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Waste Management Area C Closure Conceptual Design Support Document

MJ Holm
Washington River Protection Solutions, LLC
P. O. Box 850 Richland, Washington 99352
Richland, WA 99352
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Abstract: This document contains supporting information for closure design activities.

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ABBREVIATIONS AND ACRONYMS

AMSL	Above mean sea level
BGS	Below ground surface
CEES	Columbia Energy and Environmental Services
Ci	Curies
Cs	Cesium
DOE	Department of Energy
DOE - ID	Department of Energy Idaho Operations Office
DOE - ORP	Department of Energy – Office of River Protection
DOE - RL	Department of Energy Richland Operations Office
INL	Idaho National Laboratory
SST	Single-Shell Tank
TFPC	Tank Farm Process Condensate
TPA	Tri-Party Agreement
UPR	Unplanned releases
WDOE	Washington State Department of Ecology
WMA C	Waste Management Area C

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1.0 INTRODUCTION

The United States Department of Energy (DOE) has been planning for closure of nuclear facilities at DOE sites for over twenty years. The strategy for closing these facilities has evolved over time with changes in technology, the regulatory environment and actual facility closure experience.

This document provides background information to support closure design. A summary of the history of the Hanford Site and facility closure is included. A description of the area chosen to be the first facility closed at Hanford, 241-C Tank Farm, is also included. Additional information about the specific structures, systems and components to be closed is contained in sections three through seven.

1.2 HANFORD BACKGROUND

The Advisory Committee on Uranium was formed in 1939 to explore the feasibility of atomic weapons and atomic power. With the beginning of World War II, the Advisory Committee on Uranium sponsored an intensive and secret research program on plutonium. The purpose of the research program was to develop knowledge to design, build and operate a plant for the conversion of uranium into plutonium.

This research program became known as the Manhattan Project. The original plutonium production plant was to be located in Oak Ridge, Tennessee, but the hazards were considered to be too great. A remote area in the American West was chosen instead. This area, the Hanford Site, included the town of Hanford, Washington. The Hanford Site occupies approximately 560 square miles in south-central Washington State.

The Hanford Site was constructed by the Army Corps of Engineers. Construction began in March 1943. In the next 29 months, facilities were constructed to process uranium fuel elements. The process waste disposal systems, including tanks and piping, were constructed to manage the liquid waste generated by the processing facilities.

In 1989, the Hanford primary mission of production of nuclear materials was phased out. Environmental cleanup became the major Site mission at that point. Since that time, the planning for closure of facilities has been and continues to be negotiated with regulators and stake holders.

Also in 1989, the DOE joined with the Washington State Department of Ecology (WDOE) and the United States Environmental Protection Agency in signing the Hanford Federal Facility Agreement and Consent Order more commonly known as the Tri-Party Agreement (TPA). This document outlines legally enforceable milestones for Hanford cleanup over several decades. The

TPA is a living document that is regularly reviewed to confirm completion of milestone requirements and to make adjustments in schedule dates when milestones are to be completed.

The Department of Energy - Office of River Protection (DOE-ORP) was established to safely retrieve and treat Hanford's tank waste and close the Tank Farms to protect the Columbia River. The DOE-ORP is tasked with managing the liquid, semi-solid nuclear and chemical waste that is currently in the tanks.

1.3 CLOSURE BACKGROUND

Document DOE/RL 89-16, Draft A, *Draft Single-Shell Tanks System Closure/Corrective Action Work Plan* was published in 1989 to present a work plan of the program for reaching a decision on final disposal of the single-shell tank (SST) system. DOE/RL 89-16 utilized input from DOE/RL 88-33, *Hanford Site Waste Management Plan* and WHC-MR-0054, *Interim Hanford Waste Management Technology Plan.* Document DOE/RL 88-33 was updated annually at that point and provided actions, schedules and projected costs. Document WHC-MR-0054 was also updated annually to discuss the technical issues to be resolved with the disposal of SST waste.

DOE/RL-89-16, Revision 1, *Single-Shell Tank Closure Work Plan*, was updated in 1996 to include a closure strategy for the SST system. This strategy required closure planning. As a result, RPP-13774, *Single-Shell Tank System Closure Plan* was prepared in 2004 for the WDOE approval. At that point, the WDOE was unable to approve the design until the Environmental Impact Statement was approved.

A closure design was prepared as part of the RPP-13774 action plans. The need to close tank 241-C-106 produced a 90% design review released as RPP-21352, Revision 0A, *Tank Closure Fill System for Tank 241-C-106 Design Summary Report.* This design utilized an approach used at the DOE Savannah River facility in 1998 to close two waste tanks. Since that time, the lessons learned from the closure of tanks at the Idaho National Laboratory, and grout testing performed at the Hanford Site have led to a re-evaluation of closure plans for Hanford's SST tank farms. This re-evaluation of closure plans has lead to the development of a conceptual design for closure of Waste Management Area C (WMA C).

2.0 FACILITY DESCRIPTION

2.2 HANFORD SINGLE-SHELL TANK FARMS DESCRIPTION

The Hanford Site has 149 SST tanks constructed between 1943 and 1966. These tanks range in size from 55,000 to one million gallons and are below ground level covered with several feet of backfill material. The SST tanks are located in groups called farms, containing four to 18 tanks each.

Radioactive wastes from the recovery of plutonium from irradiated reactor fuels and the recovery of uranium metal waste generated from processing are stored as alkaline slurries in these underground tanks. Processing facilities routed the liquid waste to the tanks from the operating buildings via underground lines and diversion boxes interconnected by jumpers. Leaks that occurred in the diversion boxes or into the line encasements surrounding the underground transfer lines were drained to catch tanks. Liquid waste within the catch tanks was then pumped back the SST tanks.

Sixty seven SST tanks are assumed to have leaked between 10,000 and 277,000 gallons of waste in the past. In an effort to remove drainable liquid which could potentially leak from the tanks, interim stabilization of the SST tanks began in 1978 and continued through 2005.

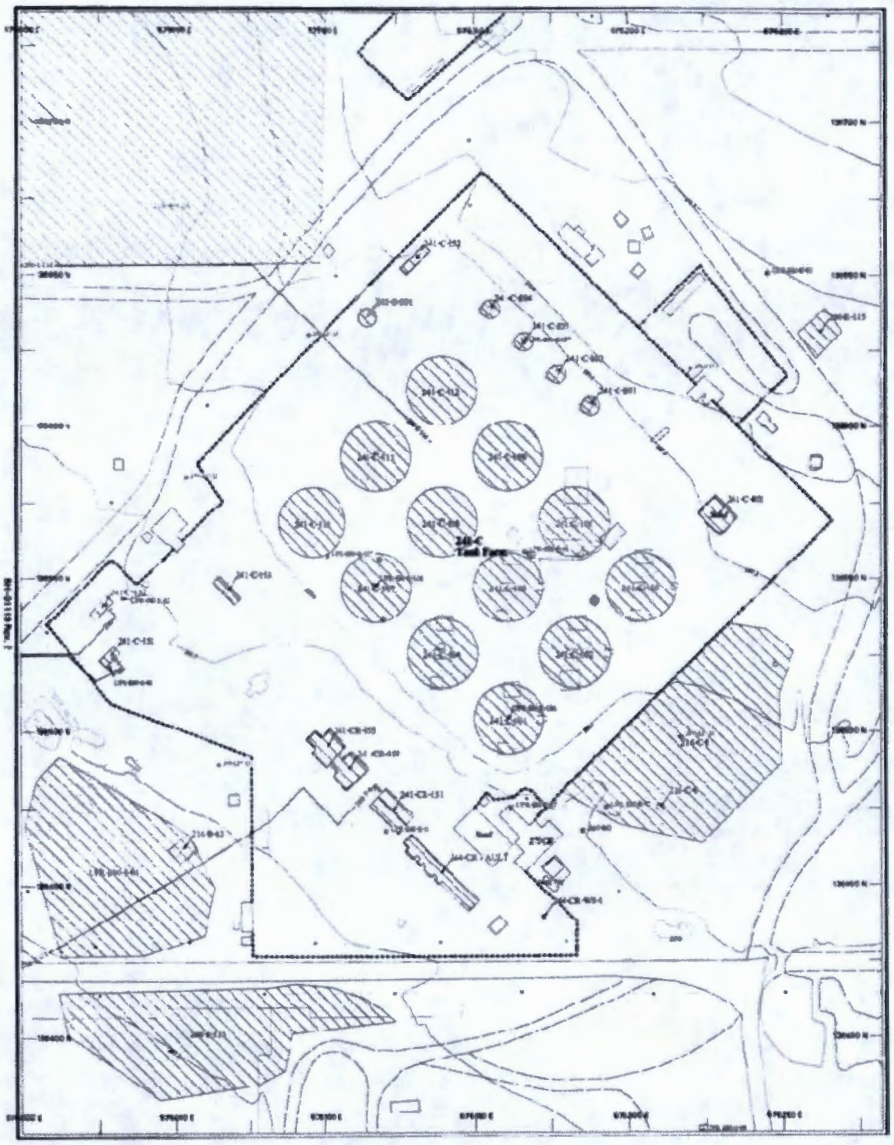
Retrieval of the SST tanks began in 1999. Retrieval is the process of removing waste from a given SST tank to limits set in the TPA. The assumption is the TPA limits meet the intent of "to the maximum extent technically and economically practical." Retrieval activities are currently ongoing and are planned to be completed in WMA C by 2014. Closure of the tanks is planned after completion of retrieval.

2.3 WMA C DESCRIPTION

RPP-13774 defines waste management areas. The WMA C consists of the 241-C Tank Farm and the surrounding area. The WMA C is depicted in Figure 2-1. The facility is located in the eastern portion of the 200 East Area of the Central Plateau of the Hanford Site.

The WMA C consists of twelve 100 Series large tanks, four 200 Series tanks and catch tank 241-C-301. Also included in WMA C are the 244-CR Vault, diversion boxes, transfer lines, and other structures.

Figure 2-1. Waste Management Area C



The 100 Series tanks in the 241-C Tank Farm were under construction in Figure 2-2. The photo was taken from the south looking north. The 241-C Tank Farm was constructed in 1944 and 1945. The tanks were placed in service in 1946.

Figure 2-2. 241-C Tank Farm Construction Photograph

3.0 UNDERGROUND TANKS AND STRUCTURES

August 2009 renegotiations of the Hanford Federal Facility and Consent Order Milestones established a September 30, 2019 date for closure for WMA C. In support of this effort, a closure conceptual design will be produced. To aid in the design, value engineering sessions are being held for input from subject matter experts.

The 241-C Tank Farm and surrounding area will need to be addressed during closure. The tanks and structures in and around the farm are illustrated in Appendix A. The structures and features to be closed include:

- 12 SSTs (530,000-gallon capacity)
- 4 SSTs (55,000-gallon capacity)
- Catch tank (36,000-gallon capacity)
- Vault (4 tanks)
  - 2 tanks with 15,000-gallon capacity
  - 2 tanks with 40,000-gallon capacity
- 7 diversion boxes
- Potentially over 8 miles of pipeline.

A detailed list of components including the underground tanks in WMA C is listed in Table 3-1.

Most WMA C components are physically located within the 241-C Farm fence line. Exceptions that extend beyond the fence line include pipelines, groundwater wells and one diversion box.

Table 3-1. Waste Management Area C Components. (3 sheets)

Single-Shell Tanks			
Tank 241-	**Constructed**	**Removed from Service**	**Constructed Operating Capacity L (gal)**
C-101	1943–1944	1970	2,000,000 (530,000)
C-102	1943–1944	1976	2,000,000 (530,000)
C-103	1943–1944	1979	2,000,000 (530,000)
C-104	1943–1944	1980	2,000,000 (530,000)
C-105	1943–1944	1979	2,000,000 (530,000)
C-106	1943–1944	1979	2,000,000 (530,000)
C-107	1943–1944	1978	2,000,000 (530,000)
C-108	1943–1944	1976	2,000,000 (530,000)
C-109	1943–1944	1976	2,000,000 (530,000)
C-110	1943–1944	1976	2,000,000 (530,000)
C-111	1943–1944	1978	2,000,000 (530,000)

Table 3-1. Waste Management Area C Components. (3 sheets)

C-112	1943–1944	1976	2,000,000 (530,000)
C-201	1943–1944	1977	210,000 (55,000)
C-202	1943–1944	1977	210,000 (55,000)
C-203	1943–1944	1977	210,000 (55,000)
C-204	1943–1944	1977	210,000 (55,000)
Diversion boxes			
Unit 241-	**Constructed**	**Removed from Service**	**Description**
C-151	1944	1985	Interconnected 241-C-152, -153, and CR-151 diversion boxes
C-152	1944	1985	Interconnected 241-B-154 and -153 and C farm, associated with 241-C-301 catch tank
C-153	1944	1985	Interconnected 241-C-151 and -152 diversion boxes
C-252	1944	1985	Interconnected 241-C-151 diversion box and C Farm
CR-151	1952	1985	Interconnected 244-CR vault and C Farm
CR-152	1942	1985	Interconnected 244-CR vault and C Farm
CR-153	1942	1985	Interconnected 244-CR vault and C Farm
244-CR Vault (contains four tanks)			
Tank 244-	**Constructed**	**Removed from Service**	**Description**
CR-011	1951-1952	1988	Transfer of waste solutions from processes and decontamination operations.
CR-001	1951-1952	1988	
CR-002	1951-1952	1988	
CR-003	1951-1952	1988	
Miscellaneous Tanks			
Facility Number	**Description**		
241-C-301	Catch tank; 36,000-gal capacity 20-ft diameter by 20.25-ft tall reinforced-concrete interior painted with two coats of Amercoat Paint (INDC-356-Vol 3, page 923 and W-72903, *Hanford Engineering Works – Bld #241 T-U-B 20'-0" Catch Tank Arrangement and Concrete*)		
CR-003-TK/SMP	**Tank/Sump**		
Miscellaneous Structures			
Facility Number	**Description**		
241-C-801	Cesium loadout facility		
216-C-8	French drain		
Valve Pit/Boxes			
Facility Number	**Description**		
241-C	Valve pit located at 9-o'clock position adjacent to tank C-103		
Unknown	Valve box located at 6-o'clock position south of tank C-112		
Unknown	Valve box located at 6-o'clock position south of tank C-111		
Unknown	Valve box located adjacent to C-801 building		

Table 3-1. Waste Management Area C Components. (3 sheets)

Tank Pits	
Facility Number[1]	**Description**
241-C-01A	Pump pit
241-C-01B	Heel pit
241-C-01C	Sluice pit
241-C-02A	Pump pit
241-C-02B	Heel pit
241-C-02C	Sluice pit
241-C-03A	Pump pit
241-C-03B	Heel pit
241-C-03C	Sluice pit
241-C-04A	Pump pit
241-C-04B	Heel pit
241-C-04C	Sluice pit
241-C-05A	Pump pit
241-C-05B	Heel pit (planned to be replaced with a larger riser to accommodate the MARS installation)
241-C-05C	Sluice pit
241-C-06A	Pump pit
241-C-06B	Heel pit
241-C-06C	Sluice pit
Tank Pits	
Facility Number[2]	**Description**
241-C-07	Large riser installation to accommodate the MARS installation
241-C-08	No pit, covered saltwell caisson pump pit
241-C-09	No pit, covered saltwell caisson pump pit
241-C-110	No pit, covered saltwell caisson pump pit
241-C-111	No pit, covered saltwell caisson pump pit
241-C-112	No pit, covered saltwell caisson pump pit
Tank Pits	
Facility Number	**Description**
241-C-201	Jet pump pit
241-C-201	Condenser pit
241-C-202	Jet pump pit
241-C-202	Condenser pit
241-C-203	Jet pump pit
241-C-203	Condenser pit
241-C-204	Jet pump pit
241-C-204	Condenser pit

[1] The pump pits, heel pits, and sluice pits are sometimes labeled as 241-CR-XX-YYY in documentation.

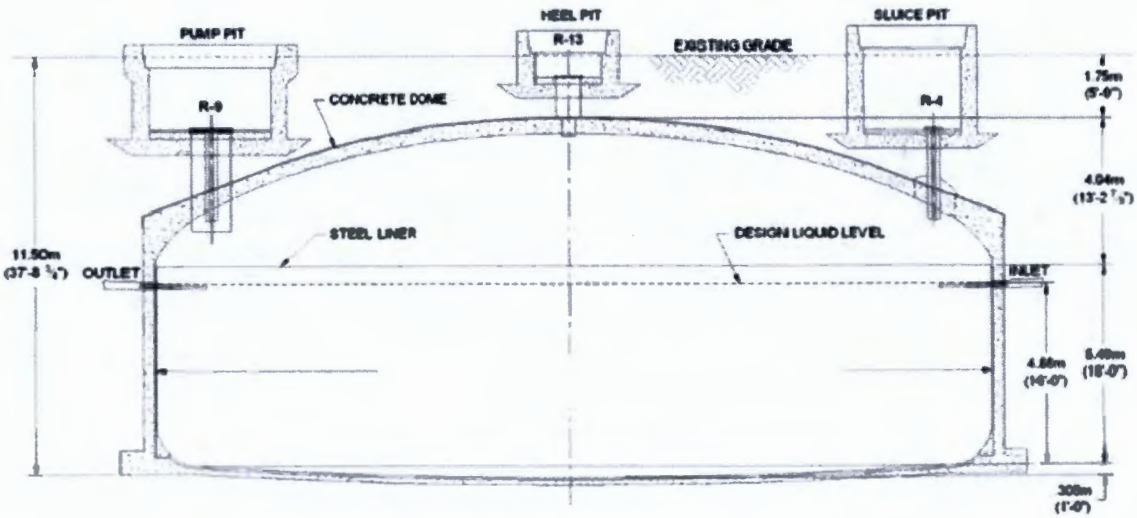
3.2 SINGLE-SHELL TANKS

The 241-C Tank Farm includes twelve 530,000 gallon, 100 Series tanks that are steel lined and are 75 feet in diameter. The 100 Series tanks have a maximum height of 30 feet. These tanks have an operational depth of 15 feet above the center of the dished tank base. Tanks 241-C-101 through 241-C-106 are the only tanks that have concrete pits shown in Figure 3-1. Tanks 241-C-107 through 241-C-112 have centrally located salt well pump pits instead of the concrete pits. Tank pits are located on top of all of the tanks and provide access to the tank, pumps, and monitoring equipment. A large diameter central riser has been installed in tank 241-C-107 and is planned for tank 241-C-105 to accommodate the Mobile Arm Retrieval System installation. The 100 Series tanks are connected in four, three-tank cascade lines. These tanks are connected via a cascade line:

- 241-C-101 through 241-C-103
- 241-C-104 through 241-C-106
- 241-C-107 through 241-C-109
- 241-C-110 through 241-C-112.

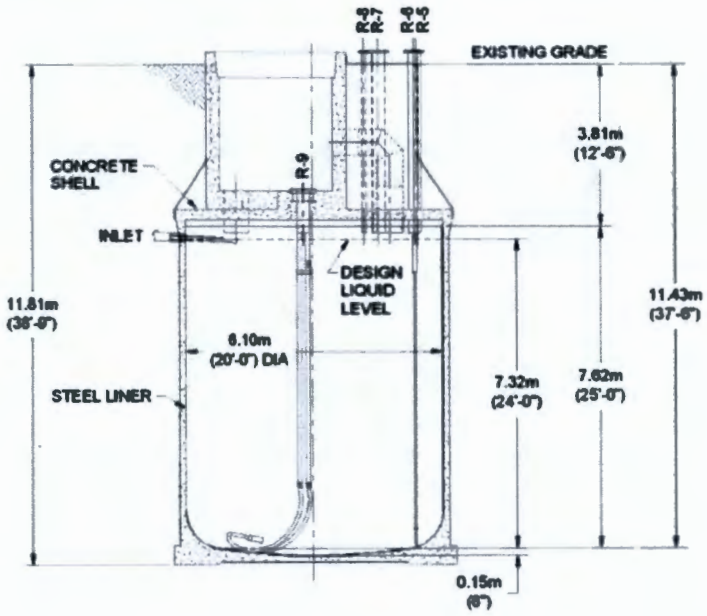
The tank cascade lines are arranged such that each successive receiving tank is 1 foot lower than the preceding feed tank allowing fluids to flow from one tank to another as they are filled. The 100 Series tanks are therefore approximately 22 to 24 ft below the ground surface and covered by approximately 5 ½ feet of soil, which provides shielding from radiation exposure to operating personnel.

Figure 3-1. 241-C Tank Farm 100 Series Tank Cross Section.



The 241-C Tank Farm contains four secondary tanks that are referred to as the 200 Series tanks. These tanks are 20 ft in diameter and have a maximum height of 37 ft. The 200 Series tanks have a 24 foot operating depth and an operating capacity of 55,000 gallons each. Typical 200 Series tank configuration and dimensions are shown in Figure 3-2. The tanks are underground and are covered by 11 feet of soil.

Figure 3-2. 241-C Tank Farm 200 Series Tank Cross Section.



Both the 100 Series and 200 Series tanks were constructed with 3/8 inch, carbon steel bottom lining and ¼ inch carbon steel side lining. There are inlet lines and cascade lines that can be found near the top of the liners penetrating the tank sidewalls. There are pipelines throughout the farm that connect through the sides of the concrete pits on the tops of the tanks. In addition, there are pipelines throughout the farm interconnecting tanks, diversion boxes and the vault.

3.3 ANCILLARY EQUIPMENT

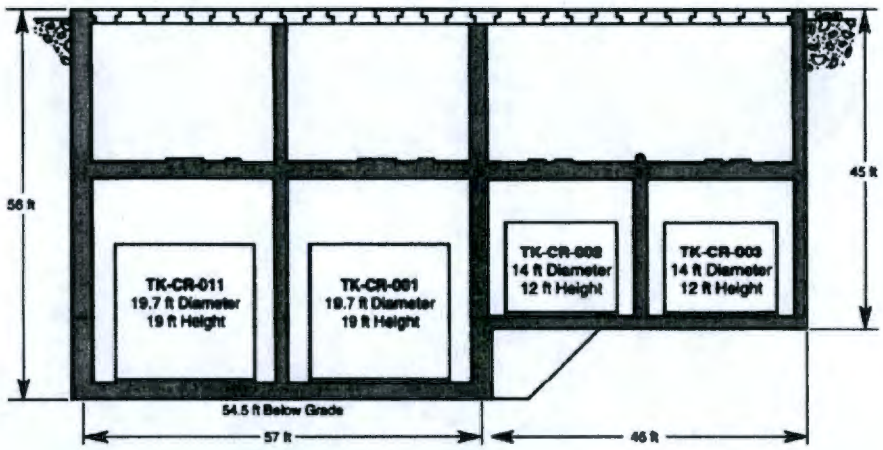
In support of the transfer and storage of waste within WMA C SST tanks, there is a complex waste transfer system that consists of pipelines/transfer lines, diversion boxes, a vault, valve pits, a catch tank, and other structures. Collectively, these are referred to as ancillary equipment.

The 244-CR Vault is located south of the 241-C Farm tanks. The vault is a two-level, multi-cell, reinforced concrete structure constructed mostly below grade, which contains four underground tanks along with overhead piping and equipment. About one foot of the vault is above grade.

The 244-CR Vault contains two 19 foot tall tanks with diameters of 19.7 feet and operating capacities of 45,000 gallons: TK-CR-001 and TK-CR-011. The other two tanks contained in the vault include TK-CR-002 and TK-CR-003. Tanks TK-CR-002 and TK-CR-003 are 12 feet tall; have a 14 foot diameter; and have an operating capacity of 14,700 gallons.

The 242-CR Vault was constructed in 1951 and stopped operating in 1988. Figure 3-3 shows a cross section of 244-CR Vault.

Figure 3-3. 244-CR Vault Cross Section.



The routing of liquid waste from the operations buildings to the tank farms was accomplished using underground piping/transfer lines, diversion boxes, and valve pits.

The diversion boxes are below ground, reinforced-concrete boxes that were designed to contain any waste that leaked from the high-level waste transfer line connections. There are seven diversion boxes located directly in the 241-C Farm labeled:

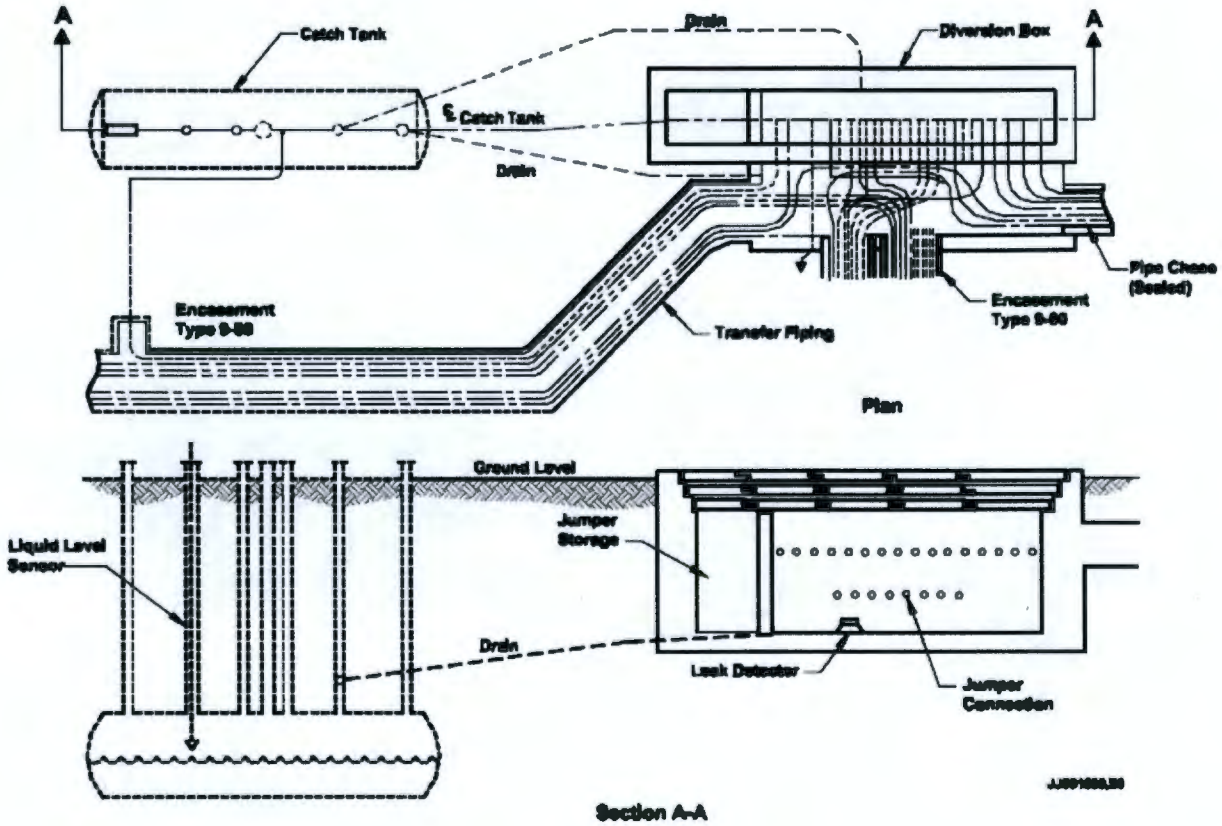
- 241-C-151
- 241-C-152
- 241-C-153
- 241-C-252
- 241-CR-151
- 241-CR-152
- 241-CR-153

Figure 3-4 shows a typical arrangement for diversion boxes within the tank farm. Additional detail on the current configurations, contents, and transfer lines routed into and out of the diversion boxes can be found in RPP-RPT-43427, *241-C Farm Diversion Box Feasibility Study*. RPP-RPT-47167, *241-C Tank Farm – Tank Removal Study* concluded that there is limited

information on the current levels of contamination within the diversion boxes and recommended core drilling through the cover blocks and performing a survey of the current contents.

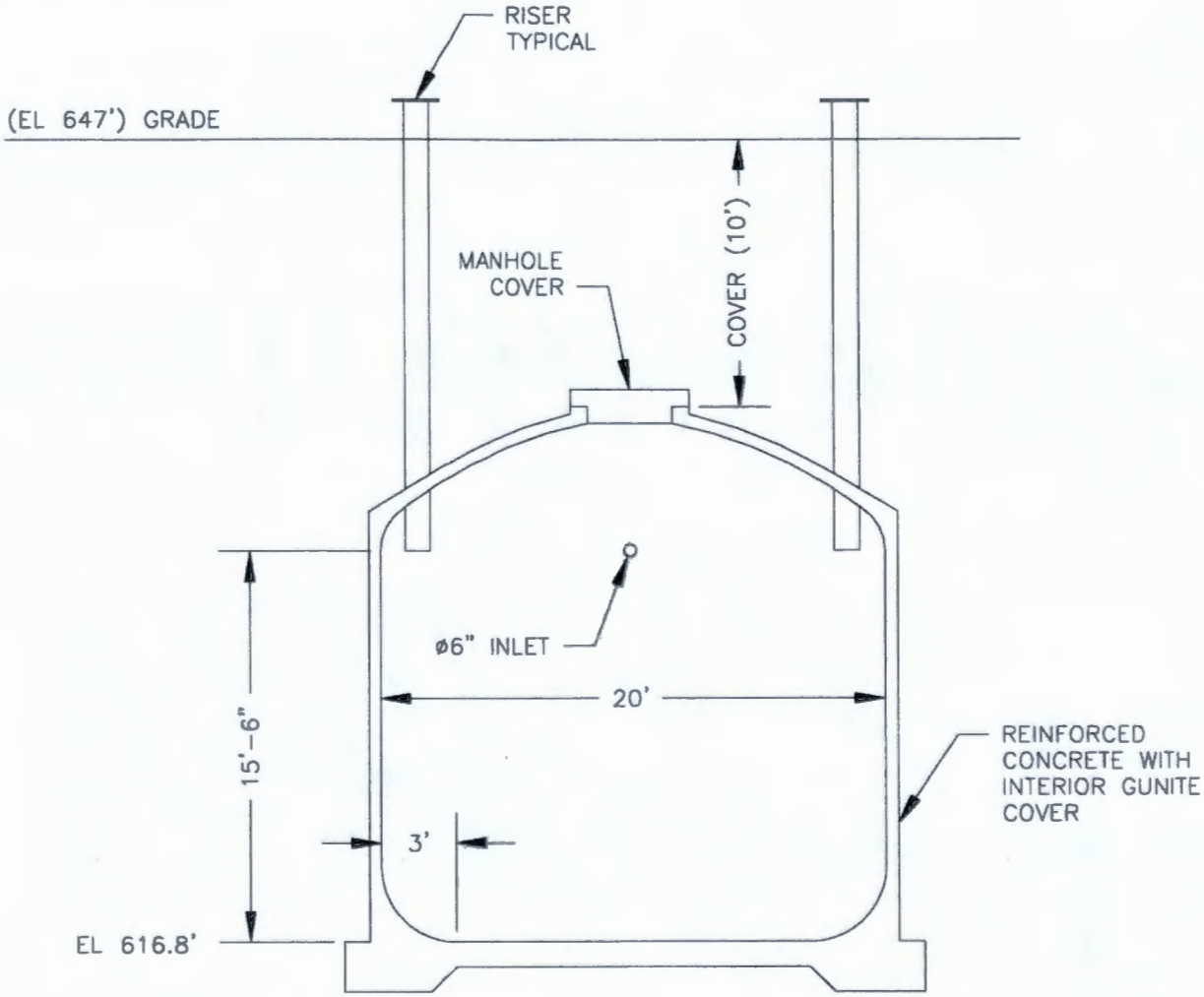
In order for waste to be transferred from one line to another, the diversion boxes contained remote pipeline connectors called jumpers. If waste leaked into a diversion box, gravity drained it to the nearby catch tank where all spilled waste was stored and eventually pumped to the SST tanks. Figure 3-4 shows a diagram of a typical diversion box transfer system.

Figure 3-4. Typical Diversion Box/Catch Tank Arrangement.



Catch Tank 241-C-301 is an underground tank that is located northwest of tank 241-C-112 and is depicted in Figure 3-5. The tank catches waste from the 241-C-151, 241-C-152, 241-C-153, and 241-C-252 diversion boxes. Catch Tank 241-C-301 is constructed of reinforced concrete with 5 inch thick walls and has an outside diameter of 20 ft, 10 inches. The waste volume is reported to be 10,470 gallons in HNF-EP-0182, *Waste Tank Summary Report for Month Ending January 31, 2011*. The catch tank contains approximately 1,400 gallons of liquid waste and 9,000 gallons of solid waste. However, the liquid level has not been monitored since June of 1985. Additional details on Catch Tank 241-C-301 are summarized in RPP-RPT-45723.

Figure 3-5. 241-C-301 Catch Tank Cross Section.



There are three valve boxes and one valve pit within WMA C. The valve boxes and valve pit contain valve assemblies that were used for routing the liquid waste through transfer lines. There is a valve box associated with the 241-C-801 cesium load-out facility; one on the south side of 241-C-112, another located on the south side of 241-C-111, and the valve pit is positioned next to 241-C-103. This valve pit is a below ground culvert with a reinforced-concrete floor with a drain to 241-C-103.

There is a complex network of piping systems within the 241-C Tank Farm that were constructed over the operational life of the farm. There is a total of approximately 8 miles of pipeline within the boundaries of the tank farm.

Other large structures include:

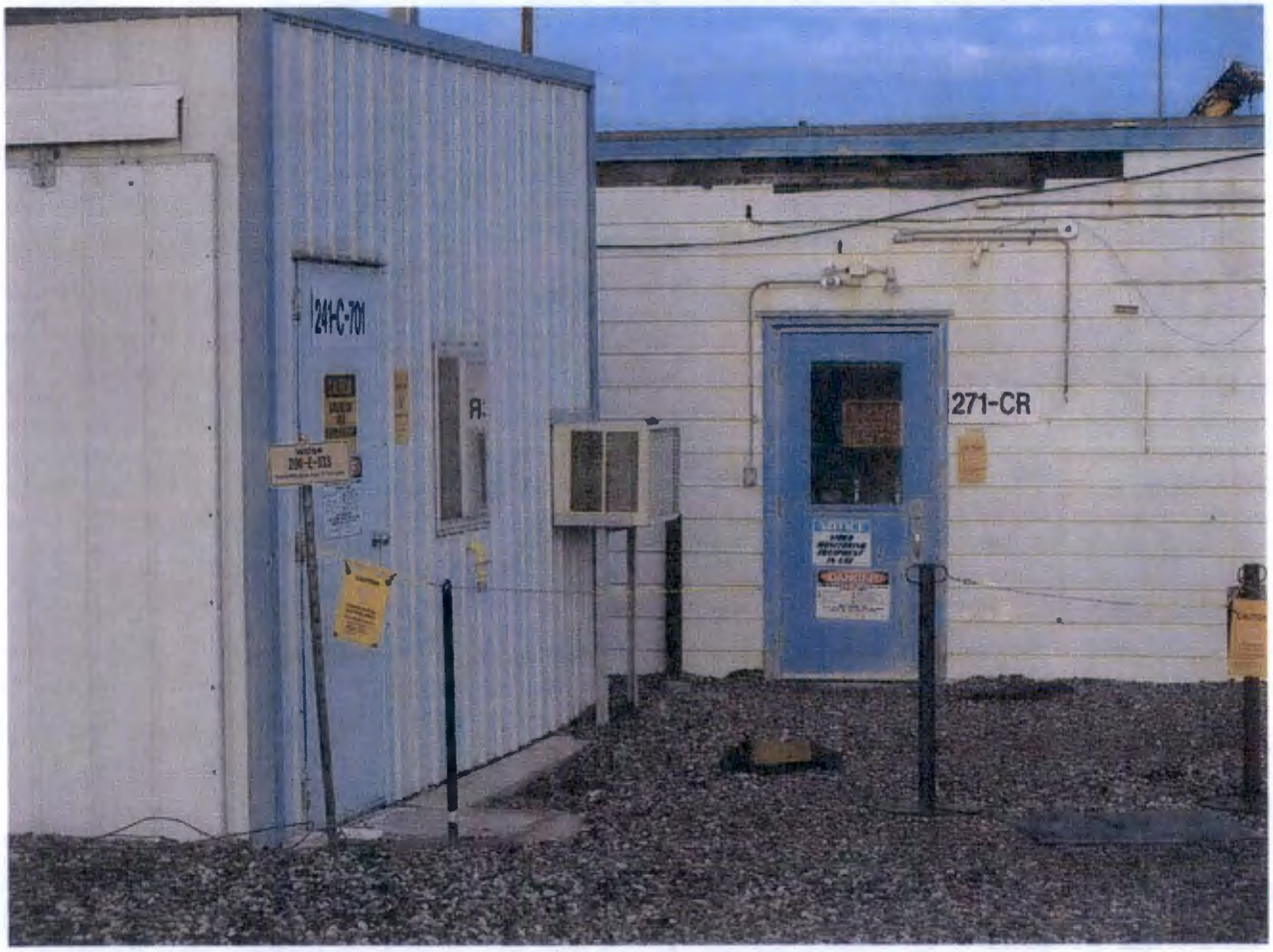
- Building 241-C-801
- 271-CR building
- 271-CR annex
- 216-C-8 French drain.

In 1962, building 241-C-801 was constructed to enable recovery of cesium (^{137}Cs) from plutonium uranium extraction of high level waste solutions and shown in Figure 3-6. The 241-C-801 Building was used from 1963 through 1968 to load cesium. The cask loading area within the 241-C-801 Building has a drain line connecting to the valve pit. The valve pit and cask loading area have separate drain lines connecting to a drywell located outside of the tank farm fence (drawings H-2-4573, *Engineering Flow Diagram, Cesium Loadout Facility*, and H-2-4554, *Plot Plan – Roads Drawing Schedule, Cesium Loadout Facility*). This drywell is located approximately 75 feet north of the 241-C-801 Building, outside the tank farm fence (DOE/RL-88-30, *Hanford Site Waste Management Units Report*, Rev. 16, page 659). No record was located that provides information on the volume and types of wastes potentially discharged to this drywell. An unknown amount of waste along with decontamination solutions may have been discharged to this drywell as a result of operations conducted at the 241-C-801 Building.

Figure 3-6. 241-C-801 Building Photograph.

A micro-pilot plant was installed in the 271-CR Building and is shown in Figure 3-7. The micro-pilot plant was operated from January 1960 through April 1963 to evaluate activated carbon and ion exchange materials for separating organics and fission products from the 241-A Tank Farm Process Condensate (TFPC). The micro-pilot plant was shut down in April 1963 and replaced by an engineering-scale pilot plant that was constructed from 1962 through September 1963 in an annex building adjacent to the 271-CR Building. The engineering-scale pilot-plant in the 271-CR Annex was operated from September 1963 through March 1965 and included a steam stripper, a vertical leaf filter, an electrodialysis unit and a thin bed ion exchanger (Letter 7G420-MEJ-06-007, "Waste Discharged to the 216-C-8 Crib").

Figure 3-7. 271-CR Building Photograph.



Floor and process drains in the 271-CR Building and 271-CR Annex connected to an underground vitrified clay pipeline that discharged to the 216-C-8 French Drain. Letter 7G420-MEJ-06-007 summarizes the analyses of the TFPC waste stream located in reference documents as well as the various tests conducted in the 271-CR Building and 271-CR Annex.

Although process records are incomplete, a minimum of 31,780 gallons of treated TFPC waste was discharged to French Drain 216-C-8 from January 1960 through March 1965.

French Drain 216-C-8 is located southeast of the 241-C Tank Farm, outside the tank farm perimeter fence. The French Drain 216-C-8 is composed of a 6 foot diameter by 8 foot long concrete culvert, placed vertically 4 feet below grade. The culvert is filled with gravel. It was placed into an 8 foot diameter by 16 foot deep excavation. A 2 inch diameter steel vent pipe was placed vertically through the center of the culvert and extended 3 feet above the surface. The above grade portion of the pipe has been removed. An underground feed pipe entered near the top of the culvert.

The start date of operation for French Drain 216-C-8 was January 1960 and the end date was June 1965. French Drain 216-C-8 received radioactively contaminated ion exchange waste from the 271-CR building.

The French Drain 216-C-8 surface was stabilized in April 1991. The area was surveyed and posted as Underground Radioactive Material in 1992. By June 2001, the French Drain 216-C-8 location was no longer marked or posted. The area was recently covered with gravel during road construction in the vicinity of 7th Street and Buffalo Avenue.

The 2607-EG Septic Tank and associated drain field are designed to accept sanitary sewer effluent from the 271-CR Building. The 2607-EG Septic Tank is associated with the 241-C Tank Farm and the 271-CR Building. The 2607-EG Septic Tank is listed in the TPA, Appendix B under Operable Unit 200-PO-3; however, it is not specifically listed in the Part A Permit Application.

The 2607-EG Septic Tank is located in a radiation zone. The unit lies southeast of the 241-C Tank Farm and northeast of the 271-CR Building. The 2607-EG Septic Tank is marked by a large diameter, vertical concrete pipe. The associated drain field has a capacity of 619 gallons per day. The current flow rates to the 2607-EG Septic Tank are unknown. However, the 2607-EG Septic Tank received sanitary sewer effluent from the 271-CR Building at a rate of 6 cubic feet per day in 1987.

The 2607-EG Septic Tank operation start date was 1953. The unit was replaced in 1972. The 2607-EG Septic Tank was scheduled to be abandoned in the year 1999.

4.0 MISCELLANEOUS ABOVE GRADE EQUIPMENT

In addition to the components listed in Table 3-1, other operational components will need to be addressed as part of closure. These components include utility supply lines, waterlines, ventilation systems, and temporary facility components such as mobile trailers. The above grade components will need to be deactivated and decommissioned. The below grade components will need to be evaluated for closure.

There is a significant amount of above grade equipment with the 241-C Tank Farm. Figure 4-1 shows the ventilation ductwork, temporary construction tents, work platforms, support stands, and other miscellaneous components. The amount of above grade equipment is expected to increase as additional waste retrieval and transfer systems are installed. Most of this equipment will require removal.

Figure 4-1. Miscellaneous Above Grade Equipment.

5.0 LEAK DETECTION

The 241-C Tank Farm and surrounding area will need to be addressed during closure. The features to be closed include:

- 70 drywells
- 11 groundwater monitoring wells.

Each 100 Series tank is surrounded by several boreholes in which radiometric instruments were used to detect changes in activity levels in the sediments surrounding the boreholes. WMA C has over 71 leak detection drywells that were drilled from 1944 to 1982. The depth ranges for most of these drywells are between 100 and 150 feet below ground surface. There are also 11 groundwater monitoring wells that have been drilled in this area surrounding WMA C. Table 5-1 provides the groundwater monitoring well attributes to support post-closure monitoring and maintenance.

Table 5-1. Waste Management Area C Groundwater Monitoring Well Attributes.

Well Name	Construction Date	Top of Casing (amsl)	Ground Surface (amsl)	Casing Stickup (ft)	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Depth to Water (ft bgs)	Water Level Date	Water Column in Well[a] (ft)	Water Level Elevation (amsl)
299-E27-4	2003	674.43	671.53	2.90	270.3	305.3	271.1	3/30/2009	34.2	400.43
299-E27-7	1982	638.23	636.89	1.35	241.0	281.0	236.8	3/30/2009	44.2	400.09
299-E27-12	1989	664.52	661.22	3.30	246.5	267.6	260.7	3/24/2009	6.9	400.52
299-E27-13	1989	672.29	669.57	2.72	253.6	274.7	269.4	3/13/2009	5.3	400.17
299-E27-14	1989	661.91	658.91	3.00	245.8	266.8	258.5	3/24/2009	8.3	400.41
299-E27-15	1989	656.24	653.41	2.83	238.0	259.0	253.5	3/30/2009	5.5	399.91
299-E27-155	2007	684.10	681.36	2.74	300.46	335.46	281.2	3/9/2009	54.26	400.16
299-E27-21	2003	674.95	672.55	2.40	271.4	306.4	272.2	3/30/2009	34.2	400.35
299-E27-22	2003	634.46	631.56	2.9	228.05	268.02	231.1	3/30/2009	36.92	400.46
299-E27-23	2003	677.69	674.73	2.96	273.51	308.54	274.4	3/30/2009	34.14	400.33
299-E27-24	2010	667.79	665.15	2.64	294.58	314.59	265.26	6/8/2010	49.33	399.89
299-E27-25	2010	615.95	612.85	3.10	209.14	229.16	216.72	9/13/2010	12.44	396.13

amsl – above mean sea level

bgs – below ground surface

a –The water column depth is measured from the bottom of the screen to the water table surface. In some of these wells, the casing exists below the bottom of the screen section creating a reservoir. This portion is not included in the water column depth.

6.0 SOIL CONTAMINATION

The 241-C Tank Farm and surrounding area will need to be addressed during closure. The structures and features to be closed include 14 recorded unplanned releases (UPR).

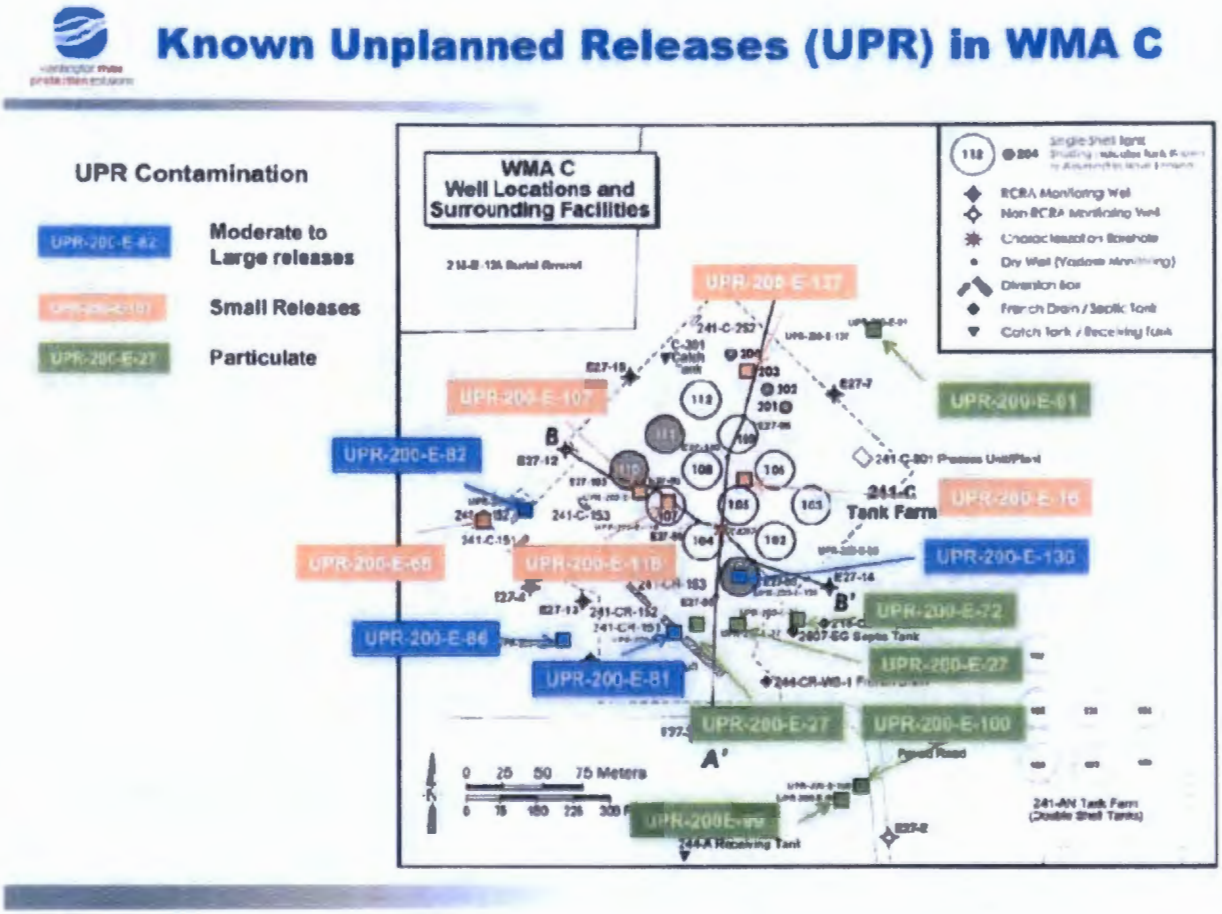
There is a significant amount of historical information regarding soil contamination in the 241-C Tank Farm. The most current inventory estimates for soil contamination for post-retrieval and closure conditions are provided in RPP-RPT-42294, *Hanford Waste Management Area C Soil Inventory Estimates*. Contaminant inventories by source are provided in RPP-RPT-42294, Appendix C.

In the upper 15 feet of the tank farm, the following generalizations have been made with respect to Cs-137 contamination (worker exposure contaminant of concern):

- Cs-137 concentration in drywells is generally below 1×10^{-10} curies per gram (100 picocuries per gram [pCi/g]) in the top 15 feet of soil in tank farm area in WMA C. There are also localized areas within the tank farm that have high levels of contamination.
- The estimated Cs-137 inventory in the top 15 feet of soil is about 20 curies (Ci) assuming the entire area encompassed by the tanks in the farm is contaminated (RPP-RPT-42294).
- Small inventory compared to 20,000 Ci estimated for tank and UPR sites.

Figure 6-1 shows the location and the relative size of the UPR sites associated with the 241-C Tank Farm. Note that some of these UPR sites are outside of the 241-C Farm fence line.

Figure 6-1. Unplanned Releases in Waste Management Area C.



7.0 TANK AND ANCILLARY EQUIPMENT INVENTORY

Inventory estimates for waste tank and ancillary equipment are taken from RPP-PRT-42323, *Hanford C-Farm Tank and Ancillary Equipment Residual Wastes Inventory*. This report provides estimates based on knowledge of tank farm inventories as of January 1, 2009. These inventories are based on current knowledge that includes waste volume measurements and estimates. Inventories are also based on analysis of tank samples and process knowledge estimates of tank waste composition, including analysis of tank waste residuals for tanks retrieved as of January 1, 2009. Projected residual estimates are based on assumptions for the amount of waste that will be retrieved prior to closure and the composition of waste remaining in tanks and ancillary equipment.

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APPENDIX A

WASTE MANAGEMENT AREA C

CARGO CONTAINER-1
MO-117
291-CR
MO-596
TRAILER 285
TRAILER 284
MO-529
241-C-701
241-CR-271
TK-CR-004
244CR VAULT
MO-522
BANG BOX 3
271-CR
244CR EVAP COOL TOWER
241-C-801
241-CR-151
272-C
MO-822
241-C-103
241-C-102
241-C-101
241-CR-152
241-CR-153
CC CO-HRA-036
CARGO CONTAINER-2
241-C-91
MO-826
MO-524
CC0854
241-C-106
241-C-105
MO-531
UPR-86
241-C-201
MO-211
R-1361
PANEL C-PDP-1
RECTIFIER PAD
241-C-51
BANG BOX 1
BANG BOX 2
241-C-51B
241-C-51A
NITROGEN GAS CONTROL
241-C-109
241-C-108
241-C-107
241-C-153
CC-3
241-C-202
TRANSFORMER T1
CC0856
POR840WT-SUS-001
SECONDARY SUBSTA
2 CARGO CONTAINERS (5&6)
MO-525
MO-523
241-C-151
241-C-112
241-C-203
CC0855
241-C-204
241-C-73
UPR-82
SHED
POR77-WT-WSD-001
WATER SUPPLY SKID
241-C-301
241-C-152
TRAILERS (1-4)
POR75-WT-CASD-001
COMPRESSOR
MO-512
CHANGE TRAILER
241-C-252
POR85-WT-TRLR-001
CONTROL TRAILER
CC-4
CONSTRUCTION STORAGE AREA
C-200 BREAK TRAILER