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OFFICE OF RIVER PROTECTION
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

14-TF-0113

SEP 24 2014

Ms. Jane A. Hedges, Program Manager
Nuclear Waste Program
Washington State
Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

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SEP 29 2014
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Ms. Hedges:

THE U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION SUBMITS THE RETRIEVAL COMPLETION CERTIFICATION AND REPORT FOR TANK 241-C-101

References:

1. ORP letter from K.W. Smith to J.A. Hedges, Ecology, "Request for Washington State Department of Ecology Agreement that the U.S. Department of Energy, Office of River Protection may Forego Implementing a Third Retrieval Technology in Tank 241-C-101," 14-TF-0012, dated February 18, 2014.

1223130

2. Ecology letter from J.A. Hedges to K.W. Smith, ORP, "Response to U.S. Department of Energy's Letter 14-TF-0012, dated February 18, 2014, Request for Washington State Department of Ecology Agreement that the U.S. Department of Energy, Office of River Protection may Forego Implementing a Third Retrieval Technology in Tank 241-C-101," 14-NWP-164, dated August 20, 2014.

1226816

The U.S. Department of Energy, Office of River Protection (ORP), is transmitting RPP-57570, *Retrieval Completion Certification Report Tank 241-C-101*, Rev. 0, to the Washington State Department of Ecology (Ecology) in accordance with Section IV-B-5 of the Consent Decree in *Washington v. DOE*, Case No. 08-5085-FVS (E.D. Wa. October 25, 2010) (Consent Decree), which states, "When DOE completes retrieval of waste from a tank covered by this Decree, DOE will submit to Ecology a written certification that DOE has completed retrieval of that tank." A request to forego a third retrieval technology (Reference 1) was submitted on February 18, 2014, and approved (Reference 2) on August 20, 2014.

This letter certifies that ORP has completed retrieval of Tank 241-C-101 in accordance with Part 1 of Appendix C of the Consent Decree and with the retrieval technology systems that were established by approval of Ecology on March 18, 2014, in RPP-22520, *241-C-101 and 241-C-105 Tanks Waste Retrieval Work Plan*, Rev. 8.

19 pgs

If you have any questions, please contact Christopher J. Kemp, Acting Federal Project Director, Retrieval and Closure, at (509) 373-0649.

Kevin W. Smith
Manager

TF:HJR

Attachment

cc w/attach:
TPA Administrative Record
Environmental Portal, LMSI
WRPS Correspondence

cc w/o attach:
S. Harris, CTUIR
J. Alzheimer, Ecology
J.L. Lyon, Ecology
J.B. Price, Ecology
N.H. Uziemblo, Ecology
C.L. Whalen, Ecology
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S.E. Hudson, HAB
R.A. Kaldor, MSA
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G. Bohnee, NPT
K. Niles, ODOE
R. Buck, Wanapum
R.M. Allen, WRPS
S.J. Eberlein, WRPS
L.A. Fort, WRPS
R.D. Greenwell, WRPS
J.A. Joyner, WRPS
J.J. Luke, WRPS
R. Jim, YN
D. Rowland, YN

ATTACHMENT
14-TF-0113

RPP-57570
RETRIEVAL COMPLETION CERTIFICATION REPORT
FOR TANK 241-C-101
REV. 0

DOCUMENT RELEASE AND CHANGE FORM

Prepared For the U.S. Department of Energy,
Assistant Secretary for Environmental Management
By Washington River Protection Solutions, LLC., PO Box 850, Richland, WA 99352
Contractor For U.S. Department of Energy, Office of River Protection, under Contract DE-AC27-08RV14800

1a. **Doc No:** RPP-57570 **Rev.** 00

1b. **Project Number:** C-101☐ N/A

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DATE: Sep 15, 2014 HANFORD RELEASE

2. **Document Title**
Retrieval Completion Certification Report for Tank 241-C-101

3. **Design Verification Required**
☐ Yes ☑ No JRR 9/15/14

4. **USQ Number** ☒ N/A

5. **PrHA Number** ☒ N/A
Rev.

6. **USQ Screening:**

a. Does the change introduce any new failure modes to the equipment? ☐ **Yes** ☒ **No**
Basis is required for Yes:_____

b. Does the change increase the probability of existing failure modes? ☐ **Yes** ☒ **No**
Basis is required for Yes:

c. For Safety Significant equipment, does the change require a modification to Chapter 4 of the DSA and/or FRED? ☐ **Yes** ☐ **No** ☒ **N/A**
Basis is required for Yes:

7. **Description of Change and Justification** (Use Continuation pages as needed)
Initial release

8. **Approvals**

Title	Name	Signature	Date
Document Control Approval	RAYMER, JULIA R	RAYMER, JULIA R	09/15/2014
Environmental Protection	WIEGMAN, REBECCA S	WIEGMAN, REBECCA S	09/15/2014
Originator	FORT, LES	FORT, LES	09/15/2014
Responsible Manager	PARKER, DAN	PARKER, DAN	09/15/2014

9. **Clearance Review:**

Restriction Type:

☒ Public
☐ Undefined
☐ Unclassified Controlled Nuclear Information (UCNI)
☐ Export Control Information (ECI)
☐ Official Use Only Exemption 2-Circumvention of Statute (OUO-2)
☐ Official Use Only Exemption 3-Statutory Exemption (OUO-3)
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☐ Official Use Only Exemption 7-Law Enforcement (OUO-7)

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11. TBDs or Holds ☒ N/A

12. Impacted Documents – Engineering ☒ N/A

Document Number	Rev.	Title

13. Other Related Documents ☒ N/A

Document Number	Rev.	Title

14. Related Systems, Structures, and Components:

14a. Related Building/Facilities ☒ N/A	14b. Related Systems ☒ N/A	14c. Related Equipment ID Nos. (EIN) ☒ N/A

DOCUMENT RELEASE AND CHANGE FORM CONTINUATION SHEET	**Document No:** RPP-57570 **Rev.** 00

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[Start Continuation Here]

RPP-57570, Rev. 0

Retrieval Completion Certification Report for Tank 241-C-101

Author Name:
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U.S. Department of Energy Contract DE-AC27-08RV14800

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Abstract: This Retrieval Completion Certification Report documents the completion of retrieval operations on the single-shell tank 241-C-101 on September 12, 2013 using the modified sluicing and high-pressure water technologies as described in the Tank Waste Retrieval Work Plan approved by the State of Washington Department of Ecology on February 16, 2012. This report provides a summary of technical information upon which the decisions to cease tank retrieval operations in tank 241-C-101 were based for each of these technologies. In addition, this report is the mechanism by which the U.S. Department of Energy (DOE) asserts that the selected retrieval technologies have reached their respective limits of technology, in compliance with the requirements of Section IV, Paragraph B.5 of the Consent Decree in Washington v. DOE (Case No. CV-08-5085-FVS) (E.D.Wa. October 25, 2010).

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APPROVED
By Julia Raymer at 10:53 am, Sep 15, 2014

Release Approval Date

DATE:
Sep 15, 2014
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Approved For Public Release

RPP-57570
Revision 0

Retrieval Completion Certification Report for Tank 241-C-101

L. A. Fort
Washington River Protection Solutions, LLC

Date Published
August 2014

washington river protection solutions

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800

Approved for public release; distribution unlimited

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RETRIEVAL COMPLETION CERTIFICATION REPORT FOR TANK 241-C-101

Pursuant to Consent Decree in Case No. CV-08-5085-FVS
(*State of Washington v. Department of Energy* [E.D. Wa. October 25, 2010])

1.0 INTRODUCTION

The U.S. Department of Energy (DOE), Office of River Protection (ORP) is hereby submitting this Retrieval Completion Certification Report (hereinafter "Retrieval Completion Certification") in accordance with Section IV-B-5 of the Consent Decree in *Washington v. DOE*, Case No. 08-5085-FVS (E.D. Wa. October 25, 2010) (hereinafter the "Decree" or "Consent Decree"), which provides as follows: "When DOE completes retrieval of waste from a tank covered by this Decree, DOE will submit to Ecology a written certification that DOE has completed retrieval of that tank."

This Retrieval Completion Certification provides a summary of retrieval operations on the single-shell tank (SST) 241-C-101 (C-101) completed on September 12, 2013. Tank C-101 was retrieved using modified sluicing with double-shell tank (DST) supernate and high-pressure water technologies deployed by two Extended Reach Sluicing System (ERSS) platforms as described in the Tank Waste Retrieval Work Plan (RPP-22520, *241-C-101 and 241-C-105 Tanks Waste Retrieval Work Plan*, Revision 7) approved by the State of Washington Department of Ecology (Ecology) on February 23, 2012. The residual volume in tank C-101 according to RPP-CALC-56434, *Post-Retrieval Camera/CAD Modeling System Waste Volume Estimate for Tank 241-C-101* is a nominal value of 667 ft^3 with a 95% upper confidence level value of 767 ft^3. Since this volume of waste exceeded the Consent Decree goal of 360 ft^3, DOE-ORP submitted a *Practicability Evaluation Request to Forego a Third Retrieval Technology for Tank 241-C-101* (RPP-55849) on February 18, 2013, in accordance with Appendix B, Part 1, of the Decree. Ecology approved this request on August 20, 2014 (Letter 14-NWP-164, "Re: Response to U.S. Department of Energy's Letter 14-TF-0012, dated February 18, 2014, 'Request for Washington State Department of Ecology Agreement that the U.S. Department of Energy, Office of River Protection may Forego Implementing a Third Retrieval Technology in Tank 241-C-101'").

This Retrieval Completion Certification provides a summary of technical information on which the decisions to cease retrieval operations in tank C-101 were based for each of these technologies. The format and content of this Retrieval Completion Certification resulted from numerous discussions between Ecology and DOE-ORP and its Tank Operations Contractor, Washington River Protection Solutions, LLC, and an agreed-upon outline that DOE-ORP followed in preparing this document. The DOE-ORP is hereby declaring that it has completed the retrieval of tank C-101 in full compliance with the requirements of Part 1 of Appendix C of the Consent Decree, and with the retrieval technologies/systems that were established by Part 1 of the Tank Waste Retrieval Work Plan, and is submitting this Retrieval Completion Certification accordingly.

2.0 RETRIEVAL PROCESS DESCRIPTION AND CHRONOLOGY

2.1 PRE-RETRIEVAL CONDITION

Tank C-101 is a 530,000-gal SST that has been used to store radioactive waste since March 1946. The tank was estimated to contain ~88,000 gal (11,760 ft^3) of residual sludge waste determined after interim stabilization in 1983. The estimate was revised to 77,500 gal (10,360 ft^3) (RPP-RPT-54839, *Evaluation of the Volumes in Tanks 241-C-101 and 241-AN-101 during Retrieval* for the volume of waste on the tank bottom, and RPP-CALC-54614, *Estimate of Residual Waste Volume for Single-Shell Tank 241-C-101* for the volume of waste on the tank walls and stiffener rings) using additional information made available as the result of waste retrieval operations (videos and associated retrieval equipment features in comparison to waste depth measurements). Tank C-101 was classified as an "assumed leaker" in 1980 with a determined approximate leak volume of 76,000 L (20,000 gal) (HNF-EP-0182, *Waste Tank Summary Report for Month Ending February 28, 2014*, Revision 314). A re-evaluation of potential leaks and waste losses in 241-C Tank Farm (C Farm) provided evidence that the historic losses of waste from tank C-101 may have been due to a release from a spare inlet port of the tank, rather than a loss of liner integrity (RPP-ENV-33418, *Hanford C-Farm Leak Assessments Report*).

The chemical and radionuclide composition and inventory of the waste was documented in the Best-Basis Inventory (BBI) estimate and is based on the results of auger samples obtained in 1995 (WHC-SD-WM-DP-111, *Final Report for Tank 241-C-101, Auger Sample 95-AUG-019*) and process knowledge of the types of waste that were received at tank C-101 (RPP-RPT-43028, *2009 Auto-TCR for Tank 241-C-101*). The tank waste BBI identifies the waste as consisting of Plutonium Uranium Extraction Plant cladding waste and tributyl phosphate process waste. During construction of the tank C-101 waste retrieval system, a spray wand was directed at the waste to determine the consistency of the waste surface; the waste had hardened and the spray wand did not mobilize any solids. Prior to the start of retrieval, ~3,700 gal of water were added to the tank as a result of construction support and testing.

2.2 PROCESS DESCRIPTION

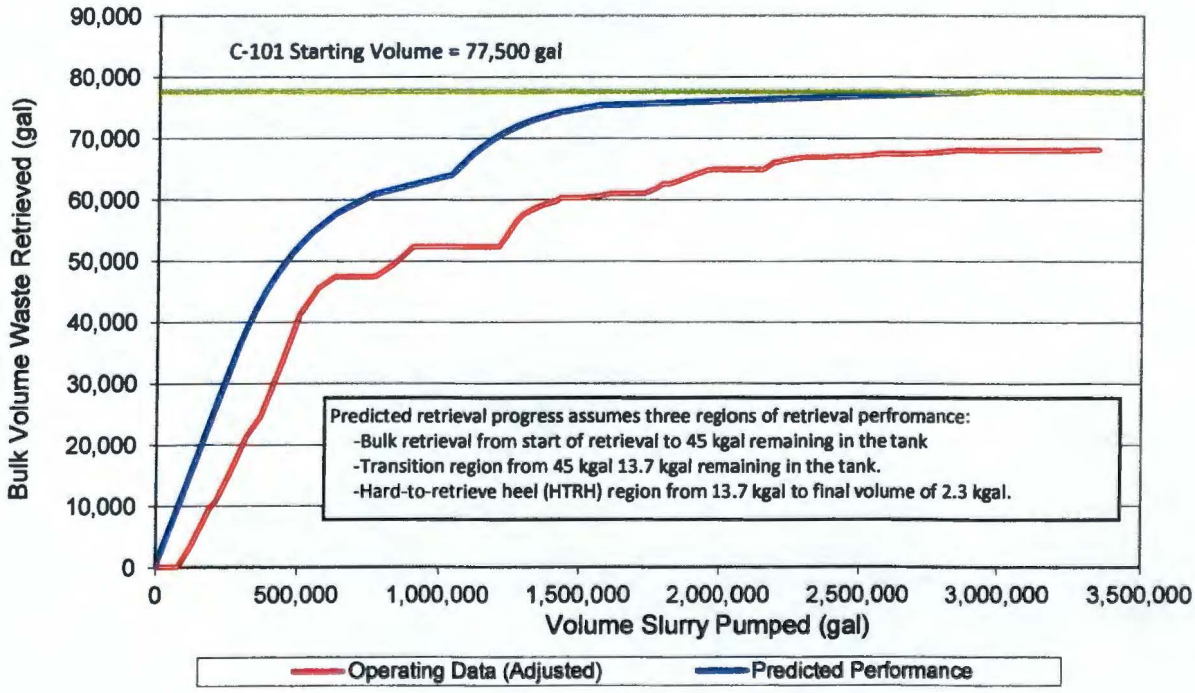
The waste retrieval technologies selected for deployment in tank C-101 were modified sluicing and high-pressure water, both deployed with the ERSS (see Revision 7 of RPP-22520). Two ERSS platforms were installed in the tank, each equipped with one sluice nozzle and a pair of high-pressure water nozzles. The ERSS operations were controlled from a control trailer located outside the tank farm fence. The ERSS platforms were installed in existing tank risers located at the perimeter of the tank. The ERSS had the capability to direct liquid at various locations in the tank. Supernatant liquid from tank 241-AN-101 (AN-101) was used as the sluicing medium to mobilize the waste in tank C-101 and the resulting slurry was pumped back to tank AN-101. The waste retrieval system also had the capacity to use raw water for sluicing with minor modifications, and to use high-pressure water to break apart hard agglomerations of waste. The flow rate through the sluice nozzles was adjusted based on the pump-out rate so that

the rate of liquid introduction was approximately equal to the rate of solution removal, minimizing the liquid waste volume in the retrieval tank. The slurry included insoluble solid material from tank C-101. The solids settled in tank AN-101 and the supernatant liquid was recycled for sluicing. After the more readily retrievable solids were removed from the tank, the high-pressure water nozzles were used to break up larger pieces of hard waste that could not be broken up by the sluice nozzles. Once broken up, this waste was removed from the tank by sluicing.

2.3 RETRIEVAL CAMPAIGN CHRONOLOGY

Retrieval operations were performed during 71 operating days (130 shifts) starting on December 10, 2012 and ending on September 11, 2013. During sluicing, the supernate solution had to penetrate the hard waste to access the softer waste below. Once the softer waste was accessed, the retrieval progressed at a relatively slow, but steady rate for the first part of the retrieval period. Figure 2-1 shows retrieval system performance as a function of the volume of slurry (solids plus recycled tank AN-101 supernate) transferred from tank C-101 to tank AN-101.

Figure 2-1. Tank 241-C-101 Waste Retrieval Progress.



Retrieval system performance was tracked by trending the net-waste volume increase in the receiver tank AN-101 after accounting for water additions and adjusting for sludge porosity; this is shown as the Operating Data (Adjusted) line in Figure 2-1. This running volume balance does

not account for solids dissolution or liquid evaporation. As the volume of waste material received by tank AN-101 approaches the starting waste volume of tank C-101, the estimate of the volume remaining in tank C-101, using the arithmetic difference between these two volumes, becomes increasingly sensitive to uncertainties in the starting waste volume estimate and cumulative measurement uncertainties. The running volume balance and other information were used to generate an estimate of the actual volume of waste retrieved during modified sluicing of tank C-101. As anticipated, the final estimate of waste volume retrieved was greater than the apparent volume based on operating data, as had been observed in other waste retrieval operations. Tank C-101 residual waste volume reported in RPP-RPT-54839 determined that the volume of waste was not conserved during retrieval, due to factors that include uncertainties in the initial volume, the initial waste porosity, the dissolution of solids during waste transfers and the evaporation of liquids during the retrieval and waste transfer process. Based on observations at the start of and during retrieval, adjustments were subsequently made to the initial volume and waste porosity estimates; the difference between this revised initial volume and the estimate of the volume remaining in tank C-101 at the end of retrieval was used to determine the volume of waste retrieved.

The use of high-pressure water resulted in the breakup of some of the large pieces of solids in the tank. However, it was only effective at close range and required that solids be sluiced to within its range. Because large pieces of solids were not easily moved with the sluicers and a relatively small volume of waste was broken up by the high-pressure water, the high-pressure water usage only resulted in ~800 gal of additional waste retrieval, while using over 6,000 gal of high-pressure water and 500,000 gal of supernate for sluicing.

A supernatant soak of the hard solids in tank C-101 was also performed in an attempt to soften the hard waste surface. On January 22, 2013, ~42,000 gal of tank AN-101 supernate was transferred to tank C-101 and the solids were allowed to soak in the supernate. The supernate was pumped out on February 20, 2013. However, the supernatant soak appeared to have no effect on the waste surface.

Attempts were made to spray the tank wall and stiffener rings, and the liquid was able to reach these areas. The same operation was also performed using high-pressure water. However, little to no reduction in the waste on the walls and stiffener rings was observed, even in the areas closest to the sluicer. It is unlikely that the use of additional sluicers would have any impact on the effectiveness of removing waste that is on the walls and stiffener rings.

The transfer of liquid from tank C-101 to tank AN-101 continued until September 12, 2013. Volume displacement measurements and tank video scans were performed during the transfer out, which completed on September 12, 2013. The residual volume was estimated in RPP-CALC-56434 to be ~ 4,995 gal (~667 ft^3).

A summary of the amount of waste retrieved and waste remaining in tank C-101 after the waste retrieval operations is provided below in Sections 3.0 and 4.0.

2.4 LIMIT OF TECHNOLOGY

According to RPP-50910, *Single-Shell Tank Waste Retrieval Limit of Technology Definition for Modified Sluicing*, meeting the following two criteria constitutes reaching the "limit of technology" for retrieval of waste from a Hanford Site SST using modified sluicing with only DST supernate or water as the sluicing medium.

1) The concentration of SST waste in the retrieved slurry sent to the DST is within or bracketing a 0 to 0.6 vol. percent range for three operating periods. Bracketing refers to two successive data points, one of which is below 0 and the next near or above 0.6, which average less than 0.6 vol. percent. An operating period is a period over which retrieval performance is measured. An operating period is normally one operating day, but as a minimum must be greater than or equal to 8 hours in duration and consist of at least ~10,000 gal (~1,340 ft^3) of slurry transferred from the SST.

2) The DOE-ORP and the Tank Operations Contractor have provided documentation to Ecology that demonstrates that all reasonable efforts were attempted to enhance the effectiveness of the installed modified sluicing retrieval system in order to increase waste removal from all quadrants of the tank under consideration.

Modified sluicing using the ERSSs was performed in tank C-101 beginning on December 10, 2012. When modified sluicing alone did not appear effective in retrieving more material, high-pressure water was introduced to facilitate breakup of larger waste chunks. High-pressure water was alternated with, or operated concurrently with, additional modified sluicing to mobilize and remove any waste pieces and fines. Retrieval activities were performed until September 11, 2013. At that time a liquid displacement volume estimate was performed, completing on September 12, 2013.

Table 2-1 displays the volume percent of solids in the retrieved bulk waste for the amount of slurry transferred for the last three months of the tank C-101 retrieval operation. It should be noted that the data before July 26, 2013 represent modified sluicing only and data from July 26, 2013 represent high-pressure water plus modified sluicing. Table 2-1 shows that, starting in mid-August 2013, the volume percent of solids in the slurry had decreased to ~0.02%; therefore, the concentration of SST waste in the retrieval slurry sent to the DST is within or bracketing a 0 to 0.6 volume percent range for three operating periods, effective September 11, 2013. Thus, the first criterion of RPP-50910 was met for the combination of modified sluicing and high-pressure water retrieval operations.

The second criterion associated with the limit of technology definition from RPP-50910 requires a demonstration that all reasonable attempts were made to enhance the effectiveness of the installed modified sluicing system in order to increase waste removal from all quadrants of the tank under consideration. At the end of modified sluicing in tank C-101, waste had been mobilized and largely removed from the areas under the sluicers and the center of the tank. In these areas, the tank bottom was either exposed or covered by loose solids. Most of the solids that still remained were in the areas near the tank wall. Attempts were made to spray the tank wall and stiffener rings, and the liquid was able to reach these areas; also, the same operation

was performed using high-pressure water. However, little to no reduction in the waste on the wall and stiffener rings was observed, even in the areas closest to the sluicer.

Table 2-1. Waste Retrieval Efficiency (June 7 to September 11, 2013).

Operating Period	Bulk Volume Solids Retrieved, gal*	Slurry Pumped, gal	Solids in Slurry, vol%
6/7/13	741	26,153	2.83%
6/10/13	0	24,946	1.44%
6/11/13, 09:33 to 9/12/13 08:45	2,171	125,511	
6/12/13, 08:45 to 13:36	161	22,351	0.72%
6/13/13	0	67,591	0.49%
6/14/13	0	71,302	
6/17/13	0	43,369	
6/19/13	1,078	39,335	
7/9/13	651	65,956	0.99%
7/10/13	322	49,388	0.65%
7/11/13	0	65,205	0.08%
7/22/13	80	41,886	
7/23/13	0	54,876	0.20%
7/24/13	241	65,298	
7/25/13	201	37,991	0.53%
7/26/13	0	0	0.04%
8/8/13	0	14,458	
8/9/13	0	57,972	
8/12/13	46	57,236	
8/13/13	201	77,577	0.26%
8/14/13	362	72,429	0.50%
8/15/13	0	9,532	0.02%
8/19/13, 10:25 to 23:00	0	69,024	
8/19/13, 23:00 to 8/20/13 17:09	0	33,608	
8/20/13, 17:09 to 8/21/13 21:18	0	132,171	
9/6/2013	0	0	
9/9/13, 16:58 to 22:50	0	30,224	
9/9/13, 22:50 to 9/10/13, 21:45	0	114,660	
9/10/13, 21:45 to 9/11/13 11:36	76	70,504	

*0 gal retrieved includes periods with net volume increase in tank 241-C-101 due to the addition of liquid (water or supernate) and periods with net volume decrease in tank 241-C-101 due only to the reduction of liquid volume in the tank.

Source: RPP-RPT-55573, *Retrieval Completion Report for Modified Sluicing of Tank 241-C-101 Using Extended Reach Sluicing and High-Pressure Water.*

Per the Consent Decree, the limits of technology should consider risk reduction, facilitating tank closures, worker safety, overall impact on mission and costs.

- The modified sluicing technology/high-pressure water retrieval had effectively removed the bulk of the sludge, and little or no additional waste could be retrieved by continued deployment, resulting in little or no additional reduction of risk.

- Continued modified sluicing/high-pressure water retrieval of tank C-101 would not facilitate tank closure because little or no additional waste would be removed. The time and budget expended on continued retrieval operations could better be spent on activities that would achieve greater risk reduction, thereby doing more to facilitate tank closures.

- Continued modified sluicing/high-pressure water retrieval of tank C-101 would result in continued exposure to workers. Although retrieval operations are controlled from a control trailer, multiple field activities (valve line-ups, field measurements and monitoring, etc.) are required to support the retrieval operations, resulting in continued exposure.

- Continued modified sluicing/high-pressure water retrieval of tank C-101 would increase schedule duration and, as a result, delay other retrieval activities, and therefore adversely affect the overall retrieval and treatment mission. The personnel involved in tank C-101 modified sluicing/high-pressure water retrieval could immediately be redeployed in other retrieval activities that would likely result in greater overall risk reduction.

- Continued modified sluicing/high-pressure water retrieval would incur costs, without an associated reduction of risk.

As a result, DOE-ORP concluded that the modified sluicing and high-pressure water retrieval steps had reached the limits of technology.

2.5 REQUEST TO FOREGO DEPLOYMENT OF A THIRD RETRIEVAL TECHNOLOGY

Because the estimate of waste residual remaining in tank C-101 (667 ft^3) following the deployment of modified sluicing and high-pressure water retrieval technologies exceeded the Decree volume requirement, DOE submitted to Ecology a request to forego deployment of a third technology that would otherwise be required by the terms of the Decree (see RPP-55849). In the Practicability Evaluation Request, DOE evaluated a set of candidate technologies for hard heel waste retrieval that were reviewed and documented in RPP-RPT-44139, *Nuclear Waste*

Retrieval Technology Review and Roadmap. From this evaluation, a subset of technologies was selected for further consideration that included the potential deployment of three technologies that included:

- Chemical dissolution – water cleaning
- Chemical dissolution – caustic cleaning, and
- Enhanced Modified Sluicing – used with in-tank vehicle such as a FoldTrack®[1].

Based on the location and configuration of the remaining waste in tank C-101, evaluation of the deployment of these technologies indicated that some portion of the remaining waste could potentially be retrieved by any one of these technologies. However, overall conclusions of the Practicability Evaluation Request also indicate that the incremental reduction in waste volume and the resulting changes in waste inventory and associated risk are relatively small, even if the retrieval operation using a third technology were successful in reaching the Decree volume requirement. The incremental increase in worker exposure, duration of field activities, potential delay in subsequent retrieval activities, and cost, are expected to be similar to those from other hard heel removal operations and are likely to outweigh whatever level of waste removal may result from installation and operation of a third retrieval technology.

3.0 POST-RETRIEVAL CONDITIONS

Several methods (i.e., volume displacement, video observations, and engineering judgment) were used to estimate the waste volume removed and the residual waste volume left after each retrieval phase. A complete discussion of these methods and associated calculations of the estimated waste volume removed from tank C-101 during the two retrieval phases (modified sluicing and high-pressure water retrieval technologies) is documented in RPP-RPT-54839, RPP-RPT-55573, *Retrieval Completion Report for Modified Sluicing of Tank 241-C-101 Using Extended Reach Sluicing and High-Pressure Water*, and RPP-CALC-56434.

The initial BBI waste volume for tank C-101 was estimated at ~88,000 gal (11,760 ft^3) and revised to 77,500 gal (10,360 ft^3) (RPP-CALC-54614 and RPP-RPT-54839) at the start of retrieval. The amount of waste remaining in tank C-101 after waste retrieval operations was completed was estimated by the Camera/Computer-Aided Design (CAD) Modeling System to be ~4,995 gal (~667 ft^3) (see RPP-CALC-56434).

4.0 RETRIEVAL COMPLETION SUMMARY AND CONCLUSIONS

At the conclusion of modified sluicing and high-pressure water waste retrieval operations, tank C-101 contained ~4,995 gal (~667 ft^3) of waste (see RPP-CALC-56434). Because the estimate of waste residual remaining in tank C-101 exceeded the Decree volume requirement, DOE submitted to Ecology a request to forego implementation of a third technology in tank C-101 that would otherwise be required by the terms of the Decree. In the analysis

[1] The FoldTrack® Mobile Retrieval Tool is manufactured by Non Entry Systems Ltd., UK Patent Application No: 0718573.9.

supporting this request (RPP-55849, *Practicability Evaluation Request to Forego a Third Retrieval Technology for Tank 241-C-101*), DOE considered a set of candidate technologies for hard heel waste retrieval that were reviewed and documented in RPP-RPT-44139.

Based on the analysis performed in the Practicability Evaluation Request (see RPP-55849), DOE concluded that the deployment of any of the selected technologies into tank C-101 is not practicable. Given the configuration of tank C-101 and the remaining residual wastes, the evaluation indicates that while some portion of the remaining waste in tank C-101 may be retrieved by any one of these technologies, the incremental reduction in waste volume and the resulting changes in waste inventory and associated risk are relatively small, even if the retrieval operation using a third technology were successful in reaching the Decree volume requirement. This request by DOE to forego implementing a third retrieval technology in tank C-101 was submitted to Ecology by Letter 14-TF-0012, dated February 18, 2014, "Request for Washington State Department of Ecology Agreement that the U.S. Department of Energy, Office of River Protection May Forego Implementing a Third Retrieval Technology in Tank 241-C-101".

5.0 CONCLUSION

This summary report supports DOE's written certification that DOE has completed retrieval of tank C-101 in accordance with Part 1 of Appendix C of the Consent Decree (*Washington v. DOE*, Case No. 08-5085-FVS [E.D.Wa. October 25, 2010]) with DOE submitting a request to forgo a third technology and with the retrieval technology/systems that were established by approval of Ecology on February 23, 2012, in Tank Waste Retrieval Work Plan RPP-22520, Revision 7.

The format and content of this Retrieval Completion Certification summary follows a general outline that was developed collaboratively by Ecology and DOE-ORP in a series of meetings held between December 19, 2011 and March 6, 2012. A working version of this outline was accepted in a February 9, 2012 meeting between DOE-ORP and Ecology.

6.0 REFERENCES

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