



Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

19-AMRP-0077

SEP 03 2019

Ms. Alexandra K. Smith, Program Manager
Nuclear Waste Program
Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Dear Ms. Smith:

SUBMITTAL OF SUPPLEMENTAL INFORMATION TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) PERMIT RENEWAL (REVISION 9) APPLICATION FOR THE 241-CX TANK SYSTEM, CLOSURE UNIT GROUP 15, ADDENDUM H, CLOSURE PLAN

The U.S. Department of Energy Richland Operations Office (herein after referred to as the Permittee) submit 241-CX Tank System, Closure Unit Group 15 (CUG-15), Addendum H, Closure Plan with certification statement, pursuant to the Washington Administrative Code (WAC) WAC 173-303-840(1)(b) to support the Hanford Facility RCRA Permit, Revision 9, renewal. The purpose of this action is to clarify, modify, or supplement information previously submitted.

The Permittee has worked with your office on the content of the Closure Plans which represents the Permittee's intent to operate pursuant to Revision 9 of the Hanford Facility RCRA Permit upon the effective date of the permit. This supplemental information may not reflect current facility configurations and /or applicable permit conditions enforceable under the Hanford Facility RCRA Permit Revisions 8C. In accordance with WAC 173-303-806(7), the Permittees will comply with the Revision 8C of the Hanford Facility RCRA Permit until the effective date of Revision 9 of the Hanford Facility RCRA Permit.

Ms. Alexandra K. Smith
19-AMRP-0077

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SEP 03 2019

If you have any questions, please contact me or your staff may contact Bill Hamel, Assistant Manager for the River and Plateau, on (509) 373-9971.

Sincerely,



Brian T. Vance
Manager

AMRP:DBC

Attachments:

1. Certification for 241-CX Tank System, CUG-15, Addendum H, Closure Plan
2. 241-CX Tank System, CUG-15, Addendum H, Closure Plan

cc w/attachs:

J. L. Cantu, Ecology
D. R. Einan, EPA
D. Thompson, Ecology
N. M. Menard, Ecology
Administrative Record (TSD: S-2-9)
Ecology NWP Library
Environmental Portal
HF Operating Record (J. K. Perry, MSA)

cc w/o attachs:

D. B. Bartus, EPA
J. Bell, NPT
R. Buck, Wanapum
L. Contreras, YN
R. E. Day, CHPRC
M. Johnson, CTUIR
T. Liebrecht, Ecology
K. Niles, ODOE
S. N. Schleif, Ecology

241-CX TANK SYSTEM WASTE MANAGEMENT UNIT, CLOSURE UNIT GROUP 15 (CUG-15), ADDENDUM H, CLOSURE PLAN

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

**P.O. Box 1600
Richland, Washington 99352**

241-CX TANK SYSTEM WASTE MANAGEMENT UNIT, CLOSURE UNIT GROUP 15 (CUG-15), ADDENDUM H, CLOSURE PLAN

Date Published
July 2019

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Assistant Secretary for Environmental Management

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Plateau Remediation Company
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Richland, Washington 99352

APPROVED

By Lynn M. Ayers at 9:32 am, Jul 11, 2019

Release Approval

Date

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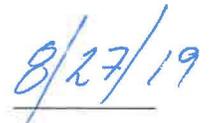
**Certification
for
Supporting Permit Application Material for Part V – Closure Units, 241-CX Tank
System Waste Management Unit, Closure Unit Group 15 (CUG-15), Addendum H,
“Closure Plan”**

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”



L. Ty Blackford, President and CEO
Co-Operator
CHPRC
Richland, Washington

Signature



Date

**Certification
for
Supporting Permit Application Material for Part V – Closure Units, 241-CX Tank
System Waste Management Unit, Closure Unit Group 15 (CUG-15), Addendum H,
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“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Brian T. Vance, Manager
Owner/Operator
U.S. Department of Energy
Richland Operations Office



Signature

8/30/19

Date

Addendum H

Closure Plan

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Terms

bgs	below ground surface
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
OU	operable unit
PUREX	plutonium uranium extraction
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
REDOX	reduction-oxidation

2

H1 Introduction

This addendum discusses closure activities for the 241-CX Tank System, which consists of the 241-CX-70, 241-CX-71, and 241-CX-72 underground tanks. The 241-CX Tank System is located in the eastern portion of the 200 East Area (Figure H1). This closure plan addresses the requirements of WAC 173-303-610(2) through (6), “Dangerous Waste Regulations,” “Closure and post-closure,” and WAC 173-303-640, “Tank systems,” as applicable to the physical components of the 241-CX Tank System.

The 241-CX Tank System (process code S02) was used for reduction-oxidation (REDOX) and plutonium uranium extraction (PUREX) process pilot studies and for process waste self-concentration studies at the 201C Hot Process Building. The underlying soil in the vicinity of the 241-CX Tank System is contaminated with a mixture of constituents released from other solid waste management units or areas of concern. These constituents are subject to the dangerous waste requirements of WAC 173-303 and the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The underlying groundwater is contaminated with a mixture of contaminants subject to CERCLA.

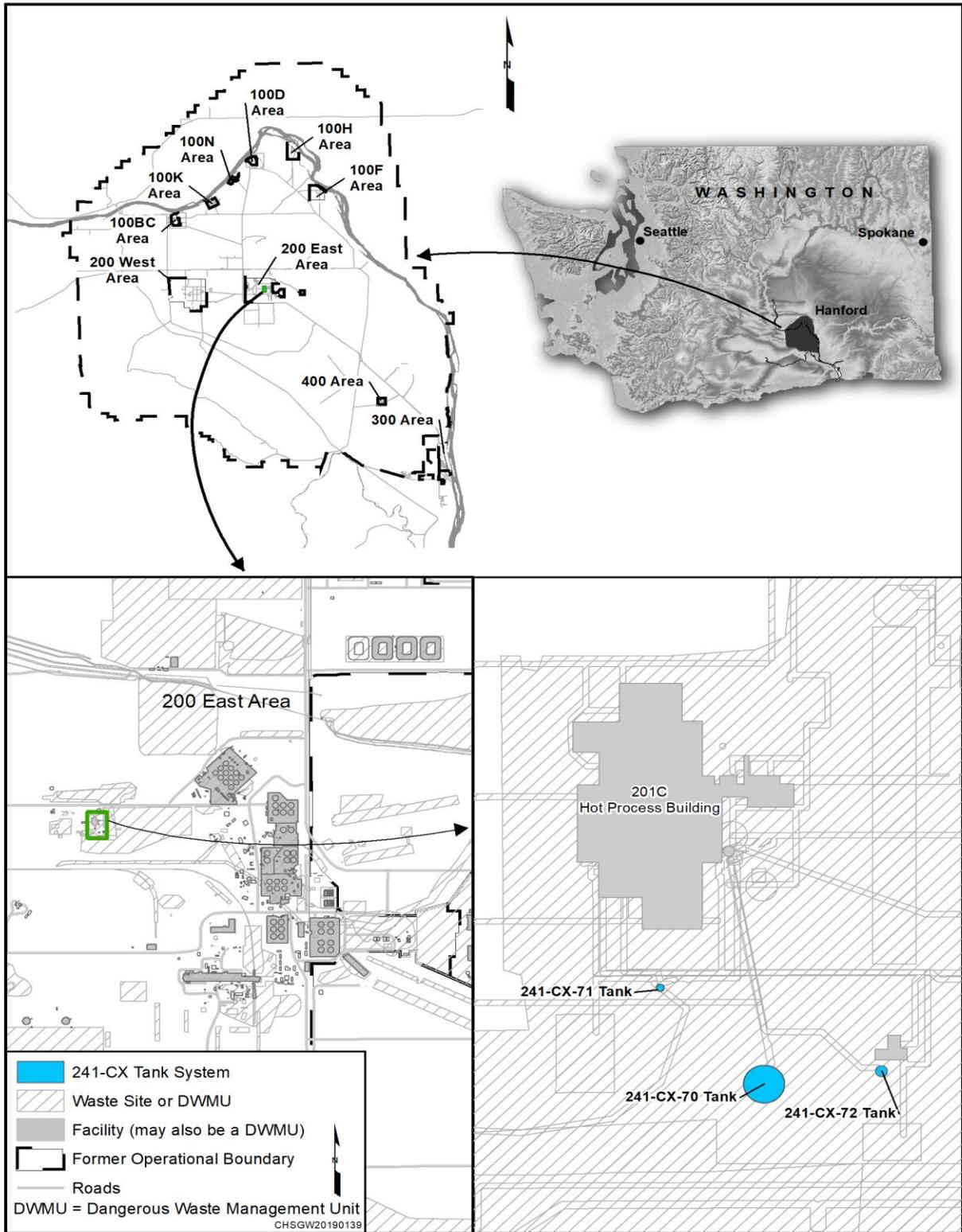
Dangerous waste closure processes will be coordinated through the integrated *Resource Conservation and Recovery Act of 1976* (RCRA)-CERCLA past-practice process for consistency in the remedy selection process, as described in Section 5.0 of Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order Action Plan* (hereinafter called the Tri-Party Agreement Action Plan). The closure decision for the 241-CX Tank System physical components (Section H1.1) will be made together with the remedial action decisions for the 200-IS-1 Operable Unit (OU). Consistent with Section 5.5 of the Tri-Party Agreement Action Plan, groundwater contamination beneath the 241-CX Tank System will be addressed through the remedial action decision process for the 200-BP-5 OU (Figure H2).

H1.1 Physical Description

The 241-CX-70 Tank consists of an underground vertical, cylindrical, concrete tank that has a 6.1 m (20 ft) diameter, 4.6 m (15 ft) height, and 113,550 L (30,000 gal) design capacity. The concrete ranges from ~23.0 to 30.5 cm (9 to 12 in.) thick and has a 0.64 cm (0.25 in.) stainless steel liner. The top of the tank is ~3.4 m (11 ft) below ground surface (bgs). The tank has one manhole and nine riser pipes extending from the top of the tank to a point below ground surface. All riser pipes have been regasketed and capped with blind flanges (Figure H3; BHI-01173, *Auditable Safety Analysis for Surveillance and Maintenance of the 241-CX Tank System*; H-2-4319, *Hot Semiworks Tanks Sections TK-70*).

The 241-CX-71 Tank consists of an underground vertical, cylindrical, stainless steel tank that has a 1.5 m (5 ft) diameter, 2.1 m (7 ft) height, and 3,785 L (1,000 gal) design capacity. The tank is built on a reinforced concrete foundation, and the top of the tank is ~1.1 m (3.5 ft) bgs. Two stainless steel vent pipes extend from the top of the tank to above ground surface (Figure H4; BHI-01173).

The 241-CX-72 Tank consists of an underground vertical, cylindrical, carbon steel tank. The tank has a 1.0 m (3.3 ft) diameter, 11 m (36 ft) height, and 8,800 L (2,300 gal) design capacity. The top of the tank is ~4.3 m (14 ft) bgs, and two riser pipes and one dry well extend from the top of the tank into an upper caisson (Figure H5; BHI-01173).



1
2

Figure H1. Site Location Map

H.3

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2

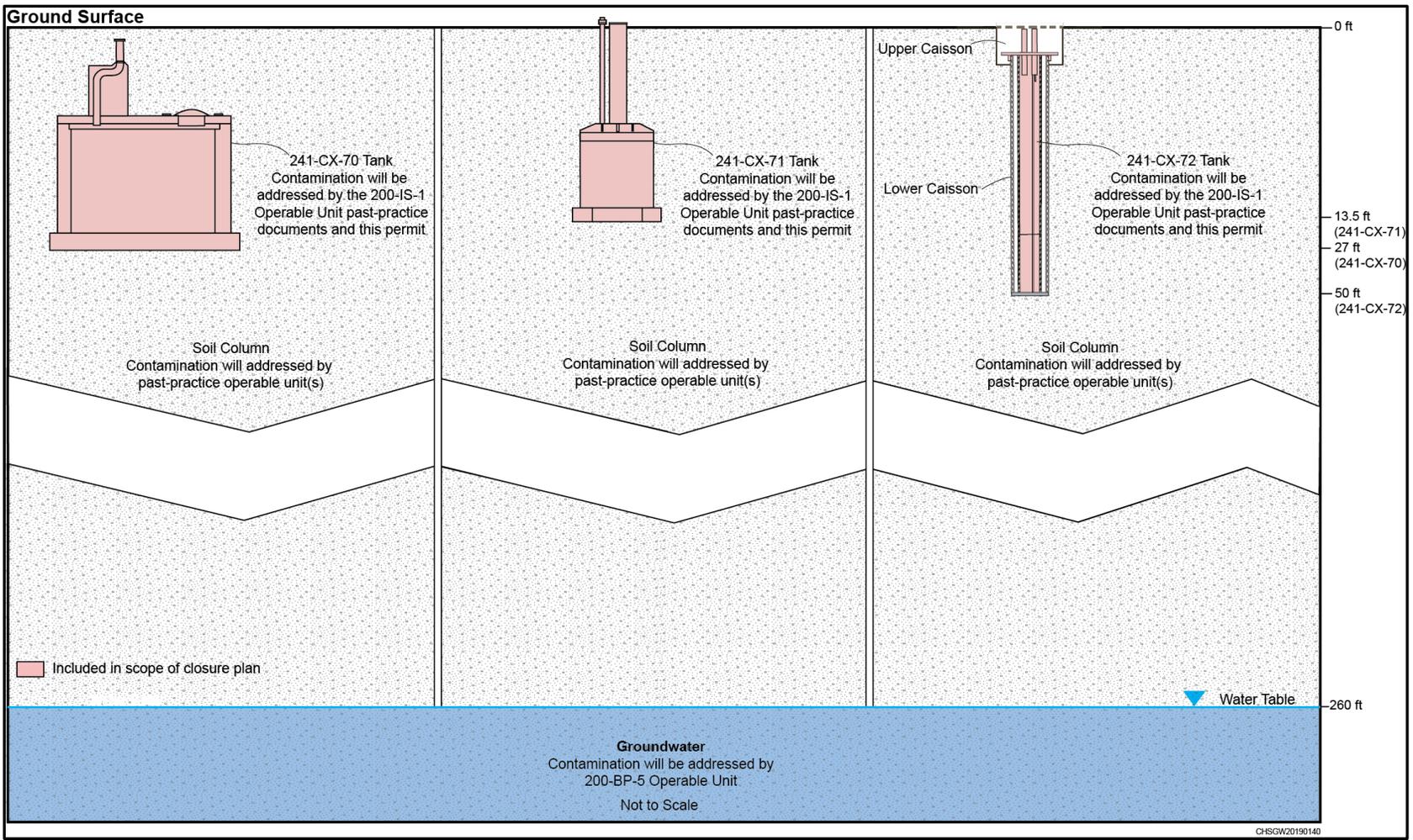


Figure H2. Scope of the 241-CX Tank System Closure Plan and OU Elements

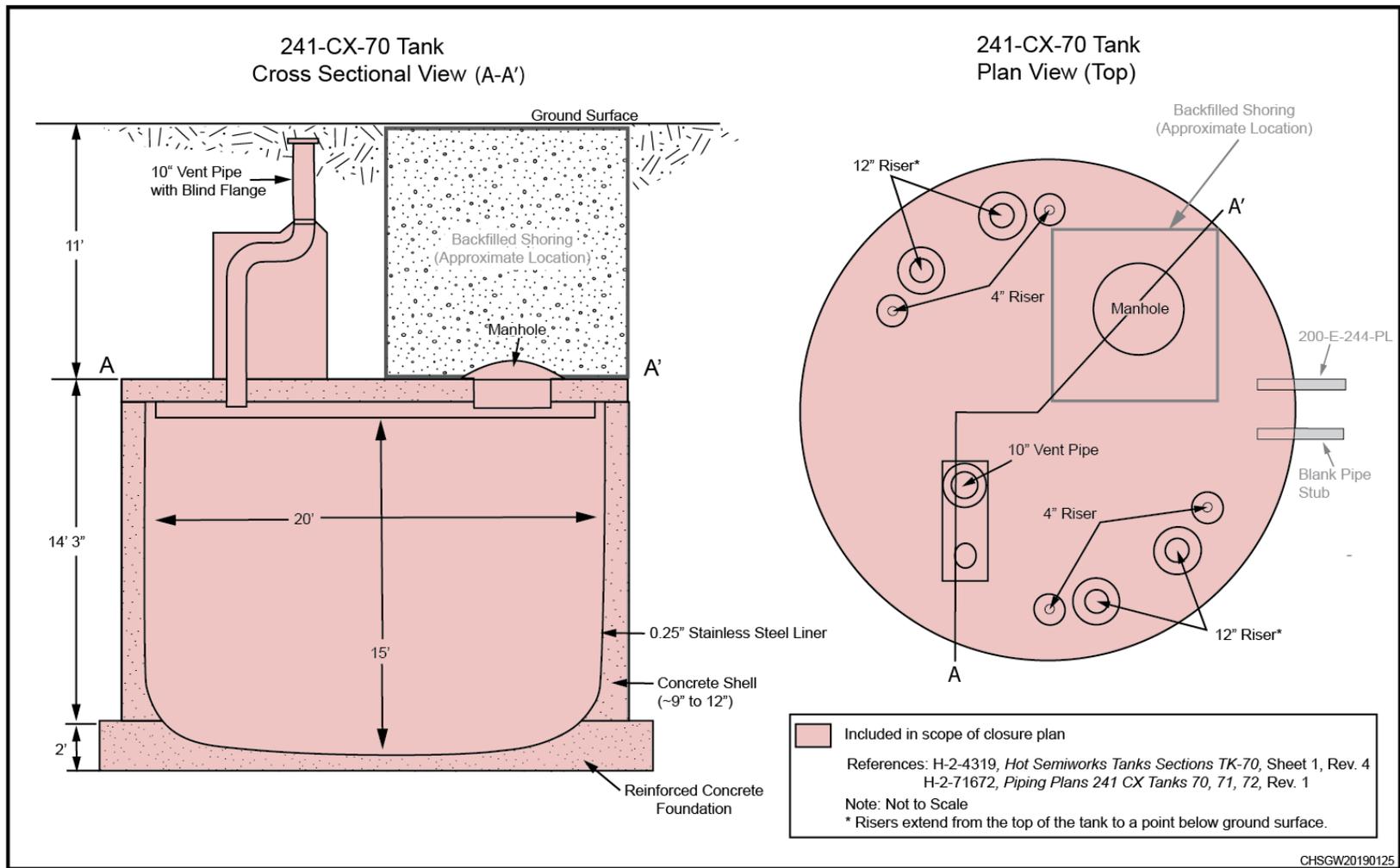
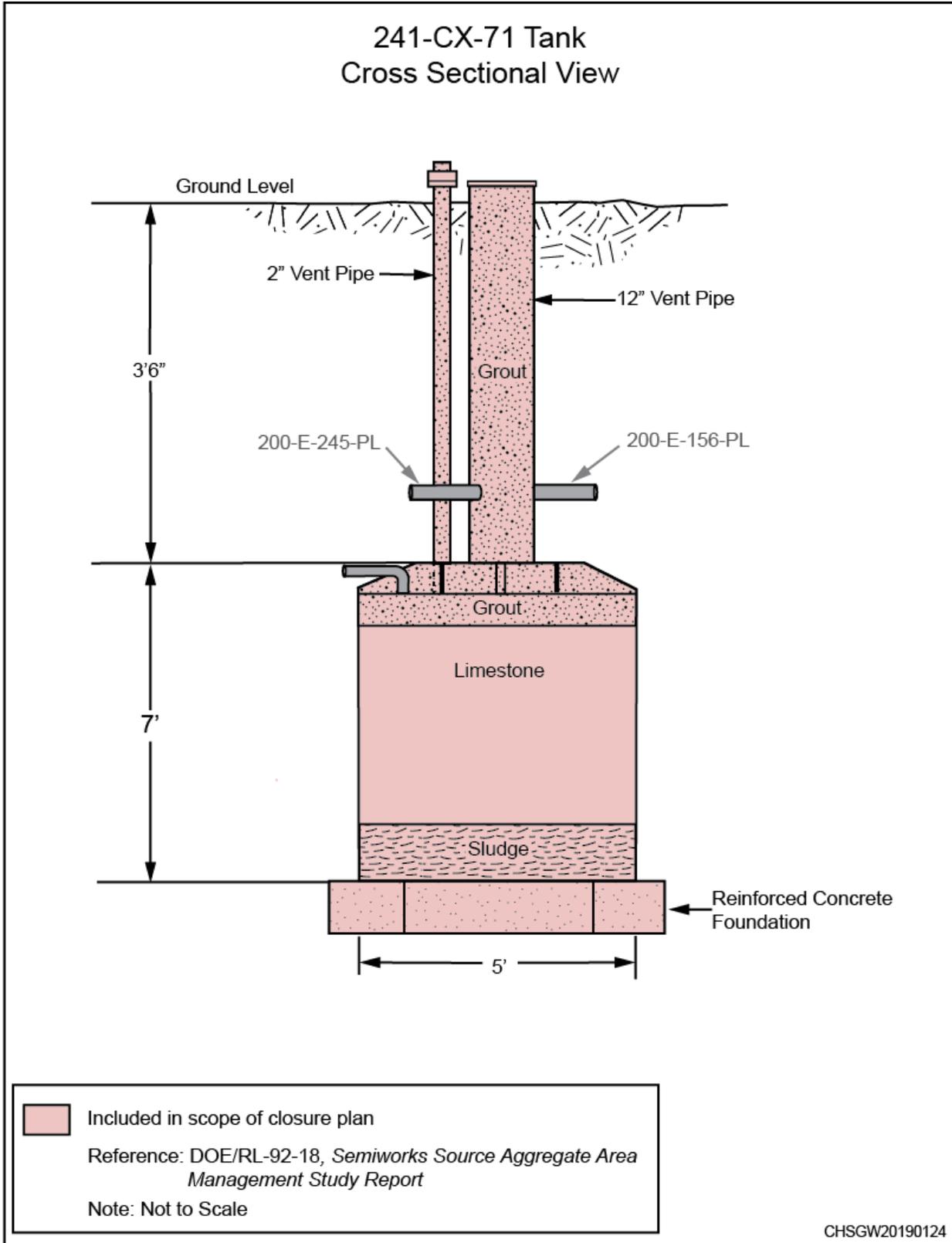
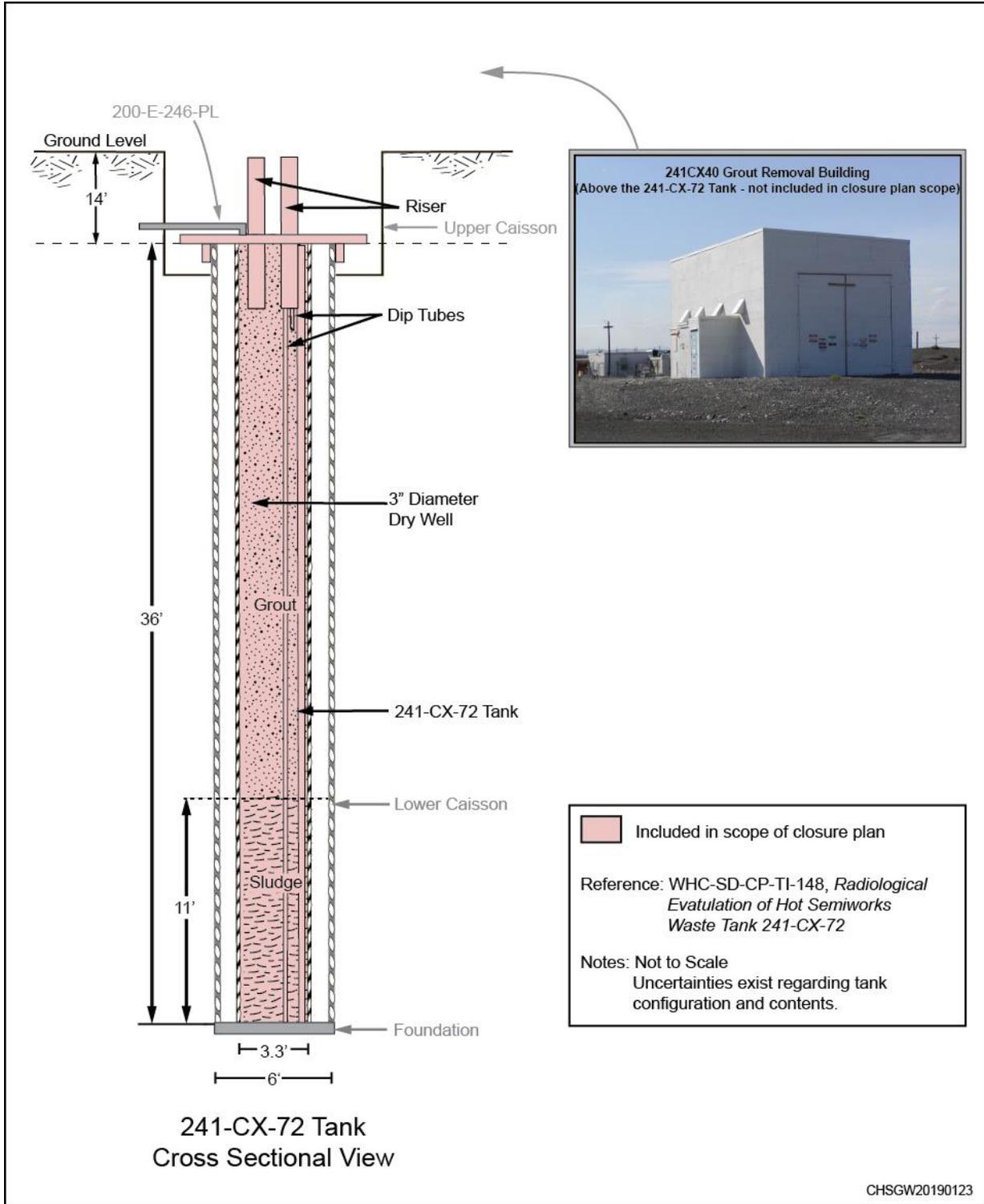


Figure H3. Construction Diagram of the 241-CX-70 Tank



1
2

Figure H4. Construction Diagram of the 241-CX-71 Tank



1
 2

Figure H5. Construction Diagram of the 241-CX-72 Tank

1 **H1.2 Process Information**

2 The 241-CX-70 Tank received REDOX mixed waste from process pilot studies. The REDOX mixed
 3 waste, which was generated by solvent extraction to remove uranium and plutonium, included residual
 4 silicon, iron, chromium, and zirconium compounds and spent solvents (e.g., hexone) from ion-exchange
 5 processing of REDOX supernatant. The 241-CX-71 Tank received and neutralized 201C Hot Process
 6 Building acidic process condensate and condenser cooling water from REDOX and PUREX processes.
 7 After PUREX operations ended, the 241-CX-71 Tank received ammonia and acid-based decontamination
 8 fluids. The 241-CX-72 Tank received PUREX mixed waste from process pilot studies. The waste was
 9 generated by solvent extraction to remove uranium and plutonium and was used for self-concentration
 10 studies through heat application (WHC-SD-EN-ES-019, *Semiworks Aggregate Area Management Study*
 11 *Technical Baseline Report*).

12 **H1.3 Waste Inventory and Characteristics**

13 The 241-CX-70 Tank received waste from 1952 to 1953, the 241-CX-71 Tank received waste from 1952
 14 through 1957, and the 241-CX-72 Tank received waste from 1957 through 1958. Table H1 identifies the
 15 constituents and estimated annual quantities of waste for the 241-CX-70, 241-CX-71, and 241-CX-72
 16 Tanks.

Table H1. Estimated Annual Quantity of Constituents for the 241-CX-70, 241-CX-71, and 241-CX-72 Tanks

Waste Constituent (Dangerous Waste Number)	Estimated Annual Quantity of Waste (lb)
241-CX-70 Tank	
Corrosive Acids and Caustics (D002)	19,000
Chromium (D007)	Included with above
241-CX-71 Tank	
State-Only Dangerous Waste (WT02)	33,400
241-CX-72 Tank	
Corrosive Acids and Caustics (D002)	19,530
Arsenic (D004)	Included with above
Barium (D005)	Included with above
Cadmium (D006)	Included with above
Chromium (D007)	Included with above
Lead (D008)	Included with above
Mercury (D009)	Included with above
Selenium (D010)	Included with above
Silver (D011)	Included with above

Source: Addendum A (Part A Form).

H2 Groundwater Monitoring

The 241-CX Tank System is not a regulated unit (WAC-173-303-040, “Definitions”). As such, RCRA interim status groundwater monitoring is not required.

H3 Closure Performance Standards

Closure of the 241-CX Tank System will meet WAC 173-303-610(2)(a) closure performance standards. Review of available records indicates no evidence of releases from the 241-CX Tank System, but the 241-CX Tank System is situated among other solid waste management units where releases to the soil column have occurred. If evidence becomes available indicating that releases from the 241-CX Tank System have occurred, the permittee may request alternative requirements protective of human health and the environment in accordance with WAC 173-303-610(1)(e). Numerical closure performance standards for constituents listed in Table H1 shall be included in a revised closure plan prior to initiating closure activities.

H4 Closure Activities

The 241-CX-70 Tank was decommissioned beginning in 1979 when liquid waste was removed and pumped to the double-shell tank farms. The remaining sludge waste was sluiced and pumped to the double-shell tank farms from September 1987 to August 1988; and from September to December 1991, residual waste was vacuumed from the tank and placed in drums for eventual transport to the 224T Transuranic Storage and Assay Facility. The 241-CX-70 Tank was confirmed empty in 1992 (WHC-SD-DD-TI-071, *Facility Decommissioning Report for Tank 241-CX-70*). In 2004 and 2016, wooden shoring built above the 241-CX-70 Tank to support decommissioning collapsed, resulting in soil subsidence above the tank. Both collapses were backfilled and stabilized. When operational, the 241-CX-70 Tank received waste via the 200-E-244-PL pipeline, which was cut and capped inside the south wall of the 201C Hot Process Building in 1986 (Figure H3; H-2-71672).

The 241-CX-71 Tank and vent pipes were filled with low-density grout in 1986 as part of interim stabilization. In 1990, a boring was advanced through the grout and limestone layers to collect samples of tank contents for waste characterization (WHC-SD-DD-TI-058, *Tank 241-CX-71 Waste Characterization*). When operational, the 241-CX-71 Tank received waste via the 200-E-156-PL and 200-E-245-PL pipelines. The 200-E-156-PL pipeline was cut and blind flanged near the 241-CX-71 Tank in 1962, and the 200-E-245-PL pipeline was cut and capped inside the 201C Hot Process Building in 1985 (Figure H4; H-2-4535; H-2-71672).

The 241-CX-72 Tank and riser pipes were filled with low-density grout in 1986 as part of interim stabilization. Nondestructive testing of the tank contents was conducted in 1989 (WHC-SD-CP-TI-148, *Radiological Evaluation of Hot Semiworks Waste Tank 241-CX-72*). There are no sample data for the 241-CX-72 Tank contents; however, historical operation and nondestructive testing data evaluations concluded that a 3.4 m (11 ft) sludge layer at the bottom of the tank contained fission products in their oxide and fluoride forms. In 1990, the soil covering the upper portion of the tank and risers was excavated, a steel caisson was constructed from ground level to the top of the tank, and the 241CX40 Grout Removal Building was constructed over the tank (BHI-01173). When operational, the 241-CX-72 Tank received waste via the 200-E-246-PL pipeline, which was cut and capped inside the south wall of the 201C Hot Process Building in 1985 (Figure H5; H-2-71672).

In accordance with Section 5.5 of the Tri-Party Agreement Action Plan (Ecology et al., 1989), alternatives development and evaluation are being integrated with the 200-IS-1 OU process.

1 **H4.1 Security, Inspection, and Training Information**

2 [RESERVED]

3 **H4.2 Removal of Wastes and Waste Residues**

4 [RESERVED]

5 **H4.3 Removal of Unit, Parts, Equipment, Piping, the Containment Structure,
6 and other Ancillary Equipment**

7 [RESERVED]

8 **H4.4 Unit Inspection Prior to Decontamination**

9 [RESERVED]

10 **H4.5 Decontamination**

11 [RESERVED]

12 **H4.6 Identifying and Managing Contaminated Environmental Media**

13 [RESERVED]

14 **H4.7 Closure Confirmation**

15 [RESERVED]

16 **H4.8 Sampling and Analysis Plan**

17 [RESERVED]

18 **H4.8.1 Constituents to be Analyzed**

19 [RESERVED]

20 **H4.8.2 Revisions to the Sampling and Analysis Plan and the Constituents to be Analyzed**

21 [RESERVED]

22 **H5 Contingent Closure Plan**

23 [RESERVED]

24 **H6 Schedule for Closure**

25 A closure schedule will be provided in the 200-IS-1 OU remedial action work plan, following the Record
26 of Decision and Hanford Facility RCRA Permit modification.

27 **H7 Closure Costs**

28 Closure cost estimates for Hanford Facility dangerous waste management units are not required per
29 Hanford Facility RCRA Permit Condition II.H.

H8 Certification of Closure

The U.S. Department of Energy will submit to the Washington State Department of Ecology a certification of closure and subsequent permit modification documentation in accordance with WAC 173-303-610(6). An Independent Qualified Registered Professional Engineer will certify that the unit has been closed in accordance with the approved closure plan. The engineer will be responsible for documenting closure activities associated with closure of the 241-CX Tank System. The certification will be submitted by registered mail or an equivalent delivery service.

H9 References

- BHI-01173, 2000, *Auditable Safety Analysis for Surveillance and Maintenance of the 241-CX Tank System*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: <https://pdw.hanford.gov/document/0071638H>.
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: <https://www.csu.edu/cerc/researchreports/documents/CERCLASummary1980.pdf>.
- DOE/RL-92-18, 1993, *Semiworks Source Aggregate Area Management Study Report*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: <https://pdw.hanford.gov/document/D196136815>.
- Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order Action Plan*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: <http://www.hanford.gov/?page=82>.
- H-2-4319 (drawing), 1950, *Hot Semiworks Tanks Sections TK-70*, Sheet 1, Rev. 4, General Electric Company, Richland, Washington. Available at: <https://pdw.hanford.gov/document/AR-02499>.
- H-2-71672 (drawing), 1985, *Piping Plans 241 CX Tanks 70, 71, 72*, Vitro Engineering Corporation, Richland, Washington. Available at: <https://pdw.hanford.gov/document/AR-02500>.
- Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq. Available at: <https://www.gpo.gov/fdsys/pkg/STATUTE-90/pdf/STATUTE-90-Pg2795.pdf>.
- WAC 173-303, “Dangerous Waste Regulations,” *Washington Administrative Code*, Olympia, Washington. Available at: <http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303>.
- 173-303-040, “Definitions.”
- 173-303-610, “Closure and post-closure.”
- 173-303-640, “Tank systems.”
- WHC-SD-CP-TI-148, 1989, *Radiological Evaluation of Hot Semiworks Waste Tank 241-CX-72*, Rev. 0, Westinghouse Hanford Company, Richland, Washington. Available at: <https://pdw.hanford.gov/document/AR-02501>.
- WHC-SD-DD-TI-058, 1991, *Tank 241-CX-71 Waste Characterization*, Rev. 0, Westinghouse Hanford Company, Richland, Washington. Available at: <https://pdw.hanford.gov/document/AR-02502>.

- 1 WHC-SD-DD-TI-071, 1992, *Facility Decommissioning Report for Tank 241-CX-70*, Rev. 0,
- 2 Westinghouse Hanford Company, Richland, Washington. Available at:
- 3 <https://pdw.hanford.gov/document/E0026400>.
- 4 WHC-SD-EN-ES-019, 1992, *Semiworks Aggregate Area Management Study Technical Baseline Report*,
- 5 Rev. 0, Westinghouse Hanford Company, Richland, Washington. Available at:
- 6 <https://pdw.hanford.gov/document/E0019905>.
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