BECHTEL SAIC COMPANY LLC

QA: N/A

PROJ.06/01.057

June 26, 2001

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CONTRACT NO. DE-AC08-01RW12101 – PRECLOSURE CLASSIFICATION ANALYSIS DOCUMENTS TRANSMITTED TO THE NUCLEAR REGULATORY COMMISSION

This letter transmits six classification analysis documents requested by the U. S. Nuclear Regulatory Commission (NRC) and the Center for Nuclear Waste Regulatory Analyses staff during the June 18, 2001, preliminary discussion of the agenda for the upcoming U.S. Department of Energy (DOE)/NRC Preclosure Technical Exchange.

We are ready to assist you in any way that will be beneficial to the project. Please contact Donald A. Beckman at (702) 295-4392 or Jack E. Bess at (702) 295-5322 for any additional information you may require.

Nancy H. Williams
Manager of Projects

JEB:cdg

Enclosures:
1. CRWMS M&O 2001a. *Classification of the MGR Carrier/Cask Handling System.* ANL-CCH-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20010227.0041. (3 copies)
2. CRWMS M&O 2001b. *Classification of the MGR Carrier Preparation Building Materials Handling System.* ANL-CMH-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC:MOL.20010227.0042. (3 copies)
3. CRWMS M&O 2001c. *Classification of the MGR Waste Handling Building Ventilation System.* ANL-HBV-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC:MOL.20010227.0044. (3 copies)
4. CRWMS M&O 2001d. *Classification of the MGR Waste Emplacement/Retrieval System.* ANL-WES-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC:MOL.20010227.0016. (3 copies)

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5. CRWMS M&O 2001e. *Classification of the MGR Waste Package Remediation System.* ANL-WPR-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC:MOL.20010227.0117. (3 copies)
6. CRWMS M&O 2001f. *Classification of the MGR Emplacement Drift System.* ANL-EDS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC:MOL.20010227.0043. (3 copies)

cc w/o encl:
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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA

Complete Only Applicable Items

2. ☑ Analysis — Check all that apply

Type of Analysis:
- ☑ Engineering
- ☐ Performance Assessment
- ☐ Scientific

Intended Use of Analysis:
- ☐ Input to Calculation
- ☐ Input to another Analysis or Model
- ☐ Input to Technical Document
- ☑ Input to other Technical Products

Describe use:
QA Classification of the MGR Carrier/Cask Handling System for input to the *Q-List* and other technical documents as appropriate.

3. ☐ Model — Check all that apply

Type of Model:
- ☐ Conceptual Model
- ☐ Abstraction Model
- ☐ Mathematical Model
- ☐ System Model
- ☐ Process Model

Intended Use of Model:
- ☐ Input to Calculation
- ☐ Input to another Model or Analysis
- ☐ Input to Technical Document
- ☐ Input to other Technical Products

Describe use:

4. Title:
Classification of the MGR Carrier/Cask Handling System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-CCH-SE-000001 REV 01

6. Total Attachments:
3

7. Attachment Numbers - No. of Pages in Each:
I-1; II-4; III-8

	Printed Name	Signature	Date
8. Originator	Jo A. Ziegler	Jo A. Ziegler	2/8/01
9. Checker	Robert T. Garrett	R A Garrett	2/8/01
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11. Responsible	Dealis W. Gwyn	Dealis W. Gwyn	2/8/01

12. Remarks:
This analysis bases the classification of MGR 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 classification conclusions of 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 Carrier/Cask Handling System

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

ANL-CCH-SE-000001 REV 01

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue.
01	This revision is a complete rewrite of the initial issue. The Carrier/Cask Handling System architecture has been expanded to include subsystems (that were not included in the initial issue) that are classified in this revision.

CONTENTS

Page

Tables

1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) carrier/cask handling system structures, systems and components (SSCs) performed by the MGR Preclosure Safety and Systems Engineering Section. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 2000). The *Q-List* identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 2000).

This QA classification incorporates the current MGR design and the results of the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000b). The content and technical approach of this analysis is in accordance with the *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000c).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 2000) as determined by the activity evaluation contained in *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000c) in accordance with procedure AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* Controls prescribed by procedure AP-SV.1Q, *Control of Electronic Management of Information*, are addressed by information management controls, such as access privileges through passwords, backup and storage of data, etc. No quality affecting software is used in the preparation of this analysis.

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 2000). Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs.*

3. COMPUTER SOFTWARE AND MODEL USAGE

This analysis uses no software 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 *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000b), 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* (Duncan et al. 1988, 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 MGR DBE calculation (CRWMS M&O 2000b) postulates a release of radioactive material associated with the carrier/cask handling system and performs subsequent consequence analysis, implementation of the repository safety strategy (CRWMS M&O 2000d) prevents (occurrence frequency less than 1E-6/year) the breach of transportation casks and the release of radioactive material within the building. The MGR preclosure safety strategy is discussed in Section 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 of the QARD, "Classifying Items" (DOE 2000).

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation.

10 CFR 71. Energy: Packaging and Transportation of Radioactive Material.

Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada (Dyer 1999).

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

5. ASSUMPTIONS

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

5.1 This analysis assumes the implementation of guidance provided by the repository safety strategy (CRWMS M&O 2000d, Section 6.3). The safety strategy proposes general guidance focused on reducing the risks associated with the handling of spent nuclear fuel, high-level waste, and the associated casks, canisters, and containers. In the case of the carrier/cask handling system, the safety strategy assumes that a design basis impact will be determined for a transportation cask with impact limiters removed and that cask handling operations will be performed such that the design impact is not exceeded. As a result of this assumption, no event resulting in breach of a transportation cask is expected as part of carrier/cask handling operations and the cask is assumed to maintain confinement of radioactive material. This assumption is used in Section 6.3.

5.2 This analysis assumes that the radiation doses to facility workers as the result of normal operations and Category 1 DBEs associated with the carrier/cask handling system, do not exceed the occupational dose limits of 10 CFR Part 20, Subpart C. This assumption is based

on the waste form remaining within the shielded transportation cask during operations and the repository safety strategy (CRWMS M&O 2000d, Section 6.3) of system design preventing DBEs that result in a breach of the transportation cask. This assumption is utilized in Section 6.5 for the classification of SSCs.

5.3 This analysis assumes that, in the event of failure, system lifting fixtures and remote manipulators do not possess the mass required to impair the radiological safety or waste isolation functions of sealed transportation casks. This assumption is based upon the robust construction of the cask and is used in Section 6.5 for the classification of remote manipulators.

6. ANALYSIS

6.1 METHOD

The basic process for classifying permanent MGR 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. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 2000).

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 is 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 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 (Duncan et al. 1988, 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 system's SSCs are established. This classification analysis is based upon the system design and functions as established by the *Carrier/Cask Handling System Description Document* (CRWMS M&O 2000a). 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 PRECLOSURE SAFETY STRATEGY

The MGR preclosure safety strategy is to prevent or mitigate preclosure offsite exposure (see Assumption 5.2). This preclosure safety strategy is a general plan to be considered in establishing design requirements for the receipt, handling, packaging and emplacing of spent nuclear fuel and other high-level wastes in the planned repository. The strategy (CRWMS M&O 2000d) suggests a combination of containment and event prevention concepts for each of the general MGR operational functions: (1) receipt of waste, (2) transfer of waste into the disposal container, (3) sealing the disposal container, (4) transfer of the waste package to an emplacement drift, (5) emplacement in a drift, and (6) monitoring until repository closure.

The safety strategy is to handle transportation casks, spent nuclear fuel and high-level waste canisters, and waste packages within the design basis, such that events that result in exceeding design basis limits are not credible. In the MGR operating areas where bare spent nuclear fuel assemblies are vulnerable to a DBE (assembly transfer and disposal container handling systems), the safety strategy is to minimize the number of events that could result in uncanistered fuel drops and minimize the releases of radioactive material from drop events.

The carrier/cask handling system handling operations include removing transportation casks from the associated carrier and placing the casks onto a cask cart. The removal of cask impact limiters in the carrier preparation building changes the cask design basis drop height from 9 meters to some unknown value as the analysis of cask drops without impact limiters is not required by 10 CFR Part 71 and has not been performed. The preclosure safety strategy is that a design basis impact will be determined for a transportation cask with impact limiters removed and that lifts or transports that exceed this design impact will not be performed. It should be noted that this strategy requires that the transportation cask be designed and licensed for lifting without impact limiters and that a design basis impact compatible with MGR design can be established. Implementation of the MGR safety strategy results in no event with a breach of the transportation cask as part of carrier/cask handling system operations, and the cask is assumed to maintain containment of radioactive material. Consequently, no confinement function is required for the waste handling carrier bay and no requirement exists for an associated nuclear quality exhaust ventilation system in the carrier bay.

6.4 DESIGN BASIS EVENT ANALYSIS

A dose calculation of MGR DBEs (CRWMS M&O 2000b) has been performed to determine the effects of internal events on facility radiological safety and is utilized by this analysis in the classification of MGR SSCs. The DBE calculation addresses both the DBE frequencies and dose consequences at the site boundary. This analysis utilizes the results of the DBE calculation 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 calculation (CRWMS M&O 2000b, Table 9) are utilized in this evaluation.

7. CONCLUSIONS

7.1 MGR QA CLASSIFICATION

The results of this QA classification analysis are provided in Table 1. As the design of the MGR proceeds and further DBE analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary. The MGR classification checklist questions included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

Table 1. Carrier/Cask Handling System QA Classification

Carrier/Cask Handling System	QL-1	QL-2	QL-3	CQ
Control and Tracking System		X		
Handling System				
Cranes and Hoists		X		
Remote Manipulators			X	
Tooling and Fixtures				X

7.2 IMPACT OF UNVERIFIED DATA

This analysis may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System database.

7.2.1. Preclosure Safety Strategy

The safety strategy assumes that a design basis impact for a transportation cask with impact limiters removed is determined and that impacts exceeding the design value are prevented (occurrence frequency less than 1E-6/year). The impact of not achieving the strategy objective may include:

- No transfers of transportation casks outside of confined, exhaust-air-filtered areas after removal of impact limiters. This may require carrier preparation in the waste handling building carrier bay and provision of the carrier bay with an important-to-radiological-safety high-efficiency particulate air filtered exhaust system and required airlocks.

- Reclassification of the system cranes and hoists from QL-2 to QL-1.

- Reclassification of the control and tracking system from QL-2 to QL-1.

7.2.2 Compliance with Occupational Dose Limits

This analysis assumes that the radiation doses to facility workers as the result of Category 1 DBEs associated with the carrier/cask handling system do not exceed the occupational dose limits of 10 CFR Part 20, Subpart C. The basis of this assumption is provided in Section 5.3. This assumption requires that a future DBE analysis verify this assumption. If the assumption cannot be verified by MGR DBE analysis, system supporting equipment may be reclassified from CQ to QL-3.

8. INPUTS AND REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 2000a. *Carrier/Cask Handling System Description Document.* SDD-CCH-SE-000001 REV 01 ICN 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000807.0091.

CRWMS M&O 2000b. *Design Basis Event Frequency and Dose Calculation for Site Recommendation.* CAL-WHS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000627.0214.

CRWMS M&O 2000c. *Technical Work Plan for: Preclosure Safety Analysis.* TWP-MGR-SE-000010 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001220.0017.

CRWMS M&O 2000d. *Repository Safety Strategy: Plan to Prepare the Safety Case to Support Yucca Mountain Site Recommendation and Licensing Considerations.* TDR-WIS-RL-000001 REV 04 ICN 01. Two volumes. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001122.0186.

DOE (Department of Energy) 2000. *Quality Assurance Requirements and Description.* DOE/RW-0333P, Rev. 10. Washington D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

Duncan, A.B.; Bilhorn, S.G.; and Kennedy, J.E. 1988. *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. TIC: 200650.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), September 3, 1999. OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

YMP (Yucca Mountain Site Characterization Project) 2000. *Q-List.* YMP/90-55Q, Rev. 6. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.20000510.0177.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily available.

10 CFR 71. Energy: Packaging and Transportation of Radioactive Material. Readily available.

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. Readily available.

8.3 PROCEDURES

AP-2.21Q, Rev. 1. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* ACC: MOL.20010129.0145.

AP-3.10Q, Rev. 2, ICN 3. *Analyses and Models.* ACC: MOL.20000918.0282.

AP-SI.1Q, Rev. 2, ICN 4, ECN 1. *Software Management.* ACC: MOL.20001019.0023.

AP-SV.1Q, Rev. 0, ICN 2. *Control of the Electronic Management of Information.* ACC: MOL.20000831.0065.

AP-3.15Q, Rev. 2. *Managing Technical Product Inputs.* ACC: MOL.20001109.0051.

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

YAP-2.7Q, Rev. 1, ICN 2. *Item Classification and Maintenance of the Q-List.* ACC: MOL.19991214.0628.

9. ATTACHMENTS

Attachment I	Acronyms
Attachment II	MGR Classification Checklist Questions
Attachment III	MGR QA Classification

Attachment I

Acronyms

CQ	Conventional Quality
DBE	Design Basis Event
MGR	Monitored Geologic Repository
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SSCs	Structures, Systems, and Components
TBV	To Be Verified
TEDE	Total Effective Dose Equivalent

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist

Complete only applicable items.

QA: L

Page: 1 Of: 1

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 Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR**	QA: L
	Complete only applicable items.	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 05/28/1998) 0973 (Rev. 05/08/1999)

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR** *Complete only applicable items.*	QA: L Page: 2 Of: 4

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?

QAP-2-3 (Effective 05/26/1999) 0873 (Rev. 05/06/1999)

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. 05/08/1999)

CCH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Carrier/Cask Handling System**

SSC Classified **Control and Tracking System**

SDD Reference: SDD-CCH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: Section 5.3

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The control and tracking system is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		The control and tracking system 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	☐	☑		Failure of the control and tracking system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The control and tracking system is not 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). (See Section 5.2.)
1.3	☐	☑		The control and tracking system is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin. (See Section 5.2.)
1.4	☐	☑	a.	The control and tracking system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The control and tracking system does not perform a site-generated radioactive waste control function.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☑	☐	Failure of the crane (which is controlled by the control and tracking system) as a result of a DBE may result in a collision onto a transportation cask. Although the impact may be within the design basis of the transportation cask, this SSC is conservatively considered to impact the function of the transportation cask until DBE analysis or transportation cask design can eliminate the DBE.

CCH

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Carrier/Cask Handling System**

SSC Classified **Control and Tracking System**

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 (CRWMS M&O 2000b, Attachment IX).
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 that exceed regulatory limits to any individual located on, or beyond, any point on the site boundary.
2.7	☐	☑ a.	Failure of the control and tracking system as a result of a DBE is not expected to result in an interaction with other QL-1 High Waste Isolation Significant SSCs or compromise their ability to perform their intended waste isolation function.
	☐	☑ 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

CCH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Carrier/Cask Handling System**

SSC Classified **Cranes & Hoists**

SDD Reference: SDD-CCH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: Sec. 5.2 & 5.3

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The cranes and hoists are relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		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	☐	☑		Failure of the cranes and hoists does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The cranes and hoists are not 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). (See Section 5.2.)
1.3	☐	☑		The cranes and hoists are not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin. (See Section 5.2.)
1.4	☐	☑	a.	The cranes and hoists system is not a part of the natural or engineered barriers important to waste isolation.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The cranes and hoists system does not collect, contain, or monitor any site-generated radioactive waste.
2.2	☐	☑	The cranes and hoists system does not protect QL-1 SSCs from the effects of fire.
2.3	☑	☐	Failure of the crane as a result of a DBE may result in a collision onto a transportation cask. Although the impact may be within the design basis of the transportation cask, this SSC is conservatively considered to impact the function of the transportation cask until DBE analysis or transportation cask design can eliminate the DBE.

CCH

Classification Analysis Checklists

Classification Results

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

System: **Carrier/Cask Handling System**

SSC Classified **Cranes & Hoists**

2.4	☐	☑		Failure of this system will not result in offsite doses exceeding regulatory limits. The bounding Category 1 DBE dose plus the yearly normal operations dose do not exceed the 25 mrem regulatory limit (CRWMS M&O 2000b, Attachment IX). (See Section 5.3.)
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 that exceed regulatory limits to any individual located on, or beyond, any point on the site boundary.
2.7	☐	☑	a.	Failure of the cranes and hoists system as a result of a DBE does not compromise the ability of natural or engineered barriers to isolate waste.
	☐	☑	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

CCH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Carrier/Cask Handling System**

SSC Classified **Remote Manipulators**

SDD Reference: SDD-CCH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: Section 5.4

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The remote manipulators are relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		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	☐	☑		Failure of the manipulators does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The manipulators are not 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).
1.3	☐	☑		The manipulators are not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The manipulators do not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The manipulators do not perform a site-generated radioactive waste control function.
2.2	☐	☑	The manipulators do not perform a fire protection function.
2.3	☐	☑	Failure of the manipulators as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function. (Assumption 5.4)

CCH

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Carrier/Cask Handling System**

SSC Classified **Remote Manipulators**

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)]. The bounding Category 1 DBE dose plus the yearly normal operations dose do not exceed the 25 mrem regulatory limit (Gwyn 2000, Attachment 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 (CRWMS M&O 2000b, Attachment IX).
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 that exceed regulatory limits to any individual located on, or beyond, any point on the site boundary.
2.7	☐	☑ a.	Failure of the manipulators as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function. (Assumption 5.4)
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not used in the 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The manipulator permits remote operations and increased distance between facility operators and radiation sources. (Assumption 5.3)

CCH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Carrier/Cask Handling System**

SSC Classified **Tooling and Fixtures**

SDD Reference: SDD-CCH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: Section 5.3

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. (See Section 5.3.)
	☐	☑	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

CCH

Classification Analysis Checklists

System: **Carrier/Cask Handling System**

SSC Classified **Tooling and Fixtures**

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

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

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA

Page: 1 of: 8

Complete Only Applicable Items

2. ☑ Analysis — Check all that apply

Type of Analysis:
- ☑ Engineering
- ☐ Performance Assessment
- ☐ Scientific

Intended Use of Analysis:
- ☐ Input to Calculation
- ☐ Input to another Analysis or Model
- ☐ Input to Technical Document
- ☑ Input to other Technical Products

Describe use:
QA Classification of the MGR Carrier Preparation Building Materials Handling System for input to the Q-List and other technical documents as appropriate.

3. ☐ Model — Check all that apply

Type of Model:
- ☐ Conceptual Model
- ☐ Abstraction Model
- ☐ Mathematical Model
- ☐ System Model
- ☐ Process Model

Intended Use of Model:
- ☐ Input to Calculation
- ☐ Input to another Model or Analysis
- ☐ Input to Technical Document
- ☐ Input to other Technical Products

Describe use:

4. Title:
Classification of the MGR Carrier Preparation Building Materials Handling System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-CMH-SE-000001 REV 01

6. Total Attachments:
3

7. Attachment Numbers - No. of Pages in Each:
I-1; II-4; III-10

	Printed Name	Signature	Date
8. Originator	Jo A. Ziegler	Jo A. Ziegler	2/8/01
9. Checker	Robert J. Garrett	RJG	2/8/01
10. Lead/Supervisor	Thomas D. Dunn	Thomas D. Dunn	2/8/01
11. Responsible	Dealis W. Gwyn	Dealis W Gwyn	2/8/01

12. Remarks:
This analysis bases the classification of MGR 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 classification conclusions of 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 Carrier Preparation Materials Handling System

3. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-CMH-SE-000001 REV 01

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue.
01	This revision is a complete rewrite of the initial issue. The Carrier Preparation Building Materials Handling System architecture has been expanded to include subsystems (that were not included in the initial issue) that are classified in this revision.

CONTENTS

Tables

1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) carrier preparation building materials handling system structures, systems and components (SSCs) performed by the MGR Preclosure Safety and Systems Engineering Section. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 2000). The *Q-List* identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 2000).

This QA classification incorporates the current MGR design and the results of the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000b). The content and technical approach of this analysis is in accordance with the *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000c).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 2000) as determined by the activity evaluation contained in *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000c) in accordance with procedure AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* Controls prescribed by procedure AP-SV.1Q, *Control of Electronic Management of Information,* are addressed by information management controls, such as access privileges through passwords, backup and storage of data, etc. No quality affecting software is used in the preparation of this analysis.

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 2000). Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs.*

3. COMPUTER SOFTWARE AND MODEL USAGE

This analysis uses no software 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 *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000b), 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* (Duncan et al. 1988, 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. Currently, no DBEs associated with this system are identified by the DBE dose calculation (CRWMS M&O 2000b).

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 of the QARD, "Classifying Items" (DOE 2000).

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation.

Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada (Dyer 1999).

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

5. ASSUMPTIONS

No assumptions are made in this analysis.

6. ANALYSIS

6.1 METHOD

The basic process for classifying permanent MGR 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. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 2000).

> 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 is 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 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 (Duncan et al. 1988, 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 system's SSCs are established. This classification analysis refers to the system design and functions as established by the *Carrier Preparation Building Materials Handling System Description Document* (SDD) (CRWMS M&O 2000a). Any decontamination of transportation casks performed in the carrier preparation building materials handling system will be done manually by radiologically trained personnel using hand tools and supplies. There is no hardware or SSCs associated with decontamination. 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 dose calculation of MGR DBEs (CRWMS M&O 2000b) 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 2000b) are utilized in this evaluation.

7. CONCLUSIONS

The results of this QA classification analysis are provided in Table 1. As the design of the MGR proceeds and further DBE analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary. The MGR classification checklist questions included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

Table 1. Carrier Preparation Building Materials Handling System QA Classification

Carrier Preparation Building Materials Handling System	QL-1	QL-2	QL-3	CQ
Control and Tracking System			X	
Handling Equipment				
Overhead Bridge Crane			X	
Remote Manipulator			X	
Tooling and Fixtures				X
Inspection Systems				X
Decontamination System *				

* There is no hardware or SSC associated with decontamination.

8. INPUTS AND REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 2000a. *Carrier Preparation Building Materials Handling System Description Document.* SDD-CMH-SE-000001 REV 01 ICN 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000807.0092.

CRWMS M&O 2000b. *Design Basis Event Frequency and Dose Calculation for Site Recommendation.* CAL-WHS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000627.0214.

CRWMS M&O 2000c. *Technical Work Plan for: Preclosure Safety Analysis.* TWP-MGR-SE-000010 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001220.0017.

DOE (Department of Energy) 2000. *Quality Assurance Requirements and Description.* DOE/RW-0333P, Rev. 10. Washington D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

Duncan, A.B.; Bilhorn, S.G.; and Kennedy, J.E. 1988. *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. TIC: 200650.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), September 3, 1999. OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

YMP (Yucca Mountain Site Characterization Project) 2000. *Q-List.* YMP/90-55Q, Rev. 6. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.20000510.0177.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily available.

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. Readily available.

8.3 PROCEDURES

AP-2.21Q, Rev. 1. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* ACC: MOL.20010129.0145.

AP-3.10Q, Rev. 2, ICN 3. *Analyses and Models.* ACC: MOL.20000918.0282.

AP-SI.1Q, Rev. 2, ICN 4, ECN 1. *Software Management.* ACC: MOL.20001019.0023.

AP-SV.1Q, Rev. 0, ICN 2. *Control of the Electronic Management of Information.* ACC: MOL.20000831.0065.

AP-3.15Q, Rev. 2. *Managing Technical Product Inputs.* ACC: MOL.20001109.0051.

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

YAP-2.7Q, Rev. 1, ICN 2. *Item Classification and Maintenance of the Q-List.* ACC: MOL.19991214.0628.

9. ATTACHMENTS

Attachment I	Acronyms
Attachment II	MGR Classification Checklist Questions
Attachment III	MGR QA Classification

Attachment I

Acronyms

CQ	Conventional Quality
DBE	Design Basis Event
MGR	Monitored Geologic Repository
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SDD	System Description Document
SSCs	Structures, Systems, and Components
TEDE	Total Effective Dose Equivalent

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist** *Complete only applicable items.*	QA: L Page: 1 Of: 1

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 06/26/1999) 0972 (Rev. 06/06/1999)

Attachment II
MGR Classification Checklist Questions

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 Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR** *Complete only applicable items.*	QA: L Page: 2 Of: 4

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?

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

0973 (Rev. 05/06/1999)

Attachment II
MGR Classification Checklist Questions

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. 05/08/1999)

CMH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Control and Tracking System**

SDD Reference: SDD-CMH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is relied upon to provide operations support necessary for waste handling safety. 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. The control and tracking system facilitates the remote operations of the crane and manipulator.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		The control and tracking system 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	☐	☑		Failure of the control and tracking system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The control and tracking system is not 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).
1.3	☐	☑		The control and tracking system is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The control and tracking system is not a part of the natural or engineered barriers important to waste isolation.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The control and tracking system does not collect, contain, or monitor any site-generated radioactive waste.
2.2	☐	☑	The control and tracking system does not protect QL-1 SSCs from the effects of fire.
2.3	☐	☑	Failure of the control and tracking system resulting from a DBE will not cause damage to the shipping cask and thus impair the cask capability to perform its intended radiological safety function.

CMH

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Control and Tracking System**

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 control and tracking system as a result of a DBE does not compromise the ability of natural or engineered barriers to isolate waste.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The control and tracking system operates the crane, which permits remote operations and increased distance between facility operators and radiation sources.

CMH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Overhead Bridge Crane**

SDD Reference: SDD-CMH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The overhead bridge crane is used for removing and installing personnel barriers, impact limiters, cask trunions, and cask tie-downs. This crane is not used to lift a transportation cask. The remote handling capability of the crane facilitates maintenance and dose reduction. This item is relied upon to provide 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: 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 overhead bridge crane does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The overhead bridge crane is not 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).
1.3	☐	☑		The overhead bridge crane is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The overhead bridge crane is not a part of the natural or engineered barriers important to waste isolation.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The overhead bridge crane does not collect, contain, or monitor any site-generated radioactive waste.
2.2	☐	☑	The overhead bridge crane does not protect QL-1 SSCs from the effects of fire.
2.3	☐	☑	Failure of the overhead bridge crane resulting from a DBE will not cause damage to the shipping cask and thus impair the cask capability to perform its intended radiological safety function. This SSC is not expected to be of sufficient mass to damage a transportation cask.

CMH

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Overhead Bridge Crane**

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 overhead bridge crane as a result of a DBE does not compromise the ability of natural or engineered barriers to isolate waste.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The crane permits remote operations and increased distance between facility operators and radiation sources.

CMH

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Remote Manipulator**

SDD Reference: SDD-CMH-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	This item is relied upon to provide operations support necessary for waste handling safety. 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.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		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	☐	☑		Failure of the manipulator does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The manipulator is not 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).
1.3	☐	☑		The manipulator is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The manipulator does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The manipulator does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The manipulator does not perform a fire protection function.
2.3	☐	☑	Failure of the manipulator as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

CMH

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Remote Manipulator**

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 manipulator as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The manipulator permits remote operations and increased distance between facility operators and radiation sources.

CMH

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Tooling and Fixtures**

SDD Reference: SDD-CMH-SE-000001 R1 ICN 1 Assumptions 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

CMH

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Tooling and Fixtures**

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

CMH

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Inspection Systems**

SDD Reference: SDD-CMH-SE-000001 R1 ICN 1 Assumptions 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

CMH

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Carrier Preparation Building Materials Handling System**

SSC Classified **Inspection Systems**

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

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA

Page: 1 of: 9

Complete Only Applicable Items

2. ☑ Analysis — Check all that apply

Type of Analysis:
- ☑ Engineering
- ☐ Performance Assessment
- ☐ Scientific

Intended Use of Analysis:
- ☐ Input to Calculation
- ☐ Input to another Analysis or Model
- ☐ Input to Technical Document
- ☑ Input to other Technical Products

Describe use:
QA classification of the emplacement drift system for input to the Q-List and other technical documents as appropriate.

3. ☐ Model — Check all that apply

Type of Model:
- ☐ Conceptual Model
- ☐ Abstraction Model
- ☐ Mathematical Model
- ☐ System Model
- ☐ Process Model

Intended Use of Model:
- ☐ Input to Calculation
- ☐ Input to another Model or Analysis
- ☐ Input to Technical Document
- ☐ Input to other Technical Products

Describe use:

4. Title:
Classification of the MGR Emplacement Drift System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-EDS-SE-000001 REV 01

6. Total Attachments:
3

7. Attachment Numbers - No. of Pages in Each:
I - 1; II - 4; III - 6

	Printed Name	Signature	Date
8. Originator	Jo A. Ziegler	Jo A. Ziegler	1/24/01
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10. Lead/Supervisor	Thomas D. Dunn	Thomas D. Dunn	1/30/01
11. Responsible	Dealis W. Gwyn	Dealis W. Gwyn	2/1/01

12. Remarks:
This analysis bases the classification of MGR 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 classification conclusions of 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 Emplacement Drift System

3. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-EDS-SE-000001 REV 01

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue of document number ANL-XCS-SE-000001 REV 00.
01	This system-specific analysis was performed to supersede ANL-XCS-SE-000001 REV 00. This document is a revision of the superseded document to incorporate a system name change (it was formerly called the "Ex-Container System") and an update to the system architecture. The new document number was assigned to agree with the system name.

CONTENTS

TABLES

1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) emplacement drift system structures, systems and components (SSCs) performed by the MGR Preclosure Safety and Systems Engineering Section. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 2000). The *Q-List* identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 2000).

This document considers the current MGR design and the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a) for the QA classification. The content and technical approach of this analysis is in accordance with the *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000f).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 2000) as determined by the activity evaluation contained in *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000f) in accordance with procedure AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*. Controls prescribed by procedure AP-SV.1Q, *Control of Electronic Management of Information*, are addressed by information management controls, such as access privileges through passwords, backup and storage of data, etc. No quality affecting software is used in the preparation of this analysis.

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 2000). Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs*.

3. COMPUTER SOFTWARE AND MODEL USAGE

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

4. INPUTS

4.1 PARAMETERS

The offsite radiological consequences of MGR preclosure Category 1 and 2 design basis events (DBEs), as calculated in *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a), the DBEs related to waste packages from *Preclosure Design Basis Events Related to Waste Packages* (CRWMS M&O 2000e), and postclosure functions as described in *EBS FEPs/Degradation Modes Abstraction* (CRWMS M&O 2000b) were 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 (Duncan et al. 1988, 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 of the QARD, "Classifying Items" (DOE 2000).

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation.

Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada (Dyer 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

This analysis assumes that system architecture, design, and SSC functions are established by the *Emplacement Drift System Description Document* (CRWMS M&O 2000c). The *Design Analysis for the Ex-Container Components* (CRWMS M&O 2000d) and direction by DOE (Dyer 2000) are used for further design information. These documents represent the best available MGR design information. This assumption is utilized in Section 6.2 to define the emplacement drift system design configuration and SSC functions.

6. ANALYSIS

6.1 METHOD

The basic process for classifying permanent MGR 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. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 2000).

> 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 is 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 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 (Duncan et al. 1988, 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 system's SSCs are established. This classification analysis is based upon the system design and functions as established by the *Emplacement Drift System Description Document* (CRWMS M&O 2000c) and the *Design Analysis for the Ex-Container Components* (CRWMS M&O 2000d). 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 dose calculation of MGR preclosure DBEs (CRWMS M&O 2000a) has been performed to determine the effects of internal events on facility radiological safety and is utilized by this analysis in the classification of MGR SSCs. DBEs related to waste packages were identified from *Preclosure Design Basis Events Related to Waste Packages* (CRWMS M&O 2000e). The DBE calculation addresses both the DBE frequencies and dose consequences at the site boundary. Results of postclosure analyses on the functions of the SSCs were identified from *EBS FEPs/Degradation Modes Abstraction* (CRWMS M&O 2000b). This analysis utilizes the results of these analyses to evaluate MGR SSCs against the classification criteria of procedure QAP-2-3.

6.4 QUALITY ASSURANCE CLASSIFICATION OF MGR SSCs

The emplacement drift system consists of the structural support hardware (emplacement drift invert and waste package emplacement pallet) and any performance enhancing barriers (drip shields) installed or placed in the emplacement drifts. The backfill component of this system has been removed as directed by DOE (Dyer 2000). The emplacement drift system is entirely located within the emplacement drifts in the subsurface portion of the MGR; specifically, it is physically bounded by the subsurface facility system, the ground support system, and the natural barrier (CRWMS M&O 2000c).

The MGR SSCs are evaluated against the criteria of QAP-2-3 to determine the item QA classification level. The results of the MGR DBE dose calculations (CRWMS M&O 2000a) are utilized in this evaluation.

7. CONCLUSIONS

This analysis may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System database.

The results of this QA classification analysis are provided in Table 1. As the design of the MGR proceeds and further DBE analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary. The MGR classification checklist questions included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

Table 1. Emplacement Drift System QA Classification

Emplacement Drift System	QL-1	QL-2	QL-3	CQ
Invert		X		
Waste Package Emplacement Pallet		X		
Drip Shield	X			

8. INPUTS AND REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management and Operating Contractor) 2000a. *Design Basis Event Frequency and Dose Calculation for Site Recommendation.* CAL-WHS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000627.0214.

CRWMS M&O 2000b. *EBS FEPs/Degradation Modes Abstraction.* ANL-WIS-PA-000002 REV 00 ICN 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001130.0003.

CRWMS M&O 2000c. *Emplacement Drift System Description Document.* SDD-EDS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000803.0348.

CRWMS M&O 2000d. *Design Analysis for the Ex-Container Components.* ANL-XCS-ME-000001 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000525.0374.

CRWMS M&O 2000e. *Preclosure Design Basis Events Related to Waste Packages.* ANL-MGR-MD-000012 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000725.0015.

CRWMS M&O 2000f. *Technical Work Plan for: Preclosure Safety Analysis.* TWP-MGR-SE-000010 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001220.0017.

DOE (U.S. Department of Energy) 2000. *Quality Assurance Requirements and Description.* DOE/RW-0333P, Rev. 10. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

Duncan, A.B.; Bilhorn, S.G.; and Kennedy, J.E. 1988. *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. TIC: 200650.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), September 3, 1999. OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

Dyer, J.R. 2000. "Direction to Prepare Change Request to Delete Backfill from Design Basis for Site Recommendation." Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), January 24, 2000, OPE:PGH-0559. ACC: MOL.20000128.0238.

YMP (Yucca Mountain Site Characterization Project) 2000. *Q-List.* YMP/90-55Q, Rev. 6. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.20000510.0177.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily available.

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. Readily available.

8.3 PROCEDURES

AP-2.21Q, Rev. 0. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* ACC: MOL.20000802.0003.

AP-3.10Q, Rev. 2, ICN 3. *Analyses and Models.* ACC: MOL.20000918.0282.

AP-3.15Q, Rev. 2. *Managing Technical Product Inputs.* ACC: MOL.20001109.0051.

AP-SI.1Q, Rev. 2, ICN 4, ECN 1. *Software Management.* ACC: MOL.20001019.0023.

AP-SV.1Q, Rev. 0, ICN 2. *Control of the Electronic Management of Information.* ACC: MOL.20000831.0065.

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

YAP-2.7Q, Rev. 1, ICN 2. *Item Classification and Maintenance of the Q-List.* ACC: MOL.19991214.0628.

9. ATTACHMENTS

Attachment I	Acronyms
Attachment II	MGR Classification Checklist Questions
Attachment III	MGR QA Classification

Attachment I

Acronyms

ALARA	As Low As is Reasonably Achievable
CQ	Conventional Quality
DBE	Design Basis Event
MGR	Monitored Geologic Repository
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SSCs	Structures, Systems, and Components
TBV	To Be Verified
TEDE	Total Effective Dose Equivalent

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist** *Complete only applicable items.*	QA: L Page: 1 Of: 1

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 Checklist Questions

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 05/28/1999) 0073 (Rev. 05/06/1999)

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR** *Complete only applicable items.*	QA: L Page: 2 Of: 4

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 Checklist Questions

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)

EDS

Classification Analysis Checklists

Classification Results	
	QL1 ☑
PS1 ☐	QL2 ☐
PS2 ☑	QL3 ☐
	CQ ☐

System: **Emplacement Drift System**

SSC Classified **Drip Shield**

SDD Reference: SDD-EDS-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The drip shields are intended to be placed in the emplacement drifts at the end of the preclosure period and serve no preclosure safety function. Drip shields are not directly or indirectly relied upon to provide any of the following Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat tranefer, structural integrity, or operations support necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☑	☐		Drip shields protect the waste packages from rockfall, divert water around the waste packages and provide a heat transfer function during the postclosure period (CRWMS M&O 2000c, Sections 1.2.1, & 1.2.3). Drip shields are relied upon for waste package protection and heat transfer as 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 drip shields would not 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 (CRWMS M&O 2000a, Attachment IX).
1.2	☐	☑		The drip shields are not 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) (CRWMS M&O 2000a, Attachment IX).
1.3	☐	☑		The drip shields are not required to prevent and/or mitigate a Category 2 DBE which would result in a release exceeding 10 CFR 63.111(b)(2) limits (CRWMS M&O 2000a, Attachment X).
1.4	☑	☐	a.	The drip shields are part of the engineered barriers (CRWMS M&O 2000c, p. 6). Drip shields are credited in the performance assessments to protect the waste packages from rockfall, inhibit waste package degradation by providing heat transfer, and divert water (if present) around the waste package, thus demonstrating the ability of the geologic repository to limit 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 (CRWMS M&O 2000b, Sec. 6.2.28).
	☑	☐	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

EDS

Classification Analysis Checklists

Classification Results	
	QL1 ☑
PS1 ☐	QL2 ☐
PS2 ☑	QL3 ☐
	CQ ☐

System: **Emplacement Drift System**

SSC Classified **Drip Shield**

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

EDS

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☑
PS2 ☑ QL3 ☐
CQ ☐

System: **Emplacement Drift System**

SSC Classified **Invert**

SDD Reference: SDD-EDS-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	Inverts are steel support frames located in the bottom of the emplacement drift, anchored to the tunnel wall. Ballast material is placed around and to the top of the frame. The invert provides support for mobile equipment in the drifts and for the drip shield and waste package (WP)/pallet combination. Inverts 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 TSPA assumes inverts provide no residence time for radionuclide releases from the WPs, i.e., the radionuclide release from a failed WP arrives instantaneously at the unsaturated zone. Failure of the inverts could cause the WP to shift and impact the drip shield.

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 inverts would not 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 (CRWMS M&O 2000a, Attachment IX).
1.2	☐	☑		The inverts are not 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) (CRWMS M&O 2000a, Attachment IX).
1.3	☐	☑		The inverts are not required to prevent and/or mitigate a Category 2 DBE which would result in a release exceeding 10 CFR 63.111(b)(2) limits (CRWMS M&O 2000a, Attachment X).
1.4	☐	☑	a.	The inverts are not part of the engineered barriers. The TSPA assumes the inverts provide no residence time for radionuclide releases from the WPs, i.e., the radionuclide release from a failed WP arrives instantaneously at the unsaturated zone, therefore, the inverts play no role in the performance assessment dose rate calculations. (CRWMS M&O 2000b, Section 6.2.27)
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The inverts have no control or management function of site-generated radioactive waste.
2.2	☐	☑	Inverts have no fire protection or suppression function.
2.3	☐	☑	Failure of an invert will not impact the radiological safety or waste isolation performance of another QL-1 SSC during the preclosure period.

EDS

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☐	QL2 ☑
PS2 ☑	QL3 ☐
	CQ ☐

System: **Emplacement Drift System**

SSC Classified **Invert**

2.4	☐	☑	Inverts are not required for prevention or mitigation of Category 1 design basis events.
2.5	☐	☑	Inverts are not required for prevention or mitigation of Category 1 design basis events.
2.6	☐	☑	Inverts are not required for prevention or mitigation of Category 2 design basis events.
2.7	☑	☐ a.	CRWMS M&O 2000b (page 50) determined that a degraded invert could cause an impact between the WP and the drip shield (i.e., a QL-1 SSC). Although the TSPA model for drip shield separation demonstrates that the impact from invert failure and contact between WP and drip shield is incorporated in the large uncertainty in the seismic displacement model, the inverts are conservatively classified as QL-2.
	☐	☑ 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

EDS

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☑
PS2 ☑ QL3 ☐
CQ ☐

System: **Emplacement Drift System**

SSC Classified **Waste Package Emplacement Pallet**

SDD Reference: SDD-EDS-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The emplacement pallets 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 failure of the pallets could cause the WP to shift and impact the drip shield. The pallets are not credited in TSPA analyses for any 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 pallets would not 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 (CRWMS M&O 2000a, Attachment IX).
1.2	☐	☑		The pallets are not 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) (CRWMS M&O 2000a, Attachment IX).
1.3	☐	☑		The pallets are not required to prevent and/or mitigate a Category 2 DBE which would result in a release exceeding 10 CFR 63.111(b)(2) limits (CRWMS M&O 2000a, Attachment X).
1.4	☐	☑	a.	The pallets are not part of the engineered barriers. The TSPA assumes the pallets provide no residence time for radionuclide releases from the WPs, i.e., the radionuclide release from a failed WP arrives instantaneously at the unsaturated zone, therefore, the pallets play no role in the performance assessment dose rate calculations. (CRWMS M&O 2000b, Section 6.2.27)
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	Pallets have no control or management function of site-generated radioactive waste.
2.2	☐	☑	Pallets have no fire protection or suppression function.
2.3	☐	☑	Failure of a pallet will not impact the radiological safety or waste isolation performance of another QL-1 SSC during the preclosure period.

EDS

Classification Analysis Checklists

Classification Results

	QL1 ☐
PS1 ☐	QL2 ☑
PS2 ☑	QL3 ☐
	CQ ☐

System: **Emplacement Drift System**

SSC Classified **Waste Package Emplacement Pallet**

2.4	☐	☑	Pallets are not required for prevention or mitigation of Category 1 design basis events.
2.5	☐	☑	Pallets are not required for prevention or mitigation of Category 1 design basis events.
2.6	☐	☑	Pallets are not required for prevention or mitigation of Category 2 design basis events.
2.7	☑	☐ a.	CRWMS M&O 2000b (page 50) determined that a WP may roll off a degraded pallet and impact the drip shield (i.e., a QL-1 SSC). Although the TSPA model for drip shield separation demonstrates that the impact from pallet failure and contact between WP and drip shield is incorporated in the large uncertainity in the seismic displacement model, the pallets are conservatively classified as QL-2.
	☐	☑ 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

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA

Complete Only Applicable Items

2. [x] Analysis — Check all that apply

Type of Analysis:
- [x] Engineering
- [ ] Performance Assessment
- [ ] Scientific

Intended Use of Analysis:
- [ ] Input to Calculation
- [ ] Input to another Analysis or Model
- [ ] Input to Technical Document
- [x] Input to other Technical Products

Describe use:
QA Classification of the MGR Waste Handling Building Ventilation System for input to the *Q-List* and other technical documents as appropriate.

3. [ ] Model — Check all that apply

Type of Model:
- [ ] Conceptual Model
- [ ] Abstraction Model
- [ ] Mathematical Model
- [ ] System Model
- [ ] Process Model

Intended Use of Model:
- [ ] Input to Calculation
- [ ] Input to another Model or Analysis
- [ ] Input to Technical Document
- [ ] Input to other Technical Products

Describe use:

4. Title:
Classification of the MGR Waste Handling Building Ventilation System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-HBV-SE-000001 REV 01

6. Total Attachments:
3

7. Attachment Numbers - No. of Pages in Each:
I-1; II-4; III-8

	Printed Name	Signature	Date
8. Originator	Jo A. Ziegler	Jo A. Ziegler	10/26/00
9. Checker	James A. Kappes	James A Kappes	10/27/00
10. Lead/Supervisor	Thomas D. Dunn	Thomas D. Dunn	11/01/00
11. Responsible	Dealis W. Gwyn	Dealis W Gwyn	11/2/00

12. Remarks:
This analysis bases the classification of MGR 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 classification conclusions of 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 Waste Handling Building Ventilation System

3. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-HBV-SE-000001 REV 01

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue.
01	This revision is a complete rewrite of the initial issue. The Waste Handling Building Ventilation System architecture has been expanded to include subsystems (that were not included in the initial issue) that are classified in this revision.

CONTENTS

Tables

1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) waste handling building ventilation system structures, systems and components (SSCs) performed by the MGR Preclosure Safety and Systems Engineering Section. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 2000). The *Q-List* identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 2000).

This QA classification incorporates the current MGR design and the results of the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a) and "Bounding Individual Category 1 Design Basis Event Dose Calculation to Support Quality Assurance Classification" (Gwyn 2000). The content and technical approach of this analysis is in accordance with the Development Plan *QA Classification of MGR Structures, Systems, and Components* (CRWMS M&O 1999b).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 2000) as determined by procedure QAP-2-0, *Conduct of Activities*. Although QAP-2-0 has been superseded by AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*, its conclusions remain valid. *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 2000). Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs*. There is no electronic management of data associated with this document.

3. COMPUTER SOFTWARE AND MODEL USAGE

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

4. INPUTS

4.1 DATA AND PARAMETERS

The offsite radiological consequences of MGR Category 1 and 2 design basis events (DBEs), as calculated in CRWMS M&O (2000a) and Gwyn (2000), are utilized in the QA classification of MGR SSCs. The credible DBEs identified in CRWMS M&O (2000a) and Gwyn (2000) assume the safety strategy as defined in Hastings (1998) is implemented. 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* (Duncan et al. 1988, 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 of the QARD (DOE 2000), "Classifying Items."

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation.

Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada (Dyer 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

This analysis assumes that system design, architecture, and functions are established by the *Waste Handling Building Ventilation System Description Document* (CRWMS M&O 2000b). This document represents the best available MGR design information. This assumption is utilized in Section 6.2 to define the ventilation system design configuration and SSC functions.

6. ANALYSIS

6.1 METHOD

The basic process for classifying permanent MGR 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. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 2000).

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 as low as is 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 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 (Duncan et al. 1988, 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 system's SSCs are established. This classification analysis is based upon the system design and functions as established by the *Waste Handling Building Ventilation System Description Document* (CRWMS M&O 2000b) (see Section 5). 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

Dose calculations of MGR DBEs (CRWMS M&O 2000a and Gwyn 2000) have been performed to determine the effects of internal events on public radiological safety and is utilized by this analysis in the classification of MGR SSCs. The DBE calculation addresses both the DBE frequencies and dose consequences at the site boundary. This analysis utilizes the results of the DBE calculations 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's QA classification level. The results of the MGR DBE calculations (CRWMS M&O 2000a, Table 9; and Gwyn 2000) are the basis for the DBEs and doses used in this evaluation.

7. CONCLUSIONS

This analysis may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System database.

The results of this QA classification analysis are provided in Table 1. As the design of the MGR proceeds and further DBE analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary. The MGR classification checklist questions included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

Table 1. Waste Handling Building Ventilation System QA Classification

Waste Handling Building Ventilation System	QL-1	QL-2	QL-3	CQ
Confinement Area Ventilation System				
Primary Confinement Area Ventilation System		X		
Secondary Confinement Area Ventilation System		X		
Tertiary Confinement Area Ventilation System		X		
Non-Confinement Area Ventilation System				X

8. INPUTS AND REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 1999a. *Design Basis Event Definition & Analysis/QA Classification Analysis (1.2.1.11)*. Activity Evaluation, March 2, 1999. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990325.0008.

CRWMS M&O 1999b. *QA Classification of MGR Structures, Systems, and Components.* Development Plan TDP-MGR-SE-000007 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991029.0155.

CRWMS M&O 2000a. *Design Basis Event Frequency and Dose Calculation for Site Recommendation.* CAL-WHS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000627.0214.

CRWMS M&O 2000b. *Waste Handling Building Ventilation System Description Document.* SDD-HBV-SE-000001 REV 01 ICN 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000807.0087.

DOE (U.S. Department of Energy) 2000. *Quality Assurance Requirements and Description.* DOE/RW-0333P, Rev. 10. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

Duncan, A.B.; Bilhorn S.G.; and Kennedy, J.E. 1988. *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. TIC: 200650.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), September 3, 1999. OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

Gwyn, D.W. 2000. "Bounding Individual Category 1 Design Basis Event Dose Calculation to Support Quality Assurance Classification." Interoffice correspondence from Gwyn, D.W. (CRWMS M&O) to SA File 503.03, August 10, 2000, LV.SA.JAK.08/00-127, with attachments. ACC: MOL.20000814.0039.

Hastings, C.R. 1998. "Strategy to Mitigate Preclosure Offsite Exposure." Interoffice correspondence from Hastings, C.R. to Distribution, July 21, 1998, LV.SEI.CRH.7/98-024. ACC: MOL.19980916.0357.

YMP (Yucca Mountain Site Characterization Project) 2000. *Q-List.* YMP/90-55Q, Rev. 6. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.20000510.0177.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily Available.

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. Readily Available.

8.3 PROCEDURES

AP-2.21Q, Rev. 0. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* ACC: MOL.20000802.0003.

AP-3.10Q, Rev. 2, ICN 3. *Analyses and Models.* ACC: MOL.20000918.0282.

AP-SI.1Q, Rev. 2, ICN 4. *Software Management.* ACC: MOL.20000223.0508.

AP-3.15Q, Rev. 1, ICN 2. *Managing Technical Product Inputs.* ACC: MOL.20000713.0363.

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 2. *Item Classification and Maintenance of the Q-List.* ACC: MOL.19991214.0628.

9. ATTACHMENTS

Attachment I	Acronyms
Attachment II	MGR Classification Checklist Questions
Attachment III	MGR QA Classification

Attachment I

Acronyms

CQ	Conventional Quality
DBE	Design Basis Event
MGR	Monitored Geologic Repository
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SSCs	Structures, Systems, and Components
TEDE	Total Effective Dose Equivalent
WHB	Waste Handling Building

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist

Complete only applicable items.

QA: L

Page: 1 Of: 1

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 Checklist Questions

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 05/28/1998) 0973 (Rev. 05/08/1998)

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR** *Complete only applicable items.*	QA: L Page: 2 Of: 4

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?

QAP-2-3 (Effective 05/26/1999) 0973 (Rev. 05/08/1999)

Attachment II
MGR Classification Checklist Questions

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 05/28/1999) 0973 (Rev. 05/08/1999)

HBV

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Handling Building Ventilation System**

SSC Classified **Primary Confinement Area Ventilation System**

SDD Reference: SDD-HBV-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The waste handling building (WHB) primary confinement area ventilation system provides filtration of exhaust air (along with heating, ventilation and air conditioning) for those WHB areas where radioactive material or contamination is present during normal operations. The system maintains air flow paths and pressure zones that minimize the potential for spread of contamination and exhausts through HEPA filters to an exhaust outlet equipped with radiation monitors. This system is relied upon to provide confinement of radioactive material being processed and mitigate radioactive releases associated with MGR DBEs.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Failure of the primary confinement area ventilation system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The primary confinement area ventilation system is not 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). A dose calculation has determined that the bounding Category 1 DBE dose plus the yearly normal operations dose does not exceed the 100 mrem TEDE regulatory limit (Gwyn 2000, Attachment 1, pp 1-2).
1.3	☐	☑		The primary confinement area ventilation system is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin. A dose calculation has not identified any Category 2 DBEs in primary confinement zones that could result in exceeding Category 2 regulatory dose limits without filtration (CRWMS M&O 2000a, Table 9).
1.4	☐	☑	a.	The confinement area ventilation system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	Failure of the primary confinement ventilation system could result in offsite doses greater than 0.25 mrem per year. The system is considered to perform radioactive waste management or control functions for the purpose of quality level determination. Airborne particulate contamination will be contained within the air filters.
2.2	☐	☑	This system does not perform a fire protection function.
2.3	☐	☑	Failure of the primary confinement area ventilation system as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs that impair their capability to perform their intended radiological safety function.

HBV

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Handling Building Ventilation System**

SSC Classified **Primary Confinement Area Ventilation System**

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)] (Gwyn 2000).
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 100 mrem TEDE (Gwyn 2000).
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 that exceed regulatory limits. A dose calculation has not identified any Category 2 DBEs that could result in exceeding Category 2 regulatory dose limits without primary confinement area filtration (CRWMS M&O 2000a, Table 9).
2.7	☐	☑ a. ☑ b. ☑ c. ☑ d.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.

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

HBV

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Handling Building Ventilation System**

SSC Classified **Secondary Confinement Area Ventilation System**

SDD Reference: SDD-HBV-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The waste handling building (WHB) secondary confinement area ventilation system provides filtration of exhaust air (along with heating, ventilation and air conditioning) for those WHB areas where the potential for radioactive contamination is high. The system maintains air flow paths and pressure zones that minimize the potential for spread of contamination. The system exhausts air through HEPA filters to an exhaust outlet equipped with radiation monitors. The WHB secondary confinement area ventilation system is not relied upon to mitigate the effects of MGR DBEs.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Failure of the secondary confinement area ventilation system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The secondary confinement area ventilation system is not 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). A dose calculation has determined that the bounding Category 1 DBE dose plus the yearly normal operations dose does not exceed the 100 mrem TEDE regulatory limit (Gwyn 2000, Attachment 1, pp 1-2).
1.3	☐	☑		The secondary confinement area ventilation system is not required to prevent or mitigate a Category 2 DBE that could result in offsite doses that exceed regulatory limits. A dose calculation has not identified any Category 2 DBEs in secondary confinement zones that could result in exceeding Category 2 regulatory dose limits without filtration (CRWMS M&O 2000a, Table 9).
1.4	☐	☑	a.	The secondary confinement area ventilation system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	A failure of this SSC may result in an offsite dose greater than 0.25 mrem/yr (Gwyn 2000, Attachment 1 and CRWMS M&O 2000a, Table 9). The system is considered to perform radioactive waste management or control functions for purposes of quality level determinations by containing possible airborne contamination within air filters.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the secondary confinement area ventilation system as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs that impair their capability to perform their intended radiological safety function.

HBV

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Handling Building Ventilation System**

SSC Classified **Secondary Confinement Area Ventilation System**

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)] (Gwyn 2000).
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 equal to or greater than 100 mrem TEDE (Gwyn 2000).
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 that exceed regulatory limits. A dose calculation has not identified any Category 2 DBEs that could result in exceeding Category 2 regulatory dose limits without secondary confinement area filtration (CRWMS M&O 2000a, Table 9).
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ 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

HBV

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Handling Building Ventilation System**

SSC Classified **Tertiary Confinement Area Ventilation System**

SDD Reference: SDD-HBV-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The waste handling building (WHB) tertiary confinement area ventilation system provides heating, ventilation and air conditioning to those WHB areas where the potential for radioactive contamination is low. The system maintains air flow paths and pressure zones that minimize the potential for spreading contamination. The system exhausts air through HEPA filters to an exhaust stack equipped with radiation monitors. The WHB tertiary confinement area ventilation system is not relied upon to mitigate the effects of MGR DBEs. The system provides 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: 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 tertiary confinement area ventilation system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		This system is not 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). A dose calculation has determined that the bounding Category 1 DBE dose plus the yearly normal operations dose does not exceed the 100 mrem TEDE regulatory limit (Gwyn 2000, Attachment 1, pp 1-2). No dose calculation has not identified any Category 1 DBE in a tertiary zone.
1.3	☐	☑		The tertiary confinement area ventilation system is not required to prevent or mitigate a Category 2 DBE that could result in offsite doses that exceed regulatory limits. A dose calculation has not identified any Category 2 DBEs in tertiary confinement zones that could result in exceeding Category 2 regulatory dose limits without filtration (CRWMS M&O 2000a, Table 9).
1.4	☐	☑	a.	The tertiary confinement area ventilation system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	Failure of the tertiary confinement ventilation system could result in offsite doses greater than 0.25 mrem per year. The system performs a radioactive waste management or control function for purposes of quality level determinations by containing possible airborne particulate contamination within air filters.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the tertiary confinement area ventilation system as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs that impair their capability to perform their intended radiological safety function.

HBV

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Handling Building Ventilation System**

SSC Classified **Tertiary Confinement Area Ventilation System**

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)]. A dose calculation has determined that the bounding Category 1 DBE dose plus the yearly normal operations dose does not exceed 25 mrem (Gwyn 2000, Attachment 1, pp 1-2).
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 100 mrem TEDE.
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 that exceed regulatory limits. A dose calculation has not identified any Category 2 DBEe that could result in exceeding Category 2 regulatory dose limits without tertiary filtration (CRWMS M&O 2000a, Table 9).
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ 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

HBV

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☐	QL2 ☐
PS2 ☐	QL3 ☐
	CQ ☑

System: **Waste Handling Building Ventilation System**

SSC Classified **Non-Confinement Area Ventilation System**

SDD Reference: SDD-HBV-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The Waste Handling Building (WHB) non-confinement area ventilation system provides heating, ventilation, and air conditioning to those WHB areas where there is no potential for radioactive contamination (e.g., offices, lunchrooms, clean maintenance areas). The system maintains the proper environmental conditions for equipment operation and personnel comfort. 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

HBV

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Handling Building Ventilation System**

SSC Classified **Non-Confinement Area Ventilation System**

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

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA

Page: 1 of: 10

Complete Only Applicable Items

2. [x] Analysis — Check all that apply

Type of Analysis:
- [x] Engineering
- [ ] Performance Assessment
- [ ] Scientific

Intended Use of Analysis:
- [ ] Input to Calculation
- [ ] Input to another Analysis or Model
- [ ] Input to Technical Document
- [x] Input to other Technical Products

Describe use:
QA classification of the waste remediation system for input to the Q-List and other technical documents as appropriate.

3. [ ] Model — Check all that apply

Type of Model:
- [ ] Conceptual Model
- [ ] Abstraction Model
- [ ] Mathematical Model
- [ ] System Model
- [ ] Process Model

Intended Use of Model:
- [ ] Input to Calculation
- [ ] Input to another Model or Analysis
- [ ] Input to Technical Document
- [ ] Input to other Technical Products

Describe use:

4. Title:
Classification of the MGR Waste Emplacement/Retrieval System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-WES-SE-000001 REV 01

6. Total Attachments:
3

7. Attachment Numbers - No. of Pages in Each:
I-1; II-4; III-50 ~~50~~ 48 11/7/00

	Printed Name	Signature	Date
8. Originator	Jo A. Ziegler	Jo A. Ziegler	11/2/00
9. Checker	Douglas D. Orvis	Douglas D. Orvis	11/2/00
10. Lead/Supervisor	Thomas D. Dunn	Thomas D. Dunn	11/7/00
11. Responsible	Dealis W. Gwyn	Dealis W. Gwyn	11/8/00

12. Remarks:

This analysis bases the classification of MGR 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 classification conclusions of 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 Waste Emplacement/Retrieval System

3. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-WES-SE-000001 REV 01

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue.
01	This revision is a complete rewrite of the initial issue. The Waste Emplacement/Retrieval System architecture has been expanded to include subsystems (that were not included in the initial issue) that are classified in this revision.

CONTENTS

TABLES

1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) waste emplacement/retrieval system structures, systems and components (SSCs) performed by the MGR Preclosure Safety and Systems Engineering Section. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 2000). The *Q-List* identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 2000).

This QA classification incorporates the current MGR design and the results of the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a). The content and technical approach of this analysis is in accordance with the development plan *QA Classification of MGR Structures, Systems, and Components* (CRWMS M&O 1999b).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 2000) as determined by procedure QAP-2-0, *Conduct of Activities*. Although QAP-2-0 has been superseded by AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*, its conclusions remain effective and valid. *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 2000). Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs*. There is no electronic management of data associated with this document.

3. COMPUTER SOFTWARE AND MODEL USAGE

This analysis uses no software 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 *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a), 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* (Duncan et al. 1988, 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 of the QARD, "Classifying Items" (DOE 2000).

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation. January 29, 1997.

Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada (Dyer 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 are made in the performance of this analysis.

5.1 This analysis assumes that system design, expanded architecture, and functions are established by the *Waste Emplacement/Remediation System Description Document* (CRWMS M&O 2000b). This document represents the best available MGR design information. This assumption is utilized in Section 6.2 to define the waste emplacement/retrieval system design configuration and SSC functions.

5.2 This analysis assumes the implementation of guidance provided by the "Strategy to Mitigate Preclosure Offsite Exposure" (Hastings 1998, Attachment 3 [all]), hereafter referred to as the "safety strategy." The safety strategy proposes general 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 assumption is utilized in Section 6.5 for the classification of the waste emplacement/retrieval system. The safety strategy assumes that MGR operations prevent (occurrence frequency less than 1×10^{-6}/year) exceeding design basis limits for waste packages.

6. ANALYSIS

6.1 METHOD

The basic process for classifying permanent MGR 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. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 2000).

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 as low as is 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 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 (Duncan et al. 1988, 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 system's SSCs are established. This classification analysis is based upon the system design and functions as established by the *Waste Emplacement/Retrieval System Description Document* (CRWMS M&O 2000b) (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 PRECLOSURE SAFETY STRATEGY

The MGR preclosure safety strategy is to prevent or mitigate preclosure offsite exposure. This preclosure safety strategy is a general plan to be considered in establishing design requirements for the receipt, handling, storage, packaging and emplacing of spent nuclear fuel and other high-level wastes in the planned repository. The strategy is described in Hastings (1998) which suggests a combination of containment and event prevention concepts for each of the general MGR operational functions: (1) receipt of waste, (2) transfer of waste to lag storage (as required), (3) packaging/sealing of the disposal container, (4) transfer of the waste package to an emplacement drift, and (5) waste package emplacement in a drift.

The safety strategy is utilized as guidance to modify the MGR design. The facility design as modified by the safety strategy is then evaluated in Section 6.5 to determine the SSC QA classifications. The waste emplacement/retrieval system functions to transport waste packages from the waste handling building to subsurface emplacement drifts and place the waste package and pallets within the emplacement drift. The system also functions to recover waste packages under abnormal conditions. The preclosure safety strategy (Hastings 1998) assumes that waste package breach as a result of transporter accidents in the north emplacement ramp area is prevented through the design of the transporter, locomotive, rails, and/or control systems. 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 waste package.
- Design the locomotive/transporter with redundant and diverse braking systems to prevent the runaway at a frequency of <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 waste package in the drift, lifts or transports above the design basis drop height for a waste package will not be performed. As a result of the above assumptions, the waste package is assumed to maintain containment of radioactive material during any credible event sequence.

6.4 DESIGN BASIS EVENT ANALYSIS

A dose calculation of MGR DBEs (CRWMS M&O 2000a) has been performed to determine the effects of internal events on facility radiological safety and is utilized by this analysis in the classification of MGR SSCs. The DBE calculation addresses both the DBE frequencies and dose consequences at the site boundary. This analysis utilizes the results of the DBE calculation to evaluate MGR SSCs against the classification criteria of procedure QAP-2-3. This analysis also considers results from *Preclosure Design Basis Events Related to Waste Packages* (CRWMS M&O 2000c, Section 6.3.2.1.2.2), where collapse of the gantry onto a waste package was determined to be within the design basis of the waste package.

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. Assumption 5.2 is used as noted in Table 1, and the results of the MGR DBE calculation (CRWMS M&O 2000a) are utilized in this evaluation. The MGR classification checklist questions included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

7. CONCLUSIONS

This analysis may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System database.

7.1 MGR QA CLASSIFICATION

The results of this QA classification analysis are provided in Table 1. As the design of the MGR proceeds and further DBE analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary.

Table 1. Waste Emplacement/Retrieval System QA Classification

Waste Emplacement/Retrieval System	QL-1	QL-2	QL-3	CQ
Emplacement, Retrieval, & Recovery Systems (Normal Conditions)				
Emplacement Gantry			X	
Gantry Carrier				X
Waste Package Transporter	X			
General Support Systems				
Control and Tracking System	X			
Locomotives	X			
Railcars				X
Recovery Systems (Abnormal Conditions)				
Ball Screw Jack				X
Bottom Lift Transporter			X	
Bottom Lift Transporter Carrier				X
Covered Shuttlecars		X		
Decontamination Equipment		X		
Emplacement Drift Forklift			X	
Forks (Note 1)				
Manipulating Arm (Note 1)				
Ejector Bucket (Note 1)				
Extendable Conveyor			X	
Load-Haul-Dump Loader			X	
Main Drift Forklift			X	
Forks (Note 1)				
Manipulating Arm (Note 1)				
Modified Waste Package Transporter	X			
Multi-Purpose Hauler		X		
Multi-Purpose Vehicle			X	
Impact Hammer (Note 1)				
Demolition Shears (Note 1)				
Bucket (Note 1)				
Scaling Machine			X	
Temporary Dock (Note 3)				X
Temporary Ground Support Subsystems (Note 2)				
Temporary Shielding (Note 2)				
Temporary Ventilation Control and Filtration System (Note 2)				
Restoration Systems (Abnormal Conditions)				
Cleanup and Construction Vehicles				X
Emplacement Drift Gantry Carrier			X	
Emplacement Drift Restoration Locomotive			X	
Re-Railer				X

Note 1: SSC classified at higher architecture level.
Note 2: Not classified, non-permanent SSC. Before retrieval or remediation is performed, a safety evaluation of the specific plan of work will be performed and appropriate quality controls assigned to actions and temporary equipment before any work begins.
Note 3: Temporary dock is a permanent portable dock.

7.2 IMPACT OF UNVERIFIED DATA

This analysis assumes that the design guidance provided by Hastings (1998 [all]) is incorporated into the waste emplacement/retrieval system. It should be noted that these impacts are based upon the DBE calculation of CRWMS M&O (2000a) 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.

If the safety strategy objective cannot be achieved or if the waste package cannot be designed to maintain containment during credible DBEs, this classification analysis will be revised. Other impacts may include requiring a seismically qualified transporter.

8. REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 1999a. *Design Basis Event Definition & Analysis/QA Classification Analysis (1.2.1.11)*. Activity Evaluation, March 2, 1999. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990325.0008.

CRWMS M&O 1999b. *QA Classification of MGR Structures, Systems, and Components*. Development Plan TDP-MGR-SE-000007 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991029.0155.

CRWMS M&O 2000a. *Design Basis Event Frequency and Dose Calculation for Site Recommendation*. CAL-WHS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000627.0214.

CRWMS M&O 2000b. *Waste Emplacement/Retrieval System Description Document*. SDD-WES-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000823.0002.

CRWMS M&O 2000c. *Preclosure Design Basis Events Related to Waste Packages*. ANL-MGR-MD-000012 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000725.0015.

DOE (U.S. Department of Energy) 2000. *Quality Assurance Requirements and Description*. DOE/RW-0333P, Rev. 10. Washington D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

Duncan, A.B.; Bilhorn, S.G.; and Kennedy, J.E. 1988. *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. TIC: 200650.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada."

Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), September 3, 1999. OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

Hastings, C.R. 1998. "Strategy to Mitigate Preclosure Offsite Exposure." Interoffice correspondence from Hastings, C.R. to Distribution, July 21, 1998, LV.SEI.CRH.7/98-024. ACC: MOL.19980916.0357.

YMP (Yucca Mountain Site Characterization Project) 2000. *Q-List.* YMP/90-55Q, Rev. 6. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.20000510.0177.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily Available.

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. Readily Available.

8.3 PROCEDURES

AP-2.21Q, Rev. 0. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* ACC: MOL.20000802.0003.

AP-3.10Q, Rev. 2, ICN 3. *Analyses and Models.* ACC: MOL.20000918.0282.

AP-SI.1Q, Rev. 2, ICN 4, ECN 1. *Software Management.* ACC: MOL.20001019.0023.

AP-3.15Q, Rev. 1, ICN 2. *Managing Technical Product Inputs.* ACC: MOL.20000713.0363.

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 2. *Item Classification and Maintenance of the Q-List.* ACC: MOL.19991214.0628.

9. ATTACHMENTS

Attachment I	Acronyms
Attachment II	MGR Classification Checklist Questions
Attachment III	MGR QA Classification

Attachment I

Acronyms

CQ	Conventional Quality
DBE	Design Basis Event
MGR	Monitored Geologic Repository
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SDD	System Description Document
SSCs	Structures, Systems, and Components
TBV	To Be Verified
TEDE	Total Effective Dose Equivalent
WP	Waste Package

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O

Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist

Complete only applicable items.

QA: L

Page: 1 Of: 1

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 Checklist Questions

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 05/28/1999) 0973 (Rev. 05/08/1999)

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR** *Complete only applicable items.*	QA: L Page: 2 Of: 4

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 Checklist Questions

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 05/26/1998) 0973 (Rev. 05/06/1999)

WES

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Gantry**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The emplacement gantry functions to lift the waste package (WP) and pallet from the transporter open deck (rolling bed plate) and carry the waste package into the emplacement drift. The gantry lowers the WP and pallet in the emplacement drift, disengages from the WP, and moves back to the transfer dock. 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. This is a support operation 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: 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 gantry would not directly result in a loss of waste package containment (because all credible drops and impacts have been accomodated in the WP design) or criticality control for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR.
1.2	☐	☑		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	☐	☑		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).
1.4	☐	☑	a.	The emplacement gantry does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The emplacement gantry does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The emplacement gantry does not perform a fire protection function.
2.3	☐	☑	Failure of emplacement gantry as a result of a DBE will not impair the capability of QL-1 SSCs (waste packages) from performing their intended radiological safety function in the preclosure phase. Analysis has shown that the collapse of the gantry onto a waste package is within the design basis of the waste package (CRWMS M&O 2000d).

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Gantry**

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	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The gantry permits remote operations and increased distance between facility operators and radiation sources.

WES

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Gantry Carrier**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The emplacement gantry carrier functions to transport the emplacement gantry from a gantry storage location to an emplacement drift or between emplacement drifts. 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: 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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Gantry Carrier**

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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☑
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Waste Package Transporter**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: Section 5.2

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	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.
	☐	☑	b.	
	☑	☐	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Waste package transporter failure will not directly result in a loss of waste package containment (because all credible impacts have been accomodated in the WP design) for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR. (See Section 5.2.)
1.2	☐	☑		This SSC 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	☑	☐		Failure of a waste package transporter (or part of the transporter, such as a braking system or other mechanical component) may result in the impact of a waste package with the subsurface facility structure or other facility equipment and subsequent radiological release. 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	☐	☑	a.	The waste package transporter does not perform a waste isolation function.
	☐	☑	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

Classification Results

QL1 ☑
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Waste Package Transporter**

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

WES

Classification Analysis Checklists

Classification Results:

QL1 ☑
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Control and Tracking System**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The control and tracking system functions to provide operational information, status, and control data for QL-1 SSCs to the MGR Operations Monitoring and Control System. 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, shielding, heat transfer, or structural integrity 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: 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	☐	☑		A control and trancking system 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	☐	☑		Failure of this item is not expected to result in the impact of a waste package with the subsurface facility structure or other facility equipment and subsequent radiological release.
1.3	☑	☐		Because this system provides controls for the transporter and locomotives, it is conservatively considered that its failure may result in a failure of the transporter or locomotives and thus cause the impact of a waste package with the subsurface facility structure or other facility equipment and subsequent radiological release.
1.4	☐	☑	a.	This item does not perform a waste isolation function.
	☐	☑	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

System: **Waste Emplacement/Retrieval System**

SSC Classified **Control and Tracking System**

Classification Results

QL1 ☑
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☐

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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☑
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Locomotives**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: Section 5.2

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The main function of the locomotives is to transfer the waste package transporter (with waste package) from the surface to the emplacement areas. 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 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.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		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. A locomotive may fail without causing failure of a waste package. (See Section 5.2.)
1.2	☐	☑		This SSC 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	☑	☐		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. 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	☐	☑	a.	The locomotives do not perform a waste isolation function.
	☐	☑	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

Classification Results

QL1 ☑
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Locomotives**

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

WES

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Railcars**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The general support system railcars function to carry personnel and/or other tools to and from the subsurface operations areas. The railcars do 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: 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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Railcars**

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

WES

Classification Analysis Checklists

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Ball Screw Jack**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The ball screw jack functions to lift or shift disabled equipment during recovery operations. This SSC will not lift the waste package above its design basis drop height. 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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Ball Screw Jack**

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

WES

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Bottom Lift Transporter**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The bottom lift transporter functions to load and haul a waste package over suitable fill material from the emplacement drifts to the multi-purpose hauler in the event that the rails in the drifts are not usable. 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.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		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	☐	☑		Bottom lift transporter failure will not directly result in a loss of waste package containment for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR.
1.2	☐	☑		Failure of the bottom lift transporter will not 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	☐	☑		Failure of a bottom lift transporter will not 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).
1.4	☐	☑	a.	The bottom lift transporter does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not control or manage the radioactive wastes generated in the decontamination of transportation casks.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs that impairs their capability to perform their intended radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Bottom Lift Transporter**

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑ a. ☑ b. ☑ c. ☑ d.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The transporter permits remote operations and increased distance between facility operators and the radiation source.

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☐	QL2 ☐
PS2 ☐	QL3 ☐
	CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Bottom Lift Transporter Carrier**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The bottom lift transporter carrier is a railcar that carries the bottom lift transporter from surface storage to the emplacement drift for recovery operations. This item is not directly or indirectly relied upon to provide the 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.
	☐	☑	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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Bottom Lift Transporter Carrier**

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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Covered Shuttlecars**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The covered shuttlecars function to haul rock and other debris recovered from a drift. The shuttlecars are covered to minimize dust generated during loading and travel. The shuttlecars are equipped with filtration and fans to provide negative pressure inside the car, if required for radioactive particulate confinement. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, structural integrity necessary for waste handling safety, or operations support.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Failure of the item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	This SSC may be used to transport contaminated rubble or debris from an emplacement drift, and therefore may perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Covered Shuttlecars**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ 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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Decontamination Equipment**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The decontamination equipment is used to decontaminate permanent underground SSCs to an acceptable level (in the event of a waste package breach and subsequent emplacement drift contamination), or apply a fixative coating where acceptable levels cannot be achieved. The system is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity 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: 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 item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	The item controls and manages the radioactive wastes generated in the decontamination of emplacement and retrieval equipment.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs that impairs their capability to perform their intended radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Decontamination Equipment**

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ 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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Drift Forklift**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The emplacement drift forklift is used in the emplacement drifts as well as the main drifts and ramp areas. This SSC is capable of lifting one end of the largest waste package, but is not designed to lift any waste package higher than its design basis drop height. This item is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity 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: 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 item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Drift Forklift**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The forklift permits remote operations and increased distance between facility operators and a radiation source.

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Extendable Conveyor**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The extendable conveyor functions to move fill material for drift access and to prevent waste package movement (if required) during abnormal retrieval. This item provides operations support necessary for waste handling, and is not directly or indirectly relied upon to provide one of the remaining 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.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		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	☐	☑		Failure of the item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

System: **Waste Emplacement/Retrieval System**

SSC Classified **Extendable Conveyor**

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The conveyor permits remote operations and increased distance between facility operators and radiation sources.

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Load-Haul-Dump Loader**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The load-haul-dump loader is a non-rail vehicle used to remove (possible contaminated) debris in the main drift or ramp areas or to place fill material on the drift invert for a roadway over damaged tracks. This item is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity 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: 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 item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Load-Haul-Dump Loader**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item may function to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. This item permits remote operations and increased distance between facility operators and radiation source if cleanup/removal of contamination is required.

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Main Drift Forklift**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The main drift forklift is a heavy-duty forklift that is used in the main drift and ramp areas with the capacity to lift one end of the largest waste package to allow for alignment with other equipment, but is not designed to lift any waste package above its design basis drop height. This item is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity 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: 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 item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Main Drift Forklift**

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. ☑ b. ☑ c. ☑ d.	Failure of the item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The forklift permits remote operations and increased distance between facility operators and radiation source.

WES

Classification Analysis Checklists

Classification Results:

QL1 ☑
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Modified Waste Package Transporter**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: Section 5.2

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The modified waste package transporter encloses the waste package during the transfer from the subsurface facilities to the surface during recovery operations. Failure of a modified 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.
	☐	☑	b.	
	☑	☐	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Modified waste package transporter failure will not directly result in a loss of waste package containment for the spent nuclear fuel, high-level wastes, or other radioactive materials received for emplacement at the MGR. (See Section 5.2.)
1.2	☑	☐		Failure of a modified 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	☑	☐		Failure of a modified 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 modified waste package transporter is designed to withstand all credible DBEs without exceeding dose limits, the transporter may not be classified QL-1.
1.4	☐	☑	a.	The waste package transporter does not perform a waste isolation function.
	☐	☑	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

Classification Results:

QL1 ☑
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Modified Waste Package Transporter**

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

WES

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Multi-Purpose Hauler**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The remotely controlled multi-purpose hauler is used to transport non-rail retrieval equipment, remove waste packages and small disabled emplacement equipment from emplacement drifts, and act as a working platform for retrieval equipment in the event a suitable working invert or roadway is not available. This item may be used to haul a breached waste package and may have a HEPA filter added to permit transport to the surface facilities. This item is not directly or indirectly relied upon to provide one of the remaining 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.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		The multi-purpose hauler 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	☐	☑		Failure of the item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	This SSC (capable of being equipped with a HEPA filter) may be used to transport a breached waste package from an emplacement drift to the surface facilities, and therefore may perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function. When used to retrieve waste packages, they are pulled into the hauler so there will not be equipment collapse onto the waste package.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Multi-Purpose Hauler**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ 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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Multi-Purpose Vehicle**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The multi-purpose vehicle is a remote controlled vehicle designed to operate on level inverts in the emplacement drifts, main drift, and ramp areas for use in cleanup operations. With appropriate attachments, the vehicle can also measure airborne contamination, surface contamination, and radiation. This item is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity necessary for waste handling safety.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		The multi-purpose vehicle 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	☐	☑		Failure of the item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Multi-Purpose Vehicle**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. This item permits remote operations and increased distance between facility operators and radiation source.

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Scaling Machine**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The scaling machine is remotely controled and functions to stabilize the roof and wall of a tunnel after a fall of ground by knocking down loose material until a stable arch is formed. The item provides operations support necessary for waste handling safety. 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.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		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	☐	☑		Failure of the item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Scaling Machine**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The scaling machine permits remote operations and increased distance between facility operators and radiation sources.

WES

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Temporary Dock**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The temporary dock functions to allow access for recovery equipment to the emplacement drifts during recovery operations. 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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Temporary Dock**

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

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☐	QL2 ☐
PS2 ☐	QL3 ☐
	CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Cleanup and Construction Vehicles**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	Cleanup and construction vehicles function to clear non-contaminated debris, emplace steel plates, and cut and remove damaged structures to facilitate deployment of other restoration equipment. 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

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Cleanup and Construction Vehicles**

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

WES

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Drift Gantry Carrier**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The drift gantry carrier functions to load and remove a derailed or damaged gantry from an emplacement drift. The carrier does not handle or transport waste packages. This item is relied upon to provide operations support necessary for waste handling safety. This item is not directly or indirectly relied upon to provide one of the remaining Important to Safety functions for radioactive wastes received or handled at the MGR: confinement or containment, criticality control, shielding, heat transfer, or structural integrity 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: 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 item does not directly result in lose of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Drift Gantry Carrier**

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The carrier permits remote operations and increased distance between facility operators and radiation source.

WES

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☑
	CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Drift Restoration Locomotive**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The emplacement drift restoration locomotive is used in emplacement drifts to assist in removal of disabled equipment and to transport non-powered retrieval equipment. 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: confinement or containment, criticality control, shielding, heat transfer, or structural integrity 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: 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 item does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The item is not 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).
1.3	☐	☑		The item is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The item does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	The item does not perform a site-generated radioactive waste control function.
2.2	☐	☑	The item does not perform a fire protection function.
2.3	☐	☑	Failure of the item as a result of a DBE does not impair the capability of a QL-1 High Safety Significant SSC to perform its radiological safety function.

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☑
CQ ☐

System: **Waste Emplacement/Retrieval System**

SSC Classified **Emplacement Drift Restoration Locomotive**

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 item as a result of a DBE does not compromise the ability of a QL-1 High Waste Isolation Significant SSC to perform its waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☑	☐	This item functions to limit onsite worker doses from normal operations and during Category 1 DBEs, including planned recovery operations, to less than 10 CFR 63.111(a)(1) [10 CFR 20.1201] requirements. The locomotive permits remote operations and increased distance between facility operators and radiation source.

WES

Classification Analysis Checklists

Classification Results

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

System: **Waste Emplacement/Retrieval System**

SSC Classified **Re-Railer**

SDD Reference: SDD-WES-SE-000001 R1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The re-railer functions to return derailed equipment to the rails in the tunnels. 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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Emplacement/Retrieval System**

SSC Classified **Re-Railer**

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

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA

Page: 1 of: 9

Complete Only Applicable Items

2. ☑ Analysis — Check all that apply

Type of Analysis:
- ☑ Engineering
- ☐ Performance Assessment
- ☐ Scientific

Intended Use of Analysis:
- ☐ Input to Calculation
- ☐ Input to another Analysis or Model
- ☐ Input to Technical Document
- ☑ Input to other Technical Products

Describe use:
QA classification of the waste remediation system for input to the *Q-List* and other technical documents as appropriate.

3. ☐ Model — Check all that apply

Type of Model:
- ☐ Conceptual Model
- ☐ Abstraction Model
- ☐ Mathematical Model
- ☐ System Model
- ☐ Process Model

Intended Use of Model:
- ☐ Input to Calculation
- ☐ Input to another Model or Analysis
- ☐ Input to Technical Document
- ☐ Input to other Technical Products

Describe use:

4. Title:
Classification of the MGR Waste Package Remediation System

5. Document Identifier (including Rev. No. and Change No., if applicable):
ANL-WPR-SE-000001 REV 01

6. Total Attachments:
3

7. Attachment Numbers - No. of Pages in Each:
I - 1; II - 4; III - 18

	Printed Name	Signature	Date
8. Originator	Jo A. Ziegler	Jo A. Ziegler	10/31/00
9. Checker	Richard P. Morissette	Richard P. Morissette	10/31/00
10. Lead/Supervisor	Thomas D. Dunn	Thomas D. Dunn	11/01/00
11. Responsible	Dealis W. Gwyn	Dealis W. Gwyn	11/2/00

12. Remarks:
This analysis bases the classification of MGR 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 classification conclusions of 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 Waste Package Remediation System

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

ANL-WPR-SE-000001 REV 01

4. Revision/Change No.	5. Description of Revision/Change
00	Initial issue.
01	This revision is a complete rewrite of the initial issue. The Waste Package Remediation System architecture has been expanded to include subsystems (that were not included in the initial issue) that are classified in this revision.

CONTENTS

Tables

1. PURPOSE

The purpose of this analysis is to document the Quality Assurance (QA) classification of the Monitored Geologic Repository (MGR) waste package remediation system structures, systems, and components (SSCs) performed by the MGR Preclosure Safety and Systems Engineering Section. This analysis also provides the basis for revision of YMP/90-55Q, *Q-List* (YMP 2000). The *Q-List* identifies those MGR SSCs subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (QARD) (DOE 2000).

This QA classification incorporates the current MGR design and the results of the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a). The content and technical approach of this analysis is in accordance with the *Development Plan for QA Classification of MGR Structures, Systems, and Components* (CRWMS M&O 1999b).

2. QUALITY ASSURANCE

This analysis is subject to the requirements of the QARD (DOE 2000) as determined by procedure QAP-2-0, *Conduct of Activities*. Although QAP-2-0 has been superseded by AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*, its conclusions remain valid. *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 2000). Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs*. There is no electronic management of data associated with this document.

3. COMPUTER SOFTWARE AND MODEL USAGE

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

4. INPUTS

4.1 DATA AND PARAMETERS

The offsite radiological consequences of MGR Category 1 and 2 design basis events (DBEs), as calculated in *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a), 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* (Duncan et al. 1988, 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 of the QARD, "Classifying Items" (DOE 2000).

4.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation.

Interim Guidance Pending Issuance of New U. S. Nuclear Regulatory Commission (NRC) Regulations for Yucca Mountain, Nevada (Dyer 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 are made in the performance of this analysis.

5.1 This analysis assumes that system design, architecture, and functions are established by the *Waste Package Remediation System Description Document* (CRWMS M&O 2000b). This document represent the best available MGR design information. This assumption is utilized in Section 6.2 to define the waste package remediation system design configuration and SSC functions.

5.2 This analysis assumes that the radiation doses to facility workers as the result of normal operations and Category 1 DBEs associated with the waste package remediation system, do not exceed the occupational dose limits of 10 CFR Part 20, Subpart C. This assumption is based upon protection of facility workers against external exposures by installed radiation shielding and internal exposures by the confinement functions of the waste handling building system and it's ventilation system. This assumption is utilized in Attachment III for the classification of waste package remediation system SSCs.

6. ANALYSIS

6.1 METHOD

The basic process for classifying permanent MGR 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. The following classification categories are specified by QAP-2-3 to meet the requirements of Section 2 of the QARD (DOE 2000).

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 is 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 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 (Duncan et al. 1988, 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 system's SSCs are established. This classification analysis refers to the system design and functions as established by the *Waste Package Remediation System Description Document* (CRWMS M&O 2000b). 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 dose calculation of MGR DBEs (CRWMS M&O 2000a) has been performed to determine the effects of internal events on facility radiological safety and is utilized by this analysis in the classification of MGR SSCs. The DBE frequencies and dose consequences at the site boundary are shown in Tables 7 and 9 of CRWMS M&O (2000a). This analysis utilizes the results of the DBE calculation 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 DBE calculations (CRWMS M&O 2000a) are utilized in this evaluation (see Attachment III).

7. CONCLUSIONS

This analysis may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System database.

7.1 MGR QA CLASSIFICATION

The results of this QA classification analysis are provided in Table 1. As the design of the MGR proceeds and further DBE analyses of MGR hazards are performed, this classification analysis will be reviewed for impact and revised as necessary. The MGR classification checklist questions included in procedure QAP-2-3 are reproduced in Attachment II. The basis for the classification evaluation is provided in Attachment III.

Table 1. Waste Package Remediation System QA Classification

Waste Package Remediation System	QL-1	QL-2	QL-3	CQ
Control & Tracking System		X		
Decontamination System		X		
Handling/Transfer System				
Bridge Crane/Hoist		X		
Hot Cell Manipulator				X
Lid Handling & Transfer Equipment				X
Transfer Cart				X
WP/DC Inspection/Sampling System				X
WP/DC Weld Preparation & Opening System		X		
WP/DC Temporary Lid				X

7.2 IMPACT OF UNVERIFIED DATA

This analysis assumes that the radiation doses to facility workers as the result of Category 1 DBEs associated with the waste package remediation system do not exceed the occupational dose limits of 10 CFR Part 20, Subpart C. The basis of this assumption is provided in Section 5.2. If the assumption cannot be verified by MGR DBE analysis, the handling/transfer system transport cart may be reclassified from CQ to QL-3.

8. REFERENCES

8.1 DOCUMENTS CITED

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 1999a. *Design Basis Event Definition & Analysis/QA Classification Analysis (1.2.1.11)*. Activity Evaluation, March 2, 1999. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990325.0008.

CRWMS M&O 1999b. *QA Classification of MGR Structures, Systems, and Components.* Development Plan TDP-MGR-SE-000007 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991029.0155.

CRWMS M&O 2000a. *Design Basis Event Frequency and Dose Calculation for Site Recommendation.* CAL-WHS-SE-000001 REV 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000627.0214.

CRWMS M&O 2000b. *Waste Package Remediation System Description Document.* SDD-WPR-SE-000001 REV 01 ICN 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000807.0090.

DOE (U.S. Department of Energy) 2000. *Quality Assurance Requirements and Description.* DOE/RW-0333P, Rev. 10. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.20000427.0422.

Duncan, A.B.; Bilhorn, S.G.; and Kennedy, J.E. 1988. *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. TIC: 200650.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." Letter from J.R. Dyer (DOE/YMSCO) to D.R. Wilkins (CRWMS M&O), September 3, 1999. OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

YMP (Yucca Mountain Site Characterization Project) 2000. *Q-List.* YMP/90-55Q, Rev. 6. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.20000510.0177.

8.2 CODES, STANDARDS, AND REGULATIONS

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily Available.

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. Readily Available.

8.3 PROCEDURES

AP-2.21Q, Rev. 0. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities.* ACC: MOL.20000802.0003.

AP-3.10Q, Rev. 2, ICN 3. *Analyses and Models.* ACC: MOL.20000918.0282.

AP-SI.1Q, Rev. 2, ICN 4, ECN 1. *Software Management.* ACC: MOL.20001019.0023.

AP-3-15, Rev. 1, ICN 2. *Managing Technical Product Inputs.* ACC: MOL.20000713.0363.

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 2. *Item Classification and Maintenance of the Q-List.* ACC: MOL.19991214.0628.

9. ATTACHMENTS

Attachment I	Acronyms
Attachment II	MGR Classification Checklist Questions
Attachment III	MGR QA Classification

Attachment I

Acronyms

CQ	Conventional Quality
DBE	Design Basis Event
DC	Disposal Container
MGR	Monitored Geologic Repository
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QL	Quality Level
SSCs	Structures, Systems, and Components
TEDE	Total Effective Dose Equivalent
WP	Waste Package

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation Pre-Screening Checklist**	QA: L
	Complete only applicable items.	Page: 1 Of: 1

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. 06/08/1999)

Attachment II
MGR Classification Checklist Questions

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 05/28/1999) 0973 (Rev. 05/06/1999)

Attachment II
MGR Classification Checklist Questions

CRWMS/M&O	**Importance to Safety or Waste Isolation Evaluation for MGR** *Complete only applicable items.*	QA: L Page: 2 Of: 4

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 Checklist Questions

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 05/20/1999) 0073 (Rev. 05/08/1999)

WPR

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Package Remediation System**

SSC Classified **Control and Tracking System**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The control and tracking system provides for the control of waste package remediation equipment. By control of the handling systems, this SSC has the capability to indirectly affect the confinement/containment of the waste package/disposal container. The control and tracking system is also relied upon to provide operations support necessary for waste handling safety (i.e., remote operations).
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☑	☐	f.	
PS2	☐	☑		The control and tracking system 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	☐	☑		Failure of the control and tracking system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The control and tracking system is not 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).
1.3	☐	☑		The control and tracking system is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The control and tracking system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	This SSC does not support waste package remediation system site-generated radioactive waste control functions.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☑	☐	Failure of the control and tracking system could cause a crane impact with the unsealed waste package and a resulting radiological release.

Classification Analysis Checklists

System: **Waste Package Remediation System**

SSC Classified **Control and Tracking System**

Classification Results:

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

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑	a.	Failure of the control and tracking system as a result of a DBE is not expected to result in an interaction with other QL-1 High Waste Isolation Significant SSCs or compromise their ability to perform their intended waste isolation function.
	☐	☑	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

WPR

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Package Remediation System**

SSC Classified **Decontamination System**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The decontamination system is used to decontaminate DCs, WPs and waste package remediation system hot cell equipment. The system is relied upon to provide 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: 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 decontamination system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The decontamination system is not 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).
1.3	☐	☑		The decontamination system is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The decontamination system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	The decontamination system controls and manages the radioactive wastes generated during system decontamination operations.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the decontamination system as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs or impair their capability to perform their intended radiological safety function.

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Package Remediation System**

SSC Classified **Decontamination System**

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ 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

WPR

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Package Remediation System**

SSC Classified **Bridge Crane/Hoist**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The bridge crane/hoist performs auxiliary hoist and lift functions to support waste package remediation operations. The hoist does not directly lift high-level radioactive wastes. The system is relied upon to provide 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: 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 bridge crane/hoist does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The bridge crane/hoist is not 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).
1.3	☐	☑		The bridge crane/hoist is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The bridge crane/hoist does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	This SSC does not perform a site-generated radioactive waste control function.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☑	☐	Failure of a bridge crane/hoist (i.e., drop of the crane onto the waste package) as a result of a DBE could impair the capability of the waste package to confine the contents within the waste package because the waste package is not sealed.

Classification Analysis Checklists

Classification Results

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

System: **Waste Package Remediation System**

SSC Classified **Bridge Crane/Hoist**

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ 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

WPR

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **Hot Cell Manipulator**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The hot cell manipulator provides remote operating capability in the system hot cell for remotely controlled equipment. The impact of a dropped remote device onto a waste package is expected to be within the design basis of the waste package. The manipulator does not handle high-level radioactive wastes. Shielding is provided to maintain facility operator radiation doses within the limits of 10 CFR 63.111(a)(1) and As Low As Reasonably Achievable (ALARA). This item is not relied upon to provide 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

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **Hot Cell Manipulator**

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

WPR

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **Lid Handling and Transfer Equipment**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	The lid handling and transfer equipment supports DC lid removal operations in the hot cell. The equipment does not handle SNF, HLW or the associated containers. This item is not relied upon to provide operations support necessary for waste handling safety. The drop of the equipment onto the waste package contents after lid removal may result in an offsite release.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Failure of the lid handling and transfer equipment does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The lid handling and transfer equipment is not 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).
1.3	☐	☑		The lid handling and transfer equipment is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The lid handling and transfer equipment does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	This SSC does not support waste package remediation system site-generated radioactive waste control functions.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of this SSC will not impair the capability of the waste package, a QL-1 SSC, to perform its intended radiological safety function. If the lid is removed or to be removed (using lid handling and transfer equipment), the waste package is defective and will become site-generated waste.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **Lid Handling and Transfer Equipment**

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.
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 100 mrem TEDE.
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 regulatory limits. A drop of handling equipment onto waste package contents was evaluated for the DC Handling system and determined to be within regulatory limits. The frequency of that event in this system is expected to be less than that in DC Handling.
2.7	☐	☑ a.	Failure of the lid handling and transfer equipment as a result of a DBE is not expected to result in an interaction with other QL-1 High Waste Isolation Significant SSCs or compromise their ability to perform their intended waste isolation function. If the lid is removed or to be removed (using lid handling and transfer equipment), the waste package is defective and will become site-generated waste.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☐	☑	This item is not required during normal operations, Category I DBEs, and planned recovery actions to limit onsite worker doses to less than 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.

WPR

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **Transfer Cart**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: Section 5.2

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The handling/transfer system transfer cart consists of a transfer cart and power supply. The system transfers waste packages/disposal containers between the disposal container handling area and the waste package remediation hot cell. The transfer cart is relied upon to provide 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: 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 transfer cart does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The transfer cart is not 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).
1.3	☐	☑		The transfer cart is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The transfer cart does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	This SSC does not collect, contain, or monitor any site-generated radioactive waste.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the transfer cart as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs or impair their capability to perform their intended radiological safety function. The transfer cart travels at very low speeds (i.e., inches/minute) and will be designed to withstand seismic events without derailment.

System: **Waste Package Remediation System**

SSC Classified **Transfer Cart**

Classification Results

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☐	☑	This item is not required during normal operations, Category I DBEs, and planned recovery actions to limit onsite worker doses to less than 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin. Assumption 5.2.

WPR

Classification Analysis Checklists

Classification Results:

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **WP/DC Inspection/Sampling System**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The inspection/sampling system provides remote operating capability in the system hot cell. The WP/DC weld preparation and opening system performs WP opening operations prior to sampling. Shielding is provided to maintain facility operator radiation doses within the limits of 10 CFR 63.111(a)(1) and As Low As Reasonably Achievable (ALARA). This item is not relied upon to provide 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

Classification Results

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

System: **Waste Package Remediation System**

SSC Classified **WP/DC Inspection/Sampling System**

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

WPR

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☐
PS2 ☐	QL3 ☐
	CQ ☑

System: **Waste Package Remediation System**

SSC Classified **WP/DC Temporary Lid**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1

Assumptions Applicable to this Item: Section 5.2

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☑	☐	a	A temporary lid consists of a temporary seal installed on the WP/DC after opening. The temporary seal is relied upon for confinement of contamination inside the WP/DC until the waste is removed by another system; permits evacuation of internal gases; and permits backfill of the waste package with inert gas that excludes oxygen from spent nuclear fuel assemblies.
	☐	☑	b.	
	☐	☑	c.	
	☐	☑	d.	
	☐	☑	e.	
	☐	☑	f.	
PS2	☐	☑		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	☐	☑		Failure of the temporary lid does not directly result in loss of waste package containment or criticality control. The temporary lid only prevents spread of contamination while the waste package transfers between waste package remediation, disposal container handling, canister handling, or assembly transfer systems.
1.2	☐	☑		The temporary lid is not 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).
1.3	☐	☑		The temporary lid is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The temporary lid does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☐	☑	This SSC does not collect, contain, or monitor any site-generated radioactive waste.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the temporary lid as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs or impair their capability to perform their intended radiological safety function.

System: **Waste Package Remediation System**

SSC Classified **WP/DC Temporary Lid**

Classification Results:

QL1 ☐
PS1 ☑ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☑

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.
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 100 mrem TEDE.
2.6	☐	☑	The temporary lid, in conjunction with an additional item or administrative control, 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. The temporary lid is not required to maintain its positive seal on a waste package during any abnormal event.
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ b.	
	☐	☑ c.	
	☐	☑ d.	

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

	Yes	No	Rationale:
3.1	☐	☑	This item does not function to provide an alarm to warn of significant increases in radiation levels or concentrations of radioactive materials.
3.2	☐	☑	This item does not function to monitor variables to verify that operating conditions are within technical specifications.
3.3	☐	☑	This item is not 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	☐	☑	This item does not function as part of the radiological, meteorological, or environmental monitoring systems required to assess radionuclide release or dispersion following a DBE.
3.5	☐	☑	This item is not 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	☐	☑	This item is not required during normal operations, Category I DBEs, and planned recovery actions to limit onsite worker doses to less than 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin. Assumption 5.2.

WPR

Classification Analysis Checklists

Classification Results	
	QL1 ☐
PS1 ☑	QL2 ☑
PS2 ☐	QL3 ☐
	CQ ☐

System: **Waste Package Remediation System**

SSC Classified **WP/DC Weld Preparation and Opening System**

SDD Reference: SDD-WPR-SE-000001 R1 ICN 1 Assumptions Applicable to this Item: N/A

Pre-Screen - Importance to Safety or Waste Isolation Evaluation

	Yes	No		Rationale:
PS1	☐	☑	a	The disposal container (DC)/waste package (WP) weld preparation and opening system removes the weld material so that the DC Handling System can complete the closure weld process or opens the WP, as applicable. Opening of a WP requires remote cutting of the lids, collection and processing of the cutting waste, and removal and staging of the lids. The system is relied upon to provide 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. The weld and inspection process per applicable codes and standards (in the DC Handling system) ensures weld integrity rather than weld equipment (or preparation).

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 weld preparation and opening system does not directly result in loss of waste package containment or criticality control.
1.2	☐	☑		The weld preparation and opening system is not 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).
1.3	☐	☑		The weld preparation and opening system is not 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 and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
1.4	☐	☑	a.	The weld preparation and opening system does not perform a waste isolation function.
	☐	☑	b.	

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

	Yes	No	Rationale:
2.1	☑	☐	The weld preparation and opening system may be required to collect radiologically contaminated metal chips generated during lid removal operations.
2.2	☐	☑	This SSC does not perform a fire protection function.
2.3	☐	☑	Failure of the weld preparation and opening system as a result of a DBE is not expected to result in an interaction with other QL-1 SSCs or impair their capability to perform their intended radiological safety function.

Classification Results

QL1 ☐
PS1 ☑ QL2 ☑
PS2 ☐ QL3 ☐
CQ ☐

System: **Waste Package Remediation System**

SSC Classified **WP/DC Weld Preparation and Opening System**

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.
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 100 mrem TEDE.
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 5 rem TEDE, 50 rem combined deep and committed dose equivalents to any individual organ or tissue, 15 rem to the lens of the eye, or 50 rem shallow dose equivalent to the skin.
2.7	☐	☑ a.	Failure of this SSC as a result of a DBE will not compromise the ability of QL-1 High Waste Isolation Significant SSCs to perform their intended waste isolation function.
	☐	☑ 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