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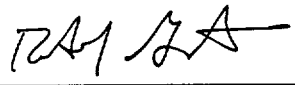
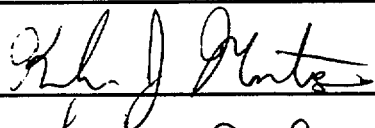
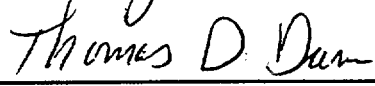
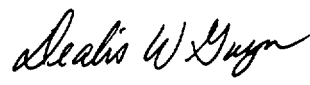
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**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET**

1. QA: L
Page: 1 of: 11

Complete Only Applicable Items

2. <input checked="" type="checkbox"/> Analysis <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> Performance Assessment <input type="checkbox"/> Scientific	3. <input type="checkbox"/> Model <input type="checkbox"/> Conceptual Model Documentation <input type="checkbox"/> Model Documentation <input type="checkbox"/> Model Validation Documentation		
4. Title: Classification of the MGR Waste Emplacement System			
5. Document Identifier (including Rev. No. and Change No., if applicable): ANL-WES-SE-000001 REV 00			
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8. Originator	Robert Garrett		8/31/99
9. Checker	Kelvin J. Montague		8/31/99
10. Lead/Supervisor	Thomas D. Dunn		8/31/99
11. Responsible Manager	Dealis W. Gwyn		8/31/99

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 This analysis contains To Be Verified (TBV) design input as follows: TBV-460.

The Document Identifier for this document previously was BCA000000-01717-0200-00038 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.

**FOR INFORMATION
ONLY**

N1H03

PDR WASTE um-11

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL REVISION RECORD**

1. Page: 2 of: 11

Complete Only Applicable Items

2. Analysis or Model Title:
Classification of MGR Waste Emplacement System

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

ANL-WES-SE-000001 REV 00

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue. This system-specific analysis was performed to supercede the applicable portion of B000000000-01717-0200-00134 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) waste emplacement 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, as modified through the application of an MGR preclosure safety strategy, 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 This analysis assumes that system design and SSC functions are established by the text and description of the system in the *Waste Emplacement System Description Document* (CRWMS M&O 1998c). This assumption is based on the fact that this type of information is found in this System Description Document (SDD). 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 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. In the case of the waste emplacement system, the safety strategy assumes that the system design prevents impacts which exceed the waste package design basis. As a result, the waste package 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 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 *Waste Emplacement System Description Document* (SDD) (CRWMS M&O 1998c) and the *Monitored Geologic Repository 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 waste package (WP), (3) packaging/sealing waste in 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 the 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.

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

- Design the transporter to withstand the worst case impact without breaching the WP.
- Design the locomotive/transporter with redundant and diverse braking systems to prevent the runaway at a frequency of $<1\text{E-}06/\text{yr}$.

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. As a result of the above assumptions, the WP is assumed to maintain containment of radioactive material.

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. The impact of important assumptions made in this analysis and the associated TBVs are discussed in the following section.

Table 1. Waste Emplacement System QA Classification

Waste Emplacement System (WES)	QL-1	QL-2	QL-3	CQ	TBV
Emplacement Gantry		X			460
Gantry Carrier				X	460
Locomotives	X				460
Rail Car				X	460
Waste Package Transporter	X				460

7.2 IMPACT OF UNVERIFIED DATA

7.2.1 TBV-460

This analysis assumes that the design guidance provided by the "Strategy to Mitigate Preclosure Offsite Exposure" (Hastings 1998 [all]) is incorporated into the subsurface emplacement transfer, waste emplacement and ex-container systems. The following paragraphs discuss the impacts of not implementing the strategy. It should be noted that these impacts are based upon the preliminary DBE analysis of 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 Sections 5.2 and 6.3.

The preclosure safety strategy makes the following assumptions concerning MGR waste emplacement transportation and waste emplacement systems (Hastings 1998, Attachment 3):

- WP breach as a result of transporter accident in the north emplacement ramp area or main drifts is prevented through transporter and/or locomotive design.
- Lifts or transports above the design basis drop height for a WP will not be performed during the emplacement of the WP in the drift.

The impact of not achieving the strategy objective may include requiring a seismically qualified transporter and rail system and emplacement gantry. The emplacement gantry may be reclassified from QL-2 to QL-1 and the waste emplacement system rail car from CQ to QL-1.

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*. BC00000000-01717-0210-00001 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19981002.0001.

CRWMS M&O 1998b. *Monitored Geologic Repository Concept of Operations*. B000000000-01717-4200-00004 REV 02. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980810.0283.

CRWMS M&O 1998c. *Waste Emplacement System Description Document*. BCA0000000-01717-1705-00017. Rev 00. Las Vegas, NV: Civilian Radioactive Waste Management System. Management and Operating Contractor. ACC: MOL.19980519.0234.

CRWMS M&O 1998d. *Classification of the Preliminary MGDS Repository Design*. B000000000-01717-0200-00134 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*. B000000000-01717-5700-00011 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
WHB	Waste Handling Building
WP	Waste Package
YAP	YMP Administrative Procedure
YMP	Yucca Mountain Site Characterization Project

CRWMS/M&O

QA: L

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[illegible]

CRWMS/M&O	Importance to Safety or Waste Isolation Evaluation for MGR
1.0	1.0
2.0	2.0
3.0	3.0
4.0	4.0
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94.0	94.0
95.0	95.0
96.0	96.0
97.0	97.0
98.0	98.0
99.0	99.0
100.0	100.0

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

[illegible]

Attachment II MGR Classification Checklists

CRWMS/M&O Importance to Safety or Waste Isolation Evaluation
for MGR

QA: L

Complete only applicable items.

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MGR Quality Level 2 Checklist

Yes	No	
8.		<p>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> <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?</p> <p>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?</p> <p>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.</p> <p>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.</p> <p>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>
9.		<p>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.		<p>Do the answers to Blocks 8 and 9 qualify the item as a Quality Level 2 item?</p>

CRWMS/M&O	Importance to Safety or Waste Isolation Evaluation for MGR
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MGR Quality Level 3 Checklist

[illegible]

WES

Waste Emplacement System

SSC: Emplacement Gantry

Level 3: N/A

Level 4: N/A

WESQL1 ☐PS1 ☒ QL2 ☒PS2 ☐ QL3 ☐PS CQ ☐ CQ ☐**Q-List Rationale**

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: 460

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No	Rationale:
PS1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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, or structural integrity. However, the gantry functions to lift the WP off of the reusable rail car and to carry the WP into the emplacement drift. This is a support operation necessary for waste handling safety.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	c.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	d.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	e.
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	f.
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: 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 gantry would not directly 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.
1.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The emplacement gantry functions to lift the WP off of the reusable rail car and carry the WP into the emplacement drift. The gantry lowers the WP onto pedestals, disengages from the WP and moves back to the transfer dock. The gantry 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 (10 CFR 63.111(b)(1) and 10 CFR 20.1301(a)(1)).
1.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The gantry is not required to prevent or mitigate Category 2 DBEs that could result in doses exceeding the requirement of 10 CFR 63.111(b)(2). (TBV-460)
1.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. The emplacement gantry does not perform a waste isolation function.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b.

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

	Yes	No	Rationale:
2.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The emplacement gantry does not perform a site-generated radioactive waste control function.
2.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The emplacement gantry does not perform a fire protection function.
2.3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Failure of emplacement gantry as a result of a DBE may impair the capability of QL-1 SSCs (waste packages) from performing their intended radiological safety function in the preclosure phase.

WES

Waste Emplacement System

SSC: Emplacement Gantry

Level 3: N/A

Level 4: N/A

WESQL1 ☐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 ☐ ☒ This item, in conjunction with an additional item or administrative control (i.e., indirect impact), is not required to prevent or mitigate a Category 2 DBE 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 the emplacement gantry as a result of a DBE will not compromise the ability of a QL-1 SSC (such as a waste packages) to perform its 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

WES

Waste Emplacement System

SSC: Gantry Carrier

Level 3: N/A

Level 4: N/A

WESQL1 ☐PS1 ☐ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☒ CQ ☒**Q-List Rationale**

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: 460

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No	Rationale:
PS1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. The emplacement gantry carrier functions to transport the emplacement gantry from a gantry storage location to an emplacement drift. The carrier does not handle or transport waste packages. 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:
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b. 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"/>	c.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	d.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	e.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	f.
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"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.

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

WES

Waste Emplacement System

SSC: Gantry Carrier

Level 3: N/A

Level 4: N/A

WESQL1 ☐PS1 ☐ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☒ CQ ☒**Q-List Rationale**2.4 ☐ ☐ N/A2.5 ☐ ☐ N/A2.6 ☐ ☐ N/A2.7 ☐ ☐ a. N/A
☐ ☐ b.
☐ ☐ c.
☐ ☐ d.**QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance**

Yes No Rationale:

3.1 ☐ ☐ N/A3.2 ☐ ☐ N/A3.3 ☐ ☐ N/A3.4 ☐ ☐ N/A3.5 ☐ ☐ N/A3.6 ☐ ☐ N/A

WES

Waste Emplacement System

SSC: Locomotives

Level 3: N/A

Level 4: N/A

WESQL1 ☒PS1 ☒ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☐ CQ ☐**Q-List Rationale**

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: 460

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No	Rationale:
PS1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	a. Locomotives are used to transfer the waste package transporter/waste package from the surface to the emplacement areas.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b. Failure of a locomotive may result in the impact of a waste package with the subsurface facility structure or other facility equipment and subsequent radiological release. This item is not directly or indirectly relied upon to provide the remaining
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	c. Important to Safety functions for radioactive wastes received or handled at the MGR: criticality control, shielding, heat transfer,
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	d. structural integrity, or operations support necessary for waste handling safety.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	e.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	f.
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: 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"/>	Locomotive failure will not directly result in a loss of waste package containment for the spent nuclear fuel, high-level waste, or other radioactive materials received for emplacement at the MGR.
1.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Locomotives are used to transfer the waste package transporter/waste package from the surface to the emplacement areas. Failure of a locomotive (or a component such as brakes) may result in the impact of a waste package with the subsurface facility structure or other facility equipment and subsequent radiological release. This SSC is 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This SSC is required to mitigate or prevent Category 2 DBEs that could exceed the values specified in 10 CFR 63.111(b)(2). It should be noted that if the waste package transporter/waste package are designed to withstand all credible DBEs without exceeding dose limits, the locomotives may not be classified QL-1.
1.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. The locomotives do not perform a waste isolation function.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b.

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

WES

Waste Emplacement System

SSC: Locomotives

Level 3: N/A

Level 4: N/A

WESQL1 ☒PS1 ☒ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☐ CQ ☐**Q-List Rationale**2.4 ☐ ☐ N/A2.5 ☐ ☐ N/A2.6 ☐ ☐ N/A2.7 ☐ ☐ a. N/A
☐ ☐ b.
☐ ☐ c.
☐ ☐ d.**QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance**

Yes No

Rationale:

3.1 ☐ ☐ N/A3.2 ☐ ☐ N/A3.3 ☐ ☐ N/A3.4 ☐ ☐ N/A3.5 ☐ ☐ N/A3.6 ☐ ☐ N/A

WES

Waste Emplacement System

SSC: Rail Car

Level 3: N/A

Level 4: N/A

WESQL1 ☐PS1 ☐ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☒ CQ ☒**Q-List Rationale**

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: 460

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No	Rationale:
PS1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. The reusable rail car functions to support the waste package inside the waste package transporter and allow waste package movement in and out of the transporter and the waste handling building, respectively. This item is not directly or indirectly
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b. relied upon to provide one of the following Important to Safety functions for radioactive wastes received or handled at the MGR:
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	c. confinement or containment, criticality control, shielding, heat transfer, structural integrity, or operations support necessary for
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	d. waste handling safety.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	e.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	f.
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"/>	a. N/A
	<input type="checkbox"/>	<input type="checkbox"/>	b.

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

WES

Waste Emplacement System

SSC: Rail Car

Level 3: N/A

Level 4: N/A

WESQL1 ☐PS1 ☐ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☒ CQ ☒**Q-List Rationale**2.4 ☐ ☐ N/A2.5 ☐ ☐ N/A2.6 ☐ ☐ N/A2.7 ☐ ☐ a. N/A
☐ ☐ b.
☐ ☐ c.
☐ ☐ d.**QL3 - Quality Level 3: Minor Safety Significance or Occupational Exposure Significance**Yes No Rationale:
3.1 ☐ ☐ N/A3.2 ☐ ☐ N/A3.3 ☐ ☐ N/A3.4 ☐ ☐ N/A3.5 ☐ ☐ N/A3.6 ☐ ☐ N/A

WES

Waste Emplacement System

SSC: Waste Package Transporter

Level 3: N/A

Level 4: N/A

WESQL1 ☒PS1 ☒ QL2 ☐PS2 ☐ QL3 ☐PS CQ ☐ CQ ☐**Q-List Rationale**

SDD / SSC Reference: CRWMS M&O 1998c

TBVs Applicable to this Item: 460

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No	Rationale:
PS1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	a. The waste package transporter encloses the waste package during the transfer from the surface facilities to the emplacement areas. Failure of a waste package transporter may result in the overexposure of a facility operator or the impact of a waste package with the subsurface facility structure or other facility equipment and a subsequent radiological release. This item is not directly or indirectly relied upon to provide the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: criticality control, heat transfer, structural integrity, or operations support necessary for waste handling safety.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b.
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	c.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	d.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	e.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	f.
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: 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"/>	Waste package transporter failure will not directly result in a loss of WP containment for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR.
1.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Failure of a waste package transporter (or part of the transporter, such as a braking system or other mechanical component) may result in 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Failure of a waste package transporter (or part of the transporter, such as a braking system or other mechanical component) may result in a Category 2 DBE that could result in offsite doses greater than or equal to 5 rem TEDE to any member of the public located on or beyond the site boundary, as well as values specified in 10 CFR 63.111(b)(2). It should be noted that if the waste package transporter/waste package are designed to withstand all credible DBEs without exceeding dose limits, the transporter may not be classified QL-1.
1.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	a. The waste package transporter does not perform a waste isolation function.
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	b.

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

WES

Waste Emplacement System

SSC: Waste Package Transporter

Level 3: N/A

Level 4: N/A

WESQL1 ☒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