approach is consistent with NUREG-1318, *Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to Quality Assurance Requirements* (NRC 1998, Section 4.2(a)), which allows engineering judgement and conservative bounding assumptions to be used in cases where data are limited.

6.2 MGR DESIGN CONFIGURATION AND ARCHITECTURE

Prior to the QA classification of MGR SSCs, the system design configuration as well as the function of the system's SSCs are established. This classification analysis is based upon the system design and functions as established by the System Description Document (SDD) (CRWMS M&O 1998c) and the MGR Concept of Operations (CRWMS M&O 1998b). In the process of QA classification, if two or more subsystems perform similar functions or are similarly classified, these subsystems are classified as a group under the higher level system and not listed individually.

6.3 MGR SAFETY STRATEGY

The MGR safety strategy is a proposed approach for developing an MGR design that limits or reduces the risks associated with the receipt, handling, packaging and emplacing of spent nuclear fuel and other high level wastes in the planned repository. The strategy is described in "Strategy to Mitigate Preclosure Offsite Exposure" (Hastings 1998 [all]) which suggests a combination of containment and event prevention concepts for the following functional areas of the MGR: (1) receipt of waste, (2) transfer of waste to the WP, (3) packaging/sealing of waste in the WP, (4) transfer of the WP to the emplacement drift, and (5) emplacement of the WP.

The safety strategy is utilized as guidance to modify the MGR design (TBV-460). The facility design as modified by the safety strategy is then evaluated in Section 6.5 to determine SSC QA classifications. If the proposed safety strategy is not or cannot be implemented, the QA classification of the affected SSCs will be reviewed and the SSCs reclassified appropriately.

In this analysis, the MGR design for the subsurface emplacement transfer, waste emplacement, and ex-container systems is assumed to be modified as described in Attachment 3 of the safety strategy (Hastings 1998). The facility design as modified by the safety strategy is then utilized in Section 6.5 to determine the QA classifications of the subsurface facility exhaust air mains and raises and ventilation shafts. As a result of these assumptions, the WP is assumed to maintain containment of radioactive material and an Important to Safety nuclear heating, ventilation, and air-conditioning system is not required. A subsurface ventilation system with some high-efficiency particulate air capability may be provided for defense in depth, however, it may be constructed as "conventional quality." If the proposed safety strategy is not or cannot be implemented, the QA classification of the affected SSCs will be reviewed and the SSCs reclassified appropriately. A description of how the safety strategy impacts MGR system design is provided in the following sections.

6.3.1 Subsurface Emplacement Transportation System

The subsurface emplacement transportation system provides the rail and rail electrification systems that support transportation of WPs from the Waste Handling Building to the emplacement drifts. The preclosure safety strategy assumes that a WP breach as a result of transporter accidents (due to rail or rail electrification failure) in the north emplacement ramp area is prevented through transporter and/or locomotive design (see Section 6.3.2) (Hastings 1998, Attachment 3, page 5).

6.3.2 Waste Emplacement System

The waste emplacement system functions to transport WPs from the Waste Handling Building to subsurface emplacement drifts and place the WP on pedestals within the emplacement drift. The preclosure safety strategy assumes that WP breach as a result of transporter accidents in the north emplacement ramp area is prevented through transporter and/or locomotive design (Hastings 1998, Attachment 3, page 5). Specific methods for preventing the breach may include one or a combination of the following:

- Design the transporter to withstand the worst case impact (through energetic contact with a wall, subsurface structure, etc.) without breaching the WP.
- Design the locomotive/transporter with redundant and diverse braking systems to prevent the runaway at a frequency <1E-06/yr.

It is expected that some portion of the locomotive/transporter combination will be Important to Safety. The preclosure safety strategy also assumes that during the emplacement of the WP in the drift, lifts or transports above the design basis drop height for a WP will not be performed.

6.3.3 Ex-Container System

The Ex-Container System is located in the MGR emplacement drifts. The purpose of the system is to support the key MGR functions of limiting radionuclide release to the natural barrier, minimizing the possibility of a criticality external to the WP, limiting natural and induced environmental effects, and providing WP support. The preclosure safety strategy assumes that emplacement of a WP above the WP design basis drop height will not be performed.

6.4 DESIGN BASIS EVENT ANALYSIS

A preliminary analysis of MGR DBEs (CRWMS M&O 1998a) has been performed to determine the effects of internal and external events on facility radiological safety and is utilized by this analysis in the classification of MGR SSCs. The DBE analysis addresses both the DBE frequencies and dose consequences at the site boundary. This analysis utilizes the results of the DBE analysis to evaluate MGR SSCs against the classification criteria of procedure QAP-2-3.

6.5 QUALITY ASSURANCE CLASSIFICATION OF MGR SSCS

The MGR SSCs are evaluated against the criteria of QAP-2-3 to determine the item QA classification level. The results of the MGR preliminary DBE calculations (CRWMS M&O 1998a) are utilized in this evaluation.

7. CONCLUSIONS

7.1 MGR QA CLASSIFICATION

The results of this QA classification analysis are provided in Table 1. This analysis is based on current MGR system design and the preliminary DBE analysis (CRWMS M&O 1998a). As the design of the MGR proceeds and further analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary. The MGR classification checklists included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

Table 1. Subsurface Facility System QA Classification

Subsurface Facility System (SFS)	QL-1	QL-2	QL-3	CQ	TBV
Access Mains				X	N/A
Emplacement Drifts	X				458, 460
Mains & Raises				X	N/A
Miscellaneous Support Openings				X	N/A
Performance Confirmation Openings				X	N/A
Portals and Access Ramps				X	N/A
Ventilation Shafts				X	N/A

7.2 IMPACT OF UNVERIFIED DATA

7.2.1 TBV-458

This analysis assumes that future DBE analysis will demonstrate that a rockfall in the MGR emplacement drifts of sufficient mass to breach the WP is not credible (<1E-06/yr) if credit is taken for ground support. This assumption is utilized in Section 6.5 for the classification of SSCs associated with the subsurface facility system. Inability to verify this assumption will not result in a reclassification of the subsurface facility system because the system is presently classified as QL-1 as a result of the layout of the system being credited in the postclosure performance assessment model.

7.2.2 TBV-460

This analysis assumes that the design guidance provided by the preclosure safety strategy (Hastings 1998, all) is incorporated into the subsurface emplacement transfer, waste emplacement and ex-container systems. It should be noted that potential impacts associated with the safety strategy are based upon the preliminary DBE analysis (CRWMS M&O 1998a) and are dependent on the design approach taken to prevent or mitigate the effects of an associated DBE. Further DBE analysis will have an effect on the impacts as discussed. The preclosure safety strategy is described in Section 6.3. The preclosure safety strategy assumes that lifts, transports, or emplacements above the design basis drop height for a WP will not be performed during the emplacement of the WP in the drift in the MGR ex-container, waste emplacement transportation, and waste emplacement systems. The

subsurface facility system is currently classified as QL-1 based on being directly credited in the postclosure performance assessment model. Not achieving a safety strategy objective may add another QL-1 classification basis for preclosure to mitigate a Category 2 DBE.

8. REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 1998a. *Preliminary Preclosure Design Basis Event Calculations for the Monitored Geologic Repository.* BC0000000-01717-0210-00001 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19981002.0001.

CRWMS M&O 1998b. *Monitored Geologic Repository Concept of Operations.* B00000000-01717-4200-00004 REV 02. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980810.0283.

CRWMS M&O 1998c. *Subsurface Facility System Description Document.* BCA000000-01717-1705-00014, REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980826.0161.

CRWMS M&O 1998d. *Classification of the Preliminary MGDS Repository Design.* B00000000-01717-0200-00134 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19981103.0546.

CRWMS M&O 1999a. *Design Basis Event Definition & Analysis/QA Classification Analysis (1.2.1.11) Activity Evaluation.* Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990325.0008.

CRWMS M&O 1999b. *Monitored Geologic Repository Architecture.* B00000000-01717-5700-00011 REV 02 ICN 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990713.0203.

DOE (U.S. Department of Energy) 1998. *Quality Assurance Requirements and Description.* DOE/RW-0333P, Rev. 8. Washington D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19980601.0022.

Dyer, J.R. 1999. *Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada.* Letter from J. Russell Dyer (DOE) to D. R. Wilkins (YMP), June 18, 1999. OL&RC:AVG:1435. ACC: MOL.19990623.0026 and MOL.19990623.0027.

Hastings, C. R. 1998. "Strategy to Mitigate Preclosure Offsite Exposure." Hastings (CRWMS M&O) Interoffice Correspondence to Distribution (CRWMS M&O). LV.SEI.CRH.7/98-024. July 21, 1998. ACC: MOL.19980916.0357, MOL.19980916.0358, MOL.19980916.0359, and MOL.19980916.0360.

YMP (Yucca Mountain Site Characterization Project) 1998. *Q-List*. YMP/90-55Q, Rev. 5. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.19980513.0132.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. January 1, 1999.

64 FR (Federal Register) 8640. Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada. Proposed rule: 10 CFR 63. February 22, 1999.

NRC (Nuclear Regulatory Commission) 1998. *Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to Quality Assurance Requirements*. NUREG-1318. Washington, D.C.: U.S. Nuclear Regulatory Commission.

8.3 PROCEDURES

AP-3.10Q, Rev. 0, ICN 0. *Analyses and Models*. ACC: MOL.19990225.0335.

AP-SI.1Q, Rev. 1, ICN 0. *Software Management*. ACC: MOL.19990520.0164.

NLP-3-15, Rev. 5. *To Be Verified (TBV) and To Be Determined (TBD) Monitoring System*. ACC: MOL.19981117.0148.

NLP-3-18, Rev. 04. *Documentation of QA Controls on Drawings, Specifications, Design Analyses, and Technical Document*. ACC: MOL.19960611.0170.

QAP-2-0, Rev. 5. *Conduct of Activities*. ACC: MOL.19980826.0209.

QAP-2-3, Rev. 10. *Classification of Permanent Items*. ACC: MOL.19990316.0006.

YAP-2.7Q, Rev. 1, ICN 1. *Item Classification and Maintenance of the Q-List*. ACC: MOL.19990115.0065.

9. ATTACHMENTS

Attachment I Acronyms

Attachment II MGR Classification Checklists

Attachment III MGR QA Classification

Attachment I

Acronyms

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
CQ	Conventional Quality
CRWMS	Civilian Radioactive Waste Management System
DBE	Design Basis Event
DOE	U. S. Department of Energy
FR	Federal Register
M&O	Management and Operating Contractor
MGR	Monitored Geologic Repository
NLP	Nevada Line Procedure
NRC	U. S. Nuclear Regulatory Commission
QA	Quality Assurance
QAP	Quality Administrative Procedure
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SDD	System Description Document
SSCs	Structures, Systems, and Components
TBD	To Be Determined
TBV	To Be Verified
TEDE	Total Effective Dose Equivalent
WP	Waste Package
YAP	YMP Administrative Procedure
YMP	Yucca Mountain Site Characterization Project

Attachment II MGR Classification Checklists

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist

Complete only applicable items.

QA: L

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1. Classification Analysis I.D.:	2. SDD/SSC Evaluated:
3. Description of SDD/SSC (or reference):	

Yes	No		
4.		PS1. Is the item directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled?	
		a.	Confinement or containment
		b.	Criticality control
		c.	Shielding
		d.	Heat transfer
		e.	Structural integrity
		f.	Operations support necessary for waste handling safety (refer to Quality Level 3 checklists in Attachments II, III, or IV for guidance)
5.		PS2. Is the item directly or indirectly relied upon to provide an Important to Waste Isolation function?	
6.		Do the answers to Blocks 4 and 5 indicate the need for an Importance to Safety evaluation?	

7. Comments/Justification:

QAP-2-3 (Effective 05/26/1999)

0972 (Rev. 05/06/1999)

Attachment II MGR Classification Checklists

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation for MGR

Complete only applicable items.

QA: L

Page: 1 Of: 4

1. Classification Analysis I.D.:	2. SDD/SSC Evaluated:
3. Description of SDD/SSC (or reference):	

MGR Quality Level 1 Checklist

Yes	No		
4.			Preclosure Phase:
		1.1.	Can failure of the item directly result in loss of waste package containment or criticality control for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR?
		1.2.	Is the item required to prevent or mitigate a Category 1 DBE that could result in offsite doses greater than or equal to 100 **mrem** Total Effective Dose Equivalent (TEDE), per event, to any member of the public located on or beyond the site boundary [10 CFR 63.111(b)(1) and 20.1301(a)(1)]? Category 1 DBE "per event" limits are interpreted as the sum of the normal operating dose and anticipated operational occurrences plus the consequences from any single additional low frequency Category 1 DBE. This sum is stated on an annual basis and consistent with 10 CFR 63.111(a) or 10 CFR 20.
		1.3.	Is the item required to prevent or mitigate a Category 2 DBE that could result in offsite doses greater than or equal to 5 **rem** TEDE, 50 **rem** combined deep dose equivalent and committed dose equivalent to any individual organ or tissue (other than the lens of the eye), 15 **rem** dose equivalent to the lens of the eye, or 50 **rem** shallow dose equivalent to the skin, per event [10 CFR 63.111(b)(2)] to any individual located on or beyond any point on the boundary of the site?
5.			Postclosure Phase:
		1.4.	Does the item perform a waste isolation function that is required to meet the performance objectives in 10 CFR 63.113(b) by:
		a.	forming part of the natural barriers or an engineered barrier system required by 10 CFR 63.113(a)?
		b.	being directly credited in the performance assessments required by 10 CFR 63.113(c) and 10 CFR 63.113(d) to demonstrate the ability of the geologic repository to limit expected annual dose to the average member of the critical group to less than 25 **mrem** TEDE at any time during the first 10,000 years after permanent closure?
6.			Do the answers to Blocks 4 and 5 qualify the item as a Quality Level 1 item?

7. Comments/Justification:

QAP-2-3 (Effective 05/26/1999) 0973 (Rev. 05/06/1999)

Attachment II MGR Classification Checklists

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation for MGR

Complete only applicable items.

QA: L

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MGR Quality Level 2 Checklist

Yes	No	
8.		Preclosure Phase:
		2.1. Does the item function to provide control and management (i.e., collection and/or confinement) of site-generated liquid, gaseous, or solid low-level or mixed radioactive waste? NOTE: Systems with trace concentration of radionuclides, the failure of which could result in offsite doses less than 0.25 **mrem** per year, are not considered to perform radioactive waste management or control functions for the purpose of this quality level determination.
		2.2. Does the item provide fire detection, fire suppression, or otherwise protect the important-to-radiological safety or waste isolation functions of Quality Level 1 SSCs from the hazards of a fire?
		2.3. As a result of a DBE, could consequential failure of the item, which is not intended to perform a Quality Level 1 radiological safety function, prevent Quality Level 1 SSCs from performing their intended radiological safety function?
		2.4. Is the item required to prevent or mitigate a Category 1 DBE that could result in offsite doses greater than or equal to 25 **mrem** TEDE, per event, to any member of the public located on or beyond the site boundary [10 CFR 63.111(a) and 10 CFR 20.1301(a)(1)]? Category 1 DBE "per event" limits are interpreted as the sum of the normal operating dose and anticipated operational occurrences plus the consequences from any single additional low frequency Category 1 DBE. This sum is stated on an annual basis and consistent with 10 CFR 63.111(a) or 10 CFR 20.
		2.5. Is the item, in conjunction with an additional item or administrative control (i.e., indirect impact), required to prevent or mitigate a Category 1 DBE that could result in offsite doses greater than or equal to 100 **mrem** TEDE, per event, to any member of the public located on or beyond the site boundary? Category 1 DBE "per event" limits are interpreted as the sum of the normal operating dose and anticipated operational occurrences plus the consequences from any single additional low frequency Category 1 DBE. This sum is stated on an annual basis and consistent with 10 CFR 63.111(a) or 10 CFR 20.
		2.6. Is the item, in conjunction with an additional item or administrative control (i.e., indirect impact), required to prevent or mitigate a Category 2 DBE that could result in offsite doses greater than or equal to 5 **rem** TEDE, 50 **rem** combined deep dose equivalent and committed dose equivalent to any individual organ or tissue (other than the lens of the eye), 15 **rem** dose equivalent to the lens of the eye, or 50 **rem** shallow dose equivalent to the skin, per event, to any individual located on or beyond any point on the boundary of the site?
9.		Postclosure Phase:
		2.7. As a result of a DBE, could consequential failure of the item, which is not intended to perform a Quality Level 1 waste isolation function, result in: a. the inability of Quality Level 1 engineered barriers to perform their intended long-term waste isolation function in the postclosure phase?
		b. long-term changes to the hydrological characteristics of natural barriers by creating significant ponding or the possibility of drainage into the postclosure underground?
		c. the introduction of fluids or other materials that could adversely affect the long-term geo-mechanical characteristics of natural barriers in the postclosure phase?
		d. compromising the ability of the natural barriers to isolate waste in the postclosure phase?
10.		Do the answers to Blocks 8 and 9 qualify the item as a Quality Level 2 item?

Attachment II MGR Classification Checklists

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation for MGR

Complete only applicable items.

QA: L

Page: 4 Of: 4

MGR Quality Level 3 Checklist

Yes	No		
12.			Preclosure Phase:
		3.1.	Does the item function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive material?
		3.2.	Does the item function to monitor variables to verify that operating conditions are within technical specification limits?
		3.3.	Is the item used in MGR emergency response to provide prompt evacuation of personnel, or to monitor variables used in helping to determine the cause or consequences of DBEs (during post-accident investigations)?
		3.4.	Does the item function as a part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE?
		3.5.	Is the item part of the design or design objectives for keeping levels of radioactive material in effluent to unrestricted areas as low as practicable during normal operations?
		3.6.	Is the item required to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 5 rem per year TEDE, 50 rem per year combined deep dose equivalent and committed dose equivalent to any individual organ or tissue (other than the lens of the eye), 15 rem per year dose equivalent to the lens of the eye, or 50 rem per year shallow dose equivalent to the skin or any extremity?
13.			Do the answers to Block 12 qualify the item as a Quality Level 3 item?

14. Comments/Justification:

QAP-2-3 (Effective 05/26/1999) 0973 (Rev. 05/06/1999)

SFS
Subsurface Facility System

SSC: Access Mains

Level 3: N/A

Level 4: N/A

SFS

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
PS CQ ☑ CQ ☑

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The Subsurface Facility System encompasses the location, arrangement, size and spacing of the underground openings. This subsurface system includes accesses, alcoves, and drifts. This system provides access to the underground, provides for the emplacement of waste packages, provides openings to allow safe and secure work conditions, and interfaces with the natural barrier. The access mains are not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		This item is not directly or indirectly relied upon to provide an Important to Waste Isolation function.

Note: If only No answers are given, the item is not subject to QARD requirements. The item is classified as Conventional Quality and an Importance to Safety or Waste Isolation evaluation is not required. Stop Here.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☐		N/A
1.2	☐	☐		N/A
1.3	☐	☐		N/A
1.4	☐	☐	a.	N/A
	☐	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

2.4	☐	☐		N/A
2.5	☐	☐		N/A
2.6	☐	☐		N/A
2.7	☐	☐	a.	N/A
	☐	☐	b.	
	☐	☐	c.	
	☐	☐	d.	

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A

SFS
Subsurface Facility System

SSC: Emplacement Drifts
Level 3: N/A
Level 4: N/A

SFS
QL1 ☑
PS1 ☐ QL2 ☐
PS2 ☑ QL3 ☐
PS CQ ☐ CQ ☐

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: 458, 460

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The Subsurface Facility System encompasses the location, arrangement, size and spacing of the underground openings. This subsurface system includes accesses, alcoves, and drifts. This system provides access to the underground, provides for the emplacement of waste packages, provides openings to allow safe and secure work conditions, and interfaces with the natural barrier. The emplacement drifts are not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☑	☐		The emplacement drifts are indirectly relied upon to provide an Important to Waste Isolation function.

Note: A Yes answer has been selected for either PS1 or PS2, therefore, the item is subject to QARD requirements. An Importance to Safety or Waste Isolation evaluation is required. Please continue with the evaluation checklists below.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☑		Failure of the emplacement drifts would not result in a loss of WP containment or criticality control for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR. DBE analysis is expected to show that the WP is capable of withstanding the credible rockfall (>1E-06/yr) within the emplacement drift without resulting in a radioactive release exceeding the applicable dose limits as specified in 10 CFR 63.111(b)(1) and 10 CFR 20.1301(a)(1) or 10
1.2	☐	☑		The emplacement drifts are not required to prevent or mitigate a Category 1 DBE that could result in offsite doses greater than or equal to 100 mrem TEDE, per event, to any member of the public located on or beyond the site boundary [10 CFR 63.111(b)(1) and 10 CFR 20.1301(a)(1)].
1.3	☐	☑		The system is not required to prevent or mitigate Category 2 DBEs that could exceed the values specified in 10 CFR 63.111(b)(2) . DBE analysis is expected to show that the WP is capable of withstanding the credible rockfall (>1E-06/yr) within the emplacement drift without resulting in a radioactive release exceeding the applicable dose limits as specified in 10 CFR 63.111(b)(1) and 10 CFR 20.1301(a)(1) or 10 CFR 63.111(b)(2). This QA classification applies to both emplacement and development activities. (TBV-458)
1.4	☐	☑	a.	The emplacement drifts are constructed within the natural barrier, but do not form part of the natural barrier. However, the sizing and placement of the emplacement drifts invokes the waste isolation requirements of 10 CFR 63.113(c) and (d). They are directly credited in the performance assessment required to demonstrate the ability of the geologic repository to meet the 10 CFR63.113 dose requirements.
	☑	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

2.4	☐	☐	N/A
2.5	☐	☐	N/A
2.6	☐	☐	N/A
2.7	☐	☐ a.	N/A
	☐	☐ b.	
	☐	☐ c.	
	☐	☐ d.	

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		This item is not directly or indirectly relied upon to provide an Important to Waste Isolation function.

Note: If only No answers are given, the item is not subject to QARD requirements. The item is classified as Conventional Quality and an Importance to Safety or Waste Isolation evaluation is not required. Stop Here.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☐		N/A
1.2	☐	☐		N/A
1.3	☐	☐		N/A
1.4	☐	☐	a.	N/A
	☐	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

			Rationale:
2.4	☐	☐	N/A
2.5	☐	☐	N/A
2.6	☐	☐	N/A
2.7	☐	☐ a.	N/A
	☐	☐ b.	
	☐	☐ c.	
	☐	☐ d.	

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A

SFS
Subsurface Facility System

SSC: Miscellaneous Support Openings

Level 3: N/A

Level 4: N/A

SFS

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
PS CQ ☑ CQ ☑

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		This item is not directly or indirectly relied upon to provide an Important to Waste Isolation function.

Note: If only No answers are given, the item is not subject to QARD requirements. The item is classified as Conventional Quality and an Importance to Safety or Waste Isolation evaluation is not required. Stop Here.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☐		N/A
1.2	☐	☐		N/A
1.3	☐	☐		N/A
1.4	☐	☐	a.	N/A
	☐	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

2.4	☐	☐	N/A
2.5	☐	☐	N/A
2.6	☐	☐	N/A
2.7	☐	☐ a.	N/A
	☐	☐ b.	
	☐	☐ c.	
	☐	☐ d.	

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A

SFS
Subsurface Facility System

SSC: Performance Confirmation Openings

Level 3: N/A

Level 4: N/A

SFS

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
PS CQ ☑ CQ ☑

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		This item is not directly or indirectly relied upon to provide an Important to Waste Isolation function.

Note: If only No answers are given, the item is not subject to QARD requirements. The item is classified as Conventional Quality and an Importance to Safety or Waste Isolation evaluation is not required. Stop Here.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☐		N/A
1.2	☐	☐		N/A
1.3	☐	☐		N/A
1.4	☐	☐	a.	N/A
	☐	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

2.4	☐	☐	N/A
2.5	☐	☐	N/A
2.6	☐	☐	N/A
2.7	☐	☐	a. N/A
	☐	☐	b.
	☐	☐	c.
	☐	☐	d.

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A

SFS
Subsurface Facility System

SSC: Portals and Access Ramps

Level 3: N/A

Level 4: N/A

SFS

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
PS CQ ☑ CQ ☑

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		This item is not directly or indirectly relied upon to provide an Important to Waste Isolation function.

Note: If only No answers are given, the item is not subject to QARD requirements. The item is classified as Conventional Quality and an Importance to Safety or Waste Isolation evaluation is not required. Stop Here.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☐		N/A
1.2	☐	☐		N/A
1.3	☐	☐		N/A
1.4	☐	☐	a.	N/A
	☐	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

2.4	☐	☐	N/A
2.5	☐	☐	N/A
2.6	☐	☐	N/A
2.7	☐	☐ a.	N/A
	☐	☐ b.	
	☐	☐ c.	
	☐	☐ d.	

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A

Q-List Rationale

SDD / SSC Reference: CRWMS M&O 1998c **TBVs Applicable to this Item:** N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is not directly or indirectly relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		This item is not directly or indirectly relied upon to provide an Important to Waste Isolation function.

Note: If only No answers are given, the item is not subject to QARD requirements. The item is classified as Conventional Quality and an Importance to Safety or Waste Isolation evaluation is not required. Stop Here.

QL1 - Quality Level 1: High Safety or Waste Isolation Significance

	Yes	No		Rationale:
1.1	☐	☐		N/A
1.2	☐	☐		N/A
1.3	☐	☐		N/A
1.4	☐	☐	a.	N/A
	☐	☐	b.	

QL2 - Quality Level 2: Low Safety or Waste Isolation Significance

	Yes	No	Rationale:
2.1	☐	☐	N/A
2.2	☐	☐	N/A
2.3	☐	☐	N/A

Q-List Rationale

			Rationale:
2.4	☐	☐	N/A
2.5	☐	☐	N/A
2.6	☐	☐	N/A
2.7	☐	☐ a.	N/A
	☐	☐ b.	
	☐	☐ c.	
	☐	☐ d.	

QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance

	Yes	No	Rationale:
3.1	☐	☐	N/A
3.2	☐	☐	N/A
3.3	☐	☐	N/A
3.4	☐	☐	N/A
3.5	☐	☐	N/A
3.6	☐	☐	N/A