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6. Author

Name: R. L. Guthrie

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7. Abstract

This document provides the preliminary safety classification for the systems and major components of the Manipulator Retrieval System.

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PRELIMINARY SAFETY EQUIPMENT LIST
FOR
TANK 241-C-106 MANIPULATOR RETRIEVAL SYSTEM
PROJECT W-340

June 6, 1994

Prepared By:

TWRS Safety Engineering

1.0 PURPOSE

This document identifies the anticipated safety classification of the estimated major subsystems, based on the projected major functions, that will be used as guidance for the development of the conceptual design of the Manipulator Retrieval System for Tank 241-C-106. This document is intended to be updated as the design of the Manipulator Retrieval System evolves through the conceptual and definitive design phases.

2.0 SCOPE

This document provides the projected safety classifications for the Manipulator Retrieval System and associated equipment by referencing existing safety classification in other similar safety equipment lists (See 5.0, References). This document is intended to be used only for guidance in the development of the Manipulator Retireval System since the conceptual design is currently fluid.

This document does not address routinely used tank farm equipment that is regulated by existing control manuals and procedures. Equipment such as ladders, fire extinguishers, electrical cords, gas bottles, etc., are addressed as part of the industrial safety program, and are, therefore, not included in this document.

This document is limited to the waste retrieval activities of the Manipulator Retrieval System for single shell tank 241-C-106.

3.0 APPLICATION

The safety classification (SC) designation of the final design will be used as the basis for establishing safety significance of the various systems, components, and structures, and providing the appropriate Quality Assurance and Quality Control to be used during the design, procurement, installation, and operation of the Manipulator Retrieval System. Each listing contains: identification of the equipment, the safety function of that equipment, the designated safety classification, and the justification of the safety basis for the safety classification.

The SC listed for each of the identified systems of the Manipulator Retrieval System is based on a pre-conceptual definition of equipment required to accomplish the identified task. The SC is dependent on the safety function of the equipment or the SC of equipment it may damage. The justification for the SC is provided with the intent that the evolving design include direct and/or mitigating features which may preclude the undesired event(s) from occurring. The final design may not have the listed equipment or may be incapable of damaging Important To Safety (ITS) equipment as defined at this time. This would greatly reduce the SC of most of the equipment listed.

4.0 SYSTEM DESCRIPTION

The Manipulator Retrieval System is to be capable of removing the hardened sludge heel at the bottom of single shell tank 241-C-106 and to perform an overall clean out of the tank that leaves a maximum of 360 ft^3 (TPA milestone M-45-00). The thickness of the heel prior to initiation of waste retrieval with the Manipulator Retrieval System is estimated to be 1- to 2-ft.

The Manipulator Retrieval System is currently in the pre-conceptual phase with no definitive systems or subsystems. The anticipated retrieval functions for the Manipulator Retrieval System is based on Table 6-2 of WHC-SD-W340-ES-001, Rev. 1. Projected equipment to accomplish these functions were based on the following systems and equipment:

- Rotary Mode Core Sampling Equipment (WHC-SD-WM-SEL-032)
- Light Duty Utility Arm System Equipment (WHC-SD-WM-SEL-034)
- Single Shell Tanks Equipment (WHC-SD-WM-SEL-027)
- Aging Waste Facilities Equipment (WHC-SD-WM-SEL-020)

5.0 REFERENCES

Conner, J. C., 1994, "*Safety Equipment List for Tank 241-C-106 Waste Retrieval Project W-320*," WHC-SD-WM-SEL-033, Rev 1, Westinghouse Hanford Company, Richland, Washington.

Corbett, J. E., 1993, "*Rotary Mode Core Sampling Safety Equipment List*," WHC-SD-WM-SEL-032, Rev 0, Westinghouse Hanford Company, Richland, Washington.

Guthrie, R. L., 1994, "*Preliminary Safety Equipment List for the Light Duty Utility Arm System*," WHC-SD-WM-SEL-034, Rev 0, Westinghouse Hanford Company, Richland, Washington.

Kidder, R. J., 1993, "*Aging Waste Facilities Interim Safety Equipment List*," WHC-SD-WM-SEL-020, Rev 2, Westinghouse Hanford Company, Richland, Washington.

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Wallace, D. A. , 1994, "*Project W-340 Manipulator Retrieval System Tank 241-C-106*," WHC-SD-W340-ES-001, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-6-1, Rev. 57, "*Standard Engineering Practices*," Westinghouse Hanford Company, Richland, Washington.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
1. Access Tank			
A. Riser Opening Modification System	Enlarge riser opening through dome	1[e]	Failure of system may damage tank dome or tank liner. Damage to tank liner or tank dome (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
B. Replacement Riser	Tank dome penetration	2[f]	Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-2) NOTE: During design, if it can be demonstrated that the riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
C. Pump Pit Modifications (If Required)	Primary confinement of radioactive aerosols during saltwell pumping operations	3[g]	Pump pit failure could result in a spray release of aerosols to the environment.[a] (Table D-2)
D. Modified Cover Blocks or Cover Plates (If Required)	Primary confinement of radioactive aerosols during high pressure pumping operations	1[j]	Pump pit failure could result in a spray release of aerosols to the environment (air). Accident scenario focuses on a spray leak coupled with a high pressure.[c] (Table G-2) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
E. Equipment Installation System	-	-	-
1. Tank Liner Protection Devices	Prevent damage/penetration of tank liner	1[o]	Dropping the equipment or using excessive force to install the equipment could cause damage to the bottom tank liner. Damage to tank liner (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
2. Riser Protection Devices	Prevent damage to riser	2[p]	Misalignment, out of roundness, excessive force, etc. could damage the tank riser. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
3. Other Components of the Equipment Installation System	Lowers arm/effector through riser and into tank	3[g]	Failure could cause pinch points, adversely impact ALARA principles, damage equipment, etc. Failure could cause loss of system or potential harm to facility workers.[b] (Table 2) and d (Table 4-1)
F. Decontamination System	Removes contamination from equipment upon equipment withdrawal	3[g]	Failure could adversely impact ALARA principles. Failure could cause potential harm to facility workers. b (Table 2) and d (Table 4-1)
2. Confine Waste			
A. Ventilation System	Provides control of tank temperature and humidity; Provides confinement of hazardous aerosols and vapors	3[g]	Failure of could result in an EDE dose of less than 5 rem. Failure could cause potential harm to facility workers. a (Table D-5) , b (Table 2), and d (Table 4-1)
B. HEPA Filters	Removes particulate material from air exiting the ventilation system	3[g]	Failure could cause a release of hazardous aerosols to the environment.[a] (Table D-5) and d (Table 4-1)

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
C. Confinement Barriers	Provides confinement of hazardous aerosols and vapors	3[g]	Failure could cause a release of hazardous aerosols to the environment.[a] (Table D-5) and d (Table 4-1)
D. Exhauster De-entrainer	Protects HEPA filters from moisture and excessive particulate loading	3[g,h]	Failure could cause plugging of HEPA filter. a (Table D-5) and d (Table 4-1)
3. Physical Characterization			
Tank Characterization Data	Visual characterization of the interior of the tank for routine operations	3[i]	Failure of characterization data could allow damage to the manipulator system or injury to facility workers.[d] (Table 4-1)
4. Control System			
A. Supervisory Control Computer Operations Used to Protect Tank Liner (if applicable)	Prevents damage/ penetration of tank liner or dome	1[e]	Failure of controls used to protect the tank liner/tank dome could cause or allow equipment to damage tank liner or tank dome. Damage to tank liner (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
B. Supervisory Control Computer Operations Used to Protect Tank Risers (if applicable)	Prevents damage to risers	2[p]	Failure of controls used to protect the tank risers could cause or allow equipment to damage tank risers. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
C. Other Supervisory Control Computer Operations	Prevents unsafe or improper actions	3[l]	Failure may cause damage to system or injury to facility workers.[d] (Table 4-1)
D. Manual Operation Safety Features Used to Protect Tank Liner/Dome	Prevents damage/ penetration of tank liner or dome	1[o]	Failure of safety features used to protect the tank liner/tank dome during manual operation could cause or allow equipment to damage tank liner or tank dome. Damage to tank liner (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
E. Manual Operation Safety Features Used to Protect Tank Riser	Prevents damage to risers	2[p]	Failure of safety features used to protect the tank risers during manual operation could cause or allow equipment to damage tank risers. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
F. Other Manual Operation Safety Features	Prevents unsafe or improper actions	3[l]	Failure may cause damage to system or injury to facility workers.[d] (Table 4-1)

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
5. Monitor Process			
A. Radiation Detection - Drywells/Laterals	Monitors for potential leaks	3[g]	Failure could allow a leak to continue unmitigated.[a] (Table D-15)
B. Monitor Slurry			
1. Slurry Monitoring Used to Mitigate a High Volume Leak	Monitor slurry flow and properties to detect a transfer leak	2[f,p]	Failure of the slurry monitoring system could result in not mitigating a waste transfer leak.[a] (Table D-15) and d (Table 4-1) NOTE: During design, if it can be demonstrated that a high volume leak cannot occur (through design or mitigating features), then the safety class of this system can be reduced accordingly.
2. Other Slurry Monitoring	Monitor slurry flow and properties	3[l]	Failure of to monitor slurry properties could allow damage to the manipulator slurry system or injury to facility workers.[d] (Table 4-1)
C. Stack Monitors	Exhaust radiation monitoring	2[f,m,n]	Failure of the ventilation radiation monitoring system could allow an unmitigated release of radioactivity.[a] (Table D-6.18) and d (Table 4-1) NOTE: During design, if it can be demonstrated that an unmitigated release of radioactivity cannot occur (through design or mitigating features), then the safety class of this system can be reduced accordingly.
D. In-Tank Monitoring (all other)	Prevents unsafe or improper actions	3[l]	Failure of characterization data could allow damage to the manipulator system or injury to facility workers.[a] (Tables D-12, D-13, & D-14) and d (Table 4-1)
E. Uninterruptable Power Supply	Maintains power for the proper operation of radiation monitoring	2[n,p]	Failure would prevent the stack monitors from performing their safety function of allowing the timely mitigation of a waste transfer leak.[d] (Table 4-1) NOTE: During design, if it can be demonstrated that an unmitigated release of radioactivity cannot occur (through design or mitigating features), then the safety class of this system can be reduced accordingly.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
6. Disposition of In-Tank Hardware			
A. Hardware Avoidance System	Provides the ability of the operating equipment to avoid existing in-tank hardware	3[l]	Failure could allow unanticipated contact with existing in-tank-hardware and cause damage to the operating equipment or injury to facility workers.[d (Table 4-1)]
B. Hardware Moving System	Provides the ability to move existing hardware in order to efficiently remove waste	3[l]	Improper operation or failure could cause damage to the operating equipment or injury to facility workers.[d (Table 4-1)]
7. Control Tank Environment			
Maintain Temperature (Systems Which Generate Excessive Heat)	Monitors Confined Waste and Monitor Process Systems	1[o]	Excessive temperature could lead to failure of the steel tank liner. Damage to tank dome (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a (Table D-1)] NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
8. Protect Tank			
A. Weight Distribution System	Prevents excessive dome loading	1[o]	Failure could allow excessive static or dynamic dome loading to occur with possible failure of the waste tank dome. Damage to tank dome (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste.[a (Table D-1)] NOTE: During design, if it can be demonstrated that the tank dome cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
B. Pressure/Vacuum Relief System	Prevents excessive positive or negative pressure loads on tank structure	1[o]	Excessive positive or negative pressure loads on tank structure could cause a structural failure of the tank dome or liner. Damage to tank liner or dome (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
C. Support Structure	-	-	
1. Support Structure for Holding/Mixing Tank	Provides structural support for holding/mixing tank	1[o]	Failure of the support structure could cause a breach or failure of the holding tank resulting in an unmitigated spill of hazardous waste. Failure could also cause excessive dome loading and result in a failure of the tank dome.[a] (Table D-1) NOTE: During design, if it can be demonstrated that the holding tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
2. Support Structure Manipulator Arm Which Protects Tank Riser	Provides structural support for manipulator equipment which protects tank riser	2[p]	Failure of the support structure could cause damage to tank riser. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
3. Support Structure Manipulator Arm	Provides structural support for manipulator equipment	3[g]	Failure could cause pinch points, adversely impact ALARA principles, damage equipment, etc. Failure could cause loss of system or potential harm to facility workers.[b] (Table 2) and d (Table 4-1)

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
D. Riser Insert (if applicable)	Provides physical protection for the tank riser	2^p	Failure of riser insert could allow damage to tank riser. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
9. Deploy System			
A. Articulated Arm System	-	-	-
1. Manipulator arm movements which may contact tank dome or tank liner	Controls movement of the manipulator arm and positioning of the retrieval tools and prevents damage to tank liner	1°	Inadvertent or uncontrolled movement of the arm which could damage or penetrate tank liner or dome. Damage to tank liner (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste.[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
2. Manipulator arm movements which may contact tank riser	Controls movement of the manipulator arm and positioning of the retrieval tools and prevents damage to tank riser	2^p	Inadvertent or uncontrolled movement of the arm which could damage tank riser. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
3. Other manipulator arm movements	Controls movement of the manipulator arm and positioning of the retrieval tools	3[l]	Inadvertent or uncontrolled movement of the arm which could damage manipulator system or injury to facility workers.[d] (Table 4-1)
B. Mast Deployment System		-	-
1. Mast positioning activities which may damage tank dome or tank liner	Controls the positioning of the mast deployment system and prevents damage to tank dome and tank liner	1[o]	Inadvertent or uncontrolled movement of the mast which could damage or penetrate tank liner or dome. Damage to tank liner (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste.[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
2. Mast positioning activities which may damage tank riser	Controls the positioning of the mast deployment system and prevents damage to tank riser	2[p]	Inadvertent or uncontrolled movement of the mast which could damage tank riser. Riser failure could result in the unmitigated release of hazardous aerosols to the environment (air).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank riser cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
3. Other positioning activities	Controls the positioning of the mast deployment system	3[l]	Inadvertent or uncontrolled movement of the mast which could damage manipulator system or cause injury to facility workers.[d] (Table 4-1)

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
10. Mobilize Waste			
A. Waste Mobilization System, High Energy Systems Capable of Damaging Tank Liner (if applicable)	Breaks up and mobilizes waste	1[c]	Failure of a high energy waste mobilization system (if applicable) may cause damage to the tank liner of the tank dome. Damage to tank liner (SC 1) may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil).[a] (Table D-1) NOTE: During design, if it can be demonstrated that the tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.
B. Waste Mobilization System, High Energy System Capable of Generating Aerosols (if applicable)	Breaks up and mobilizes waste	3[g]	High energy waste mobilization system (if applicable) may cause an excessive amount of aerosols to be generated. May prevent tank characterization from performing its safety function.[d] (Table 4-1)
C. Positioning & operation of end effector(s)	Controls and regulates the end effector of the manipulator arm to break up and mobilize the waste	3[l]	Failure to properly position and operate the end effector may cause damage to the manipulator system or injury to facility workers.[d] (Table 4-1)
D. Raw water supply and transfer line flushing (if applicable)	Maintains temperature of waste and decontamination of transfer lines	3[g]	Failure to add cooling water or decontaminate transfer lines may preclude the ALARA principles for exposure to radioactive materials.[d] (Table 4-1)
E. Waste Mobilization System Equipment (Pumps, Valves, Pipe Flanges, etc.) in Pits/Boxes	Dislodge and prepare waste for transport	3[l]	Failure could result in damage to mobilization equipment or injury to facility workers.[d] (Table 4-1)
11. Convey Waste			
A. Waste Conveyance System, In-Tank Components	Transport waste from bottom of the waste tank to the top of the tank	3[l]	Failure could result in damage to manipulator arm equipment or injury to facility workers.[d] (Table 4-1)

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
B. Mechanical Conveyance System, Outside of Tank Components (if applicable)	Transport waste from the top of the waste tank to the waste holding/mixing tank; Primary confinement of radioactive liquids and aerosols	2[f]	Failure could release radioactive material to environment. Mechanical conveyance method (conveyor belt, etc.) would tend to spill hazardous waste in a localize area. Source term would probably be between a high energy conveyance system (pressurized) and negative energy system (vacuum). [The anticipated waste transfer rate, duration, and localized nature of the spill determine the Safety Class of this system.][d (Table 4-1)] NOTE: During design, if it can be demonstrated that the amount of waste spilled to the environment (through design or mitigating features) is reduced, then the safety class of this system can be reduced accordingly.
C. Pressurized Conveyance System, Outside of Tank Components (if applicable)	Transport waste from the top of the waste tank to the waste holding/mixing tank; Primary confinement of radioactive liquids and aerosols	1[e,j,k]	Failure could release radioactive material to environment. Pressurized conveyance method could result in a hazardous waste spray leak. [The anticipated flow rate, duration, and potential nature (spray) of the leak determine the Safety Class of this system.][d (Table 4-1)] NOTE: During design, if it can be demonstrated that the amount of waste spilled to the environment (through design or mitigating features) is reduced, then the safety class of this system can be reduced accordingly.
D. Vacuum Conveyance System, Outside of Tank Components (if applicable)	Transport waste from the top of the waste tank to the waste holding/mixing tank; Primary confinement of radioactive liquids and aerosols	3[g,l]	Failure of this system would allow ambient air to infiltrate conveyance line and reduce the efficiency of the system. (Release of radioactive material to environment is not anticipated.) Possible damage to the conveyance system could result or injury to facility workers.[d (Table 4-1)]
E. Seismic Switch	Shut off waste transfer flow during a seismic event	1[k]	Failure of the seismic switch will allow a break in the transfer lines to continue unmitigated. This may preclude the safely placing the waste transfer system in a safe shutdown condition where 500 mrem effective dose equivalent (EDE) or greater may be released.[d (Table 4-1)] NOTE: During design, if it can be demonstrated that the amount of waste spilled to the environment (through design or mitigating features) is reduced, then the safety class of this system can be reduced accordingly.
F. Primary Conveyance Piping (Outside of Waste Tank)	Primary confinement of radioactive liquids and aerosols	2[f]	Failure could release radioactive material to environment. Accident scenario focuses on a spray leak couple with a high volume flow rate.[d (Table 4-1) and c (Table G-2)] NOTE: During design, if it can be demonstrated that the amount of waste spilled to the environment (through design or mitigating features) is reduced, then the safety class of this system can be reduced accordingly

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
G. Secondary Conveyance Piping (Outside of Waste Tank)	Secondary confinement of radioactive liquids and aerosols	3[g]	Failure could release radioactive material to environment. Accident scenario focuses on a spray leak couple with a high volume flow rate.[d] (Table 4-1) and c (Table G-2)
12. Process Waste			
A. Water Addition System, Slurry Properties Monitoring, Chemical Buffering System, Slurry Mixing System	Processes the hazardous waste into a slurry	3[g,l]	Failure could cause damage to the operating equipment or injury to facility workers. Failure may preclude implementing ALARA principle for exposure to radioactive materials.[d (Table 4-1)]
B. Holding/Mixing Tank	Containment and confinement of hazardous liquid and aerosols.	1[e,j,k]	Failure of system may damage holding tank. Damage to tank may adversely affect its ability to perform its safety function of containment and confinement of waste which could result in the unmitigated release of hazardous liquid to the environment (soil). [Safety class is dependent on the volume and source term of the contents of the tank. If tank is 5,000 to 8,000 gallons and holds contents of 241-C-106, then tank and tank integrity functions would be SC1.][a] (Table D-1) NOTE: During design, if it can be demonstrated that the holding tank cannot be damaged (through design or mitigating features) to where it is incapable of performing its safety function, then the safety class of this system can be reduced accordingly.

PRELIMINARY SAFETY EQUIPMENT LIST

System/ Component	Function	Safety Class	Failure Consequences
13. Transport Waste			
A. Pumping System	Transfer of radioactive liquids and aerosols to double shell tanks	1[e,j,k]	Failure could release radioactive material to environment. Accident scenario focuses on a spray leak couple with a high volume flow rate.[c (Table G-2)]
B. Double-encased Pipeline Without Seismic Switch	Primary confinement of radioactive liquids and aerosols	1[e,j,k]	Failure could release radioactive material to environment. Accident scenario focuses on a spray leak couple with a high volume flow rate.[c (Table G-2)] NOTE: During design, if it can be demonstrated that the volume of waste released during a leak (through design or mitigating features) is reduced, then the safety class of this system can be reduced accordingly.
C. Double-encased Pipeline With a Seismic Switch *See 11.E, 11.F, and 11.G Above	*	*	*

a Single Shell Waste Tanks Interim Safety Equipment List, WHC-SD-WM-SEL-027, Rev 1
b Rotary Mode Core Sampling Safety Equipment List, WHC-SD-WM-SEL-032, Rev 0
c Aging Waste Facilities Interim Safety Equipment List, WHC-SD-WM-SEL-020, Rev 2
d Safety Equipment List for Tank 241-C-106 Waste Retrieval Project W-320, WHC-SD-WM-SEL-033, Rev 1

Standard Engineering Practices, WHC-CM-6-1, EP-1.4, "Safety Classification", Table 1 (this requirement is to be incorporated into WHC-CM-4-46):

e Criterion 1
f Criterion 2
g Criterion 3
h Criterion 6
i Criterion 7
j Criterion 10
k Criterion 15
m Criterion 16
n Criterion 19
o Criterion 23
p Criterion 24

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
May 10, 1994	582-94
3. Project No.	4. Page
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5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
WHC-SD-W340-SEL-002/Preliminary SEL for C-106 Manipulator Retrieval System	W-340	L.E. Thomas	Waste Tank Safety Assurance	2751-E/372-2402

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

6-8-94
Date

Reviewer/Point of Contact

Author/Originator

11. CLOSED

6-8-94
Date

Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1.	If this equipment is to be installed and used after the past-practice sluicing has removed about 90% of the material in the tank, perhaps the safety significance of many of the systems will be lower. The remaining material is not water soluble and much less mobile than the sludge which has already been removed. The available radionuclide inventory will be much smaller also.		Agree with your comment. However, project W340 assumes that the entire contents of 241-C-106 are to be removed, not just the hard pan. Containment of sludge remains a concern during most of the retrieval process. Without knowing any additional information other than the projected functions, the safety class needs to remain the same.	