OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT ANALYSIS/MODEL COVER SHEET

1. QA: QA

Page: 1 of: 11

*Complete Only Applicable Items*2. ☒ Analysis Check all that applyType 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 applyType 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	<i>Jo A. Ziegler</i>	2/8/01
9. Checker	Robert T. Garrett	<i>R. T. Garrett</i>	2/8/01
10. Lead/Supervisor	Thomas D. Dunn	<i>Thomas D. Dunn</i>	2/8/01
11. Responsible	Dealis W. Gwyn	<i>Dealis W. Gwyn</i>	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

1. Page: 2 of: 11

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
1. PURPOSE	4
2. QUALITY ASSURANCE.....	4
3. COMPUTER SOFTWARE AND MODEL USAGE	4
4. INPUTS.....	4
4.1 PARAMETERS	4
4.2 CRITERIA.....	5
4.3 CODES, STANDARDS, AND REGULATIONS	5
5. ASSUMPTIONS.....	5
6. ANALYSIS	6
6.1 METHOD	6
6.2 MGR DESIGN CONFIGURATION AND ARCHITECTURE.....	7
6.3 PRECLOSURE SAFETY STRATEGY.....	7
6.4 DESIGN BASIS EVENT ANALYSIS	8
6.5 QUALITY ASSURANCE CLASSIFICATION OF MGR SSCs	8
7. CONCLUSIONS	8
7.1 MGR QA CLASSIFICATION.....	8
7.2 IMPACT OF UNVERIFIED DATA.....	8
7.2.1. Preclosure Safety Strategy	8
7.2.2 Compliance with Occupational Dose Limits	9
8. INPUTS AND REFERENCES	9
8.1 DOCUMENTS CITED	9
8.2 CODES, STANDARDS, AND REGULATIONS	10
8.3 PROCEDURES.....	10
9. ATTACHMENTS.....	11

Tables

1. Carrier/Cask Handling System QA Classification	8
---	---

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

CRWMS/M&O

QA: L

Page: 1 Of: 1

Complete only applicable items.

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

[illegible]

CRWMS/M&O

QA: L

Page: 1 Of: 4

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

Yes No

[illegible]

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: <ul style="list-style-type: none"> a. the inability of Quality Level 1 engineered barriers to perform their intended long-term waste isolation function in the postclosure phase?
			<ul style="list-style-type: none"> b. long-term changes to the hydrological characteristics of natural barriers by creating significant ponding or the possibility of drainage into the postclosure underground?
			<ul style="list-style-type: none"> 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?
			<ul style="list-style-type: none"> 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: <div style="border: 1px solid black; height: 300px; margin-top: 5px;"></div>		

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

0973 (Rev. 05/06/1999)

CCH

Classification Analysis Checklists

Classification Results

System: Carrier/Cask Handling System

SSC Classified Control and Tracking System

QL1	☐
PS1	☒
QL2	☒
PS2	☐
QL3	☐
CQ	☐

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

System: **Carrier/Cask Handling System**
 SSC Classified **Control and Tracking System**

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 (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**System: **Carrier/Cask Handling System**SSC Classified **Cranes & Hoists**

	QL1	☐
PS1	☒	QL2 ☒
PS2	☐	QL3 ☐
	CQ	☐

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

System: **Carrier/Cask Handling System**SSC Classified **Cranes & Hoists**

	QL1	☐
PS1	☒	QL2 ☒
PS2	☐	QL3 ☐
	CQ	☐

- 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

System: Carrier/Cask Handling System

SSC Classified Remote Manipulators

	QL1	☐	
PS1	☒	QL2	☐
PS2	☐	QL3	☒
	CQ	☐	

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)

System: **Carrier/Cask Handling System**SSC Classified **Remote Manipulators**

	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)]. 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

System: **Carrier/Cask Handling System**SSC Classified **Tooling and Fixtures**

	QL1	☐
PS1	QL2	☐
PS2	QL3	☐
	CQ	☒

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	☐	☒	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.)
	☐	☒	
	☐	☒	
	☐	☒	
	☐	☒	
	☐	☒	
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	☐	☐	N/A
	☐	☐	

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

Classification Results

System: **Carrier/Cask Handling System**

SSC Classified **Tooling and Fixtures**

QL1 ☐
PS1 ☐ QL2 ☐
PS2 ☐ QL3 ☐
CQ ☒

2.4 ☐ ☐

N/A

2.5 ☐ ☐

N/A

2.6 ☐ ☐

N/A

2.7 ☐ ☐ a.
☐ ☐ b.
☐ ☐ c.
☐ ☐ d.

N/A

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