LOW-ACTIVITY WASTE PRETREATMENT SYSTEM
ADDENDUM C
PROCESS INFORMATION

CHANGE CONTROL LOG

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The **"Modification Number"** represents Ecology's method for tracking the different versions of the permit. The log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number

This page intentionally left blank.

ADDENDUM C
PROCESS INFORMATION

This page intentionally left blank.

ADDENDUM C
PROCESS INFORMATION

TABLE OF CONTENTS

FIGURES

TABLES

C. PROCESS INFORMATION

The Low-Activity Waste Pretreatment System (LAWPS) project encompasses two phases to provide the necessary throughput to support full operation of the Waste Treatment and Immobilization Plant (WTP) Low-Activity Waste (LAW) Facility. Phase One of the project will employ use of a single Tank Side Cesium Removal (TSCR) unit that will operate for approximately 5 years. Phase Two will follow at a later date and either use a permanent cesium removal capability or additional TSCR unit(s) to support sustained, long term WTP LAW operations.

This addendum provides a detailed discussion of the LAWPS Operating Unit Group (OUG). The addendum provides technical details to describe the design and construction of the TSCR system processes and equipment. The TSCR comprises a low activity liquid mixed-waste tank storage and treatment system located in the 200 East Area of the Hanford site. The LAWPS OUG also includes two storage areas for Spent Ion Exchange Columns (IXC) that are generated during the treatment process. All LAWPS facilities are located immediately adjacent to the southeast corner of the 241-AP Tank Farm. The layout of the TSCR process area is shown on a simplified site plan in Figure C-1.

The supernatant waste treated in TSCR consists of aqueous phase liquids transferred from the 241-AP Tank Farm for treatment prior to transfer to the WTP LAW facility for vitrification. The TSCR waste processing is controlled in a Control Enclosure located immediately south of the TSCR Process Enclosure, which is staffed continuously during processing operations. Section C.2.8 describes the Monitoring and Control System (MCS) that is located within the Control Enclosure. The MCS controls and monitors the performance of TSCR process operations. When TSCR processing operations are not occurring, the Control Enclosure is not required to be staffed continuously.

C.1 Tank Side Cesium Removal Process Description

The TSCR process flow diagram is provided in Figure C-2. Tank waste supernatant is transferred from Double-Shell Tank (DST) 241-AP-107 to the Process Enclosure where an approximately 5-gallon per minute feed portion is diverted through the TSCR process system via a flow control valve. The feed stream is then filtered through a dead-end filter before passing though IXC for cesium removal. Following cesium removal, the stream passes through a media trap designed to capture IX media in the unlikely event of an upstream screen failure in one of the IXC. The treated waste then proceeds through a delay tank, which is sized to provide adequate holdup allowing the metastable barium (^{137}Ba-m) to decay so that gamma measurements can be made to ensure processing goals for cesium removal have been reached. After exiting the delay tank, the treated waste is then passed through two in-line gamma monitors to verify cesium removal before being routed to DST 241-AP-106 for storage and subsequent transfer to the WTP LAW facility for vitrification. Should the gamma monitors detect elevated cesium levels, the stream is diverted to DST 241-AP-108 as off-specification and processing is discontinued. The balance of the feed stream not processed through TSCR is continuously recycled back to DST 241-AP-107

The following is a summary of the LAWPS component operations contained in this section.

- **241-AP-107 Waste Feed and Recirculation Return** (Section C.2): Feed is transferred from DST 241-AP-107 through a hose-in-hose transfer line (HIHTL) to the TSCR Process Enclosure. A separate HIHTL from the Process Enclosure returns the unused portion of the feed stream back to DST 241-AP-107.
- **Filtration** (Section C.2.1): Initial treatment of the feed stream occurs by dead end filtration. Filtration removes solids as a means to protect the downstream IXC media bed from becoming fouled. Two filters are used, with one being off-line. The on-line filter is taken out of service for back-pulsing with air as determined by differential pressure. The back-pulsed process waste stream is sent to DST 241-AP-108 via HIHTL. During back-pulsing, the offline filter assumes

the online function. When back-pulsing and/or caustic washing are no longer effective, each filter can be replaced.

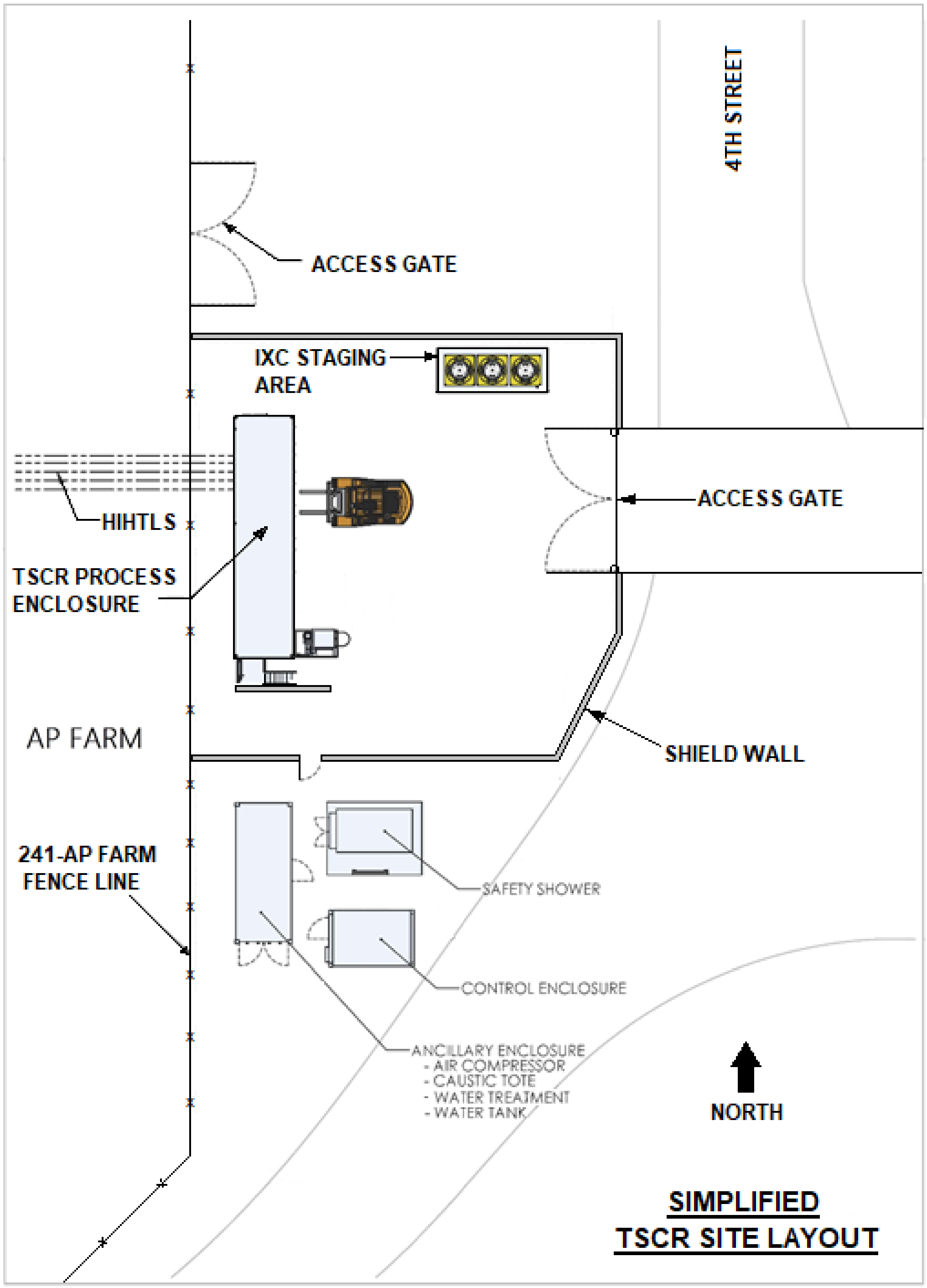


Figure C-1 Tank Side Cesium Removal Process Area Site Plan

- **Ion Exchange** (Section C.2.2): The filtered feed is passed through three IXC (lead, lag, and polish positions). The lead and lag columns remove the bulk of the cesium by adsorbing it onto crystalline silicotitanate (CST) IX media designed to selectively remove cesium from high pH and sodium solutions. High pH of the waste is the result of carbon steel corrosion protection requirements in the DST system. Cesium removal continues until it is determined that the IX media becomes saturated to a point that cesium removal efficiency declines and cesium concentration passing through the columns rises above a pre-determined limit. The process will then be shut down, and the lead and lag IXC will be removed from service and replaced with fresh columns. The polish column then becomes lead for the next loading cycle.
- **Gamma Monitoring and Treated LAW Transfer** (Section C.2.3): After exiting the lag/polish columns, the waste is routed through a media trap. This feature prevents escape of IX media from the columns in the unlikely event of IXC screen failure. Loss of media downstream would potentially render treated waste off specification for cesium. After passing through the media trap, the waste is then routed through a Delay Tank. The Delay Tank includes a baffled chamber and is sized to provide sufficient retention time to allowing the metastable barium (^{137}Ba-m) to decay so that accurate gamma measurements can be made to ensure processing goals for cesium removal have been reached. Gamma monitoring is performed just downstream of the delay tank outlet. The treated supernatant is then transferred via HIHTL to DST 241-AP-106 for accumulation and subsequent transfer to the WTP LAW facility for vitrification.
- **IXC Change-Out** (Section C.2.4.): Following system shutdown, IXC change out is initiated by displacing remaining LAW in all process components with dilute sodium hydroxide (NaOH), which is followed by a water flush. This serves to de-inventory the TSCR Process Enclosure establishing conditions necessary for personnel entry. Caustic and water flush solutions are returned to DST 241-AP-108 via a HIHTL. After waste displacement and flushing; the columns are bulk dewatered using compressed air. This effluent is also returned to DST 241-AP-108. The columns are then dried for between 1 and 4 days using compressed air, which is vented to DST 241-AP-108.
- **Reagent, Water, and Service Air** (Section C.2.5): The reagents necessary to support TSCR operations are dilute NaOH and process water. NaOH is supplied by a tote and process water is made up in the Ancillary Enclosure from potable water delivered by truck. Both are introduced into the TSCR Process Enclosure via pumps. A compressor is used to supply service air for remote valve actuation, filter back-pulse, sweep air, bulk water displacement from the columns, and column drying. All three systems are located south of the Process Enclosure in the Ancillary Enclosure. The NaOH and process water systems are protected with a misroute prevention system that ensures neither system can become cross contaminated by process waste systems.
- **Spent IXC Transfer and Storage** (Section C.2.6): Once air dried, the columns are disconnected and removed from the Process Enclosure with a forklift. During normal operations, the columns are transported directly to the IXC storage pad where they are affixed to a mounting plate on the pad. The mounting plate ensures the columns remain upright in a seismic event. Should a column become externally radiologically contaminated during process operations and require decontamination, or other corrective actions, it can be temporarily placed in the IXC staging area. The IXC staging area can hold three columns that are placed directly on the balance of facility pad. Because this is a temporary location, no mounting bracket is used. Once decontaminated, or other corrective actions completed, a column or columns are removed from the IXC staging area and transferred to the IXC storage pad via a dedicated concrete travel path.
- **Process and Enclosure Ventilation** (Section C.2.7): The TSCR Process Enclosure includes a process ventilation system and a process drain system. Both discharge to DST 241-AP-108 via separate dedicated HIHTLs. The process ventilation system remains closed during operations and is only opened during column change-out after LAW displacement and flushing are

completed. The TSCR Process Enclosure also is equipped with a separate ventilation system that only provides ventilation within the process area during manned entries into the enclosure. This ventilation system is not operated during waste processing. Heating and cooling is provided for process temperature control, and for manned entries into the enclosure.

- **Process Control and Monitoring** (Section C.2.8): The Control Enclosure provides process controls through a MCS for TSCR and is manned at all times during waste processing. The Control Enclosure is located immediately south of the Process Enclosure and is connected to the tank farms Central Control room. This allows the Control Enclosure to receive leak detection signals from the 241-AP Farm allowing process shutdown upon indication of a leak within the farm connections to the TSCR Process Enclosure.

C.2 241-AP-107 Waste Feed and Recirculation Return

The TSCR Process Enclosure receives qualified feed from DST 241-AP-107. Feed qualification and waste acceptance are discussed in detail in Addendum B, "Waste Analysis Plan." Supernatant will be transferred to the Process Enclosure through a dedicated HIHTL at a flow rate of approximately 70 gallons per minute. Of the 70 gallon per minute feed stream, approximately 5-gallons per minute portion is diverted into the TSCR process system via a flow control valve with the remainder returned to DST 241-AP-107 via a dedicated return HIHTL. The feed stream is then filtered through a dead-end filter before passing though the IXC for cesium removal.

The HIHTL feed and return lines represent one of the three process interfaces between the TSCR Process Enclosure and the 241-AP Tank Farm. The other two being the vent and drain HIHTLs between the Process Enclosure and DST 241-AP-108, and the treated LAW transfer HIHTL between the Process Enclosure and DST 241-AP-106. HIHTL layouts between TSCR and the 241-AP Tank Farm are shown on Figure C-6.

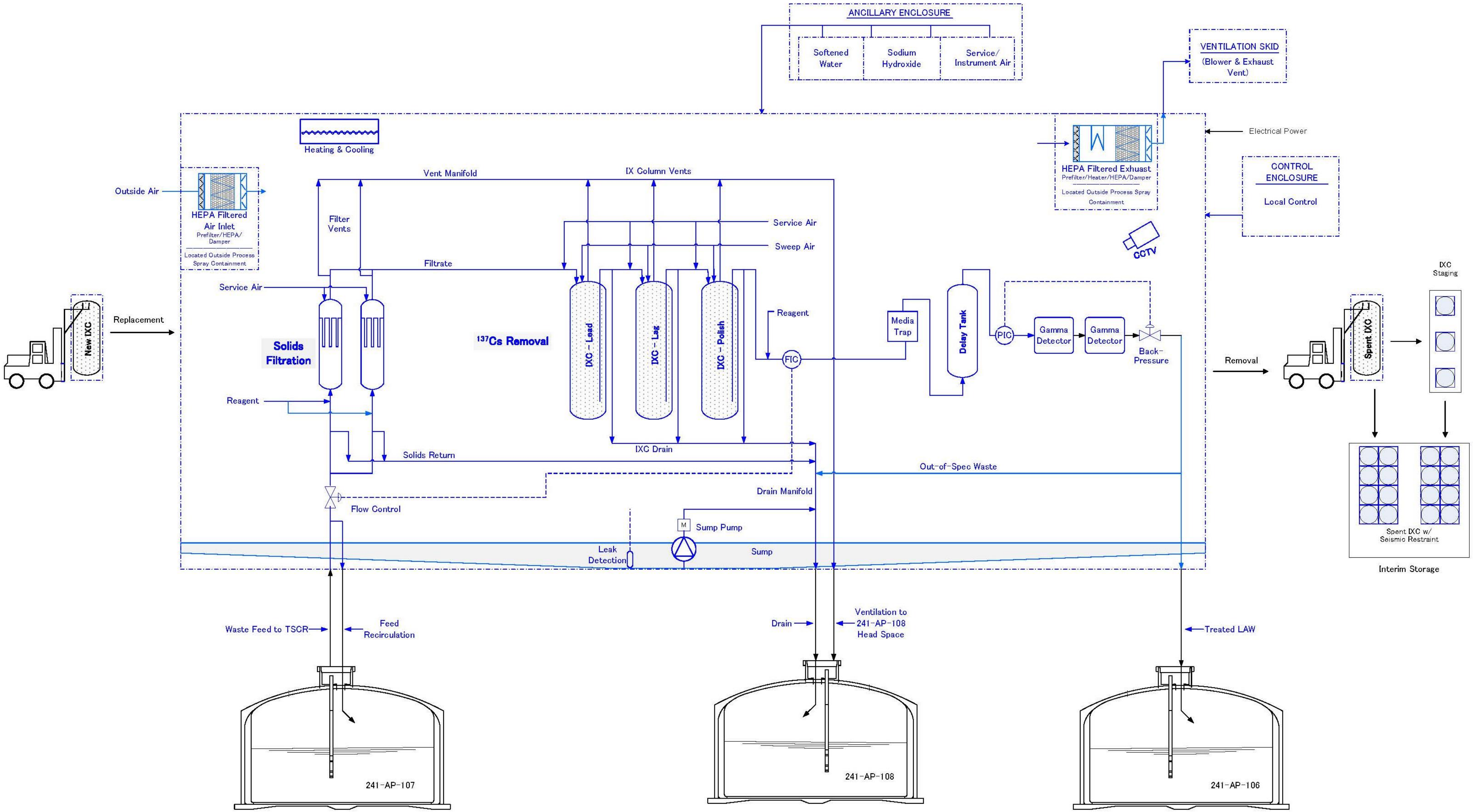
C.2.1 Filtration

Two filters are used, with one being in service and the other off-line. The on-line filter is taken out of service for back-pulsing with air approximately once per day, or if it reaches a high differential pressure beforehand. During back-pulsing, the off-line filter assumes the online function. When filter recovery is diminished as indicated by a more frequent high differential pressure readings over repeated backwash cycles, each filter can undergo a caustic wash or be replaced. The filters operate in up-flow with feed entering at the bottom and flowing up through the filter elements where solids are retained. Filtrate continues up through the filter element core into the top head where it exits out the filtrate nozzle and proceeds to the lead IXC.

The MCS automatically and remotely aligns valves to bring the second filter online. Two filters are now operating in parallel for a short period while valves are then aligned to remove the first filter from service. The drain outlet valve is opened on the filter to be back-pulsed, which allows a small amount of liquid to drain from the filter. Most of the liquid is retained, particularly within the filter element interior core up through the top head because retained solids create a thin cake on the outside of the filters that inhibits liquid drainage. Then the air receiver outlet isolation valve is opened, discharging 20 gallons of air at 60-80 pounds per square inch gauge (psig) into the filter top head.

Expansion of air from the receiver forces liquid out of the top head, down through the filter elements and out the bottom head of the Filter. Air, filtrate, and solids dislodged from the outside of the filter elements exit through the backwash outlet. Air, liquid, and backwash solids will continue into the drain manifold and are discharged through the HIHTL to DST 241-AP-108. The air receiver air capacity is sufficient to empty the contents of the filter and the HIHTL routed to DST 241-AP-108. After a backwash, the filter is virtually emptied of liquid.

Note: If desired, a second backwash can be performed by filling the Filter with 0.1 M NaOH and repeating the actions from above. Figure C-3 depicts a filter assembly.



1 **Figure C-2 Tank Side Cesium Removal Process Flow Diagram**

This page intentionally left blank.

Figure C-3 Filter Assembly

It is estimated a filter will require replacement after approximately 400 backwash cycles or about 19 months of continuous operation. Each filter includes a shield assembly to facilitate filter replacement with minimal dose to workers. An outline of the replacement sequence is as follows:

Backwash – Backwash the filter (as previously described) and leave it completely empty of liquids.

Vent – The filter vent is opened eliminating pressure on the housing.

Filter Disconnect – Disconnect the CHEMJOINT on the Filtrate nozzle of the selected filter. Install a "dust plug" into the filtrate hose to seal it and prevent leakage. Install a "dust cap" on the filtrate nozzle to seal it in preparation for disposal. Disconnect CHEMJOINT on the inlet/drain nozzle of the selected filter. Install a "dust plug" into the inlet/drain hose to seal it and prevent leakage. Install a "dust cap" on the Inlet/drain nozzle to seal it in preparation for removal.

Close the filter vent valve. Disconnect CHEMJOINT on the vent nozzle of the selected filter and install a "dust plug" into the vent hose to seal it and prevent leakage. Install a "dust cap" on the vent nozzle to seal it in preparation for removal.

Filter Removal and Installation – The bay containing the filter to be removed is located on the inside of the enclosure, which requires the outer enclosure access panel to be removed. The filter is then removed using a provided lifting yoke attached to a forklift. A new filter is then installed into the Process Enclosure followed by making inlet and outlet connections. After being filled, vented, and leak tested, the new filter will be ready for use.

C.2.2 Ion Exchange

The IXC remove ^{137}Cs from filtered waste using non-elutable CST IX media housed within three columns. The filtered feed is passed through three IXC (lead, lag, and polish positions). The lead and lag columns remove the bulk of the cesium by adsorbing it onto the CST IX media designed to selectively remove cesium from high pH and sodium waste. Cesium removal continues until it is determined that the IXC becomes saturated to a point that cesium removal efficiency declines and cesium concentration rises above a pre-determined limit. The process will then be shut down, and the lead and lag IXC will be removed from service and replaced with fresh columns. The polish column then becomes lead for the next loading cycle.

The IXC lead/lag/polish cesium loading cycle is expected to take approximately 30 days depending on the LAW feed characteristics and degree of media exhaustion in the lead (formerly polish position) IXC when the loading cycle commences. IXC change-out will require approximately one week of downtime; of which, four days will be used for drying the spent IXC. However, should an increase in operational efficiency be required to meet processing goals, drying can be completed in one day reducing the downtime associated with column change-out.

When the treated effluent approaches the treated waste set-point, the lead and lag IXC are deemed exhausted/ loaded and are removed from service. Primary steps associated with IXC replacement are:

- Displacement of LAW with 0.1 M NaOH.
- Water rinsing of lead and lag columns to remove NaOH.
- Bulk dewatering with compressed air.
- Drying of lead and lag columns.
- Removal of lead and lag columns from system.

Between the above steps and during shut-down periods, sweep-air will continuously flow into the headspace of each IXC and out through the vent line to remove hydrogen gas.

C.2.3 Gamma Monitoring and Treated Low-Activity Waste Transfer

After exiting the polish column, the waste is routed through a media trap. This feature prevents escape of IX media from the columns in the unlikely event of IXC retention screen failure. Loss of media downstream would potentially render treated waste off specification for cesium. After passing through the media trap, the waste is then routed through a Delay Tank. The Delay Tank includes a baffled chamber and is sized to provide adequate holdup time allowing the metastable barium (^{137}Ba-m) to decay so that gamma measurements can be made to ensure processing goals for cesium removal have been reached.

TSCR is equipped with gamma monitoring instrumentation to ensure treated waste being transferred to the downstream DST 241-AP-106 meets the WTP LAW acceptance criteria for cesium. There are two gamma monitors in series designed and shielded to enable detection down to less than 1.8E- 05 Ci/L, which is approximately ten times below the WTP LAW acceptance criteria for cesium. The gamma monitors are capable of measuring over a 6-decade range and the in-series configuration improves measurement reliability.

Treated LAW leaving the polish column will have the lowest cesium concentration at the beginning of a loading cycle and then trend up as loading continues. When the treated LAW approaches the gamma high set-point, operators will initiate a system shutdown. The set-point is variable based on the feed tank sodium concentration. Set-points for each campaign will be recorded and entered into the LAWPS OUG operating record. If the gamma high-high set-point is reached, the TSCR system will automatically shut down and divert the waste to DST 241-AP-108. Using knowledge of CST performance data, operations personnel will be able to forecast the approximate time of lead/lag IXC exhaustion and have fresh IXC ready to install in the lag and polish positions (previous polish position becomes the lead position). All treated supernatant with acceptable gamma levels is automatically transferred to DST 241-AP-106 via the system pressure provided by the 241-AP-107 feed pump.

C.2.4 Ion Exchange Columns Change-Out

The following steps are performed to remove waste inventory, place Process Enclosure in a safe standby, and remove spent columns.

Waste Displacement – After operations are stopped, 0.1 M NaOH is pumped through the same path that waste had previously been flowing to displace waste in the filter and IXC. The displacement solution (waste and 0.1 M NaOH) will exit from the delay tank into the drain manifold and discharge to DST 241-AP-108.

Lead/Lag Column Rinse – Sweep airflow is isolated from the lead and lag IXC. The two columns are rinsed with softened water that is discharged to DST 241-AP-108 via the drain manifold and drain HIHTL.

Column Blowdown/Sweep-Air – The lead and lag columns are bulk dewatered with service air to the drain manifold. Sweep-Air flow is then initiated through the lag IXC vent.

Air Drying of Lead/Lag IXC – Sweep Air flow is isolated from the lead and lag IXC and drying Air (service air) is started at > 30 standard cubic feet per minute (SCFM) per IXC, or > 60 SCFM total. Drying air will continuously flow through each ion exchange column for approximately four days. As noted previously, drying can be accomplished in one day should operational needs require.

After drying, drying air is secured, IXC vents are opened, sweep-air flow is established, and IXC drain outlets are closed (the path drying air flowed to drain manifold is closed). The above steps are completed immediately after drying to establish sweep-air. During this process, the polish IXC remains in standby with sweep-air continuously flowing through the headspace and into the vent line.

Disconnect IXC and Establish Ventilation-Flow – The following steps are completed to disconnect the IXC from the piping rack and establish confinement ventilation flow.

A radiological survey is completed to identify any changes in dose rates that may have taken place during IXC drying. After verifying the vent manifold pressure is below atmospheric, the IXC selected for removal is isolated from sweep-air. The CHEMJOINT on the outlet nozzle of the IXC is disconnected and a “dust plug” is installed into the outlet hose to prevent leakage. Then a “dust plug” is installed on the IXC outlet nozzle in preparation for removal and storage. This same process is repeated on the IXC inlet hose and nozzle.

The next step involves installing a vent intake assembly on the selected column that includes a filter on the inlet nozzle of the selected IXC. Then the CHEMJOINT on the vent nozzle is disconnected with a “dust plug” inserted into the hose to prevent contamination spread. A vent exhaust assembly that includes a filter is then installed on the vent nozzle. The difference in vent height, air moisture content, and temperature between the intake and outlet filters will cause sufficient convective air flow through the IXC headspace to maintain the H_2 concentration below the Lower Flammability Limit (LFL). The last step is to disconnect the CHEMJOINT on the sweep-air nozzle, install a “dust plug” into the sweep-air hose, and install a cap on the IXC sweep-air nozzle to seal it. The IXC is now ready to be removed from the Process Enclosure.

Move IXC from Process Enclosure to Storage Pad or Staging Area – The following steps are completed to remove an IXC from the Process Enclosure for relocation to either the IXC staging area or IXC storage pad.

Radiological surveys are completed to ensure surfaces are sufficiently clean to allow outdoor IXC storage. If contamination above radiological limits is identified, then decontaminate the IXC and/or wrap it in an approved material to allow movement of the column to the IXC staging area for decontamination.

Next, the Process Enclosure exterior panel and seismic brace are removed and stowed in preparation for IXC removal. If contamination above radiological limits is identified, then decontaminate the IXC and/or wrap it in an approved material to allow movement to the IXC staging area where additional decontamination can be performed.

Using a forklift fitted with the IXC lifting yoke, the IXC is removed from the Process Enclosure as depicted in Figure C-4, and transferred directly to the nearby IXC storage pad where it is secured to a mounting plate.

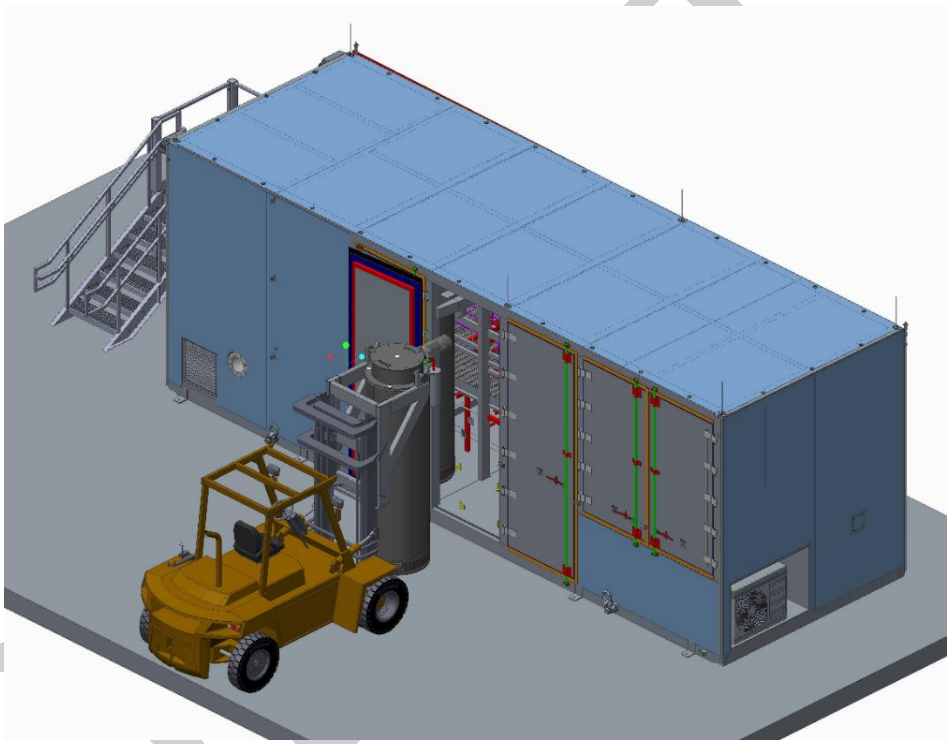


Figure C-4 Ion Exchange Columns Removal

Following IXC removal, the forklift installs a fresh column in the empty position. Then the seismic brace and exterior panels are installed and the drain valve is opened. Hose connections for the inlet, outlet, vent and sweep-air from the valve rack to the IXC are then completed. Then the new IXC is filled with either dilute NaOH or process water, vented, and leak tested. If the leak test is passed, the new IXC is ready for use.

This process is the same for lead, lag, or polish column replacement. New IXC are installed in reverse order of the connection sequence discussed above. Once the new columns are in place and all connections are made, they are charged with process water and leak tested prior to resumption of waste processing.

C.2.5 Reagent, Water, and Service Air

The reagents necessary to support TSCR operations are dilute NaOH and process water. NaOH is supplied by a tote or drum and will be replenished by delivery. Process water is made up in the Ancillary Enclosure from potable water delivered by truck. Both are introduced into the TSCR Process Enclosure via pumps. Prior to use, potable water is treated by a softener system. A compressor is used to supply service air for remote valve actuation, filter back-pulse, bulk water displacement from the columns, and IX media drying as part of change-out. All three systems are located south of the Process Enclosure in the Ancillary Enclosure. The NaOH, service air, and process water systems are protected with a misroute prevention system that ensures neither system can become cross contaminated by process waste systems.

C.2.6 Spent Ion Exchange Columns Transfer and Storage

Under normal conditions, the forklift fitted with the IXC lifting yoke transfers a spent IXC from the Process Enclosure via a concrete travel path directly to the adjacent IXC storage pad where it is secured to a mounting plate. The IXC storage pad is sized to store 150 columns, which accommodates the expected generation rate of two columns per month for the projected five-year duration of TSCR (LAWPS Phase 1) operations with some added contingency space. Upon arrival on the storage pad, the IXC are affixed in place to a mounting plate that is secured to concrete slab embed plates. The IX storage pad is fenced and locked except when transporting a column into place for storage. Refer to Figure C-5 for the IXC storage pad layout.

If contamination above radiological limits is identified during preparations for removal of a spent IXC from the Process Enclosure, the IXC can be wrapped and transferred to the IXC staging area where additional decontamination can be performed. The IXC staging area provides temporary storage and any spent IXC placed in this location will be moved to the IXC storage pad once any necessary corrective measures have been completed. The IXC staging area can accommodate three columns and is located within the Process Enclosure fenced area. Reference Figures C-1 and C-5 for the storage area layouts. Additional information regarding both container storage areas is provided in Section C.5.

C.2.7 Process and Enclosure Ventilation

There are two independent ventilation systems supporting TSCR operations; the Process Ventilation system, and the Process Enclosure ventilation system. Both are discussed separately in the following.

The Process Ventilation system consists of a vent collection header that connects the filters, IXC, and delay tank. The vent header is routed through valves out of the Process Enclosure to the headspace of DST 241-AP-108 via a dedicated HIHTL. The Process Ventilation system remains closed at all times while waste processing occurs and only opens upon process shutdown to support column or filter change-out (bulk dewatering and IX media drying) and equipment maintenance. Sweep-Air is used to maintain a flow from the process components to the DST headspace. In addition, the slight negative pressure is maintained by an eductor located upstream of the HIHTL connection. The eductor uses compressed air controlled by a manual flow control valve as the motive force and the vent line as the suction. The discharge is routed back to the vent line and DST 241-AP-108.

The TSCR Process Enclosure ventilation unit is only used to provide fresh air prior to personnel entry for column and filter change-out or maintenance activities. The ventilation system will only be operated immediately before and during personnel entries into the enclosure to provide fresh air to workers at a rate of a minimum of two air changes per hour. During routine process operations the vent will not be operated. Heating and cooling for the enclosure will be provided by the internal recirculating heating, ventilation, and air conditioning units to support process temperature requirements, and personnel comfort as necessary during manned entries. High efficiency particulate air filters on the fresh air intake and exhaust vent are only provided for equipment cleanliness within the enclosure. These filters are not credited for providing confinement ventilation.

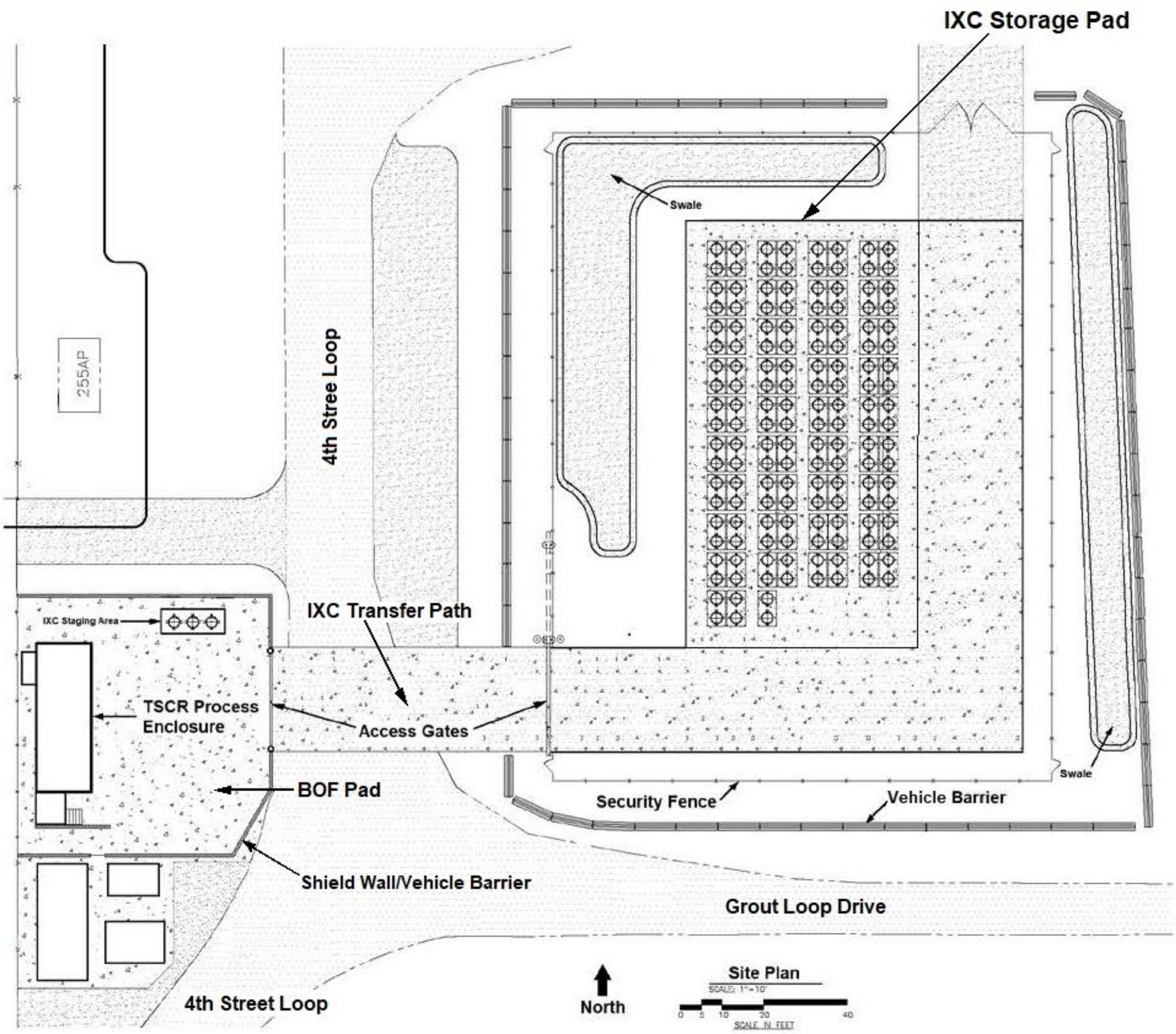


Figure C-5 Ion Exchange Columns Storage Pad Layout

C.2.8 Process Control and Monitoring

The Control Enclosure is a climate controlled, prefabricated office structure that serves as the operator workstation and TSCR control room. Primary process operations control, automated/remote maintenance evolutions (e.g., filter backwash, system flush, IXC blow-down, etc.), and ventilation system functions are controlled from the Control Enclosure. Capabilities include alarm monitoring and video monitoring of the process equipment that is facilitated via Human Machine Interface (HMI) and Programmable Logic Controller that controls all TSCR operations. The Control Enclosure also is interfaced with the Tank Farm Operations central control room and receives leak detection signals from the 241-AP Farm, which allows shutdown on indication of a HIHTL leak detected by 241-AP Farm instrumentation.

Startup commences with start of 241-AP-107 feed pump AP07F-WT-P-001. Flow continues through a short recirculation-piping loop within the Process Enclosure then back to 241-AP-107. This recirculation loop contains flow control valve WP-FCV-306 that opens to a set point of 5 gallons per minute allowing waste to enter the process system components initiating waste treatment.

Leak detection indication, whether from the Process Enclosure secondary containment or from AP Farm, activates an interlock causing shutdown of process operations. The shutdown sequence, whether in response to leak detection within the TSCR Process Enclosure or 241-AP Farm connections to the Process Enclosure, is as follows:

1. Pumps Stop.
   - 241-AP-107 Feed Pump.
   - Caustic Pump (RA-P-130).
   - Potable Water Pump (RA-P-139).
2. Flow control inlet valve WP-FCV-306 closes.
3. Valve WP-AOV-556 (effluent to 241-AP-108) opens.
4. Valve WP-AOV-560 (effluent to 241-AP-106) closes.
5. Valve RA-AOC-157 (bladder tank pressure release) opens.

The MCS provides for process monitoring, modulating control, and process interlocks, and sequencing. TSCR controls are integrated into the Tank Farm Local Area Network (TFLAN), and the primary operator interface is located at the TSCR Control Enclosure. A high level of automation is utilized to minimize direct operator interaction with TSCR and 241-AP Farm process operations. A detailed description of all warnings, alarms, set-points, and interlocks are provided in RPP-RPT-61220, *Control Logic Narrative* (as amended) included in Appendix 2, Volume 1.

The Control Enclosure is located south of, and outside, the TSCR Process Enclosure fenced area. Reference Figure C-1.

C.3 Waste Transfer Lines

Waste transfer lines supporting the projected five year duration of TSCR operations (LAWPS Phase 1) are of HIHTL type. Waste transfer lines conveying pretreated feed from the 241-AP Farm to the WTP interface point and WTP effluent returns back to the 241-AP Farm are of hard line pipe-in-pipe type. The following sections describe both waste transfer line types. For the purposes of this permit application, the two pipe-in-pipe transfer lines (241-AP-106 pretreated feed to WTP LAW and WTP Effluent Management Facility (EMF) condensate returns to DST 241-AP-102) are included to allow for design and installation of tie-in segments. Relevant design documents for the new portions of these two transfer lines are included in the design media Appendix 2, Volumes 1 and 2. Relevant design documents for the existing portions of these two lines have been provided as supplemental information to this application. Once the operating portions of the permit are written, responsibility for operations of the WTP transfer lines could be transferred to another operating unit group such as the DST OUG or the WTP OUG via future permit modification requests to reflect operational responsibility for waste going through those transfer lines.

C.3.1 Hose-in-Hose Transfer Lines

Five HIHTLs support TSCR operations and include the following:

#1. TSCR Process Enclosure to 241-AP-106 pretreated LAW transfer line.
#2. TSCR Process Enclosure to 241-AP-107 feed recirculation line.
#3. 241-AP-107 to TSCR Process Enclosure feed line.
#4. TSCR Process Enclosure to 241-AP-108 drain line.
#5. TSCR Process Enclosure to 241-AP-108 vent line.

Refer to Figure C-6 for a simplified HIHTL layout. HIHTL primary hoses have a nominal inside diameter of 2” with the secondary hoses having a nominal inside diameter of 4”. Hoses accommodate the end fittings for primary and secondary hoses on both the DST 241-AP Farm attachment points and TSCR Process Enclosure attachment points. HIHTLs have a 3 year service life, after three years the lines will be replaced with another set of HIHTL. Anything beyond the approximately 5 year duration of LAWPS Phase One will utilize hard walled piping. Installation HIHTL assemblies will be certified by an independent, qualified installation inspector or an IQRPR prior to first receipt of waste and following subsequent hose change-outs. HIHTLs removed from service will be correctly managed under the generator regulations in WAC 173-303-200.

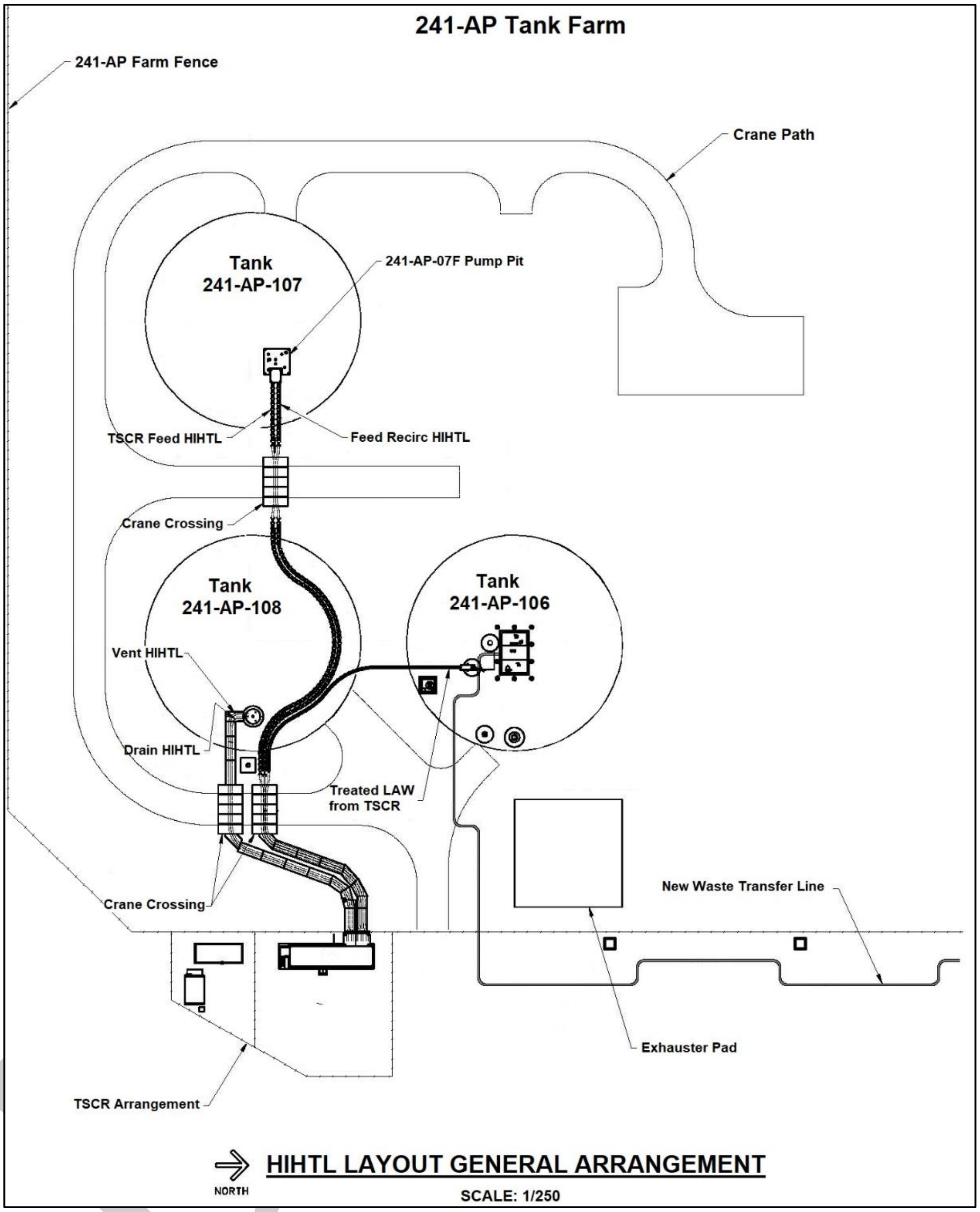
Both primary and secondary hose tube material are constructed of ethylene propylene diene monomer (EPDM) which meets the chemical compatibility requirements for use with Hanford tank waste. Braiding reinforcement is provided to meet the pressure and tensile strength requirements identified for the hoses with reinforcement material being fully encapsulated. Primary hose ends are fitted with a ChemJoint™[1] coupling. Refer to Figure C-7 for a typical HIHTL configuration. The TSCR enclosure represents the high point for the HIHTL and therefore, leak detection for all five HIHTLs occurs at the 241-AP Farm, which is the low point of the lines. All efforts have been made to minimize low points which could hold up waste between the TSCR enclosure and the AP tank farm. The leak detection has been designed to detect a leak within 24 hours. The HIHTL will be tightness tested in accordance with the required standards in Table C-3. Refer to Section C.6.3.2 for additional detail regarding HIHTL secondary containment and leak detection. The following table provides additional HIHTL attributes.

Table C-1 Hose-in-Hose Transfer Lines Attributes

HIHTL#	Line Number	Origination / Connection	Destination / Connection	Length (ft.)*
1	HIHTL-AP106-SN-101	TSCR	AP-10P-106 Drop Leg, Riser 002	211
2	HIHTL-AP107-SN-102	TSCR	AP-07F Pump Pit, Drop Leg	335
3	HIHTL-AP107-SN-103	AP-07F Pump Pit	TSCR	329
4	HIHTL-AP108-SN-104	TSCR	241-AP-108 Drop Leg, Riser 015	138
5	HIHTL-AP108-SN-105	TSCR	241-AP-108 Drop Leg, Riser 015	142

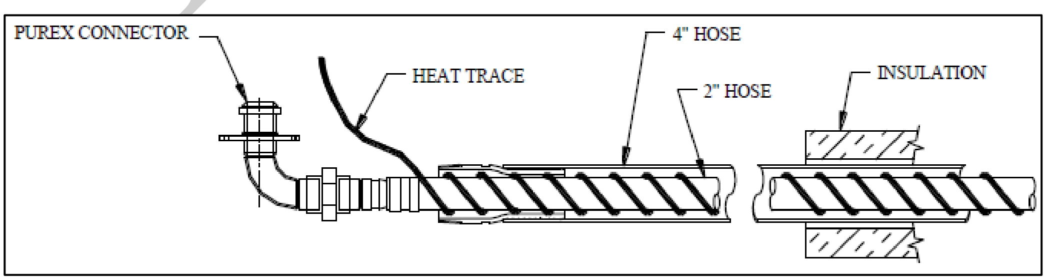
*Nominal length, subject to change.

[1]ChemJoint is a trademark of Campbell Fittings, Inc., Boyertown, Pennsylvania.



1 **Figure C-6 Simplified Hose-in-Hose Transfer Lines Layout**

2



3 **Figure C-7 Typical Hose-in-Hose Transfer Lines Configuration**

C.3.2 241-AP Farm to Waste Treatment Plant Interface Point Transfer Lines

As part of Project W-211, *Initial Tank Retrieval Systems*, three pipe-in-pipe waste transfer lines were previously installed between Tank Farms and WTP. These transfer lines were designed and originally intended to transfer full feed to the WTP Pretreatment Facility. A portion of two of the three transfer lines have been selected for use in the DFLAW program. One waste transfer line will convey pretreated waste feed from DST 241-AP-106 to the WTP LAW facility for vitrification. The second waste transfer line will convey secondary process effluent from the WTP EMF facility back to DST 241-AP-102. For the purposes of this permit application, the Tank Farms portion of both transfer lines ends at the WTP interface point (reference Figure C-8).

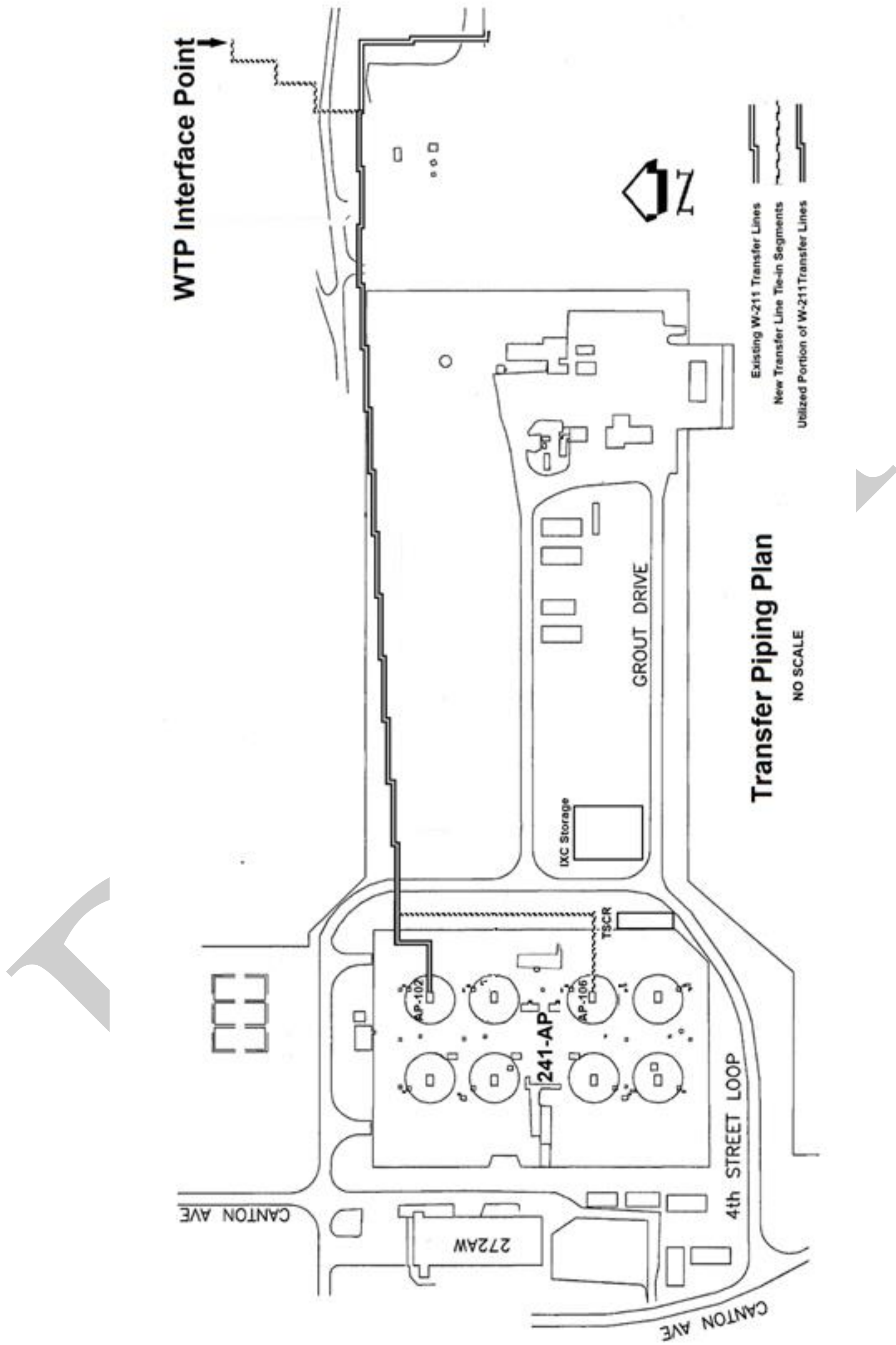
Both transfer lines utilize a significant portion of the existing WTP "full-feed" lines installed from the 241-AP Farm to the WTP Pretreatment Facility as part of Project W-211. Figure C-8 provides a graphic representation of the approximate length of the utilized portion of the W-211 transfer lines.

The three Project W-211 installed lines include; SN-637, SN-700, and SN-701, with SN-637 selected for waste feed delivery to WTP and SN-700 selected for EMF returns. A new segment from DST 241-AP-106 is to be installed to the tie-in point at SN-637. This also required installation of a new segment from the SN-637 take-off point to the WTP Interface Point. The reverse will be performed for EMF returns to DST 241-AP-102. A new segment is to be installed from the WTP Interface Point to the SN-700 tie-in point with the remainder of SN-700 being used to the AP-02D valve pit. Transfer line SN-701 will remain unused in the DFLAW configuration. The routing of the two modified two transfer lines is shown on Figure C-8.

C.4 Fire Suppression and Fire Alarm

TSCR is not connected to the 200 East Area fire water supply system. However, the Process Enclosure is equipped with a fire suppression system supplied by a nitrogen driven water mist skid located within the Ancillary Enclosure. Nearby hydrants supplement fire suppression and also serve the IXC staging and storage areas. The Hanford Fire Department is equipped with fire engines for control of fires requiring high water volume and pressure.

LAWPS OUG facilities, including the spent IXC storage pad, rely primarily on the Hanford Fire Department to respond to fires and other emergencies as described in Hanford Facility Permit Attachment 4, *Hanford Emergency Management Plan*, (DOE/RL-94-02). The Hanford Fire Department provides all the necessary equipment and personnel to respond to emergencies. Operators will respond to emergencies in accordance with the LAWPS Contingency Plan (Addendum J) and are trained in the use of emergency systems, response to fires, and use of communications equipment.



1 **Figure C-8 241-AP Farm to Waste Treatment Plant Transfer Piping Plan**

C.5 Container Storage

LAWPS OUG includes two container storage areas used to manage spent IXC. The first is the IXC Storage Pad located immediately east of the LAWPS facilities. The IXC storage pad is sized to store 150 columns, which accommodates the expected generation rate of two columns per month for the approximate five-year duration of TSCR (LAWPS Phase 1) operations with some added contingency space. The storage pad could also accommodate media traps, should that waste form be generated during waste processing. The media trap is a contingency feature located just upstream of the delay tank and is designed to capture IX media in the unlikely event of a screen failure within an IXC that could result in IX media being released into the process stream. A media trap is a small component approximately 17 inches by 3 inches that resembles a small cartridge filter.

Storage pad dimensions account for row and aisle spacing requirements in accordance with WAC 173-303-630(5)(c). The IXC storage pad is approximately 110 feet long by 75 feet wide, orientated in a north-south configuration. The reinforced slab is 28 inches thick with 54-inch turndowns to provide adequate load carrying capacity to meet seismic and loading requirements. The storage pad is connected to the Balance of Facilities (BOF) concrete pad (where the TSCR Process Enclosure resides), by a concrete travel path (reference Figure C-5).

The IXC staging area is located immediately adjacent to the TSCR Process Enclosure. This container storage area can accommodate three columns and is intended as a contingency location for columns that may require decontamination, or other corrective actions, prior to placement onto the IXC Storage Pad. The IXC staging area concrete slab is integral to the BOF slab and will be demarcated with striping and stanchions as appropriate. Refer to Section C.2.6 and Figures C-1 and C-5 for additional information on both container storage areas. Columns will remain in the IXC staging area for no longer than one year and may remain on the IXC storage pad for up to fifty years.

Both container storage areas are located within fenced and gated boundaries with access controls. Because the IXC will not contain free liquids and do not hold waste types listed in WAC 173-303-630(7)(c), secondary containment is not provided for either storage area. Both areas are sloped to remove liquids resulting from precipitation in accordance with WAC 173-303-630(7)(c)(i). The specifications and requirements for the design of both storage areas are found in RPP-SPEC-62054, *TSCR IXC Concrete Storage Pad System: Tank Farm System Infrastructure Upgrades Specification* and RPP-CALC-62547, *Structural Analysis of TSCR IXC Storage Pad* (both as amended).

Other secondary solid waste that results from the balance of process operations is considered newly generated waste that requires packaging for shipment, treatment if necessary, and disposal. Some waste may require treatment to address Land Disposal Restrictions prior to disposal.

Secondary waste will be managed in accordance with the applicable sections WAC 173-303-200, accumulation standards and WAC 173-303-630, use and management of containers. Secondary solid waste generated from LAWPS operations will not result in any unique waste forms requiring specialized packaging, transportation, treatment, and disposal considerations. Waste stream types generated from LAWPS operations may include, but are not limited to the following examples:

- Personal protective equipment/step-off pad waste.
- Decontamination materials.
- Spill cleanup materials.
- Maintenance debris waste (e.g., tank waste contacted filters, valves and instruments).

In addition, satellite accumulation areas may be used as necessary for routinely generated dangerous waste in accordance with WAC 173-303-174.

C.6 Tank Systems

This section provides specific information on the TSCR tank system and includes discussion on the type of waste to be managed in the system, tank system design information, integrity assessments, and additional information on the TSCR tank system components that treat and store mixed waste. Modifications to the 241-AP Tank Farm beyond those described in this addendum are not associated with the LAWPS OUG and are not included in this application. The TSCR Process Enclosure tank system components are discussed in Sections C.1 and C.2 and the locations of the tank system process components are presented in Figure C-9.

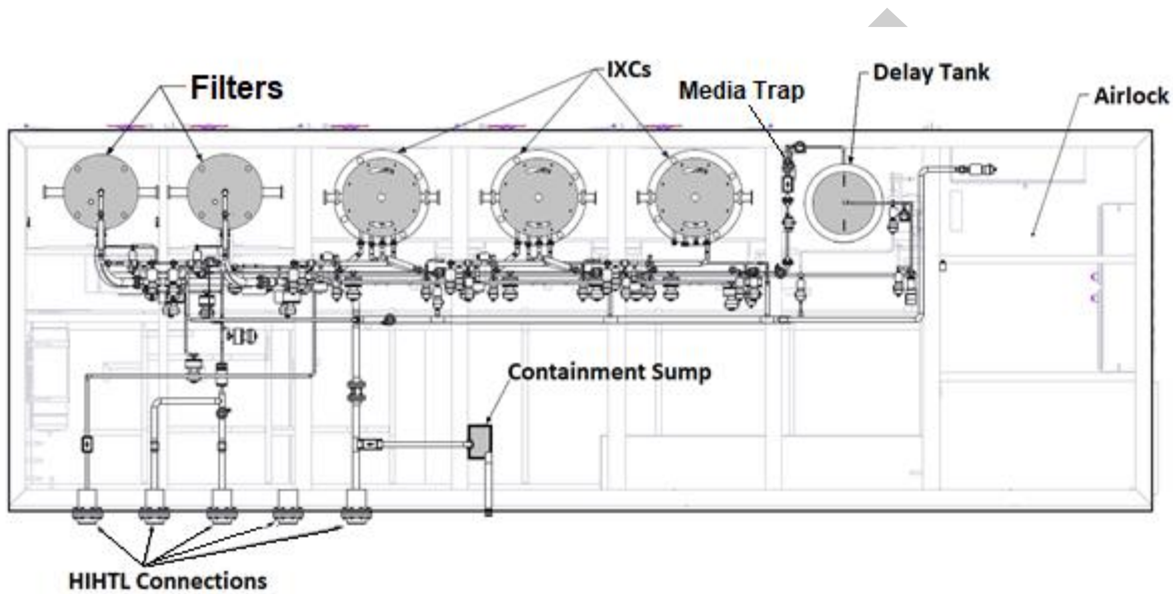


Figure C-9 Tank Side Cesium Removal Process Enclosure Layout (Simplified Plan View)

The primary TSCR tank system components are shown in Table C-2.

Table C-2 Primary Tank Side Cesium Removal Tank System Components

Component	ID Number	Function	Volume
Feed Filters (2)	WP-FLT-325A WP-FLT-325B	Solids Filtration	49.5 gal
IXC (3)	WP-IX-400A WP-IX-400B WP-IX-400C	Cesium Removal	162.6 gal
Media Trap	WP-RT-500	IX Media Confinement	.25 gal
Delay Tank	WP-TK-550	Barium Decay	300 gal

C.6.1 Design Requirements

The following sections provide an overview of the design specifications for the TSCR tank system components. In accordance with the new tank system requirements of WAC 173-303-640(3), the following tank components and specifications were assessed:

- Dimensions, capacities, wall thicknesses, and pipe connections.
- Materials of construction and compatibility of materials with the waste being processed.
- Materials of construction of foundations and structural supports.
- Review of design codes and standards used in fabrication and construction.
- Review of structural design calculations, including seismic design basis.
- Waste characteristics and the effects of waste on corrosion.

A design assessment to establish compliance with WAC 173-303-640(3) has been performed and certified by an Independent Qualified Registered Professional Engineer (IQRPE). The design assessment reports found the tank system design in compliance with WAC 173-303-640(3).

The specifications and requirements for the design and fabrication of the TSCR tank system and ancillary equipment are documented in the following:

- TSCR specifications for design and fabrication are documented in RPP-SPEC-61910, *Specification for the Tank Side Cesium Removal Demonstration Project* (as amended).
- DST Project specifications for supporting infrastructure are documented in RPP-SPEC-60547, *Low Activity Waste Pretreatment System: Tank Farm System Infrastructure Upgrades Specification* (as amended).
- HIHTL specifications for design and fabrication are documented in RPP-14859, *Specification for Hose-in-Hose Transfer Line and Hose Jumpers* (as amended).
- Project W-211 transfer line specifications for the design and fabrication of the pipe-in-pipe transfer line components are documented in HNF-SD-W211-FDC-001, *Functional Design Criteria, Project W-211, Initial Tank Retrieval Systems* (as amended) and W-211-TP-P1, *Procurement Specification Double Containment Piping TFC/WTP Waste Transfer Piping* (as amended).
- DST Project specifications for the design and fabrication of the transfer line tie-in segments to the W-211 transfer lines are documented in RPP-SPEC-62029, *Waste Feed Delivery: Tank Farm System Infrastructure Upgrades Specification* (as amended).

All of the primary dangerous waste tank system treatment components in the TSCR Process Enclosure are constructed of stainless steel. According to the design basis, it was determined stainless steel provides adequate corrosion protection for these process components.

C.6.1.1 Codes and Standards for Tank System Design and Construction

Specific standards for the manufacture of TSCR process systems are briefly discussed in the following sections. In addition to these codes and industrial standards, a seismic analysis for each process system is required [WAC 173-303-806(4)(a)(xi)]. The seismic analysis was performed in accordance with DOE Order 420.1C.

Codes and standards applicable to the design, construction, and testing of the tanks, ancillary piping systems, and hose systems are established in Table C-3.

Table C-3 Codes and Standards for Tanks and Ancillary Systems

Code/Standard	Title
ASME – B31.1 (latest edition)	*Power Piping*
ASME – B31.3 (latest edition)	*Process Piping*
ASME – Boiler and Pressure Vessel Code (latest edition)	*Rules for Construction of Pressure Vessels*
ASME – NQA-1A (Addendum A, latest edition)	*Quality Assurance Requirements for Nuclear Facility Applications*
AWS – D1.1/D1.1M (latest edition)	*Structural Welding Code – Steel*
AWS – D1.6/D1.6M (latest edition)	*Structural Welding Code – Stainless Steel*
NAHAD 500 (latest edition)	*Industrial Hose Assembly Specification Guidelines*
NAHAD 600 (latest edition)	*Composite Hose Assembly Specification Guidelines*
RMA IP-2 (latest edition)	*Hose Handbook*

The application of these standards to the fabrication and installation of the TSCR tank system, transfer piping, and hoses, combined with independent verification of completed systems ensures that the tank and tank supports have sufficient structural strength and that seams and connections are adequate to ensure tank integrity. In addition, each tank system component will meet strict quality assurance requirements. Any tank system component constructed offsite will be tested for integrity and leak tightness before shipment to the Hanford Facility. Following installation, the systems will be inspected for damage to ensure against leakage and to verify proper operation. If a tank system component was damaged during shipment or installation, repairs will be made and leak tightness testing will be repeated onsite.

C.6.1.2 Design Information for Tank Side Cesium Removal and Transfer Lines

The TSCR Process Enclosure and transfer lines (both hard pipe and HIHTL) will be constructed to meet a series of design standards, as discussed in the following sections. Table C-3 above presents the applicable design standards and codes for tank systems, and Tables C-4 and C-5 provide additional information on key ancillary equipment and materials of construction associated with the TSCR and waste transfer systems. All piping systems are designed to withstand the effects of internal pressure, weight, thermal expansion and contraction, and any dynamic flow. The design of these units been evaluated in an engineering design assessment certified by an IQRPE. The certified design assessments are documented in three reports included in the LAWPS OUG Appendix 2.11. Follow-on integrity assessments, including frequency, will be established following completion of the design assessment.

Table C-4 Materials of Construction and Design

System	Number	Material	Design
Filters (2)	WP-FLT-325A WP-FLT-325B	316/316L Stainless Steel	Appendix 2.6 Appendix 2.4
IXC 1	WP-IX-400A	316/316L Stainless Steel	Appendix 2.6 Appendix 2.4
IXC 1	WP-IX-400B	316/316L Stainless Steel	Appendix 2.6 Appendix 2.4

Table C-4 Materials of Construction and Design

System	Number	Material	Design
IXC 1	WP-IX-400C	316/316L Stainless Steel	Appendix 2.6 Appendix 2.4
Media Trap	WP-RT-500	316/316L Stainless Steel Hastelloy® C-276 (screen)	Appendix 2.6 Appendix 2.4
Delay Tank	WP-TK-550	316/316L Stainless Steel	Appendix. 2.6 Appendix 2.4
TSCR Piping & Valves	Various	304/304L and 316/316L Stainless Steel	Appendix 2.6 Appendix 2.2
TSCR Process Enclosure Secondary Containment (includes sump and pump)	N/A	Epoxy Coated Carbon Steel	Appendix 2.6 Appendix 2.4
Misroute Prevention Secondary Containment	N/A	304/304L Stainless Steel	Appendix 2.6 Appendix 2.4
HIHTLs (5)	HIHTL-AP106-SN-101 HIHTL-AP107-SN-102 HIHTL-AP107-SN-103 HIHTL-AP108-SN-104 HIHTL-AP108-SN-105	EPDM	Appendix 2.6 Appendix 2.4
Pipe-in-Pipe Transfer Lines (primary)[1]	SN-637 SN-700	316/316L Stainless Steel	Appendix 2.8 Appendix 2.5

[1]Includes utilized portions of existing W-211 transfer lines and new tie-in segments.

Hastelloy® is a registered trademark of Haynes International.

C.6.1.3 Integrity Assessments

The initial design assessment for TSCR attests to the adequacy of design and integrity of the tank system to ensure that the tanks and ancillary equipment will not collapse, rupture, or fail over the intended life considering intended uses. Specifically, the assessment documents the following considerations:

- Standards used during design of the tank system.
- Characteristics of the waste feed.
- Adequacy of the materials of construction to provide corrosion protection from the solution in waste feed.

The results of the assessment demonstrate that the tank system and ancillary equipment have sufficient structural integrity and are acceptable for storing and treating dangerous and/or mixed waste. The assessment concludes that the tank system and ancillary components are designed to withstand a design-basis earthquake.

If TSCR were to be operated longer than 5 years, a tank integrity assessment program and schedule, to include a corrosion inspection program, if necessary, will be developed and will include periodic follow-on integrity assessments. The frequency of follow-on integrity assessments will be determined by the initial assessment and include considerations for age of the tank system, materials of construction, characteristics of the waste, operating experience, and recommendations of the initial design assessment.

It is common for each of these tank types to be assessed on a frequency adequate to determine if corrosion or other indications of deterioration is occurring. The tank integrity assessment program and schedule will be developed and entered into the LAWPS OUG operating record prior to the first receipt of waste.

C.6.2 Additional Requirements for New Tanks

Procedures for proper installation of tanks, tank supports, piping, concrete, etc., are included in construction specifications. During and following installation, an independent qualified installation inspector or an independent, qualified, registered professional engineer will inspect the tanks and secondary containment in accordance with WAC 173-303-640(3)(c). Deficiencies identified are to be documented and a determination will be made as to repair/rework or use-as-is. All deficiencies requiring corrective action will be repaired to the satisfaction of the engineer. The tanks and ancillary equipment will be leak tested as part of acceptance of the system from the fabrication contractor. Information on the inspections and leak tests are to be included in the construction/installation certification, which will be entered into the LAWPS OUG operating record.

C.6.3 Secondary Containment and Leak Detection

This section describes the design and operation of secondary containment and leak detection systems for the TSCR Process Enclosure and transfer lines (HIHTL and pipe-in-pipe).

C.6.3.1 Secondary Containment for the Tank Side Cesium Removal Process Enclosure

The TSCR Process Enclosure utilizes two secondary containment features; one that provides containment for all process area tank system components, and second system providing containment for the misroute prevention interface within the Process Enclosure airlock. The basis for sizing the secondary containment system in the TSCR Process Enclosure process area is documented in calculation RPP-CALC-62500, *Process Enclosure Secondary Containment Sizing* (as amended). Supporting design and construction specifications ensures the foundation is capable of supporting the tank and secondary containment systems and that uneven settling and failures from pressure gradients should not occur.

The TSCR Process Enclosure secondary containment system is integral to the process unit and underlies all tank system components within the structure. The system is designed to contain a leak from any process component within the Process Enclosure and is constructed of epoxy coated carbon steel. The underlying concrete foundation is designed with reinforcing steel. The concrete slab and footing dimensions preclude failure caused by load pressures and climatic conditions (e.g., frost heave). Established principles and techniques for structural analysis, soil mechanics, and concrete and structural steel design were used in the design calculations for the foundation and Process Enclosure structure. In each of the analyses, the major design criteria are established from the documents listed in Table C-5.

The second containment system is comprised of a National Electrical Manufacturers Association (NEMA) 4X rated liquid tight cabinet. The cabinet is constructed of stainless steel and houses reagent feeds (e.g., water, caustic, and service air) into the Process Enclosure process area. The cabinet provides containment in the unlikely event of waste misroute into any of the reagent feed lines. The cabinet is equipped with a drain line with a leak detector installed within the drain line above a closed valve. If the leak detector is activated, the valve automatically opens and drains any leaked liquids into the Process Enclosure drain manifold, which routes the leaked material directly to 241-AP-108. Reference Figure C-10 for the NEMA cabinet location.

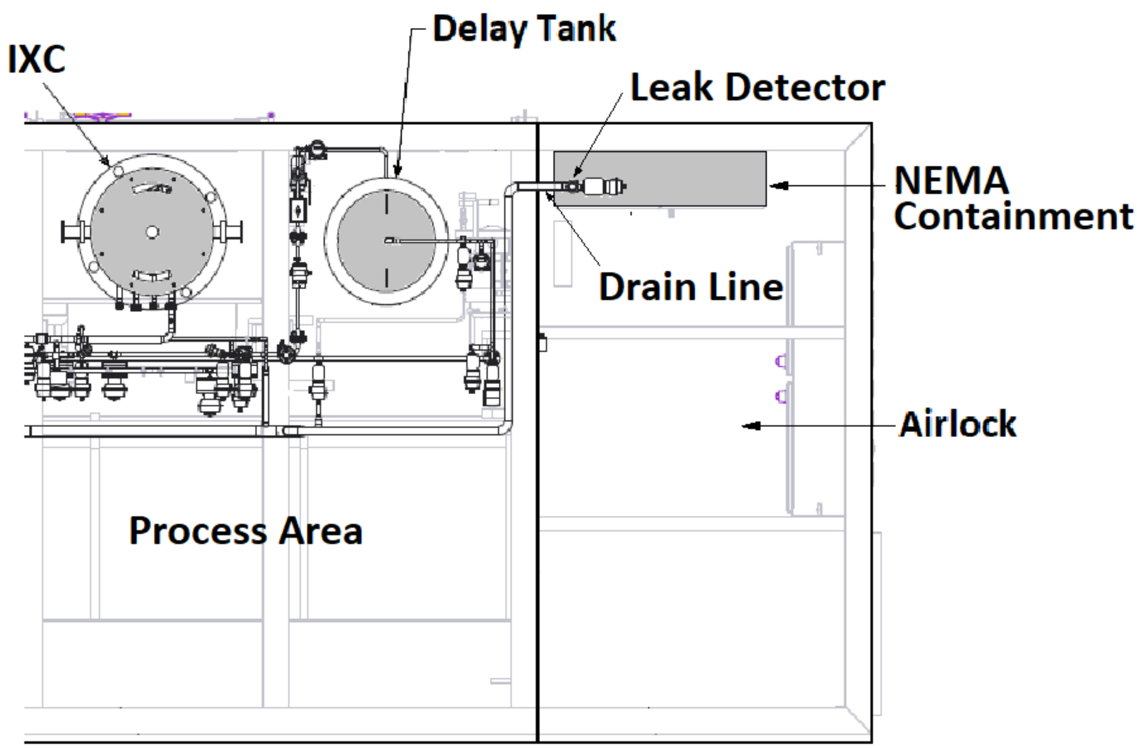


Figure C-10 National Electrical Manufacturers Association Containment Cabinet

Table C-5 Codes and Standards for Structural Systems

Document	Title
DOE Order 420.1C (latest edition)	Facility Safety
IBC 2015	International Building Code
ACI 301 (latest edition)	Standard Specification for Structural Concrete
ACI 318(latest edition)	Building Code Requirements for Structural Concrete
ACI 349 (latest edition)	Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary

The TSCR Process Enclosure secondary containment system is designed to contain 100 percent of the volume of the largest tank within its boundary in accordance with WAC 173-303-640 (4)(e)(i)(A). The 300-gallon Delay Tank bound the necessary volume. RPP-CALC-62500, Process Enclosure Secondary Containment Sizing Calculation documents the basis for this secondary containment sizing.

The total volume of the Process Enclosure secondary containment system is 432 gallons. The containment system is sloped to a single low-point sump equipped with a leak detector and pump allowing for detection and removal of any leaked waste. Leaked waste would be pumped from the secondary containment sump through the drain manifold to 241-AP-108. Leak detection alarms are monitored in accordance with Addendum I, "Inspections."

TSCR has no outside dangerous waste storage or treatment tanks that require consideration of the additional volume from a 25-year, 24-hour storm event [WAC 173-303-640(4)(e)(i)(B)].

C.6.3.2 Secondary Containment Transfer Lines

All five HIHTLs are provided secondary containment by the outer encasement hose. The TSCR Process Enclosure HIHTL connection represent the high point for all five lines, therefore, leak detection is provided by low point instruments located at the 241-AP Farm connections. All the lines have been designed to minimize low points between the TSCR enclosure and the AP Tank farm. However, due to structures, required equipment travel routes in the farms or the need to shield the lines, there can be some localized points. The following table identifies the location of low-point leak detection for each HIHTL. A 2-gallon per minute leak can be detected in any of the five hoses within one hour.

Table C-6 Secondary Containment for Hose-in-Hose Transfer Lines

HIHTL #	Line Number	Destination/Connection	Leak Detector Location
1	HIHTL-AP106-SN-101	AP-10P-106, Riser 002	Within Drop Leg
2	HIHTL-AP107-SN-102	AP-07F Pump Pit	Within Drop Leg
3	HIHTL-AP107-SN-103	AP-07F Pump Pit	Within Pump Pit
4	HIHTL-AP108-SN-104	241-AP-108, Riser 015	Within Drop Leg
5	HIHTL-AP108-SN-105	241-AP-108, Riser 015	Within Drop Leg

241-AP Farm leak detection signals are shared with the TSCR Process Enclosure allowing for shutdown of process operations upon indication of a leak with any of the five HIHTLs (reference Section C.2.8). The HIHTL primary hose can be flushed and air blown from the TSCR Process Enclosure back to the tank the HIHTL is connected to. In the event any leaked waste from a primary hose to the secondary, that material will be removed by compressed air and./or water flushing from the TSCR Process Enclosure end back to the tank the HIHTL is connected to. Any compromised HIHTL would be removed from service and replaced with a new one.

Secondary containment for hard-piped transfer lines are provided by the outer encasement pipe. Both the 241-AP Farm to WTP feed line and WTP EMF return line are sloped from the 241-AP Farm to the WTP EMF facility, which is equipped with a low-point leak detector that provides indication of a leak. WTP EMF leak detection signals will be provided to the DST Central Control room allowing for shutdown of waste transfers upon indication of a leak within either transfer line.

C.6.4 Tank Management Practices

Tank management practices addressing rupture, leakage, and corrosion prevention are discussed as follows.

Because TSCR treats DST system aqueous supernatant with a low solids content, this feed waste stream can be managed such that erosion and corrosion is not a significant concern. Additionally, the materials of construction used in the TSCR Process Enclosure, HIHTLs, and hard-piped transfer lines make it unlikely that an aqueous waste would corrode a tank, hose, or piping materials.

Should a leak in any tank system component be discovered, the leak is immediately stopped by isolating the leaking component and removing the tank system component from service. Following isolation, the requirements of WAC 173-303-640(7), incorporated by reference, are followed. These requirements include repair or closure of the tank/tank system component preceded by removal of any waste. Any major repairs require certification. If repairs are not practical or successful, the tank system would undergo closure in accordance with Addendum H, "Closure Plan."

External corrosion protection (i.e., cathodic protection) is not required for the TSCR Process Enclosure tank system components as they are contained within an above ground structure and are not in contact with soil or moisture. HIHTLs are protected from contact with soil or moisture with an exterior insulating system. Hard-piped transfer lines are protected from external corrosion by a protective coating system.

C.6.4.1 Overfilling Prevention

Because TSCR Process Enclosure tanks system components are designed and operated as a once-through, closed pressure vessel system, tank overfill controls and features are not applicable. The TSCR Control Enclosure MCS monitors all processing parameters and is equipped with alarms that annunciate on any indication of system malfunction that includes interlocks to shut the system down.

C.6.5 Labels or Signs

Each tank or primary process unit component (i.e., filters, IXC, etc.) in the TSCR Process Enclosure are identified by an attached nameplate that includes the equipment number. Additionally, the Process Enclosure will bear a legend that identifies the systems and waste in a manner that adequately warns employees, emergency personnel, and the public of the major risk(s) associated with the waste being stored or treated in the tank system.

Access to the fenced and gated TSCR Process Enclosure area, including the IXC staging area, is posted with black and white signs bearing the words "Danger – Unauthorized Personnel Keep Out." Signs are posted at each entrance gate to the facility. The same posting is affixed to the IXC storage pad gate and entrances. Individual IXC will bear labels in accordance with WAC 173-303-630(3). Refer to Addendum E, "Security Requirements," for additional information on signs and postings.

C.6.6 Management of Ignitable or Reactive Wastes in Tanks Systems

TSCR treats aqueous waste that does not meet the definition of an ignitable or reactive waste in accordance with WAC 173-303-090(5). Therefore, design requirements, controls, and inspections associated with the management of ignitable or reactive waste are not applicable to TSCR. Additional information regarding qualification of TSCR feed waste acceptance criteria is found in Addendum B, "Waste Analysis Plan."

C.6.7 Management of Incompatible Wastes in Tanks Systems

TSCR treats dilute solutions of aqueous waste that is mixed and sampled prior to receipt that pose no compatibility issues. TSCR Process Enclosure returns to the 241-AP Farm tanks will meet the DST System Waste Acceptance Criteria.

C.7 Organic Air Emissions Control

This section addresses organic air emission standards per 40 CFR 264, Subpart AA (WAC 173-303-690) and Subpart BB (WAC 173-303-691). The requirements of WAC 173-303-690 (Subpart AA) are not applicable because TSCR does not perform distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations [WAC 173-303-690(1)(b)]. The requirements of WAC 173-303-691 (Subpart BB) are not applicable because aqueous waste with 10 percent or greater organic concentration is not accepted for treatment at TSCR.

C.7.1 Applicability of Subpart CC Standards

The air emission standards of WAC 173-303-692 (40 CFR 264, Subpart CC) apply to tank, surface impoundment, and container storage units that manage wastes with average volatile organic concentrations equal to or exceeding 500 parts per million (0.05%) by weight, based on the hazardous waste composition at the point of origination. However, waste management units that are used solely for management of radioactive mixed waste are exempt [WAC 173-303-692(1)(b)(vi)]. Since only radioactive mixed waste is managed at the TSCR, these requirements are not applicable to TSCR operations.

C.8 Engineering Design Media

Tabular listings and copies of Professional Engineer-stamped TSCR Process Enclosure, HIHTL, hard-piped transfer lines, and IXC storage areas design drawings, calculations and other documentation reflecting the design submitted with this application package are provided in the LAWPS Appendix 2.0.

This page intentionally left blank.