S

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 636972

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	JL Smalley, 08E00, S7-12, 372-0886	[X] Yes [] No	07/09/98
	6. Project Title/No./Work Order No. Characterization	7. Bldg./Sys./Fac. No. 200 Gen	8. Approval Designator SQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-SEL-044, REV. 1	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

Complete re-write

13b. Design Baseline Document? [X] Yes [] No

CLARIFICATION: THIS IS NOT A COMPLETE RE-WRITE IN THE SENSE THAT IT THAT IT BRINGS THIS UP-TO-DATE WITH THE BASIS for INTERIM OPERATION (HNF-SD-WM-BIO-001) AUTHORIZATION BASIS. THIS IS A LIMITED SCOPE CHANGE AS INDICATED IN BLOCK 14b. ONLY COLUMN #1, "ITEM IDENTIFICATION" OF TABLE 5.3 IS CHANGED TO ADD EXHAUSTER "B" DRAWING NUMBERS. REVISION OF THIS SEL PER THE BIO WILL BE DONE AT A LATER DATE. 8/17/98 G.P. JANICEK

14a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details

THIS CHANGE IS BEING MADE TO INCLUDE THE EXHAUSTER B DRAWING NUMBERS FOR EQUIPMENT IDENTIFICATION OF THE SAFETY CLASS COMPONENTS ON EXHAUSTER B.
SEE USQ TF-97-0939 ~~REVISION 0~~ REV 2 8/17/98

15. Distribution (include name, MSIN, and no. of copies)

JL Smalley	S7-12	ML McElroy	S7-07
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GW Wilson	S7-12	JR Kriskovich	R1-56

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DATE: AUG 26 1998 STA: 4 HANFORD RELEASE ID: 58

A-7900-013-2 (05/96) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 636972

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $N/A	Savings	[] $N/A	Delay	[] N/A

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]	NONE	[X]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

21. Approvals

	Signature	Date		Signature	Date
Design Authority GP Janicek		8/17/98	Design Agent		
Cog. Eng. RN Dale		7/31/98	PE		
Cog. Mgr. JS Schofield		8/4/98	QA		
QA ML McElroy		8/11/98	Safety		
Safety JA Ranschau		8/5/98	Design		
Environ.			Environ.		
Charact. Project Eng. RM Bogger		8/18/98	Other		
Design Authority JR Kriskovich		8-17-98			
CPO TD Jarecki		8-13-98			
Safety Mgr.		8-6-98	DEPARTMENT OF ENERGY		
			Signature or a Control Number that tracks the Approval Signature		
			ADDITIONAL		

A Safety Equipment List for Rotary Mode Core Sampling Systems Operation in Single Shell Flammable Gas Tanks

JL Smalley
SGN Eurisys Services Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 636970 UC: 2070
Org Code: 08E00 Charge Code: N4H2D
B&R Code: EW3120074 Total Pages: 49

Key Words: Safety Equipment List, SEL, Rotary Mode Core Sampling System, RMCSS, single shell, flammable gas tanks.

Abstract: This document identifies all interim safety equipment to be used for rotary mode core sampling of single-shell flammable gas tanks utilizing Rotary Mode Core Sampling Systems (RMCSS)

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8/25/98

Release Approval Date

DATE
STA: 4
HANFORD RELEASE
ID: 58
AUG 26 1998

Release Stamp

Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-SD-WM-SEL-044	Page 1

(2) Title
A Safety Equipment List for Rotary Mode Core Sampling Systems Operation in Single Shell Flammable Gas Tanks

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) EDT 622107	R.N. Dale	J.S. Schofield
1	Complete re-write (ECN 636970)	R.N. Dale 12/11/97	J.S. Schofield 12/11/97
2 RS	Added Exhauster B drawing numbers to the equipment identification column of section 5.3 Safety Equipment List for the RMCS System Exhauster. Also added a note to section 3.0 explaining why the exhauster equipment has more than one identification number. (direct revision ECN 636972)	R.N. Dale RNDale 7/31/98	J.S. Schofield John Schofield 8/3/98

A-7320-005 (08/91) WEF168

A SAFETY EQUIPMENT LIST FOR ROTARY MODE CORE SAMPLING SYSTEMS OPERATION IN SINGLE-SHELL FLAMMABLE GAS TANKS

HNF-SD-WM-SEL-044

REVISION 2

J. L. Smalley

COGEMA ENGINEERING CORPORATION

July 1998

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A Safety Equipment List for Rotary Mode Core Sampling Systems Operation in Single-Shell Flammable Gas Tanks

1.0 PURPOSE

This document identifies all interim safety equipment to be used for rotary mode core sampling of single-shell flammable gas tanks utilizing Rotary Mode Core Sampling systems (RMCS).

2.0 SCOPE

This document provides the safety equipment for RMCS trucks HO-68K-4600, HO-68K-4647, trucks three and four respectively, and associated equipment. It is not intended to replace or supersede WHC-SD-WM-SEL-023, (Kelly 1991), or WHC-SD-WM-SEL-032, (Corbett 1994), which classifies HO-68K-4344 and HO-68K-4345 respectively. The term "safety equipment" refers to safety class (SC) and safety significant (SS) equipment, where equipment refers to structures, systems and components (SSC's).

The identification of safety equipment in this document is based on the credited design safety features and analysis contained in the Authorization Basis (AB) for rotary mode core sampling operations in single-shell flammable gas tanks. This is an interim safety classification since the AB is interim. This document will be updated to reflect the final RMCS equipment safety classification designations upon completion of a final AB which will be implemented with the release of the Final Safety Analysis Report (FSAR).

The current interim AB for rotary mode core sampling in single-shell flammable gas tanks utilizing RMCS systems three and four (RMCS trucks HO-68K-4600 and HO-68K-4647) is the Basis for Interim Operation (BIO) (LMHC 1997b), Wagoner 1997b, the RMCS initial Safety Evaluation Report (DOE-RL 1996), Wagoner 1996, LMHC 1997e, WHC-SD-WM-SAD-035(LMHC 1997d), and the Technical Safety Requirements (TSRs) (LMHC 1997f) with clarification from Wagoner 1997c. Wagoner 1996, was the first approval document for performing RMCS in flammable gas tanks. Wagoner 1996, referenced WHC-SD-WM-SAD-035, the initial Safety Evaluation Report (SER,) and itself as being part of the authorization basis. The initial SER states that WHC-SD-WM-SAD-035 (LANL 1996) , WHC-SD-WM-OSR-005 (LMHC 1996), and the SER, itself, provide the Authorization Basis for RMCS. In July 1997, DOE issued Wagoner 1997b. This second SER approved deletion of a number of flammable gas controls for RMCS from LANL 1996 and LMHC 1996, and approved addition of the Standing Order flammable gas controls in LMHC 1997a. The Standing Order flammable gas controls and some of the OSR controls were replaced by the BIO/TSR controls on September 29, 1997.

The listing shown in section 5.0 is a summary of the safety classification for all safety equipment for these systems. The actual safety equipment list (SEL), including safety classification justification, is identified in sections 5.1-5.4. All equipment associated with this system not listed in this document is considered non-safety class equipment and shall be designated as General Service (GS).

3.0 APPLICATION

The safety classification designation will be used as the basis for confirming the appropriate Quality, Safety, and Environmental Assurance, and Quality Control is used for design work, procurement, installation/modification, maintenance, and operation of equipment. Each listing contains: identification of the equipment, functional description of the equipment, equipment safety function, failure mechanisms, design attributes, failure effect on SSC safety function, safety classification justification, and designated safety classification. Note, section 5.3 (Safety Equipment List for the RMCS System Exhauster) contains up to three identification numbers for each item in the list. One identification number is for Exhauster B, the other is for Exhauster C and the remaining number is a reference number. The reference numbers were put in the list to reflect previous designations for the equipment that were used prior to the Exhauster drawings being updated. These numbers were used on the original Commercial Grade Item dedication forms and are left here for traceability only.

4.0 SYSTEM DESCRIPTION

The RMCS systems three and four consist of the sampling truck, the portable exhauster, the nitrogen supply system, the portable generator, the x-ray machine, the power distribution trailer, support trucks, support trailer, universal samplers, and associated ancillary equipment.

The RMCS systems are specifically designed to rotary sample in single-shell flammable gas tanks. The waste is collected in a universal sampler, which is lowered down through the drill string and seals in the drill bit section. While the drill bit penetrates and the sampler descends, a piston in the sampler is held in place, allowing the core sample to be drawn into the sampler. Nitrogen purge gas cools the bit and clears away the cuttings during drilling. This gas is exhausted and filtered by a tank ventilation system to avoid particulate emissions from the tank. A dedicated portable exhauster can be connected to a separate riser for this purpose on tanks that are not actively ventilated. A system is in place to provide nitrogen hydrostatic head gas to the drill string to prevent waste flooding during sampler change out.

When cutting through the waste material, friction and heat can be generated by the drill bit causing waste heating and possible ignition of the waste. Therefore, the drill bit temperature must be limited to eliminate the potential reactivity of the tank contents during sampling operations. The drill bit temperature is controlled by enveloping the operating parameters which affect drill bit temperature. Identification of the safety envelope and justification for the alarm set points and alarm delays are contained in the AB.

For further system description details refer to (WHC 1995) and (Robinson 1995).

5.0 SAFETY CLASSIFICATION

The following listing is a summary of the safety equipment associated with RMCS operations in single-shell flammable gas tanks. For specific information about the individual components listed refer to the specified section of this document. The design attributes for the safety SSC's are listed in sections 5.1-5.4. These attributes are critical to the SSC safety function, as analyzed in the referenced safety documentation. In some cases the design attributes listed are the SSC "Critical Characteristics," as defined in HNF-PRO-447 (HNF 1997a).

SAFETY EQUIPMENT LIST SUMMARY

Rotary Mode Core Sampling Truck	SC/See section 5.1
Shielded Receiver Assembly	SC/See section 5.1
Grapple Hoist	SC/See section 5.1
Purge Gas Instrumentation	SC/See section 5.1
Downward Force Instrumentation	SC/See section 5.1
RPM Instrumentation	SC/See section 5.1
Penetration Rate Instrumentation	SC/See section 5.1
Hydraulic Controls Instrumentation	SC/See section 5.1
Shutdown Interlock	SC/See section 5.1
Drill String Components	SC/See section 5.1
Shielded Receiver Assembly	SC/ See section 5.1.1
Intrinsic Safety Barrier	SC/ See section 5.1.1
Remote Latch Unit	SC/ See section 5.1.1
Cable	SC/ See section 5.1.1
Drum	SC/ See section 5.1.1
Shaft	SC/ See section 5.1.1
Insert	SC/ See section 5.1.1
Keys	SC/ See section 5.1.1
Couplings	SC/ See section 5.1.1
Gear Reducer	SC/ See section 5.1.1
Motor	SC/ See section 5.1.1
Load Cell Display	SC/ See section 5.1.1
Load Cell	SC/ See section 5.1.1

Grapple Hoist Assembly ..... SC/ See section 5.1.2

Intrinsic Safety Barrier ..... SC/ See section 5.1.2
Sample Actuator (grapple) ..... SC/ See section 5.1.2
Wire Rope ..... SC/ See section 5.1.2
Drum ..... SC/ See section 5.1.2
Shaft ..... SC/ See section 5.1.2
Roll Pin ..... SC/ See section 5.1.2
Key ..... SC/ See section 5.1.2
Coupling ..... SC/ See section 5.1.2
Gear Reducer ..... SC/ See section 5.1.2
Motor ..... SC/ See section 5.1.2
Motor Controller ..... SC/ See section 5.1.2
Load Cell Display ..... SC/ See section 5.1.2
Load Cell ..... SC/ See section 5.1.2

Purge Gas Instrumentation ..... SC/ See section 5.1.3

Purge Gas Flow Meter ..... SC/ See section 5.1.3
Purge Gas Flow Turbine ..... SC/ See section 5.1.3
Purge Gas Flow Pressure Transducer ..... SC/ See section 5.1.3
Purge Gas Flow Temperature Transmitter ..... SC/ See section 5.1.3
Riser Sleeve Purge Differential Pressure Switch ..... SC/ See section 5.1.3
Purge Gas Temperature Display ..... SS/ See section 5.1.3
Purge Gas Temperature Thermocouple ..... SS/ See section 5.1.3
Pressure Switch ..... SC/ See section 5.1.3

Downward Force Instrumentation ..... SC/ See section 5.1.4

Downward Force Pressure Transducers ..... SC/ See section 5.1.4
Downward Force Adder/Subtractor ..... SC/ See section 5.1.4
Downward Force Digital Display ..... SC/ See section 5.1.4

RPM Instrumentation ..... SC/ See section 5.1.5

Drill Rotation Sensor ..... SC/ See section 5.1.5
RPM Digital Display Unit ..... SC/ See section 5.1.5

Penetration Rate Instrumentation ..... SC/ See section 5.1.6

Drill Bit Penetration Digital Display Unit ..... SC/ See section 5.1.6
Magneto Tachometer Generator ..... SC/ See section 5.1.6

Hydraulic Control Instrumentation ..... SC/ See section 5.1.7

Lower Ram Pressure Display ..... SC/ See section 5.1.7
HBD/Walkdown Function Pressure Transducer ..... SC/ See section 5.1.7
HBD Hydraulic Solenoid Valve ..... SC/ See section 5.1.7
Walkdown Function Solenoid Valve ..... SC/ See section 5.1.7
HBD/Walkdown Function Comparator ..... SC/ See section 5.1.7

Shutdown Interlock ..... SC/ See section 5.1.8

PLC ..... SC/ See section 5.1.8
Shutdown Interlock (K5 Relay) ..... SC/ See section 5.1.8
Exhauster/Interlock Shutdown Override ..... SS/ See section 5.1.8
Pressure Switch for Actively Ventilated Tanks ..... SC/ See section 5.1.8

Drill String Components ..... SC/ See section 5.1.9

Quill Rod Adapter ..... SC/ See section 5.1.9
Core Barrel ..... SC/ See section 5.1.9
Drill Bit ..... SC/ See section 5.1.9

Riser Equipment ..... SC/See section 5.2

Foot Clamp ..... SC/See section 5.2

Exhauster ..... SC/See section 5.3

Fan ..... SC/See section 5.3
Pressure Switch ISB ..... SC/See section 5.3
Differential Pressure Switch ..... SC/See section 5.3
HEPA filter unit ..... SS/See section 5.3
Inlet Duct ..... SC/See section 5.3
Relative Humidity Transmitter ..... SC/See section 5.3
Tank Pressure Switch ..... SC/See section 5.3
Masstron Stack Flow Transmitter ..... SC/See section 5.3
Masstron Sample Flow Transmitter ..... SC/See section 5.3
Veltron Vacuum Transmitter ..... SC/See section 5.3
Vacuum Pump Pressure Switches ..... SC/See section 5.3
Vacuum Pumps ..... SC/See section 5.3
Truck Shutdown Relay ..... SS/See section 5.3
Variable Frequency Drive ..... SS/See section 5.3
Exhauster Low Flow Relay ..... SS/See section 5.3
Exhauster Flow Controller ..... SS/See section 5.3
Beta CAM In-Line Remote Detector Head ..... SC/See section 5.3

Universal Sampler ..... SC/See section 5.4

Quadralatch ..... SC/See section 5.4
Insert ..... SC/See section 5.4

5.1 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Rotary Mode Core Sampling Truck	Monitor key drilling parameters, including nitrogen purge gases, exhauster status, and drill rig parameters related to temperature buildup of the drill bit. Initiate system shutdown when parameters exceed the allowable limits established in approved safety documentation. Provide managed spark potential during waste intrusive operations	This system contains equipment designed to prevent a postulated accident scenario involving various reactions within the waste tanks during sampling operations, due to contact between tank waste elements and core drilling equipment, or due to sparking in the presence of flammable gases. The bounding accident as defined in Wagoner 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems X Structures__ Components__ for the above host item.

The safety classification of the items listed below is: Preliminary__ interim X final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Shielded Receiver Assembly	The receiver assembly which provides interim sampler shielding during sampler change out, uses a power winch to raise and lower the samplers into the drill string, x-ray cart, or transfer casks. The system provides containment for the hydrostatic head gases during sampler change out and systems to measure cable tension and depth.	Provide intrinsic safety features to ensure waste tank gases are separated from equipment not approved for use in flammable atmospheres. Control the movement of the remote latch unit to prevent mechanical sparking during operation or drop accident mitigating the probability of an ignition of potential flammable gas in the operating space.	See section 5.1.1 for specific failure mechanisms of individual components	See section 5.1.1 for specific design attributes of individual components	Certain component failures affecting the proper management of ignition sources for this equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failures would typically lead to a shutdown of sampling operations. Safe shutdown, in response to a safety component failure, and ignition source control are the primary safety function of the RMCS System.	This system contains equipment designed to prevent a postulated accident scenario due to both mechanical and electrical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of the allowable limit..	SC

5.1 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Grapple Hoist Assembly	The grapple hoist assembly is used to hold the sampler piston in position during sampling. A power winch is used to raise and lower the grapple actuator into the drill string to attach to the sampler. The system provides containment for purge gases during sampling operations and systems to measure cable tension	Provide intrinsic safety features to ensure waste tank gases are separated from equipment not approved for use in flammable atmospheres. Control the movement of the sample actuator (grapple) to prevent mechanical sparking during operation or drop accident mitigating the probability of an ignition of potential flammable gas in the operating space.	See section 5.1.2 for specific failure mechanisms of individual components	See section 5.1.2 for specific design attributes of individual components	Certain component failures affecting the proper management of ignition sources for this equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failures would typically lead to a shutdown of sampling operations. Safe shutdown, in response to a safety component failure, and ignition source control are the primary safety function of the RMCS System.	This system contains equipment designed to prevent a postulated accident scenario due to both mechanical and electrical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner, 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of the allowable limit...	SC
Purge Gas Instrumentation	The purge gas instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the primary nitrogen purge gas, hydrostatic head gases, z-purge gas, and riser sleeve annulus purge.	The purge gas instrumentation system is used to provide control utilizing measurement, monitoring and alarm for the primary nitrogen purge gas, hydrostatic head gases, Z-purge gas and riser sleeve annulus purge to prevent the possibility of waste ignition due to waste heating or ignition of potential flammable gas in the operating space from unprotected equipment.	See section 5.1.3 for specific failure mechanisms of individual components	See section 5.1.3 for specific design attributes of individual components	Certain component failures affecting the proper management of purge gas could lead to ignition of flammable gas or waste overheating and burn causing dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failure would lead to a shutdown of sampling operations. Safe shutdown, in response to a safety component failure, and ignition source control are the primary safety function of the RMCS system.	This system contains equipment designed to prevent a postulated accident scenario due to both mechanical and electrical sparking in the presence of flammable gases and possible waste heating and reaction during sampling operations. The bounding accident as defined by LMHC 1997d for waste reactions, and Wagoner 1997b for ignition of flammable gas, is dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of the allowable limit.	SC
Downward Force Instrumentation	The downward force instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the drilling force required to penetrate the waste during sampling operations.	The downward force instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the drilling force required to penetrate the waste during sampling operations. Downward force control is necessary to ensure the operational safety envelope, which prevents a potential waste reaction and fire, is not violated.	See section 5.1.4 for specific failure mechanisms of individual components	See section 5.1.4 for specific design attributes of individual components	Certain component failures affecting the proper management of downward force during sampling operations could lead to waste overheating and burn causing dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failure would lead to a shutdown of sampling operations. Safe shutdown , in response to a safety component failure, and ignition source control are the primary safety function of the RMCS system.	Equipment failure affecting the proper management of downward force during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of the allowable limit.	SC

5.1 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
RPM Instrumentation	The rpm instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the rotational speed of the drill bit during sampling operations.	The RPM instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the rotational speed of the drill bit during sampling operations. RPM control is necessary to ensure the operational safety envelope, which prevents a potential waste reaction and fire, is not violated.	See section 5.1.5 for specific failure mechanisms of individual components	See section 5.1.5 for specific design attributes of individual components	Certain component failures affecting the proper management of rpm during sampling operations could lead to waste overheating and burn causing dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failure would lead to a shutdown of sampling operations. Safe shutdown, in response to a safety component failure, and ignition source control are the primary safety function of the RMCS system.	Equipment failure affecting the proper management of rpm during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem.. and an offsite calculated exposure in excess of the allowable limit.	SC
Penetration Rate Instrumentation	The penetration instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the penetration rate of the drill bit during sampling operations.	The penetration rate instrumentation system is used to provide control utilizing measurement, monitoring and alarm for the penetration rate of the drill bit during sampling operations. Penetration rate control is necessary to ensure the operational safety envelope, which prevents a potential waste reaction and fire, is not violated.	See Section 5.1.6 for specific failure mechanisms of individual components	See section 5.1.6 for specific design attributes of individual components	Certain component failures affecting the proper management of penetration rate during sampling operations could lead to waste overheating and burn causing dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failure would lead to a shutdown of sampling operations. Safe shutdown, in response to a safety component failure, and ignition source control are the primary safety function of the RMCS system.	Equipment failure affecting the proper management of penetration rate during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of the allowable limit..	SC
Hydraulic Control Instrumentation	Operating instrumentation is used to provide control utilizing measurement, monitoring, and alarm for administratively controlling the drilling force required to penetrate the waste as well as bottom detection.	The hydraulic control instrumentation is used to provide control utilizing measurement, monitoring, and alarm for administratively controlling the drilling force required to penetrate the waste. Hydraulic control is necessary as a defense-in-depth" measure used to prevent a potential waste reaction down force in excess of the operational safety envelope. It is also used to prevent penetration of the tank bottom during drilling operations.	See section 5.1.7 for specific failure mechanisms of individual components	See section 5.1.7 for specific design attributes of individual components	Certain component failures affecting the proper management of downward force could lead to catastrophic failure of equipment which could cause ignition of flammable gas leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system. Other failures would typically lead to a shutdown of sampling operations. Safe shutdown, in response to a safety component failure, and ignition source control are the primary safety function of the RMCS system.	Equipment failure affecting the proper management of downward force during sampling operations could lead to a catastrophic failure of equipment which could cause ignition of flammable gas leading to a waste tank fire or explosion and dome collapse. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem.. and an offsite calculated exposure in excess of the allowable limit.	SC

5.1 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Shutdown Interlock	The shutdown interlock monitors and processes signals from other critical safety SSC's and provides alarm and drill rig shutdown for out of tolerance signals.	The shutdown interlock processes alarm signals during sampling operations causing activation of an alarm strobe and horn followed by drill rig engine shutdown to ensure the operational safety envelope, preventing waste reaction and fire, is not violated or preventing operations when spark sources are not protected from igniting potential flammable gas in their operating space or preventing operation when the tank dome is pressurized.	See section 5.1.8 for specific failure mechanisms of individual components	See section 5.1.8 for specific design attributes of individual components	Certain component failures affecting the proper management of alarm conditions during sampling operations could lead to both a waste reaction or ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. Failures could also cause undetected tank dome space over pressurization causing an unfiltered release of materials affecting the facility worker. These accidents would compromise the primary safety function of the RMCS system.	Equipment failure affecting the proper management of alarm conditions during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem.. and an offsite calculated exposure in excess of the allowable limit.	SC
Drill String Components	The drill string transmits energy through rotation and downward force to the drill bit, and provides a column to raise and lower samplers and provides containment of purge and hydrostatic head gases. The drill bit penetrates and drills through waste.	Reduce the possibility of ignition in the drill string, through the use of components approved for use in flammable gas environments by US Bureau of Mines testing mitigating the probability of an ignition of potential flammable gas in the operating space and preventing waste reaction and fire.	See section 5.1.9 for specific failure mechanisms of individual components	See section 5.1.9 for specific design attributes of individual components	Certain component failures affecting the proper management of ignition sources for this equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system. Other equipment failures would typically lead to shutdown of sampling operations. Safe shutdown in response to safety component failure and ignition source control are the primary safety function of the RMCS system	This system contains equipment designed to prevent a postulated accident scenario due to mechanical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner, 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem.. and an offsite calculated exposure in excess of the allowable limit.	SC

5.1.1 SAFETY EQUIPMENT LIST FOR THE SHIELDED RECEIVER SYSTEM OF THE RMCS CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Shielded Receiver Assembly	Provide intrinsic safety features to ensure waste tank gases are separated from equipment not approved for use in flammable atmospheres. Control the movement of the Remote latch unit to prevent mechanical sparking during operation or drop accident, mitigating the probability of an ignition of potential flammable gas in the operating space.	This system contains equipment designed to prevent a postulated accident scenario due to both mechanical and electrical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems___ Structures___ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary___ interim_X_ final___

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Intrinsic Safety Barrier H-2-690026-8 (SR-ISB)	The shielded receiver ISB is used to allow the load cell circuit to be qualified for use in a NFPA Class 1, Division 1, Group B environment.	The intrinsic safety barrier prevents adequate energy from reaching the load cell to create an ignition of potential flammable gas in the environment for which the loadcell is rated should the load cell display have an electrical failure.	Use of unqualified or incompatible ISB causes electrical spark potential.	The intrinsic Safety Barrier is rated per NFPA 70 for providing intrinsically safe circuit in a NFPA Class 1, Div. 1, Group B environment. The intrinsic Safety Barrier is compatible with load cell and load cell display The intrinsic Safety barrier makes the load cell circuit meet the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Failure of the intrinsic Safety Barrier has no affect on the SSC safety function. Part substitution affecting the intrinsic safety of this equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.1 SAFETY EQUIPMENT LIST FOR THE SHIELDED RECEIVER SYSTEM OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Remote Latch Unit (RLU) H-2-690143-1	The RLU is attached to the cable end of the sampler hoist assembly which is used to install and Remove samplers from the core barrel and transfer casks during sampler change out.	Performs intended function without igniting potential flammable gas in the operating space.	Relative motion or impacting with interfacing equipment causes mechanical sparking. Part substitution introducing electrical or mechanical spark potential.	RLU designed to withstand loads in excess of 2002 Newtons RLU does not contain any electrical components. The RLU maintains a relative motion within the drill string and receiver assembly of less than 30 cm/sec, which meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure which results in the free fall of the RLU in the drill string could cause a spark on impact. Part substitution which results in use of electronics in the RLU could result in the use of unapproved equipment, capable of sparking during normal use in the drill string. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Cable, H-2-690030-44	The sampler hoist cable which connects the RLU to the sampler hoist drum is used to position the RLU in the drill string and transmit the load to the hoist.	Performs intended function without failure resulting in drop of the RLU and ignition of potential flammable gas in the operating space.	Relative motion with interfacing equipment causes a mechanical spark. Structural failure causes RLU to drop and spark.	The hoist cable can be tested to loads in excess of 6583 Newtons. The cable maintains a relative motion within the drill string and receiver assembly of less than 30cm/sec, which meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure which results in the free fall of the RLU in the drill string could cause a spark on impact. Ignition of flammable gases in the drill string cold lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.1 SAFETY EQUIPMENT LIST FOR THE SHIELDED RECEIVER SYSTEM OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Drum, H-2-690036-2 Shaft, H-2-690036-3 Insert, H-2-690020-31 Key, H-2-690020-45 Key, H-2-690020-47 Drum Key, H-2-690030-80 Couplings, H-2-690020-29 H-2-690020-30	These items transmit the power for the sampler hoist system from the gear reducer to hoist cable	Performs intended function without failure resulting in drop of RLU and ignition of potential flammable gas in the operating space.	Relative motion with interfacing equipment causes a mechanical spark. Structural failure of components causes RLU to drop and spark.	Components are designed to withstand loads in excess of the maximum load applied by the drive train at motor stall. The drum, shaft, and drum key maintain a relative motion within the sampler hoist box of less than 30 cm/sec, which meets the requirements of Ignition Source Control Set 1 (LMHC 1997b, LMHC 1997f)	Structural failure which results in the free fall of the RLU in the drill string could cause a spark on impact. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Gear Reducer, H-2-690020-9	The gear reducer, located outside of the sampler hoist box, transmits the power from the motor to the sampler hoist cable drum.	The gear reducer provides adequate structural margin to prevent system failure resulting in drop of the Remote latch unit during operation and ignition of potential flammable gas in the drill string. The gear ratio limits the maximum hoist speed to prevent mechanical sparking, and ignition of potential flammable gas in the drill string, from the hoist components located in the sampler hoist box and Remote latch unit during normal operation.	Structural failure causes drop of RLU and spark. Part substitution with inadequate gear ratio causes mechanical sparking due to relative motion of components in the sampler hoist box or RLU	Gear reducer is designed to withstand loads in excess of those developed from stall torque of motor. Gear ratio chosen to limit RLU travel speed to less than 30 cm/sec.	Structural failure which results in the free fall of the RLU in the drill string could cause a spark on impact. Incorrect gear ratio could cause spark due to relative motion of components in the sampler hoist box or RLU during normal operations. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.1 SAFETY EQUIPMENT LIST FOR THE SHIELDED RECEIVER SYSTEM OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Motor, H-2-690020-23	The motor, located outside of the sampler hoist box, provides load carrying capability for the RLU.	The motor performs intended function without causing structural failure of the hoist system and drop of the Remote latch unit or allowing the system to exceed the maximum allowable hoist speed which prevents mechanical sparking of the hoist components or RLU and ignition of potential flammable gas in the drill string.	Part substitution causes excessive torque to be applied to the system resulting in structural failure and drop of RLU, or excessive hoist speed leading to mechanical spark due to relative motion of components in the sampler hoist box or RLU.	The motor is selected to limit system load to less than 6583 Newtons. Motor selected to limit RLU travel speed to less than 30 cm/sec.	Structural failure which results in the free fall of the RLU in the drill string could cause a spark on impact. Incorrect motor selection could cause spark due to relative motion of components in the sampler hoist box or RLU during normal operations. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Load Cell Display H-2-690095-3	The load cell display is used to protect the load carrying equipment of the sampler hoist by interrupting power to the hoist in the event of an overload condition. It is also, used to verify whether or not a sampler is attached to the Remote latch unit during sampler installation and retrieval.	The load cell display is compatible with the intrinsic safety barrier which combines to create part of an intrinsically safe circuit and is used as a defense-in-depth measure to interrupt the power to the hoist motor should an overloading condition occur. These functions prevent an ignition of potential flammable gas in the drill string.	Electrical damage causing the load cell display to inaccurately read the load on the hoist cable. Calibration error causes inaccurate reading of load on hoist. Part substitution incompatible with the shielded receiver ISB. Electrical failure causes display to not shutdown hoist motor on overload.	The display can be calibrated to a contractor's approved procedure over the operating range. Load cell display is compatible with the intrinsic safety barrier.	Due to the conservative design of the load carrying equipment, the load cell display is used primarily for operator information and is relied on only as defense-in-depth measure to prevent free fall of the RLU. Incorrect display selection and system failure could lead to a spark in the hoist box. Ignition of flammable gas in the hoist box could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with hoist failure could lead to dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC

5.1.1 SAFETY EQUIPMENT LIST FOR THE SHIELDED RECEIVER SYSTEM OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Load Cell H-2-690030-31	The load cell, located in the sampler hoist box, is used to measure the weight applied to the sampler hoist cable. This information is sent to the load cell display.	The load cell measures the load applied to the hoist cable without igniting potential flammable gas in the operating space.	Electrical or mechanical damage causing inaccurate measurement of the load on the hoist cable. Calibration error causes inaccurate measurement of load on hoist system. Part substitution incompatible with shielded receiver ISB resulting in capability to create a spark.	The load cell is a simple device which will not create a spark due to electrical failure The load cell can be calibrated to a contractor's approved calibration procedure over the operating range Load cell is compatible with shielded receiver ISB. Load Cell part of circuit meeting Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Due to the conservative design of the load carrying equipment, the load cell is used primarily for operator information and is relied on only as defense-in-depth measure to prevent free fall of the RLU. Incorrect load cell selection could lead to a spark in the hoist box. Ignition of flammable gas in the hoist box could lead to a reaction resulting in potential dome collapse.	Per Wagoner 1997b, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with hoist failure could lead to dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC

5.1.2 SAFETY EQUIPMENT LIST FOR THE GRAPPLE HOIST ASSEMBLY OF THE RMCS CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Grapple Hoist Assembly	Provide intrinsic safety features to ensure waste tank gases are separated form equipment not approved for use in flammable atmospheres. Control the movement of the sample actuator (grapple) to prevent mechanical sparking during operation or drop accident mitigating the probability of an ignition of potential flammable gas in the operating space.	This system contains equipment designed to prevent a postulated accident scenario due to both mechanical and electrical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner, 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components X for the above host item.

The safety classification of the items listed below is: Preliminary__ interim X final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Intrinsic Safety Barrier H-2-690073-145 through -152 (GH-ISB)	The grapple box ISB is used to allow the load cell circuit to be qualified for use in a NFPA Class 1, Division 1, Group B environment.	The intrinsic safety barrier prevents adequate energy form reaching the load cell to create an ignition of potential flammable gas in the environment for which it is rated should the load cell display have an electrical failure	Use of unqualified or incompatible ISB causing electrical spark potential.	The intrinsic safety barrier is rated per NFPA 70 for providing intrinsically safe circuit in a NFPA Class 1, Div. 1, Group B environment The intrinsic safety barrier is compatible with load cell and load cell display The intrinsic safety barrier makes the load cell circuit meet the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Failure of the intrinsic safety barrier has no affect on the SSC safety function. Part substitution affecting the intrinsic safety of this equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.2 SAFETY EQUIPMENT LIST FOR THE GRAPPLE HOIST ASSEMBLY OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attribute	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Sample Actuator (Grapple) H-2-690052-1	The sample actuator, which is attached to the cable end of the grapple hoist, is used to hold and Remove sampler pintel rods from the sampler in the drill string.	Performs intended function without igniting potential flammable gas in the operating space.	Relative motion or impacting with interfacing equipment causes mechanical sparking. Part substitution introducing electrical or mechanical spark potential	The sample actuator is designed to withstand loads in excess of the maximum allowable operating load of 1112 Newtons. The sample actuator does not contain any electrical components. The sample actuator maintains a relative motion within the drill string and quill rod of less than 30 cm/sec, which meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure which results in the free fall of the sample actuator in the drill string could cause a spark on impact. Part substitution which results in use of electronics in the grapple actuator could result in the use of unapproved equipment, capable of sparking during normal use in the drill string. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Wire rope with clevis, H-2-690057-13	The grapple hoist wire rope, which connects the sample actuator to the grapple hoist drum, is used to position the sample actuator in the drill string and transmit the load to the hoist.	Performs intended function without failure resulting in drop of the sample actuator and ignition of potential flammable gas in the operating space.	Relative motion with interfacing equipment causes a mechanical spark. Structural failure causes sample actuator to drop and spark.	The hoist cable and eye can be test to loads in excess of maximum allowable operating load of 1112 Newtons. The wire rope maintains a relative motion within the drill string and quill rod of less than 30 cm/sec, which meets Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure which results in the free fall of the sample actuator in the drill string could cause a spark on impact. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.2 SAFETY EQUIPMENT LIST FOR THE GRAPPLE HOIST ASSEMBLY OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Drum, H-2-690057-14 Shaft, H-2-690057-20 Roll pin, H-2-690057-48 Key, H-2-690055-31`` Coupling, H-2-690055-28	These items transmit the power for the grapple hoist system from the gear reducer to the wire rope.	Performs intended function without failure resulting in drop of the sample actuator and ignition of potential flammable gas in the operating space.	Relative motion with interfacing equipment causes a spark. Structural failure of components causes sample actuator to drop and spark.	Components designed to withstand loads in excess of the maximum allowable operating load of 1112 Newtons. The drum, shaft, and roll pins maintain a relative motion within the grapple hoist box of less than 30 cm/sec, which meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure which results in the free fall of the sample actuator in the drill string could cause a spark on impact. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner, 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Gear Reducer, H-2-690055-21 (including output key)	The gear reducer, located outside of the grapple hoist box, transmits the power from the motor to the grapple hoist cable drum.	The gear reducer provides adequate structural margin to prevent system failure resulting in drop of the sample actuator during operation and ignition of potential flammable gas in the drill string. The gear ratio limits the maximum hoist speed to prevent mechanical sparking and ignition of potential flammable gas in the drill string from the components located in the grapple hoist box or the sample actuator.	Structural failure causes drop of sample actuator and spark. Part substitution with inadequate gear ratio causes mechanical sparks due to relative motion of components in the grapple hoist box or sample actuator.	Gear reducer is designed to withstand loads in excess of those developed from stall torque of motor. Gear ratio chosen to limit sample actuator speed to less than 30 cm/sec.	Structural failure which results in the free fall of the grapple in the drill string could cause a spark on impact. Incorrect gear ratio could cause sparks due to relative motion of components in the grapple hoist box or sample actuator during normal operations. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner, 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.2 SAFETY EQUIPMENT LIST FOR THE GRAPPLE HOIST ASSEMBLY OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attribute	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Motor, H-2-690055-19	The motor, located outside of the grapple hoist box, provides the load carrying capability for the sample actuator.	The motor performs intended function without causing structural failures and drop of the sample actuator or allowing the system to exceed the maximum allowable hoist speed which prevents mechanical sparking of hoist components and ignition of potential flammable gas in the drill string.	Part substitution causes excessive torque resulting in structural failure and drop of the sample actuator. Part substitution causes excessive hoist speed leading to mechanical spark due to relative motion of the sample actuator.	Motor is selected to be compatible with motor controller. Motor is selected to limit hoist speed to less than 30 cm/sec	Structural failure which results in the free fall of the sample actuator in the drill string could cause a spark on impact. Incorrect motor selection could cause sparks due to relative motion of the Hoist components located in the grapple box or the sample actuator during normal operation. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner, 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Motor Controller H-2-690096-3	The motor controller provides control over the maximum motor speed and torque of the grapple hoist motor.	The motor controller limits the grapple hoist motor output speed and maximum stall torque to prevent mechanical sparking of the system and ignition of potential flammable gas in the operating spaces due to relative motion of the sample actuator or hoist components in the grapple box	Electrical failure or incompatible motor controller causes loss of motor control and excessive torque or speed of the grapple hoist system resulting in a mechanical spark. Calibration error causes excessive load on hoist	The motor controller can be calibrated to a contractor's approved calibration procedure over the operating range. Controller is compatible with the motor. The controller is capable of limiting the hoist speed to less than 30 cm/sec. The controller is capable of limiting the hoist load to less than the maximum allowable operating load of 1112 Newtons	Loss of motor control resulting in structural failure which results in the free fall of the grapple in the drill string could cause a spark on impact or excessive hoist speed and sparking due to relative motion of the sample actuator or hoist components in the grapple box during normal operations. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.2 SAFETY EQUIPMENT LIST FOR THE GRAPPLE HOIST ASSEMBLY OF THE RMCS CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attribute	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Load Cell Display H-2-690095-3	The load cell display is used to protect the load carrying equipment of the grapple hoist by interrupting power to the hoist in the event of an overload condition. It is also used to verify that the pintel rod is attached to the sample actuator prior to sampling	The load cell display is compatible with the intrinsic safety barrier which combines to create part of an intrinsically safe circuit and is used as the mechanism to limit the hoist load capacity to below the stall limit set with the motor controller which prevents structural failure and free fall of the sample actuator causing a mechanical spark and ignition of potential flammable gas in the drill string.	Electrical damage causing the load cell display to inaccurately measure the load on the hoist cable. Calibration error causes inaccurate reading of load on hoist. Part substitution incompatible with the grapple hoist ISB. Electrical failure causes display to not shutdown hoist motor on overload.	The display can be calibrated to a contractor's approved calibration procedure over the operating range. Load cell display is compatible with grapple hoist ISB.	Equipment failure has no affect on the SSC safety function except in the event of motor controller failure to limit torque which could cause structural failure and free fall of grapple actuator in the drill string resulting in spark on impact. Ignition of flammable gases in drill string could lead to a reaction resulting in potential dome collapse.	Per Wagoner 1997b, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with hoist failure could lead to dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC
Load Cell H-2-690057-40	The load cell, located in the grapple hoist box, is used to measure the weight applied to the grapple hoist cable. This information is sent to the load cell display.	The load cell measures the load applied to the hoist cable without igniting potential flammable gas in the operating space.	Electrical or mechanical damage causing inaccurate measurement of the load on the hoist cable. Calibration error causes inaccurate measurement of load on hoist system. Part substitution incompatible with grapple hoist ISB resulting in capability to create a spark.	The load cell is a simple device which will not create a spark due to electrical failure. The load cell can be calibrated to a contractor's approved calibration procedure over the operating range Load cell chosen to be compatible with grapple hoist ISB. Load cell part of circuit meeting Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Equipment failure has no effect on the SSC safety function. Except in the event of motor controller failure to limit torque which could cause structural failure and free fall of grapple actuator in the drill string resulting in spark on impact. Incorrect load cell selection could lead to a spark in the hoist box. Ignition of flammable gases in drill string could lead to a reaction resulting in potential dome collapse.	Per Wagoner 1997b, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with hoist failure could lead to dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC

5.1.3 SAFETY EQUIPMENT LIST FOR THE PURGE GAS INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Purge Gas Instrumentation	The purge gas instrumentation system is used to provide control utilizing measurement, monitoring and alarm for the primary nitrogen purge gas, hydrostatic head gases, Z-purge gas and riser sleeve annulus purge to prevent the possibility of waste ignition due to waste heating or ignition of potential flammable gas in the operating space from unprotected equipment.	This system contains equipment designed to prevent a postulated accident scenario due to both mechanical and electrical sparking in the presence of flammable gases and possible waste heating and reaction during sampling operations. The bounding accident as defined by LMHC 1997d for waste reactions, and Wagoner 1997b for ignition of flammable gas, is dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary__ interim_X_ final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Purge Gas Flow Meter H-2-690068-19 (FIA-1, FIA-2, FIA-3)	Three redundant purge gas flow meters, located in the instrument enclosure, process signals from the purge gas flow turbines, pressure transducers, and temperature transmitters. Measurement signals are converted to a numerical readout of compensated flow (displayed as SCFM). If two out of three indicators detect an out of tolerance condition, an alarm signal is sent to the controller.	The purge gas flow meter converts flow, pressure, and temperature measurements into a standardized mass flow rate of nitrogen. The device monitors the purge gas flow during drilling operations and sends an alarm signal for low purge gas flow which prevents a potential waste reaction and fire caused by drill bit overheating during the drilling process as well as preventing ignition of potential flammable gas due to breaking the drill string in shear during the sampling process. The purge gas flow meter is also used to indicate nitrogen flow during universal sampler rotary valve activation preventing an ignition of potential flammable gas in the drill string due to mechanical sparking.	Electrical failure causes inaccurate flow reading Calibration error causes inaccurate reading of compensated flow or alarm setting. Part substitution incompatible with the purge gas flow turbine, pressure transducer, or temperature transmitter Electrical failure causes failure to send alarm signal for low purge gas flow during drilling.	The purge gas flow meter is compatible with the flow turbine, pressure transducer, and temperature transmitter. The purge gas flow meter can provide shutdown signal to the host PLC. The flow meter can be calibrated to a contractor's approved calibration procedure over the operating range.	Failure of a single purge gas flow meter has no affect on SSC safety function, since Remaining flow meters will perform item function. System failure to accurately measure purge gas flow, or send an alarm signal could result in undetected low purge gas flow. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, or ignition of flammable gas in the waste or dome space as a result of structural failure of the drill string in shear, leading to waste tank fire or explosion and dome collapse. Failure to indicate flow could lead to ignition of flammable gas in the drill string causing waste tank fire or explosion and dome collapse. These failures could compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, for waste reaction, and Wagoner 1997b for flammable gas ignition, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure could lead to a dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC

5.1.3 SAFETY EQUIPMENT LIST FOR THE PURGE GAS INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Function Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Purge Gas Flow Turbine H-2-690062-16 (FT-1, FT-2, FT-3)	Three redundant purge gas flow turbines, located in the purge gas cabinet, measure relative purge gas flow rate and each send a signal to one of three digital flow meters, where compensated flow is displayed.	The purge gas flow turbine provides a signal proportional to the purge gas mass flow rate to the purge gas flow meter. The signal is used to determine the standardized mass flow rate of nitrogen during drilling operations which enables the purge gas flow meter to perform its function and prevent a potential waste reaction and fire caused by drill bit overheating during the drilling process as well as preventing ignition of potential flammable gas due to breaking the drill string in shear during the sampling process or during universal sampler valve activation.	Electrical or mechanical failure causes inaccurate flow measurement Electrical Failure causes flow signal not to be sent to flow display Part substitution incompatible with flow display	The purge gas flow turbine is compatible with purge gas flow meter	Part failure has no affect on SSC safety function, since Remaining components will perform item function. System failure to accurately measure purge gas flow, or send an alarm signal could result in undetected low purge gas flow. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse or ignition of potential flammable gas due to mechanical sparking causing waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, for waste reaction, and Wagoner 1997b for flammable gas ignition the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure could lead to a dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC
Purge Gas Flow Pressure Transducer H-2-690062-21 (PT-1, PT-2, PT-3)	Three redundant purge gas flow pressure transducers, located in the purge gas cabinet, measure purge gas pressure and each send a signal to one of three digital flow meters, where compensated flow is displayed.	The purge gas flow pressure transducer provides a signal proportional to the purge gas pressure to the purge gas flow meter. The signal is used to determine the standardized mass flow rate of nitrogen during drilling operations which enables the purge gas flow meter to perform its function and prevent a potential waste reaction and fire caused by drill bit overheating during the drilling process as well as preventing ignition of potential flammable gas due to breaking the drill string in shear during the sampling process or during universal sampler valve activation.	Electrical or mechanical failure causes inaccurate pressure measurement. Electrical failure causes pressure signal not to be sent to flow display. Part substitution incompatible with flow display Calibration error causes inaccurate reading of purge gas pressure.	The pressure transducer can be calibrated to a contractor's approved calibration procedure over the operating range. The pressure transducer is compatible with the purge gas flow display	Part failure has no affect on SSC safety function, since Remaining components will perform item function. System failure to accurately measure purge gas flow, or send an alarm signal could result in undetected low purge gas flow. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse or ignition of potential flammable gas due to mechanical sparking causing waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, for waste reaction, and Wagoner 1997b for flammable gas ignition the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure could lead to a dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC

5.1.3 SAFETY EQUIPMENT LIST FOR THE PURGE GAS INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Function Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Purge Gas Flow Temperature Transmitter H-2-690062-25 (TT-1, TT-2, TT-3)	Three redundant purge gas flow temperature transmitters, located in the purge gas cabinet, measure purge gas temperature and each send a signal to one of three digital flow meters, where compensated flow is displayed.	The purge gas temperature transmitter provides a signal proportional to the purge gas temperature to the purge gas flow meter. The signal is used to determine the standardized mass flow rate of nitrogen during drilling operations which enables the purge gas flow meter to perform its function and prevent a potential waste reaction and fire caused by drill bit overheating during the drilling process as well as preventing ignition of potential flammable gas due to breaking the drill string in shear during the sampling process or during universal sampler valve activation.	Electrical failure causes inaccurate temperature measurement or failure to send a signal to the display Calibration error causes inaccurate reading of purge gas temperature	The Temperature transmitter can be calibrated to a contractor's approved calibration procedure over the operating range The temperature transmitter is compatible with the purge gas flow display	Part failure has no affect on SSC safety function, since Remaining components will perform item function. System failure to accurately measure purge gas flow, or send an alarm signal could result in undetected low purge gas flow. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse or ignition of potential flammable gas due to mechanical sparking causing waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, for waste reaction, and Wagoner 1997b for flammable gas ignition, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure could lead to a dome collapse resulting in an offsite public exposure in excess of the allowable limit..	SC
Riser sleeve purge differential pressure switch H-2-690012-64 (PDS-1, PDS-2)	Two redundant differential pressure switches are used to detect purge flow to the riser sleeve. In the event of a loss of purge flow, each differential pressure switch sends an alarm signal to the logic controller.	The pressure switch performs its intended function without igniting potential flammable gas in a dome intrusive environment.	Part substitution introducing electrical spark potential.	The pressure switch meets Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f)	Pressure switch failure has no affect on SSC safety function. Part substitution which results in the use of unapproved equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Purge Gas Temperature Display H-2-690068-40 (TIA-1)	The purge gas temperature display, located in the instrument cabinet, converts the purge gas temperature thermocouple signal to a digital display of purge gas temperature, provides adjustment and display for purge gas temperature alarm set-points, and sends a signal to the host logic controller if purge gas temperature is out of envelope.	The purge gas temperature display monitors the purge gas temperature and sends an alarm signal for high and low purge gas temperatures which are outside of the operational safety envelope.	Electrical failure causes inaccurate temperature reading or failure to send alarm signal Calibration error causes inaccurate reading of purge gas temperature or alarm setting Part substitution incompatible with thermocouple	The Temperature display can be calibrated to a contractor's approved calibration procedure over the operating range. The temperature display is compatible with the temperature thermocouple and can send an alarm signal to the host PLC	Alarm set points (-12°C and 60°C) are outside the ambient temperatures encountered during active core sampling operations. During normal operations (within the administratively controlled operating temperature limits) this display is for operator information and does not require automatic shutdown for safety function.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release.	SS

5.1.3 SAFETY EQUIPMENT LIST FOR THE PURGE GAS INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Function Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Purge Gas Temperature Thermocouple H-2-690062-36 (TE-1)	The purge gas temperature thermocouple, located in the purge gas enclosure, measures purge gas temperature and sends an analog signal to the digital display unit in the instrumentation enclosure.	The purge gas temperature thermocouple provides a signal proportional to the purge gas temperature to the purge gas temperature display. This signal is used to determine if the purge gas temperature is within the operational safety envelope	Electrical failure causing inaccurate temperature measurement or failure to send signal to display Part Substitution with different thermocouple type.	The Thermocouple type is compatible with the display.	The thermocouple supports the purge gas temperature display, which is for operator information and does not require automatic shutdown for safety function during normal operations.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release.	SS
Pressure Switch H-2-690012-65 (PS-2,PS-3)	Two redundant pressure switches monitor the Z-purge flow. The Z-purge system prevents flammable gas buildup under the weather cover. Signals are sent from the switches to the instrumentation enclosure to activate an alarm.	The pressure switch performs its intended function of alarm on loss of pressure without igniting potential flammable gas in the operating space.	Electrical or mechanical failure causes inaccurate pressure measurement. Electrical Failure causes alarm signal to not be sent. Part substitution introduces electrical spark potential Calibration error causes inaccurate reading of purge pressure or alarm setting	The pressure switch meets Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f) The pressure switch can be calibrated to a contractor's approved calibration procedure over the operating range.	Pressure switch failure has no affect on SSC safety function, since Remaining components will perform item function. Undetected loss of Z-purge would allow a build up of potentially flammable gases leaking into the weather cover. This condition could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure causing a dome collapse results in offsite public exposure in excess of the allowable limit.	SC

5.1.4 SAFETY EQUIPMENT LIST FOR THE DOWNWARD FORCE INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Downward Force Instrumentation	The downward force instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the drilling force required to penetrate the waste during sampling operations. Downward force control is necessary to ensure the operational safety envelope, which prevents a potential waste reaction and fire is not violated.	Equipment failure affecting the proper management of downward force during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components X for the above host item.

The safety classification of the items listed below is: Preliminary__ interim X final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Downward Force Pressure Transducers H-2-690014-12 (PT-7, PT-8) H-2-690062-21 (PT-4)	The down force measurement system includes hydraulic and pneumatic pressure transducers used to measure the downward force of the drill bit on the waste. Upper ram hydraulic pressure, lower ram hydraulic pressure and pneumatic pressure above the drill head are measured and signals are sent to the adder/subtractor	The downward force pressure transducers provide signals proportional to the hydraulic pressure in the drill head rams and purge gas pressure to the downward force adder/subtractor. These signals are used to determine the downward force used during drilling operations which enables the downward force digital display to perform its function and prevent a potential waste reaction and fire caused by drill bit overheating during the drilling process.	Electrical or mechanical failure causes inaccurate pressure measurement Electrical failure causes signal not to be sent to the adder/subtractor Calibration error causes inaccurate pressure measurement Part substitution incompatible with adder/subtractor	The pressure transducers are compatible with the adder/subtractor The pressure transducer can be calibrated to a contractor's approved calibration procedure over the operating range.	Failure to accurately measure pressures associated with downward force could result in undetected high downward force condition. This condition could lead to drill bit overheating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.4 SAFETY EQUIPMENT LIST FOR THE DOWNWARD FORCE INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Downward Force Adder/Subtractor H-2-690068-11 (WQ-1)	The down force measurement system includes the adder/subtractor to calculate the downward force of the drill bit on the waste. The adder/subtractor processes the signals from the downward force pressure transducers, and provides a signal for downward force to digital display unit.	The downward force adder/subtractor calculates the downward force and sends the signal to the downward force digital display which enables the downward force digital display to perform its function and prevent a potential waste reaction and fire caused by drill bit overheating during the drilling process	Electrical failure causes inaccurate force calculation or failure to send signal to the digital display. Calibration error causes inaccurate force calculation Part substitution incompatible with pressure transducers or display	The adder/subtractor is compatible with the pressure transducers and downward force digital display The adder/subtractor can be calibrated to a contractor's approved calibration procedure over the operating range	Failure to accurately calculate downward force could result in undetected high downward force condition. This condition could lead to drill bit overheating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Downward Force Digital Display Unit H-2-690068-108 (WI-1)	The down force measurement system includes the digital display unit. The digital display unit receives a signal for downward force from the adder/subtractor, digitally displays downward force, provides adjustment and display for downward force alarm set-point, and sends alarm signal to logic controller if downward force is above alarm set point.	The downward force digital display monitors the downward force during drilling operations and sends an alarm signal for high downward force which prevents a potential waste reaction and fire caused by drill bit overheating during the drilling process.	Electrical failure causes inaccurate force readings or failure to send alarm signal. Calibration error causes inaccurate force reading or alarm setting Part substitution incompatible with adder/subtractor	The display can be calibrated to a contractor's approved calibration procedure over the operating range. The display is compatible with the adder/subtractor. The display can provide a shutdown signal to the host PLC.	Failure to accurately monitor downward force or send an alarm signal could result in undetected high downward force condition. This condition could lead to drill bit overheating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.5 SAFETY EQUIPMENT LIST FOR THE RPM INSTRUMENTATION SYSTEM OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
RPM Instrumentation	The RPM instrumentation system is used to provide control utilizing measurement, monitoring, and alarm for the rotational speed of the drill bit during sampling operations. RPM control is necessary to ensure the operational safety envelope, which prevents a potential waste reaction and fire, is not violated.	Equipment failure affecting the proper management of rpm during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems___ Structures___ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary___ interim_X_ final___

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Drill Rotation Sensor H-2-690054-5 (SE-1, SE-3)	Two drill rotation sensors measure drill rotational speed and send signals to digital display units.	The drill rotation sensor provides a signal proportional to the drill string RPM to the rpm digital display. This signal is used to determine the drill string rpm during drilling operations which enables the RPM digital display unit to perform its function to prevent a potential waste reaction and fire, caused by drill bit overheating during the drilling process.	Electrical failure causes inaccurate RPM measurement or failure to send signal to the RPM display. Improper mounting causes failure of RPM measurement. Part substitution incompatible with RPM display	The drill rotation sensor is compatible with the RPM display.	The drill rotation sensor failure has no effect on SSC safety function, since Remaining components will perform item function. System failure to accurately measure rotational speed could result in undetected high RPM condition. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure could lead to a dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC
RPM Digital Display Unit H-2-690068-41 (SI-1, SI-3)	Two redundant RPM digital display units convert the drill RPM signals to a numerical readout, provides adjustment and display for RPM set point, and if out of tolerance, send an alarm signal to logic controller.	The RPM digital display monitors the drill string RPM during drilling operations and sends an alarm signal for high RPM, which prevents a potential waste reaction and fire caused by drill bit overheating during the drilling process.	Electrical failure causing inaccurate RPM readings or failure to send alarm signal. Calibration error causes inaccurate readings of RPM or alarm setting. Part substitution incompatible with RPM sensor.	The display is compatible with the RPM sensor. The display can provide a shutdown signal to the host PLC. The display can be calibrated to a contractor's approved calibration procedure over the operating range	Part failure has no effect on SSC safety function, since Remaining components will perform item function. System failure to send RPM alarm signal could result in undetected high RPM condition. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure could lead to a dome collapse resulting in an offsite public exposure in excess of the allowable limit.	SC

5.1.6 SAFETY EQUIPMENT LIST FOR THE PENETRATION RATE INSTRUMENTATION OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Penetration Rate Instrumentation	The penetration rate instrumentation system is used to provide control utilizing measurement, monitoring and alarm for the penetration rate of the drill bit during sampling operations. Penetration rate control is necessary to ensure the operational safety envelope, which prevents a potential waste reaction and fire, is not violated.	Equipment failure affecting the proper management of penetration rate during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary__ interim_X_ final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Drill Bit Penetration Digital Display Unit H-2-690068-154 (SI-2)	The drill bit penetration rate digital display, displays the vertical speed of the drill head during drilling operations, provides adjustment and display for penetration rate alarm set point, and sends a signal to logic controller if penetration rate is below set point.	The drill bit penetration rate digital display monitors the penetration rate during sampling operations and sends an alarm signal for low penetration rate which prevents a potential waste reaction and fire caused by drill bit overheating during the drilling process	Electrical failure causing inaccurate penetration rate readings or failure to send alarm signal Calibration error results in inaccurate penetration rate reading or alarm setting Part substitution incompatible with tachometer generator	The display is compatible with the tachometer generator. The display can send an alarm signal to the host PLC. The display can be calibrated to a contractor's approved calibration procedure over the operating range	Failure of the system to accurately measure penetration rate, or send an alarm signal, could result in undetected low penetration rate condition. This condition could lead to possible ignition sources, and therefore a potential ignition of flammable gases in the waste tank, and tank dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of Rem.	SC
Magneto Tachometer Generator H-2-690053-8 (SE-2)	The magneto tachometer generator measures the vertical speed of the drill head during drilling operations and sends a signal to the penetration rate display	The magneto tachometer generator provides a signal proportional to the penetration rate to the penetration rate display. This signal is used to determine the drill bit penetration rate during sampling operations which enables the drill bit penetration digital display unit to perform its function and prevent a potential waste reaction and fire caused by drill bit overheating during the drilling process..	Electrical or mechanical failure causing inaccurate penetration rate measurement Part substitution incompatible with display	The tachometer generator is selected to be compatible with the display	Failure of the system to accurately measure penetration rate, or send an alarm signal, could result in undetected low penetration rate condition. This condition could lead to possible ignition sources, and therefore a potential ignition of flammable gases in the waste tank, and tank dome collapse. This would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit..	SC

5.1.7 SAFETY EQUIPMENT LIST FOR THE HYDRAULIC CONTROL INSTRUMENTATION OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Hydraulic Control Instrumentation	The hydraulic control instrumentation is used to provide control utilizing measurement, monitoring, and alarm for administratively controlling the drilling force required to penetrate the waste. Hydraulic control is necessary as a "defense-in-depth" measure used to prevent a potential waste reaction and fire caused by down force in excess of the operational safety envelope. It is also used to prevent penetration of the tank bottom during drilling operations.	Equipment failure affecting the proper management of downward force during sampling operations could lead to a catastrophic failure of equipment which could cause ignition of flammable gas leading to a waste tank fire or explosion and dome collapse. The bounding accident as defined in LMHC 1997d is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem. and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components X for the above host item.

The safety classification of the items listed below is: Preliminary__ interim X final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Lower Ram Pressure Display H-2-690068-38 (WI-2)	The lower ram pressure display converts transducer signal to a digital display of lower ram pressure.	The lower ram pressure display is used to enable setting and monitoring of the set point for activation of the HBD or Walkdown function which enables the HBD/lower ram pressure interlock comparator to perform its function, using the correct alarm set point, preventing a potential waste reaction and fire due to excessive downward force during the drilling process.	Electrical failure causes inaccurate set point pressure reading. Calibration error causes inaccurate reading of set point pressure part substitution incompatible with comparator.	The display is compatible with the comparator Display can be calibrated to a contractor's approved calibration procedure over the operating range	Due to the design of the drill bit, buckling strength of the drill string, and critical alarm instrumentation, failure of the hydraulic bottom detector or Walkdown function has no affect on the safety function of the core sample truck, except in the event of downward force alarm failure which could lead to a waste tank fire or explosion and dome collapse	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with failure of the down force system could cause dome collapse which results in an offsite public exposure in excess of the allowable limit.	SC

5.1.7 SAFETY EQUIPMENT LIST FOR THE HYDRAULIC CONTROL INSTRUMENTATION OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Hydraulic Bottom Detector (HBD)/Lower Ram Pressure Interlock (Walkdown Function) Pressure Transducer H-2-690014-12 (PT-9)	The pressure transducer is used to measure the hydraulic pressure of the drill head lower ram and send that signal to the comparator for the HBD and Walkdown functions	The hydraulic pressure transducer provides a signal proportional to the pressure in the lower part of the drill head ram to the comparator. This signal is used to limit the downward force during sampling which enables the HBD/lower ram pressure interlock comparator to perform its function, preventing a potential waste reaction and fire due to excessive downward force during the drilling process.	Electrical or mechanical failure causes inaccurate measurement of hydraulic pressure Calibration error causes inaccurate measurement of hydraulic pressure Electrical failure causes signal not to be sent to the comparator Part substitution incompatible with comparator	The pressure transducer is compatible with the comparator Pressure transducer can be calibrated to a contractor's approved calibration procedure over the operating range.	Due to the design of the drill bit, buckling strength of the drill string, and critical alarm instrumentation, failure of the hydraulic bottom detector or walkdown function has no effect on the safety function of the core sample truck, except in the event of downward force alarm failure which could lead to a waste tank fire or explosion and dome collapse	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with failure of the down force system could cause dome collapse which results in an offsite public exposure in excess of the allowable limit.	SC
Hydraulic Bottom Detector Hydraulic Solenoid Valve H-2-690014-17 (SOV-11)	The HBD hydraulic solenoid valve reverses the direction of hydraulic fluid into the drill head rams.	The HBD solenoid valve is used to stop drill bit penetration into the waste and reverse the direction of the drill head when a preset downward force is reached, preventing a potential waste reaction and fire due to excessive downward force during the drilling process and penetration of the tank bottom.	Electrical failure of solenoid valve causes valve to not shift position Part substitution causes valve with incompatible spool piece to be used.	The HBD hydraulic solenoid valve can reverse the flow of hydraulic fluid to the drill head rams on loss of electrical power.	Due to the design of the drill bit, buckling strength of the drill string, and critical alarm instrumentation, failure of the hydraulic bottom detector has no effect on the safety function of the core sample truck, except in the event of downward force alarm failure which could lead to a waste tank fire or explosion and dome collapse.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with failure of the down force system could cause dome collapse which results in an offsite public exposure in excess of the allowable limit.	SC

5.1.7 SAFETY EQUIPMENT LIST FOR THE HYDRAULIC CONTROL INSTRUMENTATION OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
The Hydraulic Bottom Detector (HBD)/Lower Ram Pressure Interlock (walkdown function) Comparator H-2-690068-14 (A1)	The comparator measures the actual hydraulic pressure in the drill head lower ram to the preset limit shown on the lower ram pressure display and sends a signal to de-energize the appropriate solenoid valve when the limit is reached for either the HBD or walkdown function.	The comparator compares the actual lower ram pressure to the preset limit and sends a signal to stop the drill bit penetration. This in effect limits the downward force of the drill bit during sampling, preventing a potential waste reaction and fire due to drill bit overheating during the drilling process and preventing tank bottom penetration.	Electrical failure causing inaccurate comparison of pressures or failure to send signal to de-energize the solenoid valves. Calibration error causes inaccurate comparison of the pressure readings part substitution incompatible with the pressure transducer, pressure display, or solenoid valves	The comparator is compatible with the pressure transducer, and display. The comparator can be calibrated to a contractor's approved calibration procedure over the operating range.	Due to the design of the drill bit, buckling strength of the drill string, and critical alarm instrumentation, failure of the HBD or lower ram pressure interlock has no effect on the safety function of the core sample truck, except in the event of downward force alarm failure which could lead to a waste tank fire or explosion and dome collapse.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with failure of the down force system could cause dome collapse which results in an offsite public exposure in excess of the allowable limit.	SC
Lower Ram Pressure Interlock Hydraulic Solenoid Valve H-2-690014-18 (SOV-12)	The walkdown function hydraulic solenoid valve stops the flow of hydraulic fluid into the drill head rams.	The walkdown function solenoid valve is used to stop drill bit penetration into the waste when a preset limit on downward force is reached preventing a potential waste reaction and fire due to excessive downward force during the drilling process.	Electrical failure of solenoid valve causes valve to not shift position Part substitution causes valve with incompatible spool piece to be used.	The walkdown function hydraulic solenoid valve can stop the flow of hydraulic fluid to the drill head rams on loss of electrical power.	Due to the design of the drill bit, buckling strength of the drill string, and critical alarm instrumentation, failure of the walkdown function has no effect on the safety function of the core sample truck, except in the event of downward force alarm failure which could lead to a waste tank fire or explosion and dome collapse.	Per LMHC 1997d, the effect of part failure would result in the partial loss of "defense-in-depth" protection against a significant release. System failure in conjunction with failure of the down force system could cause dome collapse which results in an offsite public exposure in excess of the allowable limit..	SC

5.1.8 SAFETY EQUIPMENT LIST FOR THE SHUTDOWN INTERLOCK OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Shutdown Interlock	The shutdown interlock processes alarm signals during sampling operations causing activation of an alarm strobe and horn followed by drill rig engine shutdown to ensure the operational safety envelope, preventing waste reaction and fire, is not violated or preventing operations when spark sources are not protected from igniting potential flammable gas in their operating space or preventing operation when the tank dome is pressurized.	Equipment failure effecting the proper management of alarm conditions during sampling operations could lead to waste overheating and burn. The bounding accident as defined in LMHC 1997d for waste reaction and Wagoner 1997b for ignition of flammable gas, is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary__ interim_X_ final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
PLC (controller) H-2-690068-20 through -24 H-2-690068-27 H-2-690068-114	The PLC, located in the instrument cabinet, processes alarm signals to activate alarm strobe, horn, and indicator lights, followed by engine shutdown signal sent to K5 relay.	The PLC processes alarm signals and activates the alarm strobe, horn, and indicator lights. In addition, the PLC sends a shutdown signal to the K5 relay for critical alarms which causes the drill rig engine to shutdown to prevent waste reaction and fire, or sparking from unprotected spark sources or an unfiltered release due to tank dome pressurization.	Electrical failure causes inaccurate reading of alarm signal or failure to send shutdown signal to relay. Part substitution incompatible with alarm signals sent from critical instruments Programming error resulting in failure to send shutdown signal when alarm received.	The PLC has sufficient type and quantity of inputs and outputs to perform its safety function	Failure to process alarm functions could result in undetected high RPM, low purge gas flow, high downward force condition, or low penetration rate. This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse. Failure to process alarm functions from purge gas or z-purge could result in ignition of flammable gases leading to a waste tank fire or explosion and dome collapse. Failure to process Exhauster shutdown alarm could lead to tank dome pressurization causing an unfiltered release of tank gases. These failures would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d for waste reaction and Wagoner 1997b for ignition of flammable gas, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.8 SAFETY EQUIPMENT LIST FOR THE SHUTDOWN INTERLOCK OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Shutdown Interlock (K5 relay) H-2-690076-10	The shutdown interlock accepts an alarm signal from controller and shuts down the drill rig engine by electrical power interrupt.	The K5 relay causes an interruption of electrical power to the drill rig engine when a shutdown signal is received from the PLC preventing waste reaction and fire, or sparking from unprotected spark sources or an unfiltered release due to tank dome pressurization.	Mechanical failure not allowing contacts to open.	The relay is selected for fail safe operation.	A relay that does not fail safe would result in loss of automatic engine shutdown. If operators also failed to shutdown engine, This condition could lead to drill bit over heating, and therefore a potential for a reaction within the waste, leading to a waste tank fire or explosion and dome collapse, or ignition of flammable gases from unprotected spark sources leading to waste tank fire or explosion and dome collapse, or tank pressurization and unfiltered release of tank gases. These failures would compromise the primary safety function of the alarm instrumentation system.	Per LMHC 1997d for waste reaction and Wagoner 1997b for ignition of flammable gas, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Exhauster Interlock Shutdown Override H-2-690063-30 (S-47)	The Exhauster/interlock shutdown on the core sample truck consists of an override switch which detects the loss a normal status condition from the RMCS Exhauster and sends an alarm signal to the PLC controller to stop purge gas flow and shut down the drill rig engine when in drilling mode.	The Exhauster interlock shutdown override enables the PLC to shutdown the drill rig engine and terminate purge gas flow upon shutdown of the Exhauster, preventing tank pressurization and unfiltered Release of tank gases.	Electrical failure causes switch to have undetected open contacts. Part substitution causes undetected key configuration change.	The switch is configured such that the key cannot be Removed in the interlock override position.	Failure to detect Exhauster shutdown signal during sample truck drilling operations without active ventilation of the dome space, tank dome pressurization and an unfiltered release of gases	Per LMHC 1997d an unfiltered release of gases could result in an unacceptable toxilogical release to the onsite worker	SS
Pressure Switch for Actively Ventilated Tanks H-2-690127-65	The actively ventilated tanks pressure switch is used to detect exhauster shutdown on actively ventilated tanks by measuring the tank pressure. The switch sends a shutdown signal to the core sample truck on loss of negative tank pressure.	The pressure switch performs its intended function without causing an ignition of potentially flammable gas in the operating space. The second function is to prevent an unfiltered release of tank gases due to addition of purge gas during sampling.	Electrical or mechanical failure cause inaccurate pressure measurement Electrical failure causes shut down signal not to be sent. Part substitution introduces electrical spark potential Calibration error causes inaccurate reading of tank pressure or alarm setting	The pressure switch meets Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f) The pressure switch can be calibrated to a contractor's approved calibration procedure over the operating range The pressure switch can provide a shutdown signal to the rotary mode core sample truck	Failure to detect exhauster shutdown signal during sample truck drilling would allow continued drilling operations without active ventilation of the tank dome space. This could lead to a tank dome pressurization and unfiltered release of gases. Part substitution which results in the use of unqualified equipment with spark potential could cause an ignition of flammable gases, leading to waste tank fire or explosion and some collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit. Per LMHC 1997d an unfiltered release of gases could result in an unacceptable toxilogical release to the onsite worker.	SC

5.1.9 SAFETY EQUIPMENT LIST FOR THE DRILL STRING COMPONENTS OF THE CORE SAMPLE TRUCK

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Drill String Components	Reduce the possibility of ignition in the drill string, through the use of components approved for use in flammable gas environments by US Bureau of Mines testing, mitigating the probability of an ignition of potential flammable gas in the operating space and preventing waste reaction and fire.	This system contains equipment designed to prevent a postulated accident scenario due to mechanical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner, 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary__ interim_X_ final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Quill Rod Adapter H-2-690051-14	The quill rod adapter transmits energy, through rotation and downward force, from the quill rod to the drill string sections.	The quill rod adapter performs its intended function without igniting potentially flammable gas in the drill string during sampler change out.	Relative motion or impacting with interfacing equipment causes mechanical spark. Part substitution introducing mechanical spark potential.	The quill rod adapter meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure has no effect on SSC safety function. Part substitution which results in a change in materials could result in the use of unapproved equipment, which could lead to sparking causing ignition of flammable gases, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Core Barrel H-2-690134-40	The core barrel transmits energy, through rotation and downward force, from the drill string sections to the drill bit. Samplers are secured in the core barrel.	The core barrel performs its intended function without igniting potentially flammable gas in the drill string during sampler insertion.	Relative motion or impacting with interfacing equipment causes mechanical spark Part substitution introducing mechanical spark potential.	The core barrel meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Structural failure has no effect on SSC safety function. Part substitution which results in a change in materials or geometry could result in the use of unapproved equipment, which could lead to ignition of flammable gases, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.1.9 SAFETY EQUIPMENT LIST FOR THE DRILL STRING COMPONENTS OF THE CORE SAMPLE TRUCK (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Drill Bit H-2-690134-33	The drill bit penetrates and drills through the waste.	The drill bit performs its intended function without igniting potentially flammable gas in its operating environment or causing frictional heating that would cause an unacceptable waste reaction. The drill bit is designed to not penetrate the steel liner of the tank.	Part substitution introducing mechanical spark potential or unacceptable frictional heating potential. Part substitution resulting in unapproved geometry leading to waste reaction due to friction.	The drill bit meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f) The drill bit is designed to not penetrate the tank steel liner under the operating conditions. The drill bit is designed to not cause a waste reaction under the envelope test (LMHC 1997d)	Structural failure has no effect on SSC safety function. Part substitution which results in a change in materials or geometry could result in the use of unapproved equipment, which could lead to ignition of flammable gases or waste reaction, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per LMHC 1997d, for waste heating consequences and Wagoner 1997b for flammable gas ignition consequences, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.2 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM RISER EQUIPMENT

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Riser Equipment	Reduce the possibility of ignition in the dome space caused by drop accidents involving the drill string.	This system contains equipment designed to prevent a postulated accident scenario due to mechanical sparking in the presence of flammable gases. The bounding accident as defined in Wagoner 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components X for the above host item.

The safety classification of the items listed below is: Preliminary__ interim X final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Foot Clamp H-2-690134-38	The foot clamp retains the drill string when shielded receiver, quill rod, or drill string hoist is disconnected.	The foot clamp restrains the drill string preventing a drop and possible spark resulting in an ignition of potentially flammable gas in the dome space.	Mechanical failure causing foot clamp to not close on drill string. Part substitution causes foot clamp to not restrain drill rod.	The foot clamp is designed to not open on loss of supply air. The foot clamp is compatible with the drill rod.	The jaw incorporates a wedge design that would fail closed. Failure of the control mechanism would cause inadvertent release of the drill string, which could lead to ignition of flammable gases, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.3 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM EXHAUSTER

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Exhauster	Filters and exhausts waste tank vapors during core sampling operations. Sends shutdown alarm to the Core Sample Truck when exhauster is not operating. Reduce the possibility of ignition in the exhauster through the use of qualified equipment and spark resistant materials in the Exhauster flow stream.	This system contains equipment designed to prevent a postulated accident scenario involving unacceptable tank pressures or reactions within the waste tanks due to sparking in the presence of flammable gases. The bounding accident as defined in Wagoner 1997b tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem. Monitors and alarms on out of tolerance tank pressure to ensure safe operations.	SC

The items listed below are the: Systems__ Structures__ Components X for the above host item.

The safety classification of the items listed below is: Preliminary__ interim X final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Fan H-2-829121-56 (for Exhauster B) H-2-829082-56 (for Exhauster C) (H-2-821455-99)ref	Provides the motive force for the air in the filter train by drawing tank vapors from the riser. Maintains tank at negative atmospheric pressure during core sampling activities.	The fan performs its intended function without igniting potential flammable gas in the operating space.	Part substitution introducing mechanical spark	The fan is designed to meet Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f)	Fan failure will trigger automatic system shutdown (exhauster and core sample truck). Material selection and fan motor isolation are designed to prevent ignition of exhaust gases in the event of failure. Undetected low tank pressure, or ignition of flammable gases would result in a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Pressure Switch ISB H-2-829125-81 (for Exhauster B) H-2-829086-81 (for Exhauster C) (H-14-030122, Sht 3, Zone D3) ref	The pressure switch ISB is used to allow the exhauster tank pressure and HEPA filter differential pressure switches to operate in a NFPA Class 1, Division 1, Group B environment.	The pressure switch intrinsic safety barrier provides an electronic barrier to prevent adequate energy from reaching the pressure switch to create an ignition in the environment for which it is rated should the equipment connected to the pressure switch have an electrical failure.	Use of unqualified or incompatible ISB causes electrical spark potential.	Safety barrier is rated per NFPA 70 for providing intrinsically safe circuit in an NFPA Class 1, Division II, Group B environment. Safety barrier is compatible with pressure switches. Safety barrier causes pressure switch circuits to meet the requirements of Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f)	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the protected equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.3 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM EXHAUSTER (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Differential Pressure Switch H-2-829121-28 (for Exhauster B) H-2-829082-28 (for Exhauster C) (H-2-821455-28) ref	The differential pressure switch provides a shutdown signal to the fan VFD (variable frequency drive) in the event of unacceptable differential pressure across the HEPA filter.	The differential pressure switch is compatible with the intrinsic safety barrier which combines to create part of an intrinsically safe circuit and is used to send a signal to the fan VFD for shutdown on high HEPA filter differential pressure preventing HEPA filter blow out and unfiltered release of tank gases.	Electrical or mechanical failure causing the pressure switch to inaccurately measure the differential pressure. Failure to send alarm signal. Improper calibration causes inaccurate measurement of pressure. Part Substitution incompatible with pressure switch ISB resulting in unacceptable spark potential.	The differential pressure switch can be calibrated to a contractor's approved calibration procedure over the operating range The differential pressure switch is compatible with the ISB. The differential pressure switch is part of a circuit meeting Ignition Source Control of set 2. (LMHC 1997b, LMHC 1997f) The pressure switch can provide a shutdown signal to the VFD	Failure could lead to exhauster operation above the differential pressure limit of the HEPA filter and, ultimately, breakup and loss of the filter. Loss of filtering during exhauster operation would cause a direct release of waste tank particulates resulting in on site exposures up to 12.4 Rem. Part substitution could result in the use of unapproved equipment, which could lead to ignition of flammable gases, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per LMHC 1997d, the effect of HEPA filter blow out results in exposure in excess of 5 Rem EDE for the onsite worker. Per Wagoner 1997b, the effect of part substitution causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
HEPA Filter Unit H-2-829121-29 (for Exhauster B) H-2-829082-29 (for Exhauster C) (H-2-821455-29) ref	Removes micron sized particles from the exhauster flow. Includes outer housing for containment.	The HEPA filter unit provides protection against unfiltered release during sampling operations.	Part substitution results in unfiltered released	The HEPA filter unit can be tested for efficiency , per a contractor's approved procedure.	Loss of HEPA filtering during exhauster operation would cause a direct release of waste tank particulates to the environment, resulting in on site exposures up to 12.4 Rem.	Per LMHC 1997d this effect results in exposure in excess of 5 Rem EDE for the onsite worker.	SS
Inlet Duct H-2-829120-17 (for Exhauster B) H-2-829081-17 (for Exhauster C) (H-2-821455-98) ref	Provides routing and containment of tank vapors, from the riser to the HEPA filters. Includes flexible ducting and all interconnecting components between the riser flange, or optional prefilter, and the heater unit.	The inlet duct performs its function without creating an electrostatic spark which can cause an ignition of potential flammable gas in the operating space..	Part substitution introduces spark potential	The inlet duct meets Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f)	Part substitution which results in a change in materials could result in the use of unapproved equipment, which could lead to ignition of flammable gases, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.3 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM EXHAUSTER (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Relative Humidity Transmitter H-2-829135-25 (for Exhauster B) H-2-829105-25 (for Exhauster C) (H-2-821455-49)ref	Provides an indication of relative humidity within the HEPA filter housing Range of 0-95% relative humidity	The relative humidity transmitter performs its function without igniting potential flammable gas in the operating space.	Part substitution introduces electrical spark potential	The relative humidity transmitter meets ignitions source control set 2 (LMHC 1997b, LMHC 1997f)	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the sensor could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b the effect of incorrect part substitution could cause a dome collapse with a resultant offsite public exposure in excess of the allowable limit.	SC
Tank Pressure Switch H-14-100740-31	Detects negative atmospheric pressure in waste tank and provides indication of low pressure.	The tank pressure switch is part of an intrinsically safe circuit which performs its function without igniting potential flammable gas in the operating space.	Electrical or mechanical failure causes inaccurate pressure measurement Part substitution incompatible with pressure switch ISB results in spark potential Calibration error causes inaccurate pressure measurement	The tank pressure switch can be calibrated to a contractor's approved calibration procedure over the operating range. The tank pressure switch is compatible with the ISB. The tank pressure switch can provide a shutdown signal to the Exhauster VFD. Then tank pressure switch is part of a circuit meeting Ignition Source Control set 2 (LMHC 1997b, LMHC 1997f).	Failure could lead to undetected low tank pressure, which could lead to tank dome collapse, and release of tank waste elements. Part substitution could result in the use of unapproved equipment, which could lead to ignition of flammable gases, and a potential dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect of part substitution could cause a dome collapse with a resultant offsite public exposure in excess of the allowable limit.. Per LMHC 1997d the effect of excessive dome vacuum could cause a dome collapse with a resultant offsite public exposure in excess of the allowable limit.	SC

5.3 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM EXHAUSTER (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Masstron Stack Flow Transmitter (FT-1) H-2-829125-151 (for Exhauster B) H-2-829086-151 (for Exhauster C) (H-2-821455-30 VI #22660)ref	The Masstron Stack Flow Transmitter measures flow in the exhauster stack and provides a mass flow signal to the exhauster flow controller.	The Masstron Stack Flow Transmitter performs its function without igniting potential flammable gas in the flow stream.	Electrical or mechanical failure causes inaccurate flow measurement and control. Calibration error causes inaccurate flow measurement and control. Part substitution introduces electrical spark potential	The Masstron meets Ignition Source Control Set 2 (LMHC 1997b, LMHC 1997f). The Masstron can be calibrated to a contractor's approved calibration procedure over the operating range. The Masstron is compatible with Exhauster flow controller	Failure of the Masstron to accurately measure flow could result in an undetected low exhaust flow leading to positive dome pressure and an unfiltered release of tank gases. Part substitution affecting the intrinsic safety of the protected equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of 9 Rem. Per LMHC 1997d an unfiltered release of gases could result in unacceptable toxilogical consequences to the onsite worker.	SC
Masstron Sample Flow Transmitter (FT-2) H-2-829125-152 (for Exhauster B) H-2-829086-152 (for Exhauster C) (FT-3) H-2-829125-153 (for Exhauster B) H-2-829086-153 (for Exhauster C) (FT-4) H-2-829125-154 (for Exhauster B) H-2-829086-154 (for Exhauster C) (H-2-821455-30 VI # 22660) ref	The Masstron Sample Flow Transmitters measure flow in the exhauster sample lines and provide a mass flow signals to the ISO-Flow Control (CM #1).	The Masstron Sample Flow Transmitter performs its function without igniting potential flammable gas in the operating space.	Part substitution introduces electrical spark potential	The Masstron meets Ignition Source Control Set 2 (LMHC 1997b, LMHC 1997f).	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the protected equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Veltron Vacuum Transmitter H-2-829125-11 (for Exhauster B) H-2-829086-11 (for Exhauster C) (H-2-821455-30 VI # 22660)ref	The Veltron Vacuum Transmitter measures the pressure at the vacuum header and provides a signal to the Auto Pump Control (CM #2).	The Veltron Vacuum Transmitter performs its function without igniting potential flammable gas in the operating space.	Part substitution introduces electrical spark potential	The Veltron Vacuum Transmitter meets Ignition Source Control Set 2 (LMHC 1997b, LMHC 1997f).	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the protected equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

5.3 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM EXHAUSTER (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Vacuum Pump Pressure Switches (PS-1, PS-2) H-2-829125-40 (for Exhauster B) H-2-829086-40 (for Exhauster C) (H-2-821455-30 VI # 22660)ref	The pressure switches monitor the pressure on the vacuum pump (P1, P2) inlet and provide a pump status signal to the Auto Pump Control (CM #2).	The pressure switches performs its function without igniting potential flammable gas in the operating space.	Part substitution introduces electrical spark potential	The Vacuum Pump Pressure Switches meet Ignition Source Control Set 2 (LMHC 1997b, LMHC 1997f).	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the protected equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Vacuum Pumps (P1, P2) H-2-829125-12 (for Exhauster B) H-2-829086-12 (for Exhauster C) (H-2-821455-30 VI # 22660) ref	The vacuum pumps provide sample flow for the record filter sampling system.	The Vacuum Pump performs its function without igniting potential flammable gas in the operating space.	Electrical or mechanical failure introduces a spark potential Part substitution introduces a spark potential.	The Vacuum Pumps meet Ignition Source Control Set 2 (LMHC 1997b, LMHC 1997f).	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the protected equipment could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Variable Frequency Drive (VFD) H-2-829136-1 (for Exhauster B) H-2-829107-1 (for Exhauster C) (H-2-818201-8 VI# 22660) ref	The variable frequency drive controls the exhauster fan operation	The variable frequency drive sends a shutdown signal to the K1 relay when a critical exhauster alarm requires the exhauster to shutdown.	Electrical failure causes variable frequency drive to not interrupt power to the truck shut down relay	The VFD has sufficient inputs and outputs to perform its safety function.	Electrical failure would result in continued drilling operations without an exhauster. This condition could lead to tank dome pressurization and an unfiltered release of gases.	Per LMHC 1997d an unfiltered release of gases could result in an unacceptable toxilogical release to the onsite worker	SS
Exhauster Low Flow relay (K6) H-2-829125-78 (for Exhauster B) H-2-829086-78 (for Exhauster C) (H-14-030122, Sht 2 VI# 22660)ref	The exhauster low flow relay causes the variable frequency drive to send a signal to shutdown the core sample truck on low flow exhauster flow	The exhauster low flow relay causes an interruption of electrical power to the variable frequency drive alarm contacts initiating a shutdown of the core sample truck on low exhauster flow enabling the VFD to perform its function and prevent an unfiltered release of tank gases	Mechanical failure not allowing contacts to open	This relay is for fail safe operations Parts substitution results in a relay that is not fail safe	Relay that does not fail safe would result in continued drilling operations without an exhauster. This condition could lead to tank dome pressurization and an unfiltered release of gases.	Per LMHC 1997d an unfiltered release of gases could result in an unacceptable toxilogical release to the onsite worker	SS

5.3 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM EXHAUSTER (cont.)

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Exhauster Flow Controller (FIC) H-2-829125-67 (for Exhauster B) H-2-829086-67 (for Exhauster C) (H-14-030122, Sht 2 VI# 22660)ref	The exhauster flow controller monitors stack flow and sends alarms for high and low exhauster flow.	The Exhauster flow controller maintains the exhaust flow by controlling fan speed based on monitoring of the signal from the Masstron stack flow transmitter and shuts down the Exhauster for low flow rate by sending a signal to the low flow relay.	Electrical failure causes inaccurate flow readings or failure to send shutdown command Calibration error cause inaccurate readings of flow Part substitution incompatible with Masstron flow transmitter	The flow controller function can be verified per a contractor's approved calibration procedure over the operating range The flow controller is compatible with the Masstron flow transmitter	Failure of the Exhauster flow controller to send truck shutdown signal on loss of Exhauster could result in tank dome pressurization and an unfiltered release of tank gases.	Per LMHC 1997d an unfiltered release of gases could result in an unacceptable toxilogical release to the onsite worker	SS
Truck Shutdown Relay (K1) H-2-829136-10 (for Exhauster B) H-2-829107-10 (for Exhauster C) (H-14-030122, Sht 3 VI# 22660)ref	The truck shutdown relay causes the core sample truck to shutdown when the exhauster shuts down.	The truck shutdown relay causes an interruption of electrical power to the exhauster shutdown interlock override causing the core sample truck to shutdown when the exhauster is shut off in order to prevent the pressurization of the tank dome space	Mechanical failure not allowing contacts to open	The relay is for fail safe operation. Parts substitution results in a relay that is not failsafe.	Relay that does not failsafe would result in continued drilling operations without an exhauster. This condition could lead to tank dome pressurization and an unfiltered release of gases.	Per LMHC 1997d an unfiltered release of gases could result in an unacceptable toxilogical release to the onsite worker	SS
Beta CAM In-Line Remote Detector Head H-2-829126-13 (for Exhauster B) H-2-829087-13 (for Exhauster C)	The Beta CAM remote detector head is used to sample and measure radiological emissions from the exhauster flow stream and send an alarm signal for unacceptable emissions.	The Beta CAM remote detector head performs its function without igniting potential flammable gas in the flow stream.	Part substitution introduces electrical spark potential	The Beta Cam remote detector head meets ignition source control set 2 (LMHC 1997b, LMHC 1997f)	Equipment failure has no effect on the SSC safety function. Part substitution effecting the intrinsic safety of the sensor could result in ignition of flammable gases, leading to a waste tank fire or explosion and dome collapse. This would compromise the primary safety function of the core sampling system.	Per Wagoner 1997b the effect of incorrect part substitution could cause a dome collapse with a resultant offsite public exposure in excess of the allowable limit.	SC

5.4 SAFETY EQUIPMENT LIST FOR THE RMCS SYSTEM UNIVERSAL SAMPLER

HOST ITEM IDENTIFICATION	SAFETY FUNCTION(S)	SAFETY CLASS JUSTIFICATION	SAFETY CLASS
Universal Sampler	The universal sampler is designed to reduce the possibility of ignition in the drill string through the use of components approved for use in the flammable gas environments by US Bureau of Mines Testing, mitigating the probability of an ignition of potential flammable gas in the drill string.	This equipment contains components designed to prevent a postulated accident scenario involving various drop accidents within the drill string leading to sparking in the presence of flammable gases. The bounding accident as defined in Wagoner, 1997b is tank dome collapse resulting in an onsite calculated exposure in excess of 17,000 Rem and an offsite calculated exposure in excess of 9 Rem.	SC

The items listed below are the: Systems__ Structures__ Components_X_ for the above host item.

The safety classification of the items listed below is: Preliminary__ interim_X_ final__

Item Identification	Item Functional Description	Item Safety Function	Item Failure Mechanisms	Item Design Attributes	Item's Failure Effect on SSC Safety Function	Item Safety Classification Justification	Item Safety Class
Quadralatch H-2-690140-42 H-2-690140-50	The Quadralatch is used to latch the universal sampler into the core barrel.	The Quadralatch provides a reduced spark potential material to mate with the core barrel to prevent ignition of potential flammable gas due to a sampler drop accident.	Relative motion or impacting with interfacing equipment causes mechanical sparking Part substitution introducing mechanical spark potential	The sampler Quadralatch meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Mechanical failure which results in the free fall of the sampler in the drill string could cause a spark on impact. Part substitution which results in a change in materials for the quadralatch could result in the use of unapproved equipment, capable of sparking in the drill string. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC
Insert H-2-690140-39 H-2-690140-26	The sampler insert is the base of the sampler that contacts the inner drill bit face.	The sampler insert provides a reduced spark potential material to mate with the drill bit to prevent ignition of potential flammable gas due to a sampler drop accident	Relative motion or impacting with interfacing equipment causes mechanical sparking Part substitution introducing mechanical spark potential	The sampler insert meets the requirements of Ignition Source Control set 1 (LMHC 1997b, LMHC 1997f)	Mechanical failure which results in the free fall of the sampler in the drill string could cause a spark on impact. Part substitution which results in a change in materials for the insert could result in the use of unapproved equipment, capable of sparking in the drill string. Ignition of flammable gases in the drill string could lead to a reaction resulting in a potential dome collapse.	Per Wagoner 1997b, the effect, of equipment failure causing a dome collapse, is a resultant offsite public exposure in excess of the allowable limit.	SC

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