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Tank Selection Criteria and Retieval Recommendations for Tri-Party Agreement Milestone M-07

J. P. Harris

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Richland, Washington 99352

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Prepared by: J. P. Harris, Principal Engineer
Single-Shell Tank Retrieval

11-13-92
Date

Approved by: J. M. Henderson, Manager
Single-Shell Tank Retrieval

11/13/92
Date

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LIST OF TERMS

DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
NEPA	*National Environmental Policy Act of 1969*
SEPA	*State Environmental Policy Act of 1971*
SST	single-shell tank
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TWRS	Tank Waste Remediation System
WAC	*Washington Administrative Code*
WHC	Westinghouse Hanford Company

TANK SELECTION CRITERIA AND RETRIEVAL RECOMMENDATIONS FOR TRI-PARTY AGREEMENT MILESTONE M-07

1.0 INTRODUCTION

The *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1990) interim milestone M-07-01 states "Submit tank selection criteria, retrieval options and recommended tank selection to Ecology for concurrence." This document provides the applicable criteria, discusses the various retrieval options available, and recommends a single-shell tank (SST) for demonstration of SST retrieval technology.

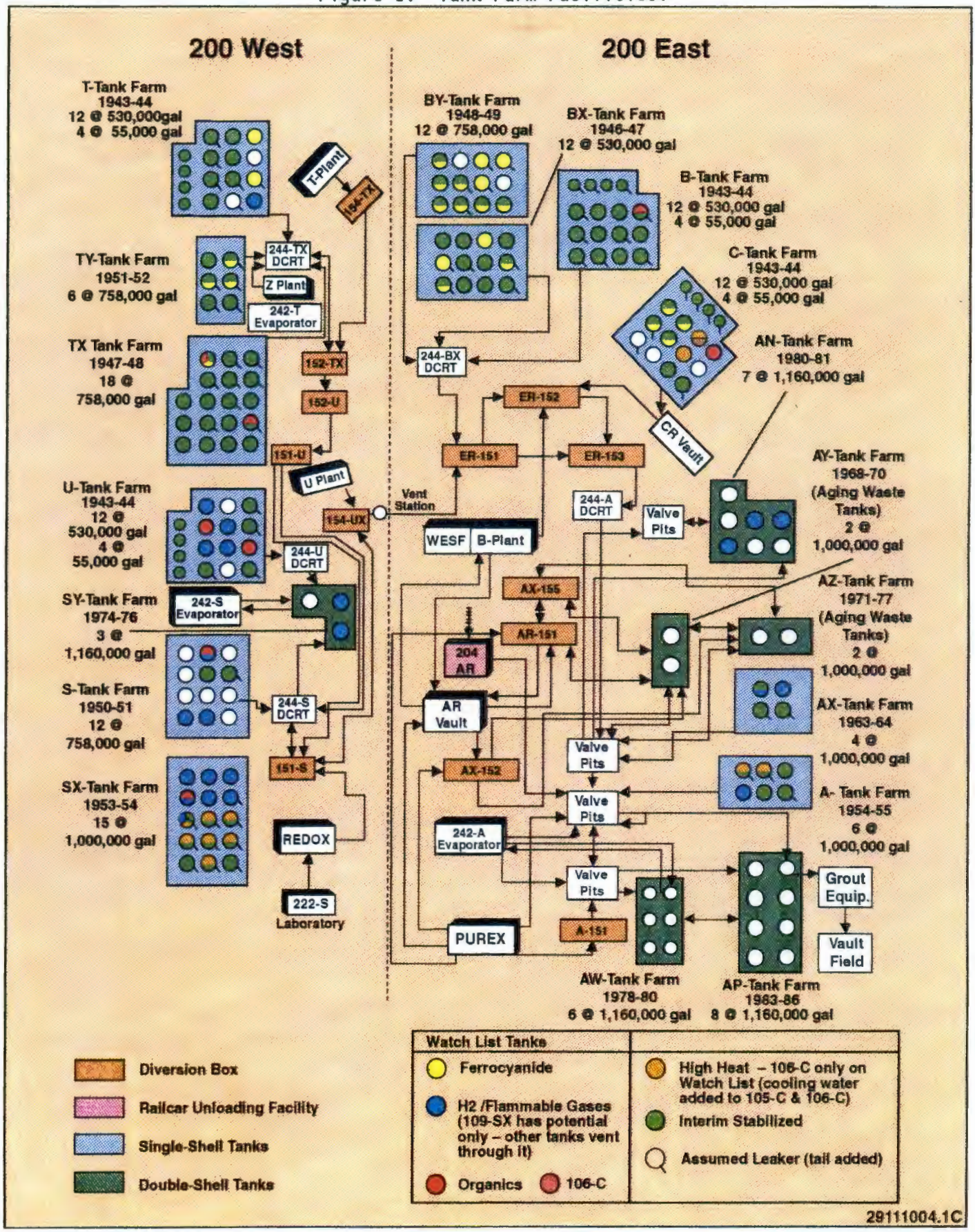
Between 1943 and 1964, 149 SSTs were built for the storage of high-level liquid radioactive wastes at the Hanford Site. These SSTs are located in 12 tank farms of 4 to 18 tanks each in the 200 East and 200 West Areas on the Hanford Site (see Figure 1). No wastes have been added to any of these tanks since November 1980. A total of 67 of the SSTs are now known or suspected leakers. Pumpable interstitial liquid and supernate wastes have been removed from 105 SSTs and transferred to double-shell tanks (DST) in a jet pumping program. The 28 DSTs are a tank-in-tank design and were placed in service beginning in 1971. In accordance with Public Law 101-510, Section 3137 (the Wyden Amendment), a total of 53 tanks (48 SSTs and 5 DSTs) have been identified by the U.S. Department of Energy (DOE) as having potential for releases of high-level waste due to uncontrolled increases in temperature or pressure. These tanks have been designated as "watch list" tanks by DOE.

The SSTs contain three general waste types: sludge, saltcake, and liquid. Sludge consists of the solids (hydrous metal oxides) precipitated from the neutralization of acid wastes before their transfer to the SSTs. Saltcake consists of the various salts formed from the evaporation of water from the alkaline waste. Liquids exist as supernate and interstitial liquid in the tanks. These waste types do not necessarily exist as discrete layers, but are intermingled to different degrees. Many SSTs contain both sludge and saltcake, with a wide range of ratios in this combination. Sludge and saltcake may contain interstitial liquids and be relatively soft. Other saltcake and sludge may be drier and harder. Sludge, saltcake, and liquid are used as general storage descriptions and classifications for the tanks.

The Tri-Party Agreement includes task listings and milestones for remediation of the Hanford Site as agreed to by the Washington State Department of Ecology (Ecology), DOE and the U.S. Environmental Protection Agency (EPA). Demonstration of waste retrieval is addressed in three Tri-Party Agreement milestones. Those milestones are:

- M-06-00 "Develop single-shell tank waste retrieval technology and complete scale-model testing." June 1994

Figure 1. Tank Farm Facilities.



- M-07-00 "Initiate full-scale demonstration of waste retrieval technology." October 1997
- M-08-00 "Initiate full-scale tank farm closure demonstration project." June 2004

Each demonstration supports follow-on tasks, including any retrieval activities that take place under milestone M-09, "Complete closure of all 149 SSTs," June 2018.

2.0 CRITERIA

Many criteria are applicable for selection of the SST retrieval demonstration tank. Several of the criteria from Federal and State regulations or Tank Waste Remediation System (TWRS) interfaces are quite specific. Other criteria derived from Tri-Party Agreement (Ecology et al. 1990) language or waste retrieval technology are more general in nature.

2.1 TANK WASTE REMEDIATION SYSTEM REQUIREMENTS

Retrieval of waste from SSTs must support numerous TWRS objectives and priorities. These top-level needs become the overall drivers for waste retrieval and were included as the selection criteria for milestone M-07-01. These drivers are the following:

- Resolve tank safety issues
- Comply with Federal regulations and commitments
- Comply with state regulations and commitments
- Proceed with waste disposal
- Manage tank space availability.

2.1.1 Tank Safety Issues

The Wyden Amendment, Public Law 101-510, Section 3137, was passed by Congress to address safety measures for high-level waste tanks at the Hanford Site. These tanks have been designated as "watch list" tanks by DOE. These watch list tanks are given in Table 1.

Resolution of the tank safety issues is the highest priority for the TWRS. Selection of the SST retrieval demonstration tank must consider the potential for near-term resolution of safety issues as a direct result of the retrieval action, or as the result of a follow-on process operation.

Table 1. Watch List Tanks.

Wyden Bill tanks				
Hydrogen				
A-101	S-112	SX-105	U-105	AN-105**
AX-101	SX-101	SX-106	U-108	SY-101**
AX-103	SX-102	SX-109	U-109	SY-103**
S-102	SX-103	T-110	AN-103**	
S-111	SX-104	U-103	AN-104**	
Ferrocyanide				
BX-102	BY-103	BY-108	C-109	TY-101
BX-106	BY-104	BY-110	C-111	TY-103
BX-110	BY-105	BY-111	C-112	TY-104
BX-111	BY-106	BY-112	T-101	T-107
BY-101	BY-107	C-108	TX-118	
Organic				
C-103	TX-105	S-102*	U-106	
B-103	TX-118*	SX-106*	U-107	
High heat				
C-106***				

*Tanks also appear under other headings.
**Double-shell tanks.
***Water added to control temperature.

2.1.2 Tri-Party Agreement

The Tri-Party Agreement establishes a program acceptable to the EPA, DOE, and Ecology for the closure of all 149 SSTs.

The following Tri-Party Agreement criteria, which relate specifically to selection of a tank for demonstration of waste retrieval technology, are straightforward.

- The tank will be a SST.
- Waste retrieval demonstration will follow scale model testing of waste retrieval technologies (milestone M-06-00).
- Completion of the demonstration will be when 95 percent of the radioactive and chemical waste inventory is removed (though milestone M-07-00 is complete upon initiation of the SST retrieval demonstration).
- Ecology concurrence will be obtained on tank selection criteria, retrieval options, and recommended tank selection.

Achievement of the 95 percent retrieval criteria will be on a simple volume of waste basis. Any additional retrieval actions required to meet final closure criteria will be accomplished under milestone M-09. The Hanford 5-Year Plan (DOE-RL 1991) makes many references to the Tri-Party Agreement and uses it as its base document.

2.1.3 Federal Regulations

Specific Federal laws deal with the closure of the Hanford Site waste tanks. Certain laws apply across the board to program level activities (e.g., the *Clean Air Act of 1977* as amended and the *Resource Conservation and Recovery Act of 1976*), and will be applicable to all tanks. As such, these requirements are not discriminators in the tank selection process.

In accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA), environmental documentation shall be written for a proposed action to ensure that environmental values and alternative actions are fully considered before any decisions are made that might lead to adverse environmental impacts, or could limit the choice of reasonable alternatives to the proposed action.

There is existing NEPA documentation for the tank farms. These documents address interim storage of wastes generated during national defense activities and stored at the Hanford Site. Retrieval of waste from SSTs is considered a major new Federal action requiring additional NEPA documentation.

This requirement for NEPA documentation does not pose any restrictions on selection criteria for choosing the demonstration tank. The NEPA documentation will be required regardless of the tank chosen.

2.1.4 Washington State Regulations

In addition to the Federal requirement for NEPA, Washington State also requires evaluation of actions in accordance with the *State Environmental Policy Act of 1971* (SEPA). For the same reasons as stated above regarding NEPA, there are no tank selection criteria impacts related to compliance with this act.

As retrieval efforts progress, specific activities will have an impact on the permits required by the State for dangerous waste treatment, storage, and disposal activities, air emissions, and waste-water discharge permits. Permits/modifications will be required for specific activities regardless of the individual tank that is the focus of the retrieval activity.

State regulations that govern tank waste retrieval design and operation will apply to all SST retrieval activities, and therefore are not discriminators in the retrieval demonstration selection process. State regulations that govern ongoing waste storage operations do, however, provide some input to the selection. The *Washington Administrative Code* (WAC) 173-303-640(7) specifies that an owner or operator must take the following actions for a tank system from which there has been a leak or spill, or is unfit for use: (1) remove the tank from service, (2) remove the waste from the tank within 24 hours or at the earliest time practicable, (3) prevent further migration of the leak or spill, and (4) properly dispose of contaminated soil.

The following two implications can be made from this regulation (WAC 173-303-640[7]):

- SSTs containing large amounts of liquid that could potentially leak to the environment should be a high priority for waste retrieval. High-liquid volume tanks are considered a greater threat to the environment than tanks that are assumed leakers, that have been interim stabilized, or that do not contain significant quantities of liquid.

- Any water addition to any SST should cease if it would increase the environmental impact from a leak. Only two SSTs receive water additions, tanks C-105 and C-106. Neither of these tanks are assumed leakers (Hanlon 1992).

2.1.5 Proceed with Waste Disposal and Manage Tank Space Logistics

The TWRS waste disposal elements are vitrification of high-level and transuranic (TRU) waste, and grouting of low-level waste. Each of these processes requires a feed stream composition that meets specific process limits. There are also large cost drivers to minimize the volumes and maximize the radionuclide concentration of waste going to vitrification. To achieve these objectives, the Hanford Site tank waste will be pretreated. The pretreatment process available for the initial vitrification campaigns is in-tank sludge washing.

The in-tank sludge washing process occurs in the DST system. Tank space in the DST system must support on-going waste management operations, jet pumping of SST interstitial liquids as part of the stabilization process, pretreatment of waste for disposal, and include allowance for emergency transfers in the event of a DST leak. At this time, DST tank space is limited for addition of significant quantities of SST solids.

The SST chosen for retrieval demonstration must contain waste that requires only in-tank sludge washing pretreatment to support early disposal processing in the Hanford Waste Vitrification Plant, and prevent tie-up of waste storage space. In addition, selection of a SST containing a large volume of waste (along with any required dilution volumes needed to be added to retrieve or transport the waste to DST storage) could negatively impact available DST storage space.

2.2 RETRIEVAL TECHNOLOGY DEMONSTRATION REQUIREMENTS

A specific technology or technologies will be employed to retrieve the waste from the SST retrieval demonstration tank. However, the individual tank could have an impact on the perceived acceptability of fully meeting the Tri-Party Agreement milestone M-07-00 (Ecology et al. 1990). These impacts have been listed as criteria below.

- The selected SST should be a full-size tank [22.9-m-dia. (75-ft-dia.)] to adequately demonstrate retrieval technology.
- The SST should contain adequate waste volume to demonstrate
  - 95 percent waste removal
  - Operability, maintainability and reliability of retrieval and transfer system.
- The SST should contain adequate quantities of waste to demonstrate required sub-functions of the retrieval system (e.g., a tank containing minimal solids would not demonstrate sustained solids mobilization, removal, and transport). These sub-functions are:
  - Waste mobilization (re-suspension or dissolution)
  - Waste conveyance (bringing waste out of the tank)
  - Waste processing (readying waste for transport, e.g., dilution)
  - Confinement of waste (protection of environment)
  - Protection of tank (structural, thermal, and chemical)
  - Disposition of in-tank hardware (cut and move, or leave in place)
  - System control (graphical and supervisory control, fault detection)

- Characterization of waste (physical characterization [in-tank mapping] as well as chemical characterization)
- Tank access (use of existing or new risers)
- Transportation of waste (exterior to the tank)
- Control of tank environment (dust, aerosol, explosive gases, temperature)
- System deployment (within and adjacent to tank)
- Monitoring of process (parameter measurement).

The definition of adequate volume for demonstration of waste transfer is based on two criteria. (1) Adequate waste volume to support demonstration of the sub-functions of the retrieval system as identified previously in Section 2.2, and (2) the ability to achieve the criteria of retrieving 95 percent of the waste within the tank. The selected lower bound of 378,540 L (100,000 gal) would require waste retrieval to the 18,927-L (5,000-gal) residual level to achieve 95 percent waste retrieval. This residual equates to approximately 5 cm (2 in.) of waste remaining in the tank. Because retrieval of waste below this level would be difficult to achieve with existing retrieval technology, it should not be attempted for the first tank retrieval demonstration.

A maximum volume of waste within the demonstration tank can also be tentatively established. A tank containing more than 946,350 L (250,000 gal) would require more than one receipt DST (if the goal dilution ratio of 3:1 is exceeded), and would adversely impact available DST space.

2.3 TANK SELECTION CRITERIA SUMMARY

The primary criteria for selection of a tank for the M-07 retrieval demonstration have been listed below, based on the prior discussion. These four items are clear discriminators in the tank selection process.

- Watch-list tank (retrieval action should remediate a safety concern)
- A tank having a high potential for leaking large quantities of liquid
  - A tank containing a high liquid volume (i.e., not interim stabilized)
  - A tank that requires continued cooling water additions (a worst case scenario could be a continual liquid leakage driven by a maintained water supply)
- A full-size tank with at least 378,540 L (100,000 gal), but no more than 946,350 L (250,000 gal) of waste

- Waste requires simple pretreatment (in-tank sludge washing) prior to disposal to minimize impacts to DST storage space. This criteria is to be applied as a further discriminator to tanks meeting previous criteria (i.e., to watch list tanks or tanks having a high potential for leakage).

The tank which best satisfies these criteria should be selected for the M-07 retrieval demonstration.

Additional considerations which should be addressed in the selection process are discussed in Section 3.0, Tank Selection Considerations. These considerations will become important as a rating tool for demonstration tank selection if no single tank can be selected from the primary criteria.

3.0 TANK SELECTION CONSIDERATIONS

Various tank configurations and parameters will influence the waste retrieval operations. The parameters listed for each tank are as follows:

- Access (number, size, and distribution of risers)--The size and location of risers can also affect the design of retrieval equipment and the effectiveness of the equipment in removing waste. Some tanks have most of their risers located in two groups at the perimeter of the tank. Some have centrally located risers.

- In-tank hardware--The presence of hardware in the tank can affect retrieval operations by presenting obstacles for retrieval equipment, or by requiring extra effort and exposure for removal and disposal prior to retrieval operations.

- In-farm location--A tank located on the corner or edge of a tank farm may be more readily accessed when considering the set-up of the retrieval equipment adjacent to the tank. This may be particularly true during the first tank waste retrieval.

- Isolation/stabilization status--Isolation/stabilization activities result in the installation of blanks on pipelines or nozzles in valve pits and diversion boxes, in the installation of weather covers over pits, and in plugging risers, etc. Planning for retrieval of tank waste must take into account reversal of isolation activities before the waste can be retrieved.

- Unique contents--Some tanks have unique contents, including plastic bottles, cobalt pellets, portland cement, and diatomaceous earth. Two tanks contain waste that is exceptionally fluffy, complicating the filtration/ventilation problems encountered during equipment installation and removal. One tank contains several fuel elements. These tanks should be avoided for the retrieval demonstration.

- Higher probability for leak development--Based on considerations such as construction, age, history, and waste contained. Data based on watch list tanks and susceptibility to leakage failure may provide a discriminator useful for demonstrating tank selection. The following is a comparison of watch list and safety concern tanks, that compares the number of leakers to the total number of tanks of this type in each safety category.

Leakers	Total	Type	Percentage
9	11	High Heat	82
2	18	Hydrogen	11
2	8	Organic	25
13	24	Ferrocyanide	54

(Implies that high-heat waste may have a detrimental effect on tank integrity causing them to be more susceptible to leakage).

Because all transfer lines previously used to transfer waste within and from the SST farms do not comply with the environmental regulations (i.e., the lines are singly-contained), and because there are no ongoing efforts to upgrade any of these lines, new transfer lines will have to be constructed to route the waste from the demonstration tank to the receipt DST. One potential discrimination may be made between the various SST farms that would influence the selection of the retrieval demonstration tank. Based on the physical location of some farms versus others, transfer systems for the demonstration may be more extensive and complex. For example, selecting a 200 West Area tank farm would require a cross-site transfer line to a receipt DST in the 200 East Area, because the three DSTs in the 200 West Area are full or are being used for tank 241-SY-101 mitigation in 1997.

4.0 RETRIEVAL OPTIONS

4.1 OPTIONS

A number of system concepts have been identified for retrieval of SST wastes (Krieg 1990). These approaches span the range of hydraulic based systems (using low to high pressure jet nozzles), traditional mechanical mining approaches adapted for use in tanks, pumping technologies used as a method to mobilize waste, long-reach manipulator systems to deploy specialized retrieval tools (end effectors), and self-powered devices, such as crawlers, walkers, and other self-powered systems.

The reference approaches for retrieval of SST wastes identified in the TWRS retrieval technology workshop are past-practice sluicing and a long-reach manipulator system. Past practice sluicing used low pressure water jets to mobilize the solids and a slurry pump to remove the liquid/solid slurry similar to methods used in the 1950's and 1970's at Hanford. The long reach manipulator system deploys different retrieval tools, or end effectors, to mobilize the waste and a separate conveyance system to transport the waste to

the surface of the tank. Both systems use slurry pumping techniques to transfer the waste to the DST system. These systems are shown in Figures 2 and 3.

The two reference systems were selected to support the following strategy: (1) start SST retrieval with known technology (sluicing) on wastes amenable to this retrieval technique (soft sludge and saltcake) and (2) continue with development of the reference systems (sluicing and manipulator systems), and retrieval enhancements for wastes not retrievable by the past-practice sluicing technique. The enhancements would be implemented as they became available. Development of the alternate systems, e.g., mining techniques, would proceed based on program requirements and system feasibility. Therefore, compliance with the applicable regulations will be achieved at the earliest practicable time.

5.0 DISCUSSION

The M-07 retrieval demonstration tank must satisfy the criteria listed in Section 2. Table 1 provides the listing of watch-list tanks at the Hanford Site. Table 2 provides the list of full-size non-interim stabilized SSTs. Table 3 provides an evaluation of all full-size SSTs against the selection criteria.

The watch-list tanks are sub-divided into four categories; hydrogen emission, organic acetate, ferrocyanide, and high heat.

A review of each of the four watch list tank categories reveals the following:

- Five of the hydrogen emission tanks are DSTs. Retrieval of waste from these tanks will not demonstrate SST retrieval technology. The remainder of hydrogen tanks may require chemical pretreatment of the waste for disposal in grout or glass. As in-tank pretreatment processes may not be attractive for this waste, early retrieval could adversely impact DST storage space prior to availability of the new DST farm in December 1999, or creation of additional tank space as grout processes additional DST waste.

- The waste in organic acetate and ferrocyanide tanks also requires advanced chemical pretreatment prior to disposal in grout or glass. Retrieval of waste from these tanks would also adversely impact DST storage space.

- Available core sample data indicate that the high-heat tanks (C-105 and C-106) waste requires only minimal pretreatment (sludge washing) prior to disposal via grout and the HWVP. Further sampling and analyses and flowsheet review will be required to verify the amount of pretreatment needed. Additional chemical pretreatment may further reduce the number of glass canisters produced from this

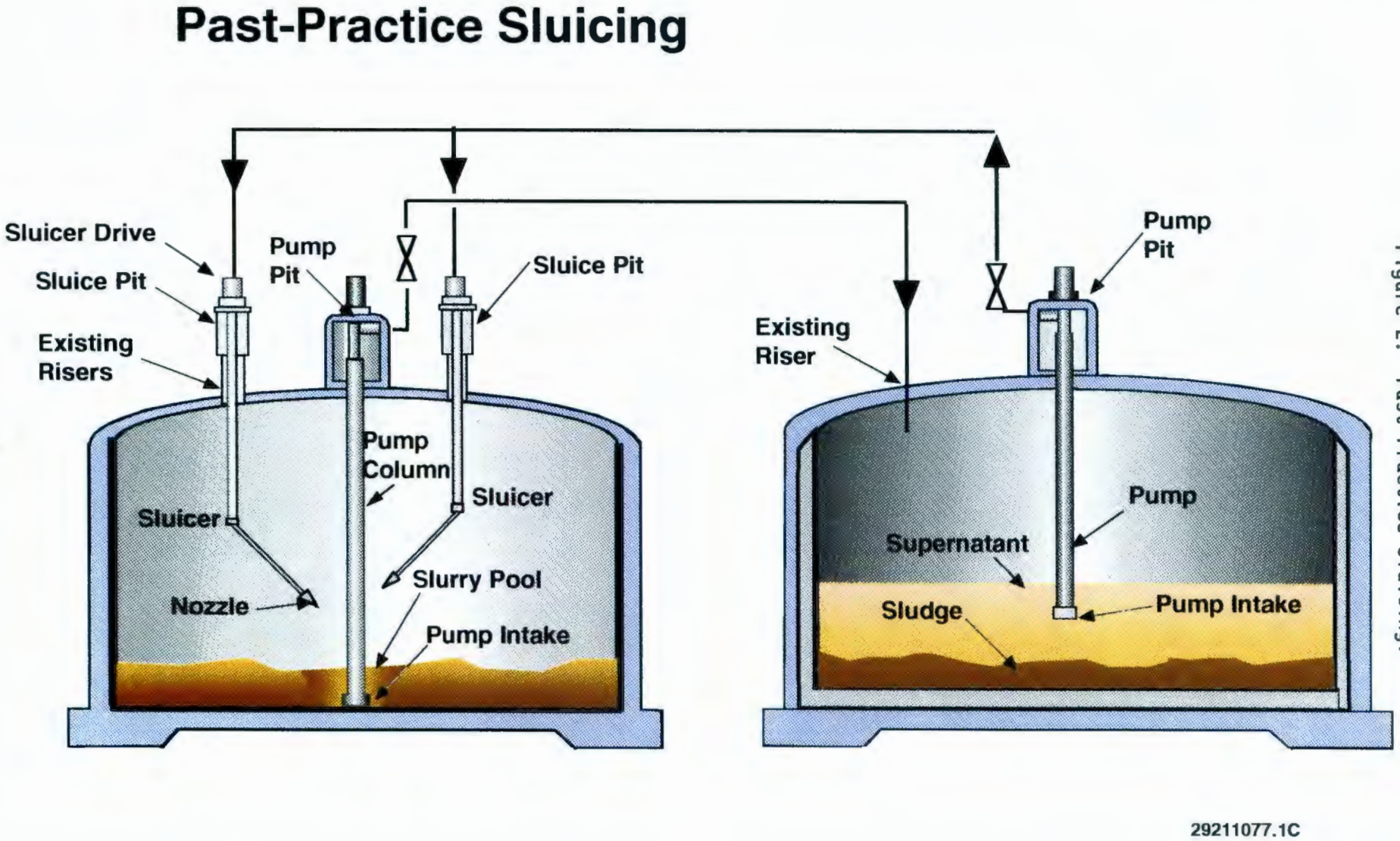


Figure 2. Past-Practice Sluicing.

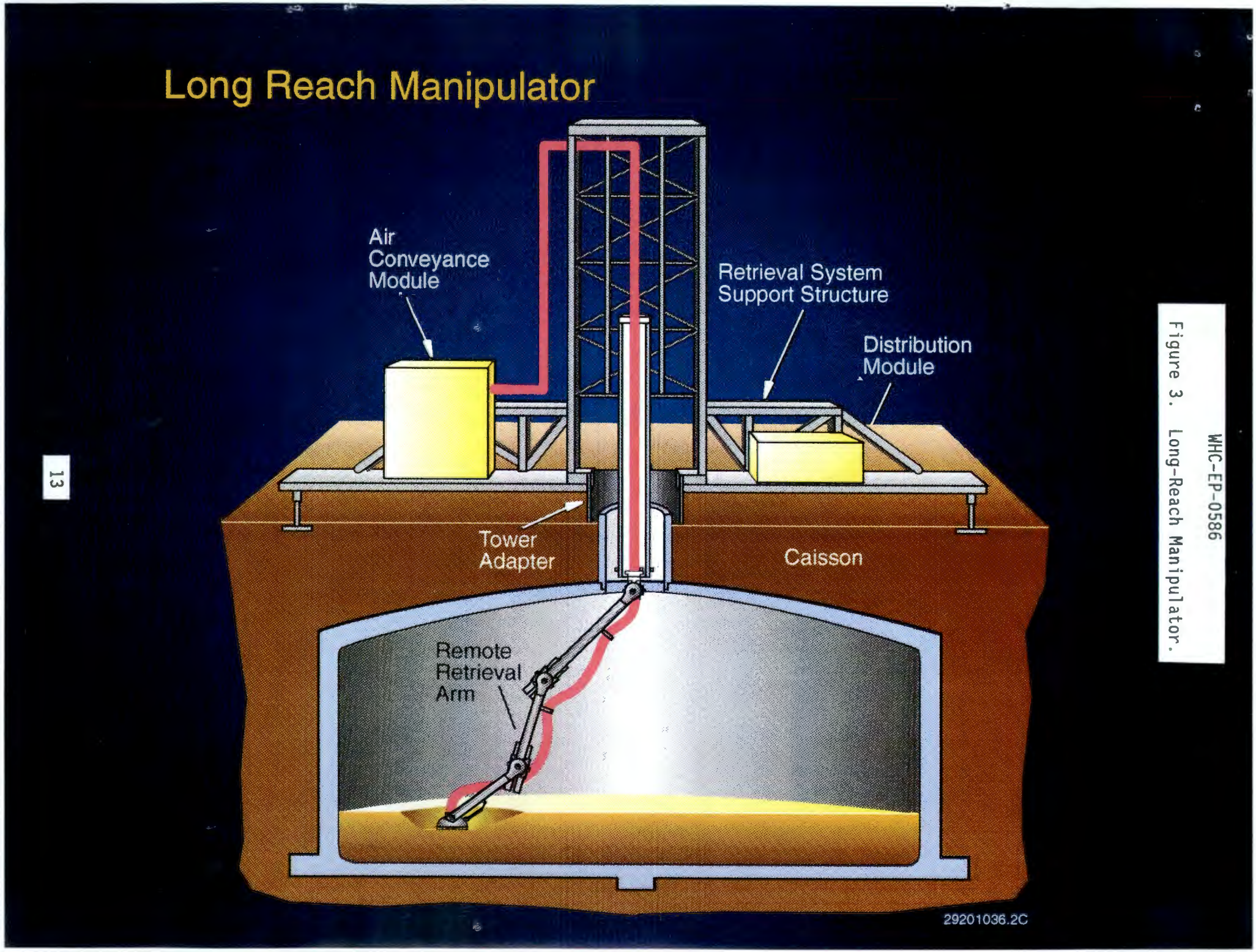


Figure 3. Long-Reach Manipulator.

Table 2. Non-Interim Stabilized Tanks.

Full-size single-shell tanks 22.9-m-dia. (75-ft-dia.) that are not interim stabilized:			
A-101	C-105	S-110	T-107
AX-101	C-106	S-111	T-110
BX-106	C-107	S-112	T-111
BX-111	C-110	SX-101	U-102
BY-102	S-101	SX-102	U-103
BY-103	S-102	SX-103	U-105
BY-105	S-103	SX-104	U-106
BY-106	S-106	SX-105	U-107
BY-109	S-107	SX-106	U-108
C-102	S-108	T-101	U-109
C-103	S-109	T-104	U-111

Table 3. Comparison of Single-Shell Tanks to Selection Criteria. (4 sheets)

Single-shell tank	Watch list tank	Potential for leakage	100K < Waste volume < 250K	Simple pretreatment
(Only full-size tanks listed)	H = Hydrogen O = Organic F = FeCN Ht= High heat	High liquid content or requires water additions		(Only listed for watch list tanks due to limited core sample information)
A-101	H	X		
A-102				
A-103				
A-104				
A-105				
A-106			X	
AX-101	H	X		
AX-102				
AX-103	H		X	
AX-104				
B-101			X	
B-102				
B-103	O			
B-104				
B-105				
B-106			X	
B-107			X	
B-108				
B-109			X	
B-110			X	
B-111			X	
B-112				
BX-101				
BX-102	F			
BX-103				
BX-104			X	
BX-105				
BX-106	F	X		
BX-107				
BX-108				
BX-109			X	
BX-110	F		X	
BX-111	F	X	X	
BX-112			X	
BY-101	F			
BY-102		X		

Table 3. Comparison of Single-Shell Tanks to Selection Criteria. (4 sheets)

Single-shell tank	Watch list tank	Potential for leakage	100K < Waste volume < 250K	Simple pretreatment
(Only full-size tanks listed)	H = Hydrogen O = Organic F = FeCN Ht= High heat	High liquid content or requires water additions		(Only listed for watch list tanks due to limited core sample information)
BY-103	F	X		
BY-104	F			
BY-105	F	X		
BY-106	F	X		
BY-107	F			
BY-108	F		X	
BY-109		X		
BY-110	F			
BY-111	F			
BY-112	F			
C-101				
C-102		X		
C-103	O	X	X	
C-104				
C-105		X	X	
C-106	Ht	X	X	X
C-107		X		
C-108	F			
C-109	F			
C-110		X	X	
C-111	F			
C-112	F		X	
S-101		X		
S-102	H,O	X		
S-103		X	X	
S-104				
S-105				
S-106		X		
S-107		X		
S-108		X		
S-109		X		
S-110		X		
S-111	H	X		
S-112	H	X		
SX-101	H	X		
SX-102	H	X		

Table 3. Comparison of Single-Shell Tanks to Selection Criteria. (4 sheets)

Single-shell tank	Watch list tank	Potential for leakage	100K < Waste volume < 250K	Simple pretreatment
(Only full-size tanks listed)	H = Hydrogen O = Organic F = FeCN Ht= High heat	High liquid content or requires water additions		(Only listed for watch list tanks due to limited core sample information)
SX-103	H	X		
SX-104	H	X		
SX-105	H	X		
SX-106	H,O	X		
SX-107			X	
SX-108			X	
SX-109	H		X	
SX-110				
SX-111			X	
SX-112				
SX-113				
SX-114			X	
SX-115				
T-101	F	X	X	
T-102				
T-103				
T-104		X		
T-105			X	
T-106				
T-107	F	X	X	
T-108				
T-109				
T-110	H	X		
T-111		X		
T-112				
TX-101				
TX-102			X	
TX-103			X	
TX-104				
TX-105	O			
TX-106				
TX-107				
TX-108			X	
TX-109				
TX-110				
TX-111				

Table 3. Comparison of Single-Shell Tanks to Selection Criteria. (4 sheets)

Single-shell tank	Watch list tank	Potential for leakage	100K < Waste volume < 250K	Simple pretreatment
(Only full-size tanks listed)	H = Hydrogen O = Organic F = FeCN Ht= High heat	High liquid content or requires water additions		(Only listed for watch list tanks due to limited core sample information)
TX-112				
TX-113				
TX-114				
TX-115				
TX-116				
TX-117				
TX-118	F			
TY-101	F		X	
TY-102				
TY-103	F		X	
TY-104	F			
TY-105			X	
TY-106				
U-101				
U-102		X		
U-103	H	X		
U-104			X	
U-105	H	X		
U-106	O	X	X	
U-107	O	X		
U-108	H	X		
U-109	H	X		
U-110			X	
U-111		X		
U-112				

waste by the vitrification facility, however, sludge washing should produce a material with a composition acceptable for vitrification. Additional core sampling of tank C-106 is scheduled for early FY 1993, which will provide further information on tank contents and required pretreatment methods. The suitability of the high-heat tank waste for in-tank sludge washing pretreatment (as compared to other watch list tanks) will minimize the impact on available DST storage space. This is particularly critical if waste retrieval operations are to start by October 1997.

Current waste composition data on assumed leaking SSTs indicates that advanced chemical pretreatment operations would be required prior to vitrification of the waste.

6.0 RECOMMENDATIONS

In Table 3, the comparison of all full-size SSTs to the selection criteria indicates that 6 SSTs meet the criteria that the demonstration tank be: (1) on the watch list, (2) have an adequate waste volume to demonstrate retrieval technology, and (3) have a high potential for liquid leakage. These tanks are: BX-111, C-103, C-106, T-101, T-107, and U-106. Of these tanks, only C-106 meets the final selection criteria that the selected tank should only require minimal pretreatment (in-tank sludge washing) prior to disposal via grout and the HWVP to minimize the impact on available DST storage space.

Based on the needs and criteria detailed above, WHC recommends that tank 241-C-106 (C-106) be selected as the M-07 demonstration tank.

- Retrieval of waste from tank C-106 would close a safety issue involving one of the tanks specified in Public Law 101-510 Section 3137 (Wyden Amendment). Tank C-106 was identified by the DOE as a safety tank.

- Tank C-106 is a full-size 22.9-m-dia. (75-ft-dia.) SST containing sufficient volume of liquid and solid wastes to demonstrate the 95 percent waste removal criteria, the operability, maintainability, and reliability of the retrieval and transfer systems, and demonstrates the required retrieval sub-functions.

- The closer physical proximity of tank C-106 to the receipt DST farm as compared to the other finalist tanks makes the construction and use of the demonstration system less complex. The complexity of the demonstration system should be minimized to increase the reliability of the system and provide operational data to support enhancement development for more complicated retrieval systems for use in subsequent retrieval operations.

WHC also recommends that, because of the nature of the waste in tank C-106, and in keeping with the TWRS retrieval strategy, the waste in tank C-106 should be retrieved using the past-practice sluicing technique to remove the soft sludge containing the majority of the high-heat generating

radionuclides (primarily ^{90}Sr). If 95 percent of the waste is removed in this fashion, then the demonstration of retrieval technology will have been satisfactorily completed (the M-07-00 milestone is accomplished upon initiation of the retrieval operation). If the 95 percent criteria cannot be met by sluicing, then the sluicing may be followed by use of long reach manipulator systems, or other suitable SST retrieval systems developed and available to remove the harder sludge lying on the tank bottom.

7.0 REFERENCES

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