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WM-11  
NMS07

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT  
ANALYSIS/MODEL COVER SHEET**

1. QA: L  
Page: 1 of: 9

*Complete Only Applicable Items*

2.  Analysis       Engineering  
                                   Performance Assessment  
                                   Scientific

3.  Model       Conceptual Model Documentation  
                                   Model Documentation  
                                   Model Validation Documentation

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Classification of the MGR Ground Control System

5. Document Identifier (including Rev. No. and Change No., if applicable):  
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12. Remarks:  
This analysis contains no To Be Verified (TBV) design inputs.

The Document Identifier for this document previously was BCA000000-01717-0200-00028 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.

**PRELIMINARY DRAFT  
INFORMATION ONLY**

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT  
ANALYSIS/MODEL REVISION RECORD

1. Page: 2 of: 9

*Complete Only Applicable Items*

2. Analysis or Model Title:

Classification of the MGR Ground Control System

3. Document Identifier (including Rev. No. and Change No., if applicable):

ANL-GCS-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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## 1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) ground control 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.

## 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 Based on the *Ground Control System Description Document* (CRWMS M&O 1998c), this analysis assumes that the ground control system provides for the safe construction and operation of the subsurface facility system by controlling the configuration and stability of the openings and preventing rock falls during construction, development, and caretaker modes of the facility. This analysis also assumes that the ground control system architecture is based on the subsurface facility system architecture and the MGR architecture as established by *Monitored Geologic Repository Architecture* (CRWMS M&O 1999b). In addition, it is assumed 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.

## 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 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) (see Assumption 5.1). 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 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.

### 6.4 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. Ground Control System QA Classification**

Ground Control System (GCS)	QL-1	QL-2	QL-3	CQ	TBV
Access Mains				X	N/A
Emplacement Drifts		X			N/A
Exhaust Air 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

## 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. *Ground Control System Description Document*. BCA000000-01717-1705-00011, REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980825.0286.

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 (1.2.1.1) 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.

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
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  
 for MGR

QA: L

Complete only applicable items.

Page: 2 Of: 4

MGR Quality Level 2 Checklist

Yes	No	
		<p><b>8.</b> Preclosure Phase:</p> <p>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?</p> <p>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.</p>
		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?
		<p><b>9.</b> Postclosure Phase:</p> <p>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:</p> <p>a. the inability of Quality Level 1 engineered barriers to perform their intended long-term waste isolation function in the postclosure phase?</p> <p>b. long-term changes to the hydrological characteristics of natural barriers by creating significant ponding or the possibility of drainage into the postclosure underground?</p> <p>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?</p> <p>d. compromising the ability of the natural barriers to isolate waste in the postclosure phase?</p>
		10. Do the answers to Blocks 8 and 9 qualify the item as a Quality Level 2 item?



**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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	<input type="checkbox"/>	

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

	Yes	No	Rationale:
2.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A

**Q-List Rationale**

2.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.7	<input type="checkbox"/>	<input type="checkbox"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.
	<input type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input type="checkbox"/>	d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

- 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	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: criticality control, shielding, heat transfer, structural integrity, or operations support necessary for waste handling safety. However, in the preclosure phase of the repository, the ground control system does provide confinement/containment functions in the emplacement drifts.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	This item is not indirectly or directly 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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Failure of the emplacement drifts ground control system would not directly result in a loss of waste package containment or criticality control. DBE analysis is expected to show that the waste package 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 10CFR63 and 10CFR20.
1.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The emplacement drifts ground control system is not required to provide reasonable assurance that high-level waste can be emplaced, and retrieved without exceeding the requirements of 10 CFR 63.111(b)(1) and 10 CFR 20.1301(a)(1) for Category 1 DBEs.
1.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Emplacement drifts are 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 waste package 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)(2). This QA classification applies to both emplacement and development activities. (TBV-458)
1.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No credit is taken for the ground control system in meeting the requirements of 10 CFR 63.113 or 10 CFR 63.114.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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

	Yes	No	Rationale:
2.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	This SSC does not perform a site-generated radioactive waste control function.
2.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	This SSC does not perform a fire protection function.
2.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Failure of this SSC as a result of a DBE would not impair the capability of QL-1 SSCs to perform their intended radiological safety function. No QL-1 SSCs, other than the waste package, are located in the emplacement drifts and DBE analysis is expected to show that the waste package is capable of withstanding the credible rockfall (>1E-06/yr) without exceeding the applicable dose limits as specified in 10 CFR 60.111(a) or 10 CFR 60.136.

Level 3: N/A

Level 4: N/A

QL1   
PS1  QL2   
PS2  QL3   
PS CQ  CQ

**Q-List Rationale**

- 2.4   This item is not 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)].
- 2.5   This item, in conjunction with an additional item or administrative control (i.e., indirect impact), is 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.
- 2.6   The emplacement drift ground control system, in conjunction with an additional item or administrative control (i.e., the waste package), is required to prevent or mitigate a Category 2 DBE (such as a rockfall in the emplacement drift) that could result in offsite doses greater than or equal to the more limiting of 10 CFR 63.111(b)(2) doses to any individual located on, or beyond, any point on the site boundary.
- 2.7   a. Failure of emplacement drift ground control as a result of a DBE will not compromise the ability of natural barriers to perform the intended long-term waste isolation function in the postclosure phase.  
  b.  
  c.  
  d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	<input type="checkbox"/>	

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

	Yes	No	Rationale:
2.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

QL1

PS1  QL2

PS2  QL3

PS CQ  CQ

**Q-List Rationale**

2.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.7	<input type="checkbox"/>	<input type="checkbox"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.
	<input type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input type="checkbox"/>	d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	<input type="checkbox"/>	

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

	Yes	No	Rationale:
2.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A

**Q-List Rationale**

2.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.7	<input type="checkbox"/>	<input type="checkbox"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.
	<input type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input type="checkbox"/>	d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

QL1

PS1  QL2

PS2  QL3

PS CQ  CQ

**Q-List Rationale**

SDD / SSC Reference:

TBVs Applicable to this Item:

**Pre-Screen - Importance to Safety or Waste Isolation Evaluation**

Yes	No	Rationale:
PS1 <input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2 <input type="checkbox"/>	<input checked="" type="checkbox"/>	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 <input type="checkbox"/>	<input type="checkbox"/>	N/A
1.2 <input type="checkbox"/>	<input type="checkbox"/>	N/A
1.3 <input type="checkbox"/>	<input type="checkbox"/>	N/A
1.4 <input type="checkbox"/>	<input type="checkbox"/>	N/A
<input type="checkbox"/>	<input type="checkbox"/>	

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

Yes	No	Rationale:
2.1 <input type="checkbox"/>	<input type="checkbox"/>	N/A
2.2 <input type="checkbox"/>	<input type="checkbox"/>	N/A
2.3 <input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

QL1

PS1  QL2

PS2  QL3

PS CQ  CQ

**Q-List Rationale**

2.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.7	<input type="checkbox"/>	<input type="checkbox"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.
	<input type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input type="checkbox"/>	d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
1.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	<input type="checkbox"/>	

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

	Yes	No	Rationale:
2.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

QL1

PS1  QL2

PS2  QL3

PS CQ  CQ

**Q-List Rationale**

2.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.7	<input type="checkbox"/>	<input type="checkbox"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.
	<input type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input type="checkbox"/>	d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

QL1

PS1  QL2

PS2  QL3

PS CQ  CQ

**Q-List Rationale**

SDD / SSC Reference:

TBVs Applicable to this Item:

**Pre-Screen - Importance to Safety or Waste Isolation Evaluation**

Yes	No	Rationale:
PS1 <input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PS2 <input type="checkbox"/>	<input checked="" type="checkbox"/>	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 <input type="checkbox"/>	<input type="checkbox"/>	N/A
1.2 <input type="checkbox"/>	<input type="checkbox"/>	N/A
1.3 <input type="checkbox"/>	<input type="checkbox"/>	N/A
1.4 <input type="checkbox"/>	<input type="checkbox"/>	N/A
<input type="checkbox"/>	<input type="checkbox"/>	

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

Yes	No	Rationale:
2.1 <input type="checkbox"/>	<input type="checkbox"/>	N/A
2.2 <input type="checkbox"/>	<input type="checkbox"/>	N/A
2.3 <input type="checkbox"/>	<input type="checkbox"/>	N/A

Level 3: N/A

Level 4: N/A

QL1

PS1  QL2

PS2  QL3

PS CQ  CQ

**Q-List Rationale**

2.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A
2.7	<input type="checkbox"/>	<input type="checkbox"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.
	<input type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input type="checkbox"/>	d.

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

	Yes	No	Rationale:
3.1	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.2	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.3	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.4	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.5	<input type="checkbox"/>	<input type="checkbox"/>	N/A
3.6	<input type="checkbox"/>	<input type="checkbox"/>	N/A