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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
3100 Port of Benton Blvd • Richland, WA 99354 • (509) 372-7950

November 16, 2016 16-NWP-197

By certified mail

Mr. Doug S. Shoop, Manager
Richland Operations Office
United States Department of Energy
PO Box 550, MSIN: A7-50
Richland, Washington 99352

Mr. John A. Ciucci, President and CEO
CH2M HILL Plateau Remediation Company
PO Box 1600, MSIN: H7-30
Richland, Washington 99352

Re: Dangerous Waste Compliance Inspection on June 7, 8, and June 9, 2016, at United States Department of Energy Hanford Site, RCRA Site ID: WA7890008967, NWP Compliance Index Nos. 16.562 through 16.574

Dear Mr. Shoop and Mr. Ciucci:

Thank you for your staff's time during the Groundwater Operation and Maintenance inspections on June 7, 8, and 9, 2016. The Department of Ecology's (Ecology) compliance report of this inspection is enclosed. The report cites four areas of non-compliance, five areas of concern, and three permit deficiencies, listed in the compliance problems section of the report.

To return to compliance, complete the actions required and respond to Ecology within the timeframes specified. Include all supporting documentation in your response, (such as photographs, records, and statements explaining the actions taken and dates completed). Submit this information to Jared Mathey at 3100 Port of Benton Boulevard, Richland, Washington 99354.

Specific deficiencies or violations not listed in the enclosed compliance report does not relieve your facility from having to comply with all applicable regulations.

Failure to correct the deficiencies may result in an administrative order, a penalty, or both, as provided by the Hazardous Waste Management Act (Revised Code of Washington 70.105.080 and .095). Persons who fail to comply with any provision of this chapter are subject to penalties of up to $10,000 per day per violation.

If you have questions or need further information, please contact me at jared.mathey@ecy.wa.gov or (509) 372-7949.

Sincerely,

Jared Mathey
Dangerous Waste Compliance Inspector
Nuclear Waste Program

tkb
Enclosure
cc: See page 2

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cc electronic w/enc:

Dave Bartus, EPA
Jack Boller, EPA
Dennis Faulk, EPA
Duane Carter, USDOE
Cliff Clark, USDOE
Michael Cline, USDOE
Doug Hildebrand, USDOE
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Zelma Jackson, Ecology
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Cheryl Whalen, Ecology
CHPRC Correspondence Control
Environmental Portal
Hanford Facility Operating Record

cc w/enc:

Steve Hudson, HAB
Administrative Record
NWP Central File
NWP Compliance Index File:
16.562 – 16.574

cc w/o enc:

Rod Skeen, CTUIR
Gabriel Bohnee, NPT
Russell Jim, YN

Washington Department of Ecology
Nuclear Waste Program
Compliance Report

Sites:	1301-N Liquid Waste Disposal Facility, 1325-N Liquid Waste Disposal Facility, 183-H Solar Evaporator Basins, 1324-N Impoundment and 1324-NA Percolation Pond, 300 Area Process Trenches, 216-B-3 Main Pond, 216-S-10 Pond and Ditch, 216-B-63 Trench, 216-A-29 Ditch, 216-A-36B Crib, 216-A-37-1 Crib, Low Level Burial Grounds (LLBG) Green Islands, and Non-Radioactive Dangerous Waste Landfill (NRDWL)
RCRA Site ID:	WA7890008967
Inspection Dates:	June 7, 2016; June 8, 2016; and June 9, 2016
Site Contacts:	Doug Hildebrand, Department of Energy Richland Operations Office (DOE-RL) Joel Williams Jr., CH2M Hill Plateau Remediation Company (CHPRC)
Phone:	(509) 376-4782 – Joel Williams, CHPRC FAX: N/A
Site Location:	Hanford Site, 100, 200, 300, and 600 Areas Benton County, WA
At This Site Since:	March 2, 1943 NAICS#: 562211, 541712, and 924110
Current Site Status:	See below

Ecology

Lead Contact: Jared Mathey Phone: (509) 372-7949 FAX: (509) 372-7971

Other Representatives: Edward Holbrook, (Ecology Compliance Support), Nancy Ware (Ecology Compliance Support), and Kathy Conaway (Ecology Compliance Support), Joe Caggiano (Ecology Hydrogeological Support), Jeff Ayres (Ecology Hydrogeological Support), Zelma Jackson (Ecology Hydrogeological Support), Dwayne Crumpler (Ecology Hydrogeological Support), Brian Johnson (Ecology Project Support), Tim Mullin (Ecology Project Support), Elis Eberlein (Ecology Project Support), and Jack Boller (Environmental Protection Agency – Oversight)

Report Date: November 16, 2016

Index Numbers:
16.562 – 1301-N Liquid Waste Disposal Facility – Closure Unit 2 – Inspected June 7, 2016
16.563 – 1325-N Liquid Waste Disposal Facility – Post Closure Unit 3 – Inspected June 7, 2016
16.564 – 183-H Solar Evaporator Basins – Post Closure Unit 2 – Inspected June 7, 2016
16.565 – 1324-N Impoundment and 1324-NA Percolation Pond – Post Closure Unit 4 – Inspected June 7, 2016
16.566 – 300 Area Process Trenches – Post Closure Unit 1 - Inspected June 8, 2016
16.567 – 216-B-3 Main Pond – Closure Unit 22 – Inspected June 8, 2016
16.568 – 216-S-10 Pond & Ditch – Closure Unit 14 – Inspected June 8, 2016
16.569 – 216-B-63 Trench – Closure Unit 21 – Inspected June 8, 2016
16.570 – 216-A-29 Ditch – Closure Unit 11 – Inspected June 8, 2016
16.571 – 216-A-36B Crib – Closure Unit 12 – Inspected June 8, 2016
16.572 – 216-A-37-1 Crib – Closure Unit 13 – Inspected June 8, 2016
16.573 – LLBG Used Trenches (Green Islands) – Closure Unit 26 – Inspected June 9, 2016
16.574 – NRDWL – Closure Unit 20 – Inspected June 9, 2016

Report By: Jared Mathey

(Signed) 11/16/16 (Date)

D-2-7 D-2-6 D-2-3 D-2-4 D-2-10 D-2-9
D-1-2 T-1-4 T-1-2 D-3-1 D-2-5 D-61

Inspection Summary

This inspection was an announced inspection. Ecology notified USDOE-RL and CHPRC on May 23, 2016, by e-mail that Groundwater Operation and Maintenance (OAM) inspections would begin on the following dates for the following dangerous waste management unit groups:

- June 7, 2016, for 1301-N Liquid Waste Disposal Facility, 183-H Solar Evaporator Basin, 1325-N Liquid Waste Disposal Facility, and 1324-N Impoundment and 1324-NA Percolation Pond;
- June 8, 2016, for 216-A-29 Ditch, 216-A-36B Crib, 216-A-37-1 Crib, 216-B-63 Trench, 216-S-10-Pond, and Ditch, 216-B-3 Main Pond;
- June 9, 2016, for the 300 Area Process Trenches, LLBG Green Islands, and NRDWL.

All inspections focused on groundwater operation and maintenance, well inspections, resource well construction standards, and verifying compliance with groundwater monitoring requirements.

To observe a groundwater sampling event in the field, the 300 Area Process Trenches Groundwater OAM inspection was re-scheduled to June 8, 2016.

Site Location

The Hanford Site was assigned a single United States Environmental Protection Agency (EPA) identification number, and is considered a single site under the Resource and Conservation Recovery Act of 1976, as amended (RCRA) facility even though the Hanford Site contains numerous processing areas spread over a large geographic area. The Hanford Site is a tract of land approximately 583 square miles and is located in Benton County, Washington. This site is divided into distinct Dangerous Waste Management Units (DWMUs) which are administratively organized into "unit groups." A unit group may contain only one DWMU or many; currently, there are 36 unit groups at the Hanford Site. Individual DWMUs utilize only a very small portion of the Hanford Site. Additional descriptive information on the individual DWMUs is contained in unit group permit applications and in Parts III, V, and VI of the Hanford Facility RCRA Permit, Dangerous Waste Portion, WA7890008967, Revision 8C (hereafter referred to as the Permit).

Facility Backgrounds

300 Area Process Trenches

The 300 Area Process Trenches (300 APT) became active in 1975. The 300 APT effluent received dangerous waste liquid discharges from research and development laboratories in the 300 Area and from the fuels fabrication process. The effluent had no outlet from the process trenches and either infiltrated the soil column or evaporated. The estimated annual quantity of waste was 453,592,370 liters, the total quantity of both regulated and non-regulated wastewater that was discharged to the unit in one year. This estimate was made because facility records were unavailable for dangerous waste volumes discharged to the trenches. The process trenches were designed to percolate up to 11,356,200 liters (3,000,000 gallons) of wastewater per day, and the maximum volume of wastewater that was discharged daily, rather than the physical capacity of the unit.

In 1985, the 300 APT received RCRA interim status. Administrative controls were implemented to eliminate discharges of dangerous wastes to the unit group. The waste consisted of state-only toxic, dangerous waste (WT02), discarded chemical product (U210), corrosive waste (D002), chromium (D007), spent halogenated solvents (F001, F002, and F003), and spent non-halogenated solvent (F005).

All discharges to the 300 APT were permanently discontinued in December 1994. Closure actions were undertaken and on July 9, 1998, the U.S. Department of Energy submitted to Ecology a certification of closure for the 300 APT. Ecology accepted the certification of closure of the 300 APT on August 10, 1998, and it was moved into post-closure status. Groundwater monitoring is set up to meet the corrective action requirements at the 300 APT and is addressed in the "Groundwater Monitoring Plan for the 300 Area Process Trenches" (WHC-SD-EN-AP-185), which has been in effect since 1997. This plan has a network of the following eight (8) wells: 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, 399-1-17B, 399-1-18A, and 399-1-18B.

216-A-29 Ditch

The 216-A-29 Ditch is a man-made earthen percolation unit, regulated as an unlined (non-compliant) dangerous waste surface impoundment, located east of the 200 East Area. This ditch was used to manage chemical sewer discharges from the separation and concentration processes at the Plutonium-Uranium Extraction (PUREX) Plant located in the 200 West Area. The PUREX Facility chemical sewer operated between November 1955 and October 1991. The 216-A-29 Ditch passed beneath the 200 East Area perimeter fence and ran northeast to the 216-B-3 Ditches, which discharged to the 216-B-3 Pond. Approximately 6,000,000 gallons (22,712,400 liters) of waste per day flowed to the ditch. The 216-A-29 Ditch is estimated to be 1.8 meters (6 feet) wide, 1,097 meters (3,600 feet) long, and varies from 0.6 – 0.9 meters (2 to 3 feet) deep at the south end to approximately 5 meters (16 feet) deep at the north end.

216-A-36B Crib

The 216-A-36B Crib is a man-made, subsurface liquid effluent disposal facility, designated as an unlined (non-compliant) surface impoundment. The 216-A-36B Crib is located approximately 366 meters (1,200 feet) south of the 202-A Building, also referred to as the PUREX Plant. The 216-A-36B Crib was used to manage process chemical waste from the PUREX Plant. The 216-A-36B Crib operated from 1966 until October 1972, and again from November 1982 to September 6, 1987. The nature and quantity of mixed waste (wastes with both a dangerous and a radioactive constituent) managed by the 216-A-36B Crib is known and identified on the unit group's Part A Form. The design capacity of the 216-A-36B Crib was 440,000 liters per day (116,000 gallons per day). Because the 216-A-36B Crib has received its last known final volume of dangerous waste, this unit will close according to the requirements and closure schedule of an Ecology approved closure plan.

216-A-37-1 Crib

The 216-A-37-1 Crib is an inactive, man-made earthen percolation unit, designated as an unlined (non-compliant) dangerous waste surface impoundment. This crib is located outside the 200 East Area perimeter fence, east of the 202-A Building, also referred to as the PUREX Plant. The 216-A37-1 Crib was used for percolation of process condensate waste from the 242-A Evaporator, and was operational from March 1977 through April 1989.

216-B-63 Trench

The 216-B-63 Trench is a non-operational, open, man-made earthen percolation unit that is designated as an unlined (non-compliant) dangerous waste surface impoundment. The 216-B-63 Trench was used to receive emergency cooling water and chemical sewer waste from B Plant (221-B Canyon Building). The 216-B-63 Trench has not received liquid waste since February 1992.

216-S-10 Pond & Ditch

The 216-S-10 Pond and Ditch (216-S-10 P&D) are non-operational, open, and man-made earthen percolation units that are designated as unlined (non-compliant) dangerous waste surface impoundments. The 216-S-10 P&D were used to manage chemical sewer discharges from the separation/concentration processes at the Reduction Oxidation (REDOX) Facility. The 216-S-10 P&D have not received liquid waste since October 1991.

216-B-3 Main Pond

The 216-B-3 Main Pond treatment, storage, and disposal (TSD) unit is a non-operational man-made earthen percolation unit that is designated as an unlined (non-compliant) dangerous waste surface impoundment. The 216-B-3 Main Pond TSD unit consists of the 216-B-3 Pond and 216-B-3-3 Ditch. The 216-B-3 Main Pond was used predominantly to dispose of cooling water discharges from 200 East Area facilities (PUREX Plant and B Plant). Other effluent sources included chemical sewer discharges and steam condensates (PUREX Plant, B Plant, 242-A Evaporator, 242-B Evaporator, 244-AR Vault, 244-BXR Vault, 244-CR Vault, BY Tank Farm, 241-A Aging Waste Ventilation System Complex, 283-E Water Treatment Facility, and 284-E Powerhouse). The 216-B-3 Main Pond has not received liquid waste since April, 1994.

1301-N Liquid Waste Disposal Facility

The 1301-N Liquid Waste Disposal Facility received waste from 1963 to 1985. The 1301-N Liquid Waste Disposal Facility was operated as a liquid waste disposal facility for mixed waste process and cooling waste water from N Reactor. The 1301-N Liquid Waste Disposal Facility also received dangerous waste from laboratories and may have received waste from spills within the N Reactor Building. The 1301-N Liquid Waste Disposal Facility, also known by the Waste Information Data System (WIDS) number 116-N-1, is an inactive Treatment, Storage, and Disposal (TSD) unit that has undergone dangerous waste closure activities.

183-H Solar Evaporator Basins

The 183-H Solar Evaporation Basins were four concrete basins used for waste treatment and disposal from 1973 to 1985. The waste discharged to the basins originated in the 300 Area Fuel Fabrication Facility and included solutions of neutralized chromic, hydrofluoric, nitric, and sulfuric acids. In addition, nonradioactive dangerous waste was discharged to the basins on a non-routine basis. The 183-H Solar Evaporation Basins received mixed waste that consisted primarily of neutralized acid process waste that was designated Extremely Hazardous Waste (EHW) because of toxicity (WT01). The basins also received various nonradioactive waste (listed discarded chemical products), resulting in designation for cyanides (P030), vanadium oxide (P120), and formic acid (U123). Approximately 3,600,000 pounds (1,632,000 kilograms) of waste a year was treated. These deactivated water treatment basins received a maximum of approximately 400,000 gallons (1,514,160 liters) of waste a year. The basins had a tank treatment design capacity of 700 gallons (2,650 liters) of waste a day treated by evaporation and a tank storage design capacity of 2,167,000 gallons (8,202,960 liters), a collective value representing all four basins. The basins have not received waste since November 1985.

Dangerous waste closure activities were completed. Post-closure groundwater monitoring is being conducted as a part of the interim remediation action for the 100-HR-3 Groundwater Operable Unit under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

1325-N Liquid Waste Disposal Facility

The 1325-N Liquid Waste Disposal Facility, (also known by WIDS number 116-N-3), is an inactive Treatment, Storage, and Disposal unit that has undergone dangerous waste closure activities. The 1325-N Liquid Waste Disposal Facility was operated as a liquid waste disposal facility for mixed waste process and cooling waste water from N Reactor. The 1325-N Liquid Waste Disposal Facility also received dangerous waste from laboratories and may have received waste from spills within the N Reactor Building. In April 2005, the United States Department of Energy (USDOE) submitted to Ecology a certification of closure.

1324-N Impoundment and 1324-NA Percolation Pond

The 1324-N Surface Impoundment (also known by WIDS number 120-N-2) and 1324-NA Percolation Pond (also known by WIDS number 120-N-1) are two units included in the 100-NR-1 operable unit (OU). These RCRA units, and adjacent non-RCRA ponds, comprised the cascading corrosive effluent treatment and disposal system for 163-N Demineralization Plant and 183-N Filtered Water Plant. 1324-NA operated continuously from 1977 until 1991 while 1324-N operated from 1986 until 1988. Reports on quantities of effluent discharged to 1324 N & NA vary through the life of the combined unit but conservative estimates are approximately 1,500,000,000 pounds of corrosives waste (D002) treated and disposed annually.

Low Level Burial Grounds Used Trenches (Green Islands)

There are 24 radioactive solid waste burial grounds in the central part (200 Area) of the Hanford facility. Hanford Federal Facility Agreement and Consent Order (HFFACO) Action Plan Appendix C organizes the 24 burial grounds into the 200-SW-2 OU. HFFACO Appendix C identifies the unit type as "burial ground." The burial grounds were constructed as individual trenches; there are an estimated 333 total trenches. Mixed waste was disposed at a few locations within individual trenches. The name "Green Islands" is associated with these locations because the areas of mixed waste disposal are shown in green on Hanford maps.

In the state of Washington, mixed wastes did not become subject to dangerous waste regulation until August 19, 1987. Given that no exemption pursuant to Washington Administrative Code (WAC) 173-303-665(2)(b) has been requested by USDOE or approved by Ecology, at no point subsequent to the effective date of mixed waste regulation (pursuant to WAC 173-303) could any mixed waste have been legally placed in an unlined disposal trench. None of the unlined trenches ever qualified for interim status and Ecology has not provided authorization to dispose of mixed or dangerous waste through the permit. If the Permittees sought authorization through the permit, Ecology would have denied the request on the basis that no exemption was granted under WAC 173-303-610(2)(b) and the trenches fail to meet the technical standards of WAC 173-303-665(2)(a). Therefore, land disposal of mixed waste in any of the unlined trenches was without authorization, and illegal.

Based on future negotiations of the Tri-Party Agreement (TPA) past practice process for the 200-SW-1 and/or 200-SW-2 operable unit, the Low Level Burial Grounds Green Islands dangerous waste management units will be subject to closure requirements in the dangerous waste permit. If unable to meet the requirements for alternative closure, closure requirements will be established in the permit under the authority of WAC 173-303-610(1)(e) based on the results of the 200-SW-1 operable unit and/or 200-SW-2 operable unit past-practice unit remedial action process. Groundwater monitoring

requirements associated with these units can be satisfied through the parallel authority of WAC 173-303-645(1)(e), based on the remedial decision for the associated groundwater operable unit.

Non-Radioactive Dangerous Waste Landfill (NRDWL)

The 600 Area Central Non-Radioactive Waste Landfill otherwise referred to as the NRDWL and the Solid Waste Landfill (SWL) was operated as one unit between 1973 and 1975. The units received waste from the Hanford site. In 1975, the 600 Area landfill was divided into two separate units because of the nature of the waste disposed at the NRDWL and SWL. The NRDWL hazardous waste was regulated under Chapter 173-303 WAC. The SWL received non-dangerous solid waste, which was regulated under Chapter 173-350 WAC.

The NRDWL is a 10 acre land disposal unit that consists of 19 unlined trenches approximately 400 feet long, 16 feet wide at the base, and 15 feet deep. Six trenches (trenches 19N, 26, 28, 31, 33, and 34) were used for disposal of dangerous waste. The NRDWL was used from January 1975 through May 1985 for the disposal of dangerous waste generated from various Hanford Site operations. Asbestos was disposed in nine trenches (trenches 2N, 20, 21, 22, 23, 25, 27, 29, and 30). Nonhazardous waste was disposed in trench 1N. The NRDWL is an inactive landfill and ceased receiving nonradioactive dangerous waste for disposal in May 1985. This waste consists of listed waste, waste from nonspecific sources, characteristic waste, and state only waste. NRDWL provided disposal of dangerous wastes generated from process operations, research and development laboratories, maintenance activities and transportation functions located throughout the Hanford Facility.

Inspections

June 7, 2016 – Groundwater OAM Inspection of 1301-N Liquid Waste Disposal Facility, 1325-N Liquid Waste Disposal Facility, 183-H Solar Evaporator Basin, and 1324-N Impoundment and 1324-NA Percolation Pond

At 9:00 a.m. on June 7, 2016, Mr. Edward Holbrook, Mr. Dwayne Crumpler, Mr. Brian Johnson, and I entered the front conference room in Building 2753E in the 200 Area East on the Hanford Site. I explained we were there for a groundwater OAM inspection of the 1301-N, 1325-N, 183-H, and 1324-N and 1324-NA. The following representatives from the USDOE-RL and CHPRC were present during the inspection in-brief.

- Mr. Joel Williams, CHPRC - Regulatory Inspection Lead
- Mr. Mitch Boyd, CHPRC - Inspection Specialist
- Mr. Robert Cathel, CHPRC - Groundwater Environmental Manager
- Mr. Rick Oldham, CHPRC - Environmental Compliance Officer
- Mr. Doug Hildebrand, USDOE-RL Soil and Groundwater Division

Mr. Cathel went over the updated Health and Safety Plan (HASP) requirements for our field inspection. All Ecology staff confirmed receiving the updated HASP by signature. The group discussed the inspection schedule and meeting places for the next few days. I provided a list of groundwater wells I wanted to inspect today and verified with CHPRC that my list was current for wells in the groundwater monitoring networks. I explained I observed that Well 199-N-28 for 1325-N was reported as support information in the 2015 annual groundwater report. I asked if Well 199-N-28 is considered a part of the well monitoring network. Mr. Cathel said that the well is a part of the groundwater monitoring network, but that no statistics were done.

1325-N Liquid Waste Disposal Facility

We departed Building 2753E in USDOE vehicles for the 1325-N Liquid Waste Disposal Facility (1325-N). At 100-N, we met and picked up Mr. Dwayne Carter, USDOE-RL.

At 10:15 a.m. we arrived at groundwater Well 199-N-74 for 1325-N. I observed the following on the Up-Gradient Well 199-N-74:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 654.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Note: For the purposes of these groundwater well inspections, protective measures are identified in WAC 173-160-420(11), (12), and (13).

Photo #DSC01272, Up-Gradient Well No. 199-N-74 for 1325-N

I observed the following on the Down-Gradient Well 199-N-32 for 1325-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 662.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by three metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- A forth well post protection measure appeared to be removed from its previous location and was leaning against one of the other protective posts. I observed that the concrete around the casing was slightly chipped, but otherwise intact.
- The well was equipped with an Automatic Water Level Network (AWLN).

Photo #DSC01273, Up-Gradient Well No. 199-N-32 for 1325-N

I observed the following on the Down-Gradient Well 199-N-81 for 1325-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 665.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01274, Down Gradient Well No. 199-N-81 for 1325-N

I observed the following on the Down-Gradient Well 199-N-41 for 1325-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 663.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- I observed a small crack in the concrete pad protective measure and approximately 10 percent coverage of rust on the protective posts.

Photo #DSC01275, Down-Gradient Well No. 199-N-41 for 1325-N

We completed our field inspection of 1325-N at 10:42 a.m. and proceeded to groundwater wells for 1301-N.

1301-N Liquid Waste Disposal Facility

At 10:50 a.m. we arrived at groundwater Well 199-N-2 for 1301-N. I observed the following on the Down-Gradient Well 199-N-2:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 667.
- The well had a cap that was locked on top of the casing.
- The well had no protective measures.
- The well was equipped with an Automatic Water Level Network (AWLN)

Photo #DSC01276, Down-Gradient Well No. 199-N-2 for 1301-N

I observed the following on the Down-Gradient Well 199-N-105A at 1301-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 666.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by three metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01277, Down-Gradient Well No. 199-N-105A for 1301-N

I observed the following on the Down-Gradient Well 199-N-3 at 1301-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 668.
- The well had a cap that was locked on top of the casing.
- The well had no protective measures.
- The well was equipped with an Automatic Water Level Network (AWLN)
- The outer well casing of the well had a small hole in it.

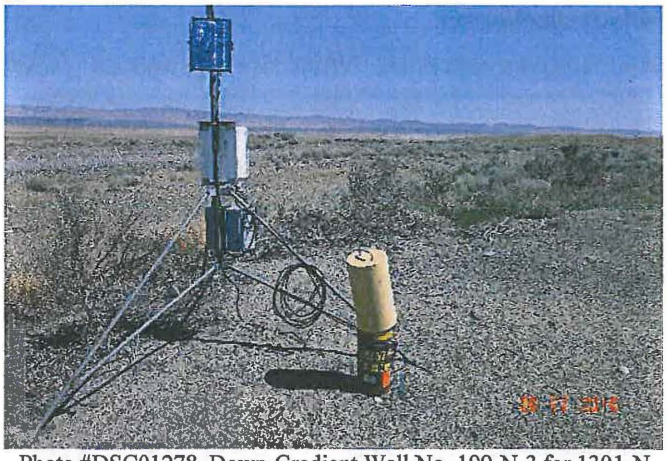


Photo #DSC01278, Down-Gradient Well No. 199-N-3 for 1301-N

I observed the following on the up-gradient Well 199-N-34 for the 1301-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 664.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by three metal posts. The posts were over three inches in diameter, over three feet above the land surface, were over two feet away from the well casing, and were in a triangular array that was not completely around the casing.
- A forth well post protection measure appeared to be removed from its previous location and was laying on the ground.
- The well did not have a concrete pad around the casing.
- The well was equipped with an Automatic Water Level Network (AWLN)

Photo #DSC01279, Down-Gradient Well No. 199-N-34 for 1301-N

I observed the following on the down-gradient Well 199-N-57 for the 1301-N:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BIV 660.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 10 percent coverage of rust on the protective posts.

Photo #DSC01280, Down-gradient Well No. 199-N-57 for 1301-N

We ended our field inspection at 11:25 a.m. and returned back to Building 2753E in 200 Area East where we began the inspection questioning and document reviews.

I said that the 1301-N groundwater monitoring plan states that subsurface inspection and maintenance is performed on a 3 to 5-year schedule. I asked what wells have had a subsurface inspection in the last 5-years. Mr. Cathel said subsurface well inspections are on an as needed basis and were not done unless there is an indicator of an issue. Mr. Hildebrand said that well maintenance was done every 5-years in the past, but now subsurface well inspections are done as needed. I explained in last year's inspection report response, I wrote that preventive maintenance should be performed in cases where maintenance activities, such as pulling a well pump, would be expected to potentially cause an exceedance of indicator parameters. I explained if exceedances were observed, they would need to follow the interim status groundwater monitoring requirements, regardless if the exceedance was caused by the previous maintenance activity or not.

I asked what the current status was for revising the 1324-N and 1324-NA, 1325-N, and 1301-N groundwater monitoring plans so that they would meet final status groundwater monitoring requirements. Mr. Hildebrand said that it would depend on if the units will be closing according to Revision 8C of the permit.

I asked if there have been any new or decommissioned wells installed within the last two years at 1324-N and 1324-NA, 1325-N, 1301-N, and 183-H. Mr. Cathel said there has been no new wells installed at these units. Mr. Oldham said that there has not been any decommissioned wells at these units since around 2011. I asked if there was a schedule for well decommissioning. Mr. Cathel said they do not have a decommissioning schedule for their wells. I asked if there were any plans to decommission any of the wells at these units. Mr. Cathel said there are no current plans to decommission any of the wells at any of these units. Mr. Hildebrand said that if the wells are not being used, they are put on a list to be decommissioned. He explained if a well is broken, they decommission it. Mr. Hildebrand said that around 15-years ago they had a campaign to decommission wells at Hanford.

I asked if groundwater wells were no longer used for the RCRA groundwater monitoring, would the wells be used for groundwater monitoring for CERCLA activities. Mr. Hildebrand said that if CERCLA has a need for the unused RCRA well, that they would consider using it.

I went through my list of documents I was planning on requesting as a part of this inspection and verified the most recent documents to request. I explained I may have a few supplemental questions I would ask in my documents request. We ended our inspection at 1:12 p.m.

June 8, 2016 – Groundwater OAM Inspection of 300 Area Process Trenches, 216-B-3 Main Pond, 216-S-10 Pond and Ditch, 216-B-63 Trench, 216-A-29 Ditch, 216-A-36B Crib, and 216-A-37-1 Crib

At 8:30 a.m. on June 8, 2016, Ecology met USDOE-RL and CHPRC groundwater staff in the parking lot of 2420 Stevens to leave to observe groundwater sampling at the 300 Area Process Trenches. Due to lightning in the area, groundwater sampling was delayed, so the groups left for Building 2753E in 200 East Area on the Hanford Site to conduct our inspection in-brief, document review, and questions for today's groundwater operating and maintenance inspections.

At 9:15 a.m. on June 8, 2016, Ms. Kathy Conaway, Ms. Zelma Jackson, Mr. Tim Mullin, Mr. Jack Boller, and I entered the back conference room 3E in Building 2753E in the 200 East Area. I explained we were there to continue our groundwater operation and maintenance inspections for the 300 Area Process Trenches, 216-B-3 Main Pond, 216-S-10 Pond and Ditch, 216-B-63 Trench, 216-A-29 Ditch, 216-A-36B Crib, and 216-A-37-1 Crib. The following representatives from the USDOE-RL and CHPRC were present during the inspection in-brief and inspection questions.

- Mr. Joel Williams, CHPRC - Regulatory Inspection Lead
- Mr. Mitch Boyd, CHPRC - Inspection Specialist
- Mr. Robert Cathel, CHPRC - Groundwater Environmental Manager
- Mr. Rick Oldham, CHPRC - Environmental Compliance Officer
- Mr. Doug Hildebrand, USDOE-RL Soil and Groundwater Division
- Mr. Duane Carter, USDOE-RL Environmental, Safety and Quality Division

Mr. Cathel said because of the lightning storms in the area, that field and groundwater sampling activities were postponed until 11 a.m. Mr. Cathel went over the updated Health and Safety Plan (HASP) requirements and all who were present and did not sign off the previous day, signed off that we went over the updated HASP.

I provided a list of groundwater wells I wanted to inspect today and verified my list was current for wells in the groundwater monitoring networks. I asked if Well 299-W27-2 for 216-S-10 Pond and Ditch is considered a part of the well monitoring network. Mr. Cathel said that the well is a part of the groundwater monitoring network, but that no statistical evaluation was done on the data from that well. Mr. Hildebrand said that this was a deep well that was not at the top of the unconfined aquafer.

Mr. Williams asked if we could go over my inspection questions while we waited to go out on the field inspection. I agreed and started with my questions for the 300 Area Process Trenches. I asked if there have been any decommissioned wells at the 300 Area Process Trenches in the last two years. Mr. Cathel said there have been no decommissioned or new wells installed at the 300 Area Process Trenches in the last two years. I asked if Permit Attachment 10, Strategy for Handling and Disposing of Purgewater need to be updated, as I observed that current practices were not included in the plan. Mr. Cathel said the update is for it to be removed from the permit. He explained that Investigative Derived Wastes Strategy supersedes the Strategy for Handling and Disposing of Purgewater. Mr. Cathel said the document number was 2011-41-IDW-DOE-RL. Mr. Carter said that the removal of Permit Attachment 10, Strategy for Handling and Disposing of Purgewater was possibly a Class 2 permit modification and was on the list to be removed from the permit. Mr. Hildebrand said that they are operating to the Investigative Derived Wastes Strategy.

I asked if they could explain the II.F.2 and Permit Attachment 8 – Hanford Well Maintenance Inspection Plan and how that correlates to subsurface well condition inspection schedules per 8.1.2 and Table 8.1 in the Post Closure Plan for the 300 Area Process Trenches. I explained that the language in the two

sections appear to be in conflict of each other. Mr. Cathel said that there have been no down well inspections of 300 Area Process Trenches. I explained that Table 8.1 from the Post-Closure Plan stated that the inspection frequency for subsurface well condition inspections were to be conducted every 3 to 5 years where as the II.F.2 and Permit Attachment 8 – Hanford Well Maintenance Inspection Plan, require inspections on an as needed basis. I explained that this needs to be revised in the permit if the inspections were not being performed. Mr. Boller asked what issues cause a down well camera inspection. Mr. Cathel said examples could be if a surface inspection showed issues, if there were issues with the well monitoring data, or if they had sand buildup at the bottom of the well. Ms. Jackson asked if all wells had dedicated pumps. Mr. Cathel said that not all wells had dedicated pumps.

Mr. Cathel showed pre-trip inspection records and pump check inspection records for the 300 Area Process Trenches. He showed where they have updated their inspection forms to be compliant with the requirements of the dangerous waste regulations. Mr. Cathel went over how if they found issues during the inspection, they fill out a well concern report to develop a work package to get the issue fixed by their well maintenance group. He explained that once the report is closed by the well maintenance group, that the paperwork is removed and a new pre-trip inspection occurs to verify the well repair and it is working again.

I checked and verified that I had the most current copies (as of December 31, 2015) of the interim status groundwater monitoring plans for 216-B-3 Main Pond, 216-S-10 Pond and Ditch, 216-B-63 Trench, 216-A-29 Ditch, 216-A-36B Crib, and 216-A-37-1 Crib. I asked if there have been any new wells or any decommissioned wells at any of these units. Mr. Cathel said there have been no new wells installed or any decommissioned wells in the last two years at these units. I asked what the current status was for revising all of the interim status groundwater monitoring plans for these units. Mr. Hildebrand said that the plans have been submitted as drafts to Ecology and that they were currently working through comments. I asked if any of these units had exceedances in 2015 and if so, if they have went into the groundwater quality assessment program. Mr. Hildebrand said yes, 216-A-29 Ditch had an exceedance for specific conductance and that it has moved into the groundwater quality assessment program. I reminded USDOE that once a determination has been made regarding if there were impacts to groundwater, that it triggers a report be submitted to Ecology within 15 days.

300 Area Process Trenches

We broke for an early lunch and then left Building 2753E for the 300 Area Process Trenches. At 11:43 a.m. we arrived at the 300 Area Process Trenches to observe a groundwater sampling event. We joined the following people:

- Barbra Briggs, Nuclear Chemical Operator, CHPRC
- Kyle Stiles, Groundwater Sampling Field Work Supervisor, CHPRC
- Elis Eberlein, Chemist, Ecology
- Joe Caggiano, Hydrogeologist Ecology
- Brian Johnson, Permit Writer, Ecology
- Dwayne Crumpler, Hydrogeologist, Ecology

The CHPRC groundwater sampling team had just finished sampling of a resource protection well. Mr. Stiles gave a field safety debrief and explained that we were welcome to come observe the sampling of their next well (Well 399-1-17A). I observed the groundwater sampling team install a Hydrostar pump actuator on Well 399-1-17A. The groundwater sampler then took a water level measurement with an e-tape that he placed down the well. The groundwater sampling team then installed a compressor fitting onto the Hydrostar pump actuator and connected the Hydrostar pump actuator output to the purgewater truck. I then walked inside of the groundwater sampling truck and observed Ms. Barbra Briggs measuring the parameters of pH, dissolved oxygen, specific conductance, temperature, and turbidity on the groundwater samples.

I walked back outside and observed the groundwater sampler taking Total Organic Carbon (TOC), Total Organic Halogen (TOX), and Volatile Organic Analysis (VOA) samples. After sampling was finished, I observed one of the samplers took the 5 gallon bucket with the generated purgewater and poured it into the top opening of the purgewater truck. I walked back inside the sampling truck, where Ms. Briggs showed me the sealed bags of groundwater samples they took for Well 399-1-17A. I thanked them for their time and we left for Building 2753E in 200 Area East at 12:35 p.m.

Photo #DSC01281, Hydrostar Pump Actuator on Well No. 399-1-17A

Photo #DSC01282, E-Tape Water Level Measurement

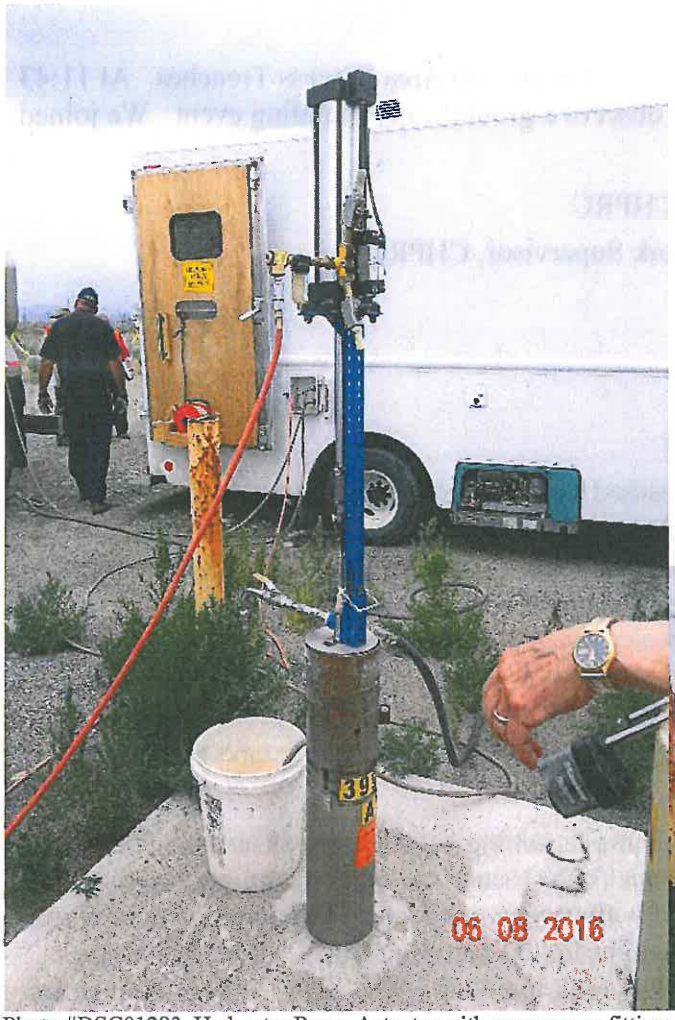


Photo #DSC01283, Hydrostar Pump Actuator with compressor fitting

Photo #DSC01284, Pump actuator connection to purge water truck

Photo #DSC01285, Analyzing turbidity sample

Photo #DSC01286, Groundwater sampling work

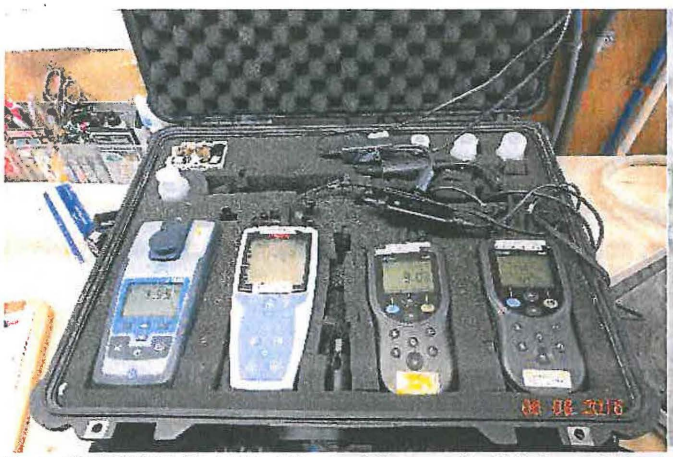


Photo #DSC01287, Turbidity, Dissolved Oxygen, & pH & Temp. Meters

Photo #DSC01288, Quality control sample

Photo #DSC01289, Taking groundwater sample

Photo #DSC01290, Taking groundwater sample

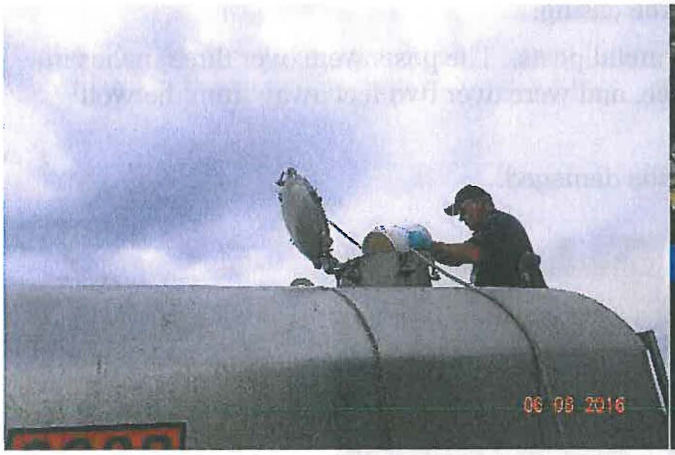


Photo #DSC01291, Returning sampling purgewater to purgewater truck

Photo #DSC01292, Groundwater samples for Well 399-1-17A

216-B-63 Trench

At Building 2753E, we regrouped and left in USDOE vehicles for 216-B-63 Trench. At 1:25 p.m. we arrived at groundwater Well 299-E34-8 for 216-B-63 Trench.

I observed the following on the Up-Gradient Well 299-E34-8:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01293, Up-Gradient Well 299-E34-8 for 216-B-63 Trench

I observed the following on the Up-Gradient Well 299-E34-12 for 216-B-63 Trench:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01294, Up-Gradient Well 299-E34-12 for 216-B-63 Trench

I observed the following on the Up-Gradient Well 299-E33-33 for 216-B-63 Trench:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 10 percent coverage of rust on the protective posts.

Photo #DSC01295, Up-Gradient Well 299-E33-33 for 216-B-63 Trench

I observed the following on the Down-Gradient Well 299-E27-16 for 216-B-63 Trench:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 10 percent coverage of rust on the protective posts.

Photo #DSC01296, Down-Gradient Well 299-E27-16 for 216-B-63 Trench

I observed the following on the Down-Gradient Well 299-E27-18 for 216-B-63 Trench:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01297, Down-Gradient Well 299-E27-18 for 216-B-63 Trench

I observed the following on the Down-Gradient Well 299-E27-19 for 216-B-63 Trench:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 20 percent coverage of rust on one of the protective posts.

Photo #DSC01298, Down-Gradient Well 299-E27-19 for 216-B-63 Trench

We left 216-B-63 Trench at 1:50 p.m.

216-B-3 Main Pond

At 1:59 p.m. we arrived at groundwater Well 699-43-45 for 216-B-3 Main Pond. I observed the following on the Down-Gradient Well 699-43-45:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 20 percent coverage of rust on one of the protective posts.

Photo #DSC01299, Down-Gradient Well 699-43-45 for 216-B-3 Main Pond

I observed the following on the Down-Gradient Well 699-43-44 for 216-B-3 Main Pond:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number AAO 451.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01300, Down-Gradient Well 699-43-44 for 216-B-3 Main Pond

I observed the following on the Down-Gradient Well 699-42-42B:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 10 percent coverage of rust on the protective posts.

Photo #DSC01301, Down-Gradient Well 699-42-42B for 216-B-3 Main Pond

I observed the following on the Up-Gradient Well 699-44-39B:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01302, Up-Gradient Well 699-44-39B for 216-B-3 Main Pond

We left 216-B-3 Main Pond at 2:21 p.m.

216-S-10 Pond and Ditch

At 2:46 p.m., we arrived at groundwater Well 699-33-76 for 216-S-10 Pond and Ditch. I observed the following on the Up-Gradient Well 699-33-76:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BAL 354.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01303, Up-Gradient Well 699-33-76 for 216-S-10 Pond and Ditch

I observed the following on the Down-Gradient Well 699-33-75:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BAL 352.
- The well had a cap that was locked on top of the casing.

- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01304, Down-Gradient Well 699-33-75 for 216-S-10 Pond and Ditch

During my inspection of Well 299-W26-14, Mr. Hildebrand told me he just received a phone call that they had confirmed exceedances of specific conductance for 1325-N and 1324 N and 1324-NA. He explained he wanted me to know right now, as the previous day he told me they did not have any known exceedances for those units. I observed the following on the Down-Gradient Well 299-W26-14:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number AHK 590.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

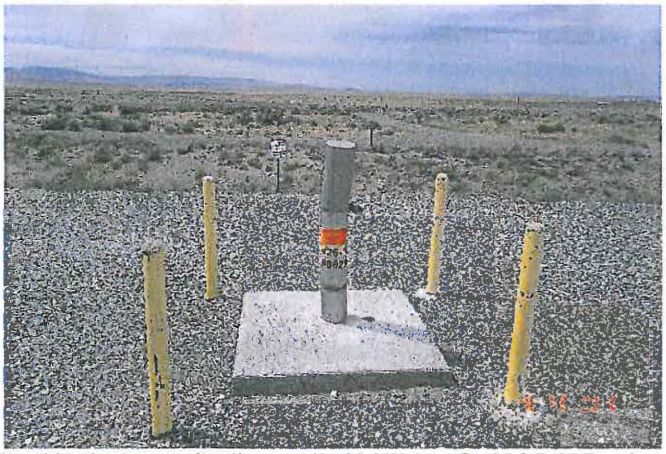


Photo #DSC01305, Down-Gradient Well 299-W26-14 for 216-S-10 Pond and Ditch

I observed the following on the Down-Gradient Well 699-32-76:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BAL 351.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01306, Down-Gradient Well 699-32-76 for 216-S-10 Pond and Ditch

I observed the following on the Down-Gradient Well 299-W26-13:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number AAO 459.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01307, Down-Gradient Well 699-32-76 for 216-S-10 Pond and Ditch

We left 216-S-10 Pond and Ditch at 3:09 p.m. and returned to Building 2753 and then left the Hanford site.

June 9, 2016 – Groundwater OAM Inspection of the Low Level Burial Grounds Green Islands and the Non-Radioactive Dangerous Waste Landfill

At 9:30 a.m. on June 9, 2016, Ms. Nancy Ware, Mr. Jack Boller, Mr. Jeff Ayres, Mr. Elis Eberlein, and I entered the front conference room in Building 2753E in the 200 Area East on the Hanford Site. I explained we were there to continue our groundwater operation and maintenance inspections for the Low Level Burial Grounds Green Islands and the Non-Radioactive Dangerous Waste Landfill. The following representatives from the USDOE-RL and CHPRC were present during the inspection in-brief and inspection questions.

- Mr. Joel Williams, CHPRC - Regulatory Inspection Lead
- Mr. Mitch Boyd, CHPRC - Inspection Specialist
- Mr. Robert Cathel, CHPRC - Groundwater Environmental Manager
- Mr. Rick Oldham, CHPRC - Environmental Compliance Officer
- Mr. Duane Carter, USDOE-RL - Environmental, Safety and Quality Division

Mr. Cathel went over the updated Health and Safety Plan (HASP) requirements and all who were present and did not sign off the previous days, signed off today.

I provided a list of groundwater wells I wanted to inspect during today's inspection and verified my list was current for wells in the groundwater monitoring networks. I explained during today's field inspection, that I wanted to observe the two new wells installed at the Non-Radioactive Dangerous Waste Landfill. I asked as of December 31, 2015, if DOE/RL-2009-76, Rev. 0 was the most current interim status groundwater monitoring plan for the Low Level Burial Grounds Green Islands Waste Management Area-2. Mr. Cathel said that it was the most current version. I asked as of December 31, 2015, if DOE/RL-2010-28, Rev. 1 was the most current interim status groundwater monitoring plan for the Non-Radioactive Dangerous Waste Landfill. Mr. Cathel said that he would have to check and get back to me. I asked for updates on revisions to interim status groundwater monitoring plans for the Low Level Burial Grounds Green Islands and the Non-Radioactive Dangerous Waste Landfill. Mr. Cathel said that they have drafted a new plan for the Non-Radioactive Dangerous Waste Landfill and possibly for the Low Level Burial Grounds Green Islands, but that he would need to check. I asked what wells replaced 699-25-34F and 699-26-33A at the Non-Radioactive Dangerous Waste Landfill. Mr. Oldham said that 699-25-34F replaced 699-25-34A and 699-26-33A replaced 699-26-33. I asked if there were any new wells installed at the Low Level Burial Grounds Green Islands in the last two years. Mr. Cathel answered no. I asked if the Non-Radioactive Dangerous Waste Landfill or Low level Burial Grounds Green Islands had any exceedances in 2015. Mr. Cathel said that he was not aware of any exceedances. I asked if either of these two units had any wells that were decommissioned in the last two years. Mr. Oldham said that the most recent well that was decommissioned was Well 299-E34-13 in April of 2010.

I explained that during our field inspection of the Low Level Burial Grounds Green Islands, I wanted to observe a pile of unknown material near Trench 94. Mr. Oldham said that it was probably ice melt and that we would need to talk to Mission Support Alliance for information on that material.

I requested to see an inspection and maintenance record for the Low Level Burial Grounds Green Islands. Mr. Cathel brought up the most recent pre-inspection groundwater sampling records for all of the Low Level Burial Grounds Green Islands and pump check inspection records for Well 299-E34-2

and Well 299-E34-10. Mr. Cathel also showed an example maintenance record and Well Concern Report.

I requested example inspection and maintenance records for the Non-Radioactive Dangerous Waste Landfill. Mr. Cathel showed the most recent pre-inspection groundwater sampling records for all of the Non-Radioactive Dangerous Waste Landfill and pump check inspection record for Well 699-25-34B. Mr. Cathel also showed maintenance records for Wells 699-25-34B and 699-26-33A.

Mr. Cathel said that he looked up Well 299-E34-13 for the Low Level Burial Grounds Green Islands and found out that it was abandoned in place, because the drilling did not work out. We completed our records review and we left in USDOE government vehicles for the Low Level Burial Grounds Green Islands – Waste Management Area 2.

Low Level Burial Grounds Green Islands – Waste Management Area 2

At 10:23 a.m. we arrived at groundwater Well 299-E34-9 for Low Level Burial Grounds Green Islands. I observed the following on the Cross-Gradient Well 299-E34-9:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was not locked or on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01308, Cross-Gradient Well 299-E34-9 for Low Level Burial Grounds Green Islands

Note: Ecology was provided with a photograph that showed Well 299-E34-9 had its well cap secured on June 9, 2016.

I observed the following on the Cross-Gradient Well 299-E34-10:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.

- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01309, Cross-Gradient Well 299-E34-10 for Low Level Burial Grounds Green Islands

I observed the following on the Cross-Gradient Well 299-E34-12:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01310, Cross-Gradient Well 299-E34-12 for Low Level Burial Grounds Green Islands

I observed the following on the Cross-Gradient Well 299-E27-17:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.

- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01311, Cross-Gradient Well 299-E27-17 for Low Level Burial Grounds Green Islands

I observed the following on the Up-Gradient Well 299-E34-2:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 40 percent coverage of rust on the protective posts.

Photo #DSC01312, Up-Gradient Well 299-E34-2 for Low Level Burial Grounds Green Islands

I observed the following on the Cross-Gradient Well 299-E27-11:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged; however I observed approximately 10 percent coverage of rust on the protective posts.

Photo #DSC01313, Cross-Gradient Well 299-E27-11 for Low Level Burial Grounds Green Islands

I observed the following on the Down-Gradient Well 299-E27-8:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01314, Down-Gradient Well 299-E27-8 for Low Level Burial Grounds Green Islands

I observed the following on the Down-Gradient Well 299-E27-9:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01315, Down-Gradient Well 299-E27-9 for Low Level Burial Grounds Green Islands

I observed the following on the Down-Gradient Well 299-E27-10:

- The well did not have a Washington State identification tag with unique well identification number on the well casing that was visible above the land surface.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

Photo #DSC01316, Down-Gradient Well 299-E27-10 for Low Level Burial Grounds Green Islands

After inspecting the resource protection wells for the Low Level Burial Ground Green Islands Waste Management Area 2, we drove up onto the road just southeast from Trench 94. I observed an orange and white pile of unknown material in a pit to the south of Trench 94. I explained that I observed the pile during a previous inspection and I wanted to inquire about the material. Mr. Oldham said that this was Mission Support Alliance's pit and that the pile was likely road salt used in the winter. Mr. Williams called a contact at Mission Support Alliance, but was not able to get an answer during this field inspection. Mr. Williams told me that I could ask the question and request an answer in my documents request. We left at 11:07 a.m. and drove back to Building 2753E. At Building 2753E we regrouped and then drove to the Non-Radioactive Dangerous Waste Landfill.

Photo #DSC01317, Pile of unknown material to the southeast from Trench 94

Non-Radioactive Dangerous Waste Landfill

At 11:42 a.m., we arrived at groundwater Well 699-25-34F for the Non-Radioactive Dangerous Waste Landfill. I observed the following on Down-Gradient Well 699-25-34F:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BJB 544.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

After looking at Down-Gradient Well 699-25-34F we walked to the well it replaced, Well 699-25-34A.

Photo #DSC01318, New Down-Gradient Well 699-25-34F for NRDWL

Photo #DSC01319, No Longer Used Down-Gradient Well 699-25-34A

I observed the following on Down-Gradient Well 699-26-33A:

- The well had a Washington State well identification tag on the well casing that was visible above the land surface with unique well identification number BJB 546.
- The well had a cap that was locked on top of the casing.
- The well was protected from damage by four metal posts. The posts were over three inches in diameter, over three feet above the land surface, and were over two feet away from the well casing.
- The well protection measures appeared to not be damaged.

After looking at Down-Gradient Well 699-26-33A we walked to the well it replaced, Well 699-26-33.

Photo #DSC01320, New Down-Gradient Well 699-26-33A for NRDWL

Photo #DSC01321, No Longer Used Down-Gradient Well 699-26-33

We ended our field inspection of the Non-Radioactive Dangerous Waste Landfill and I thanked everybody for their time. We left Hanford at 11:56 a.m.

Document Review

16.562 – 1301-N Liquid Waste Disposal Facility

Monitoring Well Records Review – 1301-N

I conducted a documents review of 1301-N groundwater monitoring records for 2015 against the requirements in the Chapter 3.0 Groundwater Monitoring for 1301-N in the Hanford Facility Resource Conservation and Recovery Act Permit, Revision 8C.

I observed that Wells 199-N-105A, 199-N-2, 199-N-3, 199-N-34, and 199-N-57 were all sampled at least semi-annually in 2015 for specific conductance, pH, total organic carbon, total organic halides, and turbidity. Except for one sample, I did not observe any exceedances for specific conductance, pH, total organic carbon, and total organic halides in any of the wells for 1301-N. I observed that there was an exceedance (5,100 ug/L) of the critical mean (2,532 ug/L) on one of the four replicate samples for Total Organic Carbon taken on March 9, 2015 for Up-Gradient Well 199-N-34. I observed that the value was marked "Y" that represents "Result suspect. Review – insufficient evidence to show result valid or invalid." I observed the following reported in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Value of 5,100 µg/L from upgradient well 199-N-34 is from one of the quadruplicate replicate samples taken on March 9, 2015. The three other replicate samples were below the analytical reporting limit of 350 µg/L, and the average of the four replicate values for well 199-N-34 for March 9, 2015, was less than the critical mean.*

As required in Chapter 3.0 Groundwater Monitoring and by reference, BHI-00725, Rev. 0, *100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program* (Borghese, et. al., 1996) and WHC-SD-EN-AP-038, Rev. 1, *RCRA and Operational Groundwater Monitoring (100-N).* I observed that Wells 199-N-105A, 199-N-2, 199-N-3, 199-N-34, and 199-N-57 were all sampled at least annually in 2015 for alkalinity, anions (Fluoride, Chloride, Nitrate, and Sulfate), and ICP metals (Arsenic, Barium, Cadmium, Chromium, Iron, Manganese, Selenium, Sodium, and Silver). I observed that Mercury was not sampled at least annually in 2015 for 1301-N. EPA Method 6010C for Inductively Coupled Plasma-Atomic Emission Spectrometry includes the metal Mercury.

I observed that Wells 199-N-34 had the below individual samples that exceeded the critical mean.

Well Number	Well Type	Indicator Parameter	Value Reported	Sample Average	Critical Mean	Date Sampled
199-N-34	Up Gradient	Total Organic Carbon	350 ug/L	1,538 ug/L	2,532 ug/L	March 9, 2015
			350 ug/L			
			350 ug/L			
			5,100 ug/L			

I observed that the groundwater flow rate and direction in the uppermost aquifer was determined in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015,* in accordance with WAC 173-303-645(9)(e).

Review of Maintenance Records – 1301-N

I reviewed all requested maintenance records for 2015 for the 1301-N and observed the following:

- On March 27, 2015, Wells 199-N-2 and 199-N-3 had general well maintenance inspections. The wells were reported in good condition and that the wells did not have a well pad, marker, or bollards installed.

- On March 27, 2015, Well 199-N-34 had a general well maintenance inspection. The well was reported to not have a well pad or marker, and that bollards were bent with one pulled out for access to well.
- On March 27, 2015, Well 199-N-57 had a general well maintenance inspection. The well was reported in good condition.
- On March 27, 2015, Well 199-N-105A had a general well maintenance inspection. The well was reported in good condition with one bollard missing and the old pump and treat rack and equipment still located at the well.
- On November 4, 2015, Well 199-N-2 - had a new Cable Grip Bushing (CGB) installed.
- On December 21, 2015, Well 199-N-2 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 667 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-3 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 668 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-34 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 664 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-57 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 660 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-105A had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 666 was added to the well casing during the inspection.

Review of Inspection Records – 1301-N

I reviewed the March 3, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 199-N-105A, 199-N-2, 199-N-3, 199-N-34, and 199-N-57 at 1301-N. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any problems observed during the inspection that required any repairs or remedial actions.

I reviewed the March 9, 2016 (Well 199-N-105A) and March 10, 2016 (Wells 199-N-2 and 199-N-3), pump check inspection records on the groundwater sample report for 1301-N. I observed that the inspection records included the date and time of the inspection, the handwritten signature of the inspectors, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection records. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any problems observed during the inspection that required any repairs or remedial actions.

I reviewed the March 9, 2016 (Well 199-N-57) and March 10, 2016, (Well 199-N-34) pump check inspection records on the groundwater sample report for 1301-N. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any problems observed during the inspection that required any repairs or remedial actions.

Well Construction Records Review – 1301-N

I reviewed the well construction record for Well 199-N-2. I observed that Well 199-N-2 was completed on June 5, 1964 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 199-N-3. I observed that Well 199-N-3 was completed on June 12, 1964 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 199-N-34. I observed that Well 199-N-34 was completed on September 9, 1983 and pre-dated the applicability date for Chapter 173-160 WAC.

16.563 – 1325-N Liquid Waste Disposal Facility

Monitoring Well Records Review – 1325-N

I conducted a documents review of 1325-N groundwater monitoring records for 2015 against the requirements in the Chapter 3.0 Groundwater Monitoring for 1325-N in the Hanford Facility Resource Conservation and Recovery Act Permit, Revision 8C.

I observed that Wells 199-N-32, 199-N-41, 199-N-74 and 199-N-81 were all sampled at least semi-annually in 2015 for specific conductance, pH, total organic carbon, total organic halides, and turbidity.

I observed that Wells 199-N-32, 199-N-41, and 199-N-81 had the below individual samples that exceeded the critical mean. Samples averages that exceeded the critical mean are noted in orange highlight below:

Well Number	Well Type	Indicator Parameter	Value Reported	Sample Average	Critical Mean	Date Sampled
199-N-32	Down Gradient	Specific Conductance	476 uS/cm 476 uS/cm 476 uS/cm 477 uS/cm	476 uS/cm	466 uS/cm	March 9, 2015
199-N-32	Down Gradient	Specific Conductance	466 uS/cm	466 uS/cm	466 uS/cm	June 2, 2015
199-N-32	Down Gradient	Specific Conductance	484 uS/cm 485 uS/cm 484 uS/cm 484 uS/cm	484 uS/cm	466 uS/cm	September 14, 2015
199-N-41	Down Gradient	Specific Conductance	620 uS/cm 619 uS/cm 621 uS/cm 618 uS/cm	620 uS/cm	466 uS/cm	March 11, 2015
199-N-41	Down Gradient	Specific Conductance	600 uS/cm 601 uS/cm 601 uS/cm	601 uS/cm	466 uS/cm	September 28, 2015

			601 uS/cm			
199-N-41	Down Gradient	Total Organic Carbon	893 ug/L 925 ug/L 778 ug/L 1,270 ug/L	967 ug/L	1,137 ug/L	March 11, 2015
199-N-81	Down Gradient	Specific Conductance	475 uS/cm 476 uS/cm 477 uS/cm 478 uS/cm	477 uS/cm	466 uS/cm	March 11, 2015
199-N-81	Down Gradient	Specific Conductance	506 uS/cm 506 uS/cm 506 uS/cm 506 uS/cm	506 uS/cm	466 uS/cm	September 17, 2015

I observed that there was an exceedance (1,270 ug/L) of the critical mean (1,137 ug/L) on one of the four replicate samples for Total Organic Carbon taken on March 11, 2015 for Down-Gradient Well 199-N-41. I observed the following reported in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Total organic carbon concentration of 1,270 µg/L from one of the four replicate samples from 199-N-41 taken on March 11, 2015. The average of quadruplicate measurements for 199-N-41 was below the critical mean. All other TOC concentrations were below the critical mean.*

As required in Chapter 3.0 Groundwater Monitoring and by reference, BHI-00725, Rev. 0, *100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program* (Borghese, et. al., 1996) and WHC-SD-EN-AP-038, Rev. 1, *RCRA and Operational Groundwater Monitoring (100-N)*, I observed that Wells 199-N-32, 199-N-41, 199-N-74 and 199-N-81 were all sampled at least annually in 2015 for alkalinity, anions (Fluoride, Chloride, Nitrate, and Sulfate), and ICP metals (Arsenic, Barium, Cadmium, Chromium, Iron, Manganese, Selenium, Sodium, and Silver). I observed that Wells 199-N-32, 199-N-41, 199-N-74 and 199-N-81 were not sampled for Mercury in 2015. EPA Method 6010C for Inductively Coupled Plasma-Atomic Emission Spectrometry includes the metal Mercury.

I observed that the groundwater flow rate and direction in the uppermost aquifer was determined in DOE/RL-2016-12, Rev. 0, Hanford Site RCRA Groundwater Monitoring Report for 2015, in accordance with WAC 173-303-645(9)(e).

Review of Maintenance Records – 1325-N

I observed the below records for maintenance activities for groundwater wells at 1325-N.

- On March 27, 2015, Well 199-N-28 had a general well maintenance inspection. I observed that the inspection noted that the well pad was in bad condition and that there was no brass marker and that the concrete was deteriorated.
- On March 27, 2015, Well 199-N-32 had a general well maintenance inspection. I observed that the inspection noted that the well pad had minor deterioration, that no brass marker was in place, and the bollard (i.e. steel post) was out of place.
- On March 27, 2015, Well 199-N-41 had a general well maintenance inspection. I observed that the inspection noted that the well needed to be relabeled and that the concrete pad had minor deterioration, and no brass marker in place.

- On March 27, 2015, Well 199-N-74 had a maintenance inspection and was reported to be in good condition.
- On March 27, 2015, Well 199-N-81 had a maintenance inspection and was reported to be in good condition.
- On December 21, 2015, Well 199-N-81 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 665 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-28 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 661 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-32 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 662 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-41 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 663 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-74 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 654 was added to the well casing during the inspection.

Review of Inspection Records – 1325-N

I reviewed the March 3, 2016, Appendix K Groundwater Well Pre-Trip Inspection for 199-N-32, 199-N-41, 199-N-74 and 199-N-81 at 1325-N. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the March 9, 2016 (Well 199-N-32) and April 26, 2016 (Wells 199-N-41 and 199-N-81) pump check inspection records on the groundwater sample report for 1325-N. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the March 10, 2016 (Well 199-N-74) pump check inspection record on the groundwater sample report for 1325-N. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

Well Construction Records Review – 1325-N

I reviewed the well construction record for Well 199-N-32. I observed that Well 199-N-32 was completed on September 29, 1983 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 199-N-41. I observed that Well 199-N-41 was completed on April 19, 1984 and pre-dated the applicability date for Chapter 173-160 WAC.

16.564 – 183-H Solar Evaporator Basins

Monitoring Well Records Review – 183-H

I conducted a documents review of 183-H groundwater monitoring records for 2015 against the requirements in the Chapter 3.0 Groundwater Monitoring for 183-H in the Hanford Facility Resource Conservation and Recovery Act Permit, Revision 8C.

I observed in Table 3.1 Sampling and Analysis Schedule for 183-H Solar Evaporator Basins RCRA Corrective Action and CERCLA Remedial Investigation Monitoring in the Chapter 3.0 Groundwater Monitoring Plan listed the following frequencies for well sampling:

Well/Location Identifier	183-H: Corrective Action
199-H4-8	A-1
199-H4-12A	A-1
199-H4-12C	A-1
199-H4-84	

Note: A=Annual Sampling 1= Defines the analysis suite in Table 3.2 in the Groundwater Monitoring Plan

I observed there was no corrective action sampling requirements in Table 3.1 for Well 199-H4-84 however, there were requirements for sampling this well for corrective action in Section 3.2 of the Chapter 3.0 Groundwater Monitoring Plan. Section 3.2 RCRA Corrective Action Groundwater Monitoring Schedule from Chapter 3.0 Groundwater Monitoring for 183-H Solar Evaporator Basins states the following in part:

> *The resulting schedule for the 183-H Solar Evaporation Basins RCRA network is presented in Table 3.1. This table identifies the wells being sampled, the frequency of sampling, and an analysis suite code for the previous RCRA compliance monitoring schedule and for the revised corrective action monitoring schedule. Table 3.2 provides a complete description of the constituent analysis suites....*
>
> *The RCRA sampling and analysis schedule includes a network of four wells sampled annually. The wells are 199-H4-8, 199-H4-12A, 199-H4-12C, and 199-H4-84 (Figure 3.1). (Well 199-H4-12C is also used as an extraction well for the pump-and-treat system.) Water samples will be analyzed for the constituents of concern previously identified for tracking contamination attributable to the 183-H Solar Evaporation Basins (nitrate, fluoride, chromium, uranium, and technetium-99). Additional analyses will be performed for alkalinity, other anions, and other metals, to aid in interpreting results. Field parameters (pH, temperature, specific conductance, and turbidity) will also be measured.*

I observed that Wells 199-H4-8, 199-H4-12A, 199-H4-12C, and 199-H4-84 were all sampled at least annually in 2015 for Aluminum, Antimony, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt,

Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Silver, Sodium, Vanadium, Zinc, Uranium, Chloride, Fluoride, Nitrate, Sulfate,Technetium-99, Alkalinity, pH, Specific conductance, Temperature, and Turbidity. I observed that Wells 199-H4-12A, 199-H4-12C, and 199-H4-84 were in many cases sampled quarterly for many of these same constituents. I observed that results from Well 199-H4-12C exceeded the permitted limit for chromium. Samples averages that exceeded the permitted limit are noted in orange highlight below:

Well Number	Well Type	Indicator Parameter	Value Reported	Sample Average	Permit Limit	Date Sampled
199-H4-12C	Down Gradient	chromium	127 ug/L	127 ug/L	122 ug/L	August 12, 2015
199-H4-12C	Down Gradient	chromium	126 ug/L			

I observed the following reported in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Total chromium concentrations exceeded the Permit limit of 122 µg/L in well 199-H4-12C, which is connected to the P&T system for the 100-HR-3 OU. Hexavalent chromium concentrations were also higher than 122 µg/L in well 199-H4-12C; however, the Permit applies to total filtered chromium. The hexavalent chromium results are provided for informational purposes only.*

183-H is under corrective action monitoring and has a pump and treat system under WAC 173-303-645(11) for hexavalent chromium.

Review of Maintenance Records – 183-H

I observed the below records for maintenance activities for groundwater wells at 183-H.

- On March 27, 2015, Well 199-H4-8 had a general well maintenance inspection. The well was reported as being in good condition.
- On March 27, 2015, Well 199-H4-12A had a general well maintenance inspection and the top of the casing was shortened to about 16 inches.
- On March 27, 2015, Well 199-H4-12C had a general well maintenance inspection. The well was reported to be in good condition and it was recommended to cover the half inch hole that was drilled into the protective casing.
- On March 27, 2015, Well 199-H4-84 had a general well maintenance inspection. The well was reported to be in good condition.
- On April 16, 2015, Wells 199-H4-8, 199-H4-12A, and 199-H4-84 had well caps replaced.
- On December 21, 2015, Well 199-H4-8 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 671 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-H4-12A had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 670 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-H4-12C had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time

of inspection. Washington State Ecology Tag BIV 669 was added to the well casing during the inspection.

Review of Inspection Records – 183-H

I reviewed the May 3, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 199-H4-8, 199-H4-12A, 199-H4-12C, and 199-H4-84 at 183-H. I observed that the inspection record included the date and time of the inspection, the printed name and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the February 3, 2016 (Wells 199-H4-12A and 199-H4-84), and February 24, 2016 (Well 199-H4-12C) pump check inspection records on the groundwater sample report for 183-H. I observed that the inspection record included the date and time of the inspection, the printed name and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the May 20, 2016 (Well 199-H4-8) pump check inspection records on the groundwater sample report for 183-H. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

16.565 – 1324-N Impoundment and 1324-NA Percolation Pond

Monitoring Well Records Review – 1324-N and 1324-NA

I conducted a documents review of 1324-N and 1324-NA groundwater monitoring records for 2015 against the requirements in the Chapter 3.0 Groundwater Monitoring for 1324-N and 1324-NA in the Hanford Facility Resource Conservation and Recovery Act Permit, Revision 8C.

I observed that Wells 199-N-71, 199-N-72, 199-N-73 and 199-N-165 were all sampled at least semi-annually in 2015 for specific conductance, pH, total organic carbon, total organic halides, and turbidity.

As required in Chapter 3.0 Groundwater Monitoring and by reference, BHI-00725, Rev. 0, *100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program* (Borghese, et. al., 1996) and WHC-SD-EN-AP-038, Rev. 1, *RCRA and Operational Groundwater Monitoring (100-N)*, I observed that Wells 199-N-71, 199-N-72, 199-N-73 and 199-N-165 were all sampled at least annually in 2015 for alkalinity, anions (Fluoride, Chloride, Nitrate, and Sulfate), and ICP metals (Arsenic, Barium, Cadmium, Chromium, Iron, Manganese, Sodium, and Silver). I observed that Wells 199-N-71, 199-N-73 and 199-N-165 were sampled for Selenium and Lead, but not for Mercury in 2015. I observed that Well 199-N-72 was not sampled for Mercury, Selenium, or Lead in 2015. EPA Method 6010C for Inductively Coupled Plasma-Atomic Emission Spectrometry includes the metals Selenium, Lead, and Mercury.

I observed that Wells 199-N-71, 199-N-72, 199-N-73 and 199-N-165 had the below exceedances highlighted in orange:

Well Number	Well Type	Indicator Parameter	Value Reported	Sample Average	Critical Mean	Date Sampled
199-N-71	Up Gradient	Total Organic Halides	13.1 ug/L 12.1 ug/L 16.6 ug/L 14.6 ug/L	14.1 ug/L	12.9 ug/L	March 18, 2015
199-N-71	Up Gradient	Total Organic Halides	13.1 ug/L 15.2 ug/L 15.8 ug/L 13.6 ug/L	14.4 ug/L	12.9 ug/L	September 16, 2015
199-N-73	Down Gradient	Total Organic Halides	14.4 ug/L 13.1 ug/L 13.8 ug/L 12.5 ug/L	13.5 ug/L	12.9 ug/L	March 11, 2015
199-N-165	Down Gradient	Specific Conductance	673 uS/cm 675 uS/cm 677 uS/cm 674 uS/cm	675 uS/cm	526 uS/cm	March 11, 2015
199-N-165	Down Gradient	Specific Conductance	654 uS/cm	654 uS/cm	526 uS/cm	June 5, 2015
199-N-165	Down Gradient	Specific Conductance	668 uS/cm 669 uS/cm 670 uS/cm 663 uS/cm	668 uS/cm	526 uS/cm	September 15, 2015
199-N-165	Down Gradient	Specific Conductance	636 uS/cm	636 uS/cm	526 uS/cm	December 8, 2015
199-N-72	Down Gradient	Specific Conductance	852 uS/cm 845 uS/cm 837 uS/cm 836 uS/cm	843 uS/cm	526 uS/cm	March 12, 2015
199-N-72	Down Gradient	Specific Conductance	909 uS/cm 908 uS/cm 906 uS/cm 909 uS/cm	908 uS/cm	526 uS/cm	September 15, 2015
199-N-73	Down Gradient	Specific Conductance	888 uS/cm 876 uS/cm 886 uS/cm 888 uS/cm	885 uS/cm	526 uS/cm	March 11, 2015
199-N-73	Down Gradient	Specific Conductance	916 uS/cm 916 uS/cm 915 uS/cm 918 uS/cm	916 uS/cm	526 uS/cm	September 15, 2015

I observed that the groundwater flow rate and direction in the uppermost aquifer was determined in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015,* in accordance with WAC 173-303-645(9)(e).

I am concerned that if limits of quantification or practical quantification limits are used for determining if a hazardous constituent(s) are exceeded in a unit group with final permit status and groundwater monitoring requirements, CHPRC and USDOE first get the approval by the Department of Ecology prior to using limits of quantification or practical quantification limits to excuse an exceedance of any hazardous constituent.

In DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015,* I observed the following statement:

> *Total average organic halide concentration of the four replicate samples collected on September 16, 2015, from upgradient well (199-N-71) was 14.4 µg/L. This concentration exceeds the critical mean value of 12.9 µg/L and the laboratory (Test America St. Louis [TASL]) LOQ of 12.5 µg/L calculated for that quarter. The average TOX concentration from the four replicate samples on March 18, 2015, was 14.1 µg/L, which is also above the critical mean value of 12.9 µg/L but is below the laboratory LOQ for that quarter (15.3 µg/L). TOX concentrations in all downgradient wells were below the critical mean or LOQ value for 2015. The critical mean values will be recalculated for future comparisons.*

Permit Condition II.F. from the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C states the following in part:

> *The Permittees will comply with the ground water monitoring requirements of WAC 173-303-645. This Condition will apply only to those wells the Permittees use for the ground water monitoring programs applicable to the TSD units incorporated into Parts III, V, and/or VI of this Permit.*

WAC 173-303-645(8)(h) states the following:

> *The owner or operator will specify one of the following statistical methods to be used in evaluating groundwater monitoring data for each hazardous constituent which, upon approval by the department, will be specified in the unit permit. The statistical test chosen must be conducted separately for each dangerous constituent in each well.* ***Where practical quantification limits (pqls) are used in any of the following statistical procedures to comply with (i)(v) of this subsection, the pql must be proposed by the owner or operator and approved by the department.*** *Use of any of the following statistical methods must be protective of human health and the environment and must comply with the performance standards outlined in (i) of this subsection.*
>
> *(i) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.*
>
> *(ii) An analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.*
>
> *(iii) A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.*
>
> *(iv) A control chart approach that gives control limits for each constituent.*

Emphasis added

In a subsequent records request, I asked for units 1324-N and 1324-NA, to provide Ecology approvals for use of the laboratory limit of quantification (LOQ) or practical quantification limit (pql) of 15.3 µg/L for Total Organic Halides as required in WAC 173-303-645(8)(h) and used to report (on page 2-12 of DOE/RL-2016-12 Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015*) why exceedances for Total Organic Halides were not reported to Ecology for 1324-N and 1324-NA. I received the following response to this question:

> *The site is monitored under interim status in accordance with 40 CFR 264 part F. The large number of non-detects and lab qualified data places large uncertainty if the underlying population is normal or can be normalized. In these type of situations the double quantification rule can be used to define an approximate non-parametric prediction limit according to the unified guidance, with the reporting limit as an upper bound. DOE has decided to use the LOQ as the upper reporting limit. The LOQ calculated for the labs were for the reporting period. This action was completed in accordance with 40 CFR 265.91(a)(1)(i), which states the background groundwater quality must be representative.*

Note: The above response is conflicted. Interim status is under 40 CFR 265. Final status is 40 CFR 264 and this would be under WAC 173-303-645 since these units are in final permit status. ANOVA student t-test is supposed to be used for the statistical analysis. Prediction limits are used only for final permit status units.

I did not observe any records submitted to Ecology that demonstrated that approval of the limit of quantification (LOQ) or practical quantification limit (pql) of 15.3 µg/L for Total Organic Halides for 1324 N and 1324-NA was approved by Ecology; however WAC 173-303-110(7) states the following:

> *"Ground-Water Monitoring List" Appendix IX to 40 C.F.R. Part 264 is replaced with the version in Appendix 5 of Chemical Testing Methods for Designating Dangerous Waste, Department of Ecology Publication #97-407, revised December 2014. The Appendix "Ground-Water Monitoring List" in Chemical Testing Methods includes the columns "Suggested methods" and "PQL."*

Appendix IX of 40 CFR 264 in Publication #97-407, does not reference the groundwater indicator parameters of pH, specific conductance, total organic halides, or total organic carbon, as they are not a specific hazardous constituents as referenced in WAC 173-303-645(8)(h).

Review of Maintenance Records – 1324-N and 1324-NA

- On March 27, 2015, Well 199-N-71 had a general well maintenance inspection. The well was reported to be in good condition.
- On March 27, 2015, Well 199-N-72 had a general well maintenance inspection. The well was reported to be in good condition, but could be relabeled.
- On March 27, 2015, Well 199-N-73 had a general well maintenance inspection. The well was reported to be in good condition.
- On March 27, 2015, Well 199-N-77 had a general well maintenance inspection. The well was reported to be in good condition, but could be relabeled.
- On March 27, 2015, Well 199-N-165 had a general well maintenance inspection. The well was reported to be in good condition.
- On December 8, 2015, Well 199-N-165 had its cap repaired.
- On December 21, 2015, Well 199-N-77 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time

of inspection. Washington State Ecology Tag BIV 659 was added to the well casing during the inspection.

- On December 21, 2015, Well 199-N-73 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 656 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-71 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 655 was added to the well casing during the inspection.
- On December 21, 2015, Well 199-N-72 had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 658 was added to the well casing during the inspection.

Review of Inspection Records – 1324-N and 1324-NA

I reviewed the March 3, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 199-N-71, 199-N-72, 199-N-73, and 199-N-165 at 1324-N and 1324-NA. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the March 9, 2016 (Wells 199-N-71) and April 26, 2016 (Wells 199-N-72, 199-N-73, and 199-N-165) pump check inspection records on the groundwater sample report for 1324-N and 1324-NA. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

Sampling Parameters for 1301-N Liquid Waste Disposal Facility, 1325-N Liquid Waste Disposal Facility, and 1324-N Impoundment and 1324-NA Percolation Pond

In a subsequent records request, I asked CHPRC to provide a list of what specific anions, ICP Metals (filtered), and what water quality parameters are tested for at 1301-N, 1325-N, and 1324-N and 1324-NA. I also asked if bromide was not included in the list, to explain why the anion bromide is not included in the sampling. I received the below response from CHPRC.

As called out in the groundwater monitoring plan, specific analytes include:

- *Iron, Manganese, Sodium, Chloride, Sulfate*
- *Supporting parameters include Alkalinity, Turbidity*
- *Gross Alpha is also analyzed at 1324-N/NA for wells 199-N-165 and 199-N-77 only*
- *Bromide: No requirement to sample for bromide at these sites.*

In Permit Section 3.4.1 from Chapters 3.0 Groundwater Monitoring for 1301-N, 1324-N and 1324-NA, and 1325-N state that "Groundwater monitoring will be done in accordance with the existing groundwater-monitoring program (Borghese, et. al., 1996)."

I observed that in Section 4.3 from BHI-00725, Rev. 0, *100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program* (Borghese, et. al., 1996) stated the following:

Table 4 lists the constituent for the 100-N RCRA sites. The list includes semiannual analysis for the indicator parameters pH, conductivity, TOC, TOX [40 CFR 265.92(b)(3)], and turbidity, and annual analyses for metals, anions, and alkalinity. The metals and anions include constituents required by 40 CFR 265.92(b)(1) and (b)(2).

Lead was formerly analyzed for in samples from 1301-N and 1325-N monitoring wells, because process knowledge indicated that it may have been introduced to the waste stream. It has been dropped from the constituent lists because it was never detected in the effluent and has never been detected in groundwater at these sites.

Analysis for phenol is required annually by 40 CFR 265.92. This plan proposes dropping phenol from the constituent list for all three RCRA sites at 100-N because it was not discharged to the facilities and has never been detected in groundwater.

40 CFR 265.92(b)(1) states, "Parameters characterizing the suitability of the ground water as a drinking water supply, as specified in appendix III."

Appendix III references the following metals and anions

Arsenic	Metal
Barium	Metal
Cadmium	Metal
Chromium	Metal
Fluoride	Anion
Lead	Metal
Mercury	Metal
Nitrate (as N)	Anion
Selenium	Metal
Silver	Metal

40 CFR 265.92(b)(2) states, Parameters establishing ground-water quality:

(i) Chloride	Anion
(ii) Iron	Metal
(iii) Manganese	Metal
(iv) Phenols	Constituent
(v) Sodium	Metal
(vi) Sulfate	Anion

Exceedance Evaluations for 1325-N Liquid Waste Disposal Facility and 1324-N Impoundment and 1324-NA Percolation Pond

On June 8, 2016, during my inspection, Mr. Hildebrand received a phone call confirming exceedances of specific conductance for 1325-N and 1324 N and 1324-NA. In a subsequent records request received by Ecology on August 24, 2016, I asked for the following for 1324-N, 1324-NA, and 1325-N:

- All current 2016 groundwater monitoring records (up to the date of this request)(8/4/2016)
- Records showing that notification to Ecology was provided in accordance with WAC 173-303-645(9)(g)(i) and WAC 173-303-645(9)(g)(vi)(A) if applicable.
- Records showing that all wells were sampled for requirements listed in WAC 173-303-645(9)(g)(ii) or Ecology approved sampling for an alternate site-specific subset of constituents from the "Ground-Water Monitoring List" Appendix and other representative/related waste constituents.
- Records (e.g. e-mails, letters, meeting minutes, reports) showing that DOE/CHPRC is compliant with WAC 173-303-645(9)(g)(vi) (not including WAC 173-303-645(9)(g)(vi)(A) as requested in 19b) for the exceedances confirmed at both of these units.

I received the following response in a subsequent records request, received by Ecology on August 24, 2016.

In March 8 through 10, 2016, the RCRA monitoring well sampling for 1325-N and 1324-N/NA was performed. The data results indicated that specific conductance measurements exceeded the critical mean comparison values in samples collected from the 1325-N and 1324-N/NA downgradient monitoring wells. Verification samples were taken and the results confirmed that the critical mean was exceeded at these wells. The verification samples were also analyzed for sulfate and sodium to evaluate if the exceedance was a continuation of previously assessed exceedance attributed to the non-dangerous waste constituent sulfate. The sulfate/specific conductance trends continue to support the source of high specific conductance is sulfate.

Attached are the 1325-N and 1324-N/NA March and April 2016 laboratory results identifying the exceedance caused by the sulfate for the identified groundwater monitoring wells that were sampled at in March and April 2016.

Specific conductance exceedances were identified in these units as early as 1989 when assessment monitoring began at the 1324-N/NA facilities.

Attached document "Results of Groundwater Quality Assessment Monitoring at the 1301-N and 1324-N/NA Facilities", WHC-SD-EN-EV-003, Revision 1, dated December 1992 provides the conclusion:

> *Groundwater quality assessment data provide no evidence that elevated specific conductance in groundwater results from hazardous waste from the 1301-N or 1324-N/NA facilities. The elevated specific conductance observed in some of the downgradient monitoring wells results primarily from elevated concentrations of sulfate and sodium, which are non-regulated constituents. The elevated specific conductance observed in some groundwater samples from well N-3 reflects the influence of the 1324-NA Percolation Pond, not contamination from the 1301-N LWDF.*

Attached is a letter (00-GWVZ-054) K. Michael Thompson, Acting Program Manger Groundwater/Vadose Zone Program DOE-RL to J.A Hedges, Perimeter Section Manager, Ecology, Subject "Results of Assessment at the 1325-N Facility", provides the following conclusion:

> *The groundwater-quality assessment indicates that the elevated downgradient measurements of specific conductance is caused by a nonhazardous constituent, sulfate, from an upgradient source as discussed in the attached report. Monitoring will continue at this site.*

Additionally, the report referenced in letter 00-GWVZ-054 states:

No further assessment of the high specific conductance at 1325-N is needed. The site should remain in detection monitoring as described in the existing monitoring plan (Hartman 1996).

The continued exceedance of specific conductance above its calculated critical mean value is expected and has been determined to be due to the non-dangerous waste constituent sulfate.

Attached are the minutes of the 100/300 Area Unit Managers Meeting, dated May 12, 2016, in which Department of Ecology representatives participated in a discussion on the 1325-N and 1324-N/NA exceedance event identified in March and April 2016, and referred to above. This discussion can be found on page 23 of the attached meeting minutes.

No additional notifications to Ecology are required since previous notifications of this continuing condition have been provided as noted above.

I observed the following confirmation sampling results for 1324 N and 1324-NA and 1325-N.

Unit Group	Well Number	Well Type	Parameter	Value Reported	Critical Mean	Date Sampled
1325-N	199-N-41	Down Gradient	Specific Conductance	582 uS/cm	470 uS/cm	April 26, 2016 Confirmation Sampling
1325-N	199-N-81	Down Gradient	Specific Conductance	480 uS/cm	470 uS/cm	April 26, 2016 Confirmation Sampling
1324-N and 1324-NA	199-N-72	Down Gradient	Specific Conductance	914 uS/cm	487 uS/cm	April 26, 2016 Confirmation Sampling
1324-N and 1324-NA	199-N-73	Down Gradient	Specific Conductance	745 uS/cm	487 uS/cm	April 26, 2016 Confirmation Sampling
1324-N and 1324-NA	199-N-77	Down Gradient	Specific Conductance	726 uS/cm	487 uS/cm	April 26, 2016 Confirmation Sampling
1324-N and 1324-NA	199-N-165	Down Gradient	Specific Conductance	609 uS/cm	487 uS/cm	April 26, 2016 Confirmation Sampling

Additionally, WHC-SD-EN-EV-003, Rev 1, Dated December 22 ,1992, *Results of Groundwater Quality Assessment Monitoring at the 1301-N and 1324-N NA Facilities* was provided as a part of the subsequent records request received on August 24, 2016.

Section 3.2.2 Sampling and Analysis Plan from the 1324-N and 1324-NA and 1325-N Chapter 3.0 Groundwater Monitoring from the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C states the following:

The Groundwater Monitoring Plan for the 1301-N, 1324-N/NA, and 1325-N Sites (Hartman 1996b) describes the interim status sampling and analysis plan for RCRA monitoring.

Section 5.2 Statistical Analysis in WHC-SD-EN-AP-038, Rev. 2, Dated September 26, 1996, *Groundwater Monitoring Plan for the 1301-N, 1324-N/NA, and 1325-N Sites* states the following in part:

The 1301-N, 1324-N/NA, and 1325-N sites are all monitored in accordance with interim-status regulations under indicator evaluation monitoring (40 CFR 265.93).

Section 3.4.1 Monitoring Program from the 1324-N and 1324-NA and 1325-N Chapter 3.0 Groundwater Monitoring from the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C states the following:

> *Groundwater monitoring will be done in accordance with the existing groundwater-monitoring program (Borghese, et. al 1996).*

Section 4.1.1.1 RCRA Groundwater Monitoring Requirements from BHI-00725, Rev. 0,

> *The TSD is currently implementing a compliance monitoring program in accordance with Subpart F (40 CFR 265.90-25.94) of RCRA. This act was incorporated by reference in WAC 173-303-400(3)b.*

I did not observe that CHPRC or USDOE-RL submitted a groundwater quality assessment program as required in 40 CFR. 265.93(d)(4), when confirmation sampling conducted on April 26, 2016, confirmed exceedances of specific conductance in 1324-N and 1324-NA and 1325-N.

The Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, Permit Condition II.F states the following:

> *The permittees will comply with the ground water monitoring requirements of WAC 173-303-645. This Condition will apply only to those wells the Permittees use for ground water monitoring programs applicable to the TSD units incorporated into Parts III, V, and/or VI of this Permit...*

WAC 173-303-645(9)(g) states if the owner or operator determines pursuant to (f) of this subsection that there is statistically significant evidence of contamination for chemical parameters or dangerous constituents specified pursuant to (a) of this subsection at any monitoring well at the compliance point, he or she must: (i) Notify the department of this finding in writing within seven days. The notification must indicate what chemical parameters or dangerous constituents have shown statistically significant evidence of contamination:

On June 8, 2016, during my inspection, Mr. Hildebrand received a phone call confirming exceedances of specific conductance for 1325-N and 1324 N and 1324-NA. From review of Ecology e-mail records, Mr. Hildebrand sent Ecology written notification of the confirmed exceedances at 1324-N, 1324-NA, and 1325-N on June 13, 2016.

WAC 173-303-645(9)(g)(ii) states immediately sample the groundwater in all monitoring wells and determine whether constituents in the Appendix "Ground-Water Monitoring List" in Chemical Testing Methods for Designating Dangerous Waste which is incorporated at WAC 173-303-110 (3)(c) are present, and if so, in what concentration. However, the department, on a discretionary basis, may allow sampling for a site-specific subset of constituents from the "Ground-Water Monitoring List" Appendix and other representative/related waste constituents.

In groundwater sampling records received by Ecology on August 24, 2016, I observed the following:

- For 1324 N and 1324-NA, Wells 199-N-72, 199-N-73, 199-N-77, and 199-N-165 were sampled for pH, Specific Conductance, Temperature, and Turbidity on April 26, 2016.
- For 1325-N, Wells 199-N-41 and 199-N-81 were sampled for pH, Specific Conductance, Temperature, and Turbidity on April 26, 2016.

I observed that Wells 199-N-32 and 199-N-74 for 1325-N and Well 199-N-71 for 1324-N and 1324-NA were not sampled for confirmation of exceedances and all Wells at 1324-N and 1324-NA and 1325-N were not sampled to determine whether constituents in the Appendix "Ground-Water Monitoring List" in Chemical Testing Methods for Designating Dangerous Waste (which is incorporated at WAC 173-303-110(3)(c)) are present. Additionally, CHPRC and USDOE-RL did not request and Ecology did not

approve the allowance to sample a site specific subset of constituents from the ground-water monitoring list appendix incorporated by reference in WAC 173-303-110(3)(c).

WAC 173-303-645(9)(g)(vi) states if the owner or operator determines, pursuant to (f) of this subsection, that there is a statistically significant difference for chemical parameters or dangerous constituents specified pursuant to (a) of this subsection at any monitoring well at the compliance point, he or she may demonstrate that a source other than a regulated unit caused the contamination or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the groundwater. The owner operator may make a demonstration under this subsection in addition to, or in lieu of, submitting a permit modification application under (g)(iv) of this subsection; however, the owner or operator is not relieved of the requirement to submit a permit modification application within the time specified in (g)(iv) of this subsection unless the demonstration made under this subsection successfully shows that a source other than a regulated unit caused the increase, or that the increase resulted from error in sampling, analysis, or evaluation. In making a demonstration under this subsection, the owner or operator must:

(A) Notify the department in writing within seven days of determining statistically significant evidence of contamination at the compliance point that he intends to make a demonstration under this subsection;

(B) Within ninety days, submit a report to the department which demonstrates that a source other than a regulated unit caused the contamination or that the contamination resulted from error in sampling, analysis, or evaluation;

(C) Within ninety days, submit to the department an application for a permit modification to make any appropriate changes to the detection monitoring program facility; and

(D) Continue to monitor in accordance with the detection monitoring program established under this section.

On June 13, 2016, Mr. Hildebrand provided a written notification to Ecology using e-mail. Records provided in this e-mail included an informal report that demonstrated that a source other than the regulated units caused the increase. Below is the information from the June 13, 2016 e-mail to Ecology.

Note: A formal report showing that a source other than a regulated unit has not been completed since 1992 for 1324-N and 1324-NA and 1999 for 1325-N. Various remedial actions have significantly changed groundwater flow and direction through this portion of 100-N Area. These documents are approximately 20 years old and are no longer applicable.

In a separate record, received by Ecology on August 24, 2016, I observed the following:

The RCRA monitoring wells scheduled for March 2016 were sampled March 8 - 10, 2016. Specific conductance measurements exceeded the critical mean comparison values in samples collected from the 1325-N and 1324-N/NA downgradient monitoring wells listed below. Sample results did not exceed critical mean values for the remaining indicator parameters. Verification samples were collected on April 26, 2016 for laboratory analysis. Note that well 199-N-77 is a deep screened monitoring well and not used for statistical analysis, but verification sample was also collected from this well for completeness. The specific conductance values from the verification samples confirmed the critical mean value was exceeded at the wells. The verification samples were also analyzed for sulfate and sodium to evaluate if the exceedance was a continuation of previously assessed exceedance attribute to the non-regulated constituent sulfate. The sulfate / specific conductance trends continue to support the source of high specific conductance is sulfate. The attached file

provides a summary of previous assessments and additional information on evaluation of migration of sulfate from 1324-N/NA to 1325-N monitoring wells.

Verification sample results for Specific Conductance

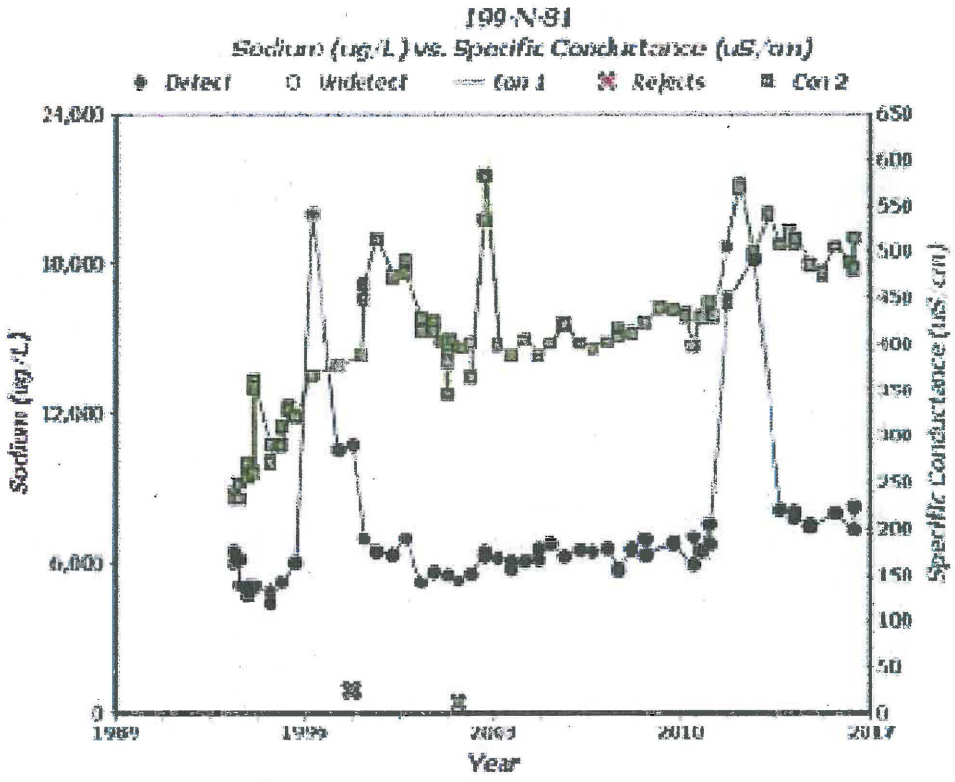
ID	Well	Month_Sched	Program	TSD	Date_Collected	SpC	DTW (m) - Top of Casing
45614	199-N-41	1-Mar-16	RCRA	116-N-3 Crib	26-Apr-16	611	21.841
45616	199-N-81	1-Mar-16	RCRA	116-N-3 Crib	26-Apr-16	498	23.288
45609	199-N-165	1-Mar-16	RCRA	120-N-1-2 Ponds	26-Apr-16	650	22.185
45619	199-N-72	1-Mar-16	RCRA	120-N-1-2 Ponds	26-Apr-16	967	21.63
45620	199-N-73	1-Mar-16	RCRA	120-N-1-2 Ponds	26-Apr-16	777	22.959
45621	199-N-77	1-Mar-16	RCRA	120-N-1-2 Ponds	26-Apr-16	758	21.881

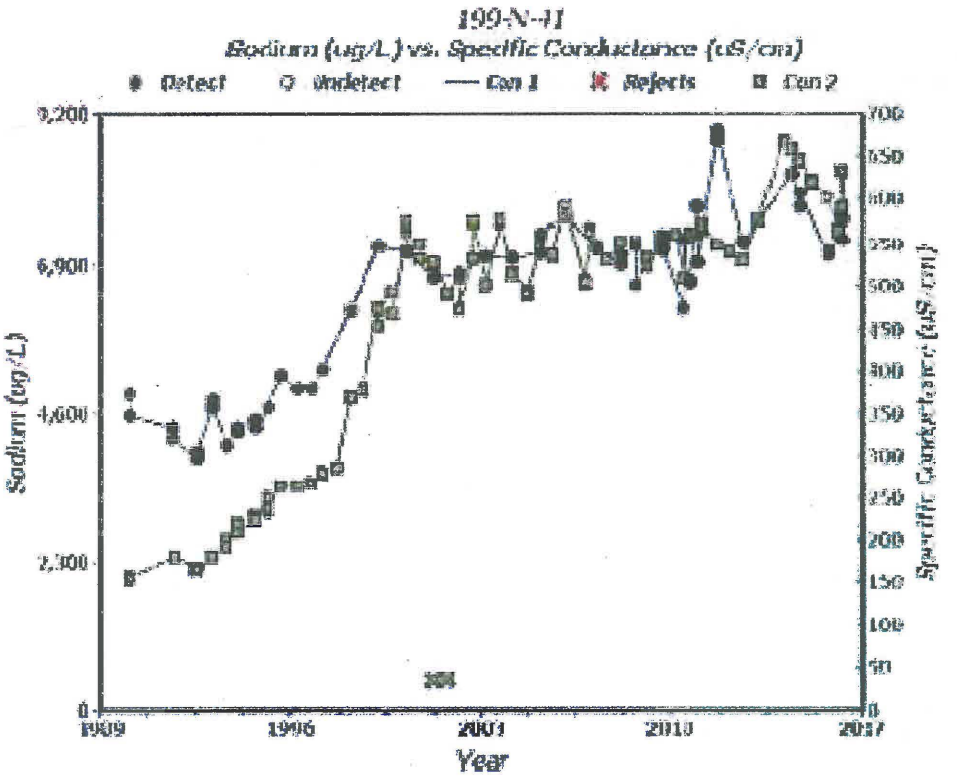
March RCRA sample results showing specific conductance exceedance at downgradient monitoring wells for 1325-N and 1324-N/NA

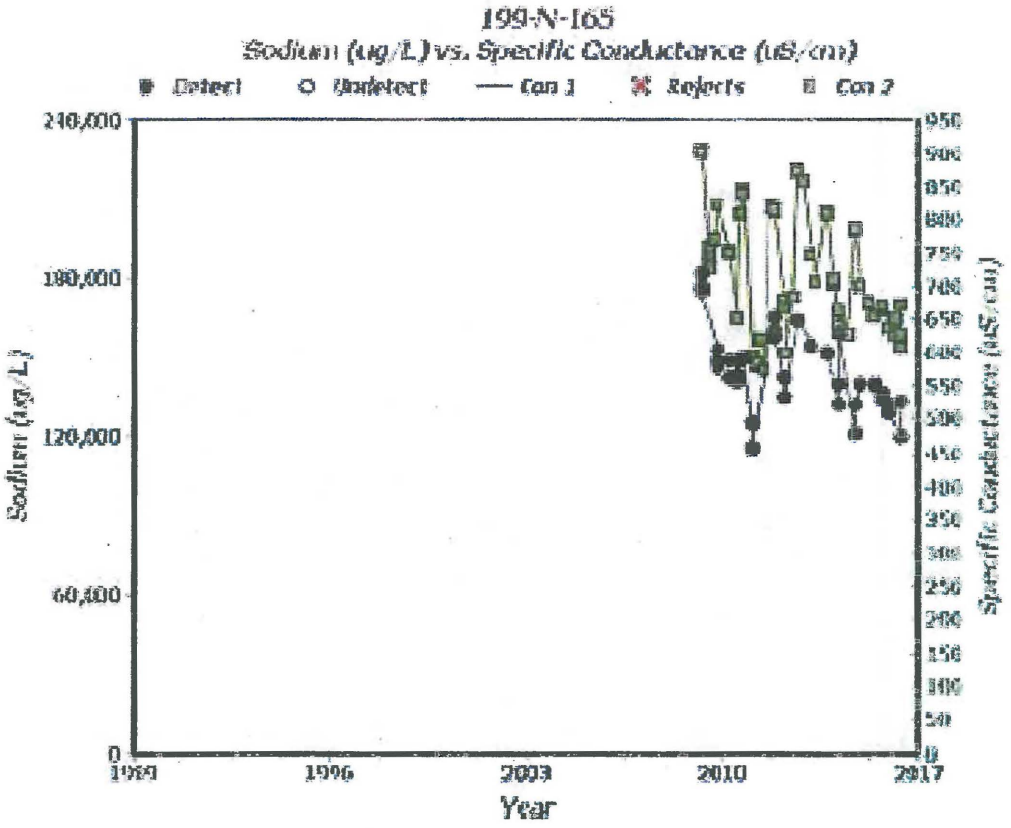
ID	Well	Month_Sched	Program	TSD	Date_Collected	pH	SpC	TOC	TOX	DTW (m) - Top of Casing
45607	199-N-105A	1-Mar-16	RCRA	116-N-1 Crib	8-Mar-16	7.9525	601.75	526.75	5.2875	21.671
45617	199-N-2	1-Mar-16	RCRA	116-N-1 Crib	10-Mar-16	7.82	664.25	720	3.55	22.692
45618	199-N-3	1-Mar-16	RCRA	116-N-1 Crib	10-Mar-16	7.09	891.75	720	7.775	22.521
45611	199-N-34	1-Mar-16	RCRA	116-N-1 Crib	9-Mar-16	7.9375	484.25	720	6.5	22.583
45612	199-N-57	1-Mar-16	RCRA	116-N-1 Crib	9-Mar-16	7.355	902.25	704.25	8.155	21.961
45608	199-N-28	1-Mar-16	RCRA	116-N-3 Crib	9-Mar-16	7.92	441.25	423	3.33	23.816
45613	199-N-32	1-Mar-16	RCRA	116-N-3 Crib	9-Mar-16	7.71	452	471.5	4.3825	23.357

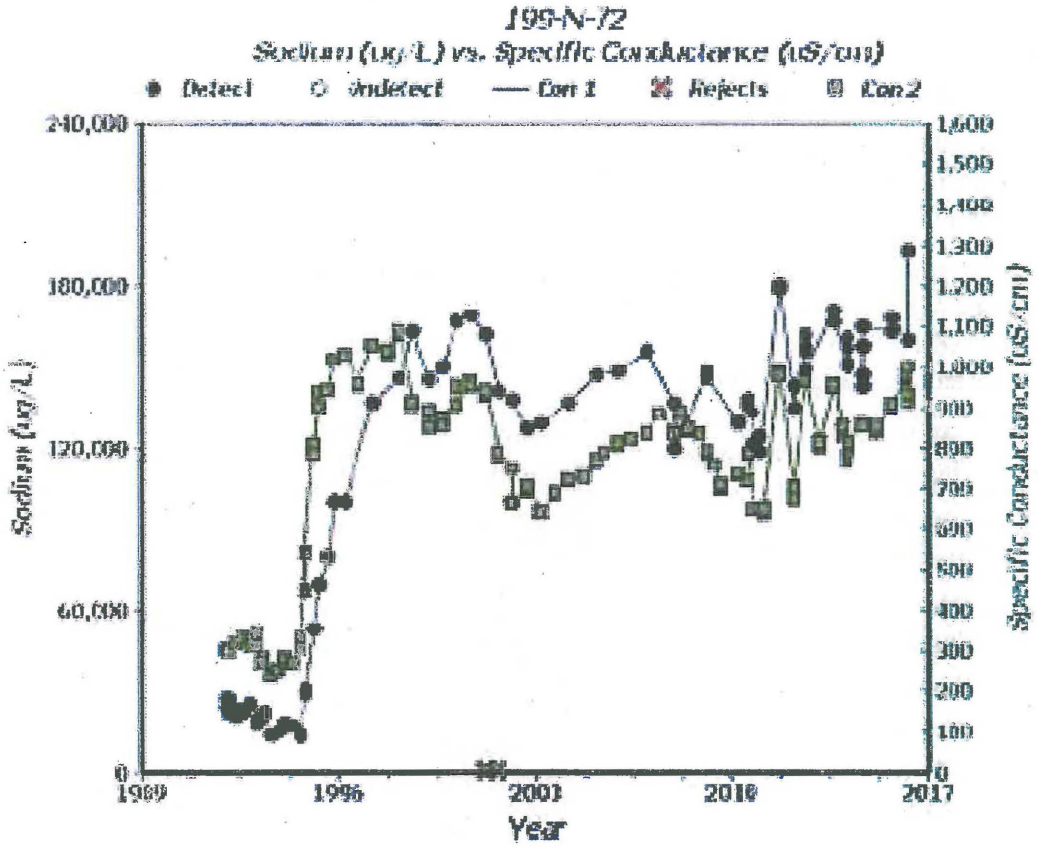
DOE-RL/CHPRC RESPONSE TO ITEM 7, ECOLOGY REQUEST NUMBER 18 - EXCEEDANCE

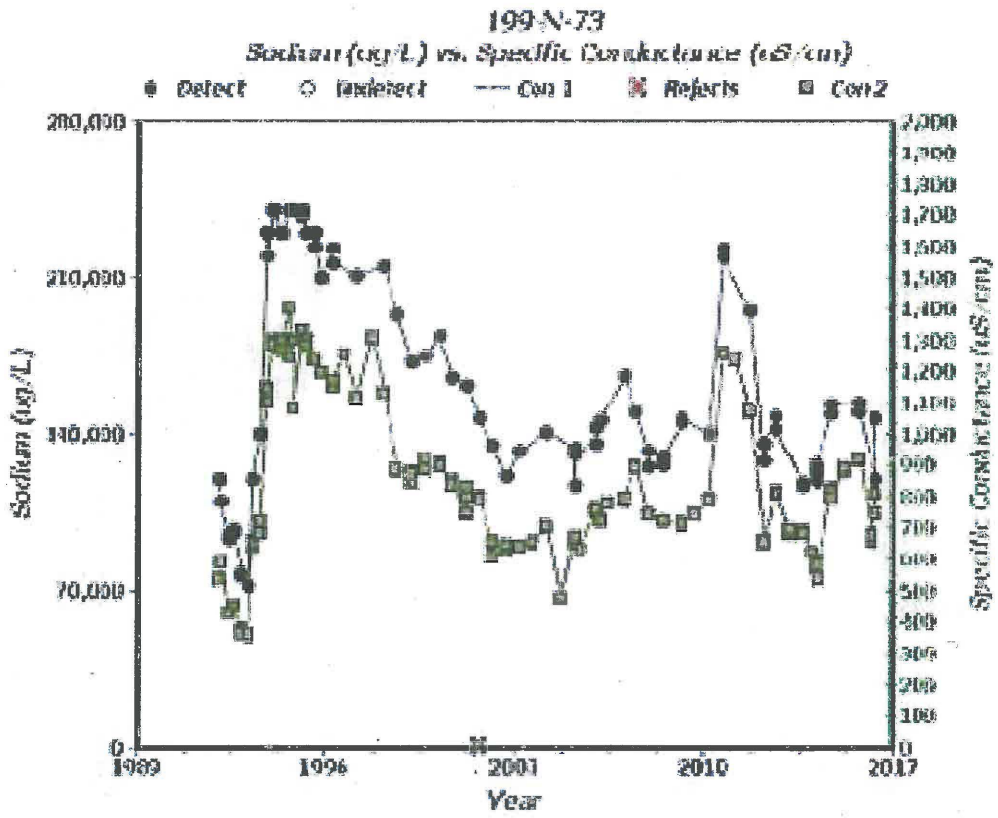
ID	Well	Month_Sched	Program	TSD	Date_Collected	pH	SpC	TOC	TOX	DTW (m) - Top of Casing
45614	199-N-41	1-Mar-16	RCRA	116-N-3 Crib	10-Mar-16	7.92	563.75	424.75	4.5575	22.265
45615	199-N-74	1-Mar-16	RCRA	116-N-3 Crib	10-Mar-16	7.91	417.25	330	4.245	21.421
45616	199-N-81	1-Mar-16	RCRA	116-N-3 Crib	10-Mar-16	7.9	487.75	720	8.025	23.548
45609	199-N-165	1-Mar-16	RCRA	120-N-1-2 Ponds	8-Mar-16	8.25	640.25	685	8.6325	22.374
45610	199-N-71	1-Mar-16	RCRA	120-N-1-2 Ponds	9-Mar-16	7.7975	806.5	720	23.075	23.033
45619	199-N-72	1-Mar-16	RCRA	120-N-1-2 Ponds	9-Mar-16	8.215	974	881.75	7.48	21.946
45620	199-N-73	1-Mar-16	RCRA	120-N-1-2 Ponds	9-Mar-16	8.1875	670.75	720	8.325	23.129
45621	199-N-77	1-Mar-16	RCRA	120-N-1-2 Ponds	9-Mar-16	8.255	768	720	15.1	22.068


199-N-81
Sodium (ug/L) vs. Specific Conductance (uS/cm)
Detect
Undetect
Con 1
Rejects
Con 2
24,000
18,000
12,000
6,000
0
Sodium (ug/L)
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Specific Conductance (uS/cm)
1989
1999
2010
2017
Year


199-N-41
Sodium (ug/L) vs. Specific Conductance (uS/cm)
Detect
Undetect
Con 1
Rejects
Con 2
9,200
6,900
4,600
2,300
0
Sodium (ug/L)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Specific Conductance (uS/cm)
1989
1996
2003
2010
2017
Year


199-N-165
Sodium (ug/L) vs. Specific Conductance (uS/cm)
Detect
Undetect
Con 1
Rejects
Con 2
240,000
180,000
120,000
60,000
0
Sodium (ug/L)
1989
1996
2003
2010
2017
Year
Specific Conductance (uS/cm)


199-N-72
Sodium (ug/L) vs. Specific Conductance (uS/cm)
Detect
Undetect
Con 1
Rejects
Con 2
240,000
180,000
120,000
60,000
0
Sodium (ug/L)
1989
1996
2001
2010
2017
Year
Specific Conductance (uS/cm)



16.566 – 300 Area Process Trenches

Monitoring Well Records Review – 300 Area Process Trenches

I conducted a documents review of 300 Area Process Trenches 2015 groundwater monitoring records against the requirements in the Chapter 3.0 - 300 Area Process Trenches Groundwater Monitoring Plan in the Hanford Facility Resource Conservation and Recovery Act Permit, Revision 8C.

I observed that Uranium, cis-1,2-Dichloroethylene, and Trichloroethylene (TCE) were all sampled at least semi-annually in 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, 399-1-17B, 399-1-18A, and 399-1-18B. I observed that Wells 399-1-10A, 399-1-16A, and 399-1-17A had the below permit limit exceedances highlighted in orange:

Well Number	Well Type	Parameter	Value Reported	Permit Limit	Date Sampled
399-1-10A	Down Gradient	Uranium	23.9 ug/L	20 ug/L	March 19, 2015
399-1-10A	Down Gradient	Uranium	23 ug/L	20 ug/L	June 8, 2015
399-1-10A	Down Gradient	Uranium	23.3 ug/L	20 ug/L	July 21, 2015
399-1-10A	Down Gradient	Uranium	22 ug/L	20 ug/L	August 14, 2015

399-1-16A	Down Gradient	Uranium	37.7 ug/L	20 ug/L	January 23, 2015
399-1-16A	Down Gradient	Uranium	28.1 ug/L	20 ug/L	February 18, 2015
399-1-16A	Down Gradient	Uranium	41.6 ug/L	20 ug/L	March 19, 2015
399-1-16A	Down Gradient	Uranium	53.8 ug/L	20 ug/L	June 8, 2015
399-1-16A	Down Gradient	Uranium	63.5 ug/L	20 ug/L	July 21, 2015
399-1-16A	Down Gradient	Uranium	59.6 ug/L	20 ug/L	August 14, 2015
399-1-16A	Down Gradient	Uranium	56.3 ug/L	20 ug/L	September 9, 2015
399-1-17A	Down Gradient	Uranium	43.3 ug/L	20 ug/L	January 23, 2015
399-1-17A	Down Gradient	Uranium	44.7 ug/L	20 ug/L	January 23, 2015
399-1-17A	Down Gradient	Uranium	45.8 ug/L	20 ug/L	February 18, 2015
399-1-17A	Down Gradient	Uranium	42.5 ug/L	20 ug/L	February 18, 2015
399-1-17A	Down Gradient	Uranium	54.2 ug/L	20 ug/L	March 19, 2015
399-1-17A	Down Gradient	Uranium	50.1 ug/L	20 ug/L	June 9, 2015
399-1-17A	Down Gradient	Uranium	49.8 ug/L	20 ug/L	June 9, 2015
399-1-17A	Down Gradient	Uranium	48.2 ug/L	20 ug/L	July 22, 2015
399-1-17A	Down Gradient	Uranium	43.3 ug/L	20 ug/L	August 14, 2015
399-1-17A	Down Gradient	Uranium	45.1 ug/L	20 ug/L	September 9, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	182 ug/L	70 ug/L	January 23, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	154 ug/L	70 ug/L	February 18, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	185 ug/L	70 ug/L	March 19, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	172 ug/L	70 ug/L	June 8, 2015

399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	211 ug/L	70 ug/L	July 21, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	181 ug/L	70 ug/L	August 14, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	181 ug/L	70 ug/L	September 9, 2015
399-1-16B	Down Gradient	cis-1,2-Dichloroethylene	151 ug/L	70 ug/L	December 4, 2015

On August 10, 1998, Ecology sent a letter to USDOE which stated the below in part:

The Washington State Department of Ecology (Ecology) has reviewed and approved the above referenced documents 1, 2, and 3. Ecology concurs with the determination made by the U.S. Department of Energy (USDOE) that clean closure performance standards (pursuant to Washington Administrative Code [W AC 173-303-610]) have been met for the 300 Area Process Trenches (300 APT) soil column. Postclosure requirements for the groundwater will continue as stipulated by the Hanford Facility Resource Conservation and Recovery Act (RCRA) Site Wide Permit, the Ground Water Monitoring 'Plan for the 300 Area Process Trenches (i.e., WHC-SDEN-AP-185 Rev. OA), and the 300 FF-5 Record of Decision (as applicable).

Reference 4 transmitted to Ecology an application for modification of the 300 APT portion of theHanford Facility Dangerous Waste Permit (Permit). This application was prompted due to exceedances of dangerous constituents (specifically, cis-1, 2-dichloroethene) in the groundwater above action levels prescribed in the Permit, and it fulfilled the requirements of WAC 173-303-645 10(g)(ii) for submittal of an application within 90 days of notification to Ecology of the exceedances. Notification was made to Ecology on June 16, 1997 (Reference 5). ***The application for modification contained changes to the groundwater monitoring program from a compliance monitoring program to a corrective action program in compliance with WAC 173-303-645(11) and added a corrective action plan.***

Since submittal of the application for modification, Ecology has revisited the need for modifying the Permit to reflect corrective action, and has concluded that modification of the Permit is currently not required. *The current groundwater monitoring plan for 300 APT that is contained in the Permit (Groundwater Monitoring Plan for the 300 Area Process Trenches, WHC-SD-ENAP-185, Rev. OA) states in Chapter 6.0 that should exceedances of dangerous constituents occur in the groundwater, a corrective action program will be initiated. It further states that groundwater monitoring will continue as described in Chapters 4.0 and 5.0 of the plan and that corrective action will be accomplished through integration with remediation of the 300-FF-1 (source contamination) and 300-FF-5 (groundwater contamination) Operable Units. Remediation of these operable units has been authorized through a separate Record of Decision. Corrective action for groundwater contamination at 300 APT has been initiated as part of the 300-FF-5 groundwater remedial actions.*

Ecology considers the groundwater monitoring plan that is currently effective in the Permit and described in Chapters 4.0 and 5.0 of the Groundwater Monitoring Plan for the 300 Area Process Trenches, WHC-SD-EN-AP-185, Rev. OA, to be adequate for monitoring the effectiveness of corrective action at 300 APT. The groundwater monitoring plan in fact proposed utilization of the existing compliance monitoring program to meet the corrective action monitoring. Integration of corrective action at 300 APT with remedial actions at these operable units was also previously

defined in the Permit (for example, Conditions VI.I.B.b and VI.I.B.n). Because these corrective actions are currently in place and were previously defined in the Permit, Ecology concludes that no modification to the Permit is required to modify the groundwater monitoring plan....

This letter states that the 300 Area Process Trenches is in corrective action monitoring; however, the letter also states that a modification to the Permit for including a corrective action program was not required. It appears that the groundwater monitoring plan was not updated. Not requiring a permit modification to change the compliance monitoring program to a corrective action program is less stringent than the requirements and outside Ecology authority. This can result in a non-compliance and violations for not following the current plan's requirements.

I observed that water level measurements were sampled at least quarterly in Wells 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, 399-1-17B, 399-1-18A, and 399-1-18B. I observed that groundwater flow rate and direction in the uppermost aquifer for 300 Area Process Trenches were calculated in DOE/RL-2016-12 Revision 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015*.

Review of Maintenance Records – 300 Area Process Trenches

- On March 27, 2015, Well 399-1-10A had a general well maintenance inspection. The well was reported to have a transducer and it was noted that the removable post is 5 inches above the ground.
- On March 27, 2015, Well 399-1-10B had a general well maintenance inspection.
- On March 27, 2015, Well 399-1-16A had a general well maintenance inspection. The well was reported to have a transducer.
- On March 27, 2015, Well 399-1-16B had a general well maintenance inspection.
- On March 27, 2015, Well 399-1-17A had a general well maintenance inspection.
- On March 27, 2015, Well 399-1-17B had a general well maintenance inspection. The well was reported to have a Thermo-Luminescent Dosimeter (TLD) on protective post.
- On March 27, 2015, Well 399-1-18A had a general well maintenance inspection.
- On March 27, 2015, Well 399-1-18B had a general well maintenance inspection.
- On April 16, 2015, Well 399-1-10A had its well cap replaced.
- On December 21, 2015, Well 399-1-10A had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 674 was added to the well casing during the inspection.
- On December 21, 2015, Well 399-1-10B had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 675 was added to the well casing during the inspection.
- On December 21, 2015, Well 399-1-16A had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 676 was added to the well casing during the inspection.
- On December 21, 2015, Well 399-1-16B had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time

of inspection. Washington State Ecology Tag BIV 677 was added to the well casing during the inspection.

- On December 21, 2015, Well 399-1-17A had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 678 was added to the well casing during the inspection.
- On December 21, 2015, Well 399-1-17B had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 679 was added to the well casing during the inspection.
- On December 21, 2015, Well 399-1-18A had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 672 was added to the well casing during the inspection.
- On December 21, 2015, Well 399-1-18B had a maintenance inspection to see if the well had a Washington State identification tag. The inspection found that a tag was not in place at the time of inspection. Washington State Ecology Tag BIV 673 was added to the well casing during the inspection.

Review of Inspection Records – 300 Area Process Trenches

I reviewed the February 25, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, 399-1-17B, 399-1-18A, and 399-1-18B at 300 Area Process Trenches. I observed that the inspection record included the date and time of the inspection, the printed name and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the March 4, 2016, Well 399-1-17B pump check inspection record on the groundwater sample report for 300 Area Process Trenches. I observed that the inspection record included the date and time of the inspection, the printed name and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions

I reviewed the March 4, 2016 (Well 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, 399-1-18A, and 399-1-18B) pump check inspection records on the groundwater sample report for 300 Area Process Trenches. I observed that the inspection records included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

16.567 – 216-B-3 Main Pond

Monitoring Well Records Review – 216-B-3

I conducted a documents review of 216-B-3 Main Pond groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 699-42-42B, 699-43-44, 699-43-45, 699-44-39B were all

at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I observed that each time an indicator parameter sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded. I did not observe any exceedances in 2015 for specific conductance, pH, Total Organic Carbon, and Total Organic Halogen.

I observed the following in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Due to the number of nondetects in the upgradient well, a 2015 critical mean was not calculated for TOX. In lieu of a critical mean, sampling results were compared to the laboratory LOQ.*
>
> *With respect to TOX, no values above the laboratory LOQs were detected for the associated sampling events completed at B Pond.*

I observed that Wells 699-42-42B, 699-43-44, 699-43-45, 699-44-39B were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate.

Review of Maintenance Records – 216-B-3

- On November 16, 2015, Well 699-45-42 had a maintenance inspection to do the following:
  - Measure the water level and total depth of well.
  - Run a camera down the well.
  - Brush the well.
  - Bail the sediment.
  - Develop the well with pump.
  - Bail the well again if necessary.
  - Measure the final water level and total depth of well.

I observed that the maintenance activities created an additional 1.7 feet of more depth to the well.

Review of Inspection Records – 216-B-3

I reviewed the December 29, 2015, Appendix K Groundwater Well Pre-Trip Inspection for Wells

699-42-42B, 699-43-44, 699-43-45, 699-44-39B at 216-B-3 Main Pond. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the January 13, 2016, (Well 699-43-44 and 699-45-42) and January 18, 2016, (Well 699-42-42B, 699-43-45, and 699-44-39B) pump check inspection records on the groundwater sample report for 216-B-3 Main Pond. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions

Well Construction Records Review – 216-B-3

I reviewed the well construction record for Well 699-42-42B. I observed that Well 699-42-42B was completed on October 15, 1988, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 699-43-45. I observed that Well 699-43-45 was completed on June 2, 1989, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 699-44-39B. I observed that Well 699-44-39B was completed on November 3, 1992, and pre-dated the applicability date for Chapter 173-160 WAC.

16.568 – 216-S-10 Pond & Ditch

Monitoring Well Records Review – 216-S-10

I conducted a documents review of 216-S-10 Pond and Ditch groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 299-W26-13, 299-W26-14, 699-32-76, 699-33-75, and 699-33-76 were all at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I did not observe any exceedances in 2015 for specific conductance, pH, Total Organic Carbon, and Total Organic Halogen. I observed that each time an indicator parameter sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded. I observed that Wells 299-W26-13, 299-W26-14, 699-32-76, 699-33-75, and 699-33-76 were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate.

Review of Maintenance Records – 216-S-10

I observed the following statement on the Ecology response table for the records request:

> *Note: There was no groundwater well maintenance performed and/or groundwater well concern reports generated for the following groundwater wells: 216-S-10, 216-B-63, and 216-A-36B for the requested period.*

Review of Inspection Records – 216-S-10

I reviewed the May 2, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 299-W26-13, 299-W26-14, 699-32-76, 699-33-75, and 699-33-76 at 216-S-10 Pond and Ditch. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the May 20, 2016 (Wells 299-W26-13, 299-W26-14, 699-32-76, 699-33-75, and 699-33-76) pump check inspection records on the groundwater sample reports for 216-S-10 Pond and Ditch. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

16.569 – 216-B-63 Trench

Monitoring Well Records Review – 216-B-63

I conducted a documents review of 216-B-63 Trench groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 299-E27-16, 299-E27-18, 299-E27-19, 299-E33-33, 299-E34-8, and

299-E34-12 were all at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I did not observe any exceedances in 2015 for specific conductance, pH, Total Organic Carbon, and Total Organic Halogen. I observed that each time an indicator parameter sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded.

I observed the following in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Due to the number of nondetects in the upgradient wells, a 2015 critical mean was not calculated for TOX. In lieu of a critical mean, sampling results were compared to the laboratory LOQ.*

I observed that Wells 299-E27-16, 299-E27-18, 299-E27-19, 299-E33-33. 299-E34-8, and 299-E34-12 were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate.

Review of Maintenance Records – 216-B-63

I observed the following statement on the Ecology response table for the records request:

> *Note: There was no groundwater well maintenance performed and/or groundwater well concern reports generated for the following groundwater wells: 216-S-10, 216-B-63, and 216-A-36B for the requested period.*

Review of Inspection Records – 216-B-63

I reviewed the March 29, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 299-E27-16, 299-E27-18, 299-E27-19, 299-E33-33, 299-E34-8, and 299-E34-12 at 216-B-63 Trench. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

I reviewed the April 1, 2016 (Wells 299-E27-16, 299-E27-18, 299-E27-19, 299-E33-33, 299-E34-8, and 299-E34-12) pump check inspection records on the groundwater sample reports for 216-B-63 Trench. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any noted problems during the inspection that required any repairs or remedial actions.

Well Construction Records Review – 216-B-63

I reviewed the well construction record for Well 299-E27-16. I observed that Well 299-E27-16 was completed on April 17, 1990 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E27-18. I observed that Well 299-E27-18 was completed on July 8, 1992 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E27-19. I observed that Well 299-E27-19 was completed on July 8, 1992 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E33-33. I observed that Well 299-E33-33 was completed on August 29, 1989 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E34-8. I observed that Well 299-E34-8 was completed on April 20, 1990 and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E34-12. I observed that Well 299-E34-12 was completed on January 14, 1992 and pre-dated the applicability date for Chapter 173-160 WAC.

16.570 – 216-A-29 Ditch

Monitoring Well Records Review – 216-A-29

I conducted a documents review of 216-A-29 Ditch groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 299-E25-26, 299-E25-32P, 299-E25-34, 299-E25-35, 299-E25-48, 299-E26-12, 299-E26-13, and 699-43-45 were at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I did not observe any exceedances in 2015 for pH and Total Organic Halogen. I observed the following in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Due to the number of nondetects in upgradient wells, a 2015 critical mean was not calculated for TOX. In lieu of a critical mean, sampling results were compared to the laboratory LOQ. Two laboratories were used for groundwater TOX analyses, requiring the determination of LOQ values for TOX for each laboratory in 2015. All reported detections for TOX were less than the laboratory LOQs.*

Except for Well 299-E25-32P on October 27, 2015, I observed that each time an indicator parameter sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded. In a subsequent records request received by Ecology on August 24, 2016, I observed that the elevation of Well 299-E25-32P was taken on October 27, 2015.

I observed that Wells 299-E25-26, 299-E25-32P, 299-E25-34, 299-E25-35, 299-E25-48, 299-E26-12, 299-E26-13, and 699-43-45 were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate.

I observed the below exceedances (highlighted in orange) of the critical mean with any verification sampling results for total organic carbon and specific conductance:

Well Number	Well Type	Indicator Parameter	Value Reported	Sample Average	Critical Mean	Date Sampled
299-E25-26	Down Gradient	Total Organic Carbon	1,900 ug/L 2,000 ug/L 2,300 ug/L 2,200 ug/L	2,100 ug/L	1,029 ug/L	October 7, 2015
299-E25-26	Down Gradient	Total Organic Carbon	787 ug/L 753 ug/L 835 ug/L 754 ug/L	782 ug/L	1,029 ug/L	December 14, 2015 (Verification sampling)
299-E25-26	Down Gradient	Total Organic Carbon	350 ug/L 410 ug/L 380 ug/L 350 ug/L	373 ug/L	1,029 ug/L	December 14, 2015 (Verification sampling)
299-E25-32P	Down Gradient	Specific Conductance	452 uS/cm 452 uS/cm 449 uS/cm 451 uS/cm	451 uS/cm	401 uS/cm	April 23, 2015

299-E25-32P	Down Gradient	Specific Conductance	454 uS/cm 454 uS/cm 454 uS/cm 455 uS/cm	454 uS/cm	401 uS/cm	October 27, 2015
299-E25-32P	Down Gradient	Specific Conductance	486 uS/cm* 493 uS/cm*	490 uS/cm	401 uS/cm	November 20, 2015 (Verification Sampling)
299-E25-35	Down Gradient	Specific Conductance	511 uS/cm 516 uS/cm 524 uS/cm 504 uS/cm	514 uS/cm	401 uS/cm	April 1, 2015
299-E25-35	Down Gradient	Specific Conductance	497 uS/cm 496 uS/cm 499 uS/cm 497 uS/cm	497 uS/cm	401 uS/cm	April 8, 2015
299-E25-35	Down Gradient	Specific Conductance	491 uS/cm 493 uS/cm 493 uS/cm 493 uS/cm	493 uS/cm	401 uS/cm	October 7, 2015
299-E25-35	Down Gradient	Specific Conductance	466 uS/cm 463 uS/cm	465 uS/cm	401 uS/cm	December 14, 2015 (Lab Verification Sampling)
299-E25-35	Down Gradient	Specific Conductance	528 uS/cm 517 uS/cm 520 uS/cm 507 uS/cm	518 uS/cm	401 uS/cm	December 14, 2015 (Verification Sampling)
299-E25-35	Down Gradient	Specific Conductance	515 uS/cm 521 uS/cm 533 uS/cm 521 uS/cm	523 uS/cm	401 uS/cm	December 14, 2015 (Verification Sampling)
299-E25-48	Down Gradient	Specific Conductance	598 uS/cm 599 uS/cm 599 uS/cm 596 uS/cm	598 uS/cm	401 uS/cm	April 17, 2015
299-E25-48	Down Gradient	Specific Conductance	576 uS/cm 577 uS/cm 577 uS/cm 577 uS/cm	577 uS/cm	401 uS/cm	October 9, 2015
299-E25-48	Down Gradient	Specific Conductance	596 uS/cm 591 uS/cm 587 uS/cm* 586 uS/cm	590 uS/cm	401 uS/cm	December 18, 2015 (Verification Sampling)
299-E25-48	Down Gradient	Specific Conductance	584 uS/cm 564 uS/cm 563 uS/cm* 561 uS/cm	568 uS/cm	401 uS/cm	December 18, 2015 (Verification Sampling)

299-E25-48	Down Gradient	Specific Conductance	642 uS/cm 629 uS/cm	636 uS/cm	401 uS/cm	December 18, 2015 (Lab Verification Sampling)

*These sample results were not included in the sampling records provided to Ecology, but were included in Attachment 2 from letter 16-ESQ-0032 that notified Ecology of groundwater sampling result exceedances for the 216-A-29 Ditch.

In a subsequent records request received by Ecology on August 24, 2016, I asked to see 2016 specific conductance exceedance confirmation groundwater sampling records for Well 299-E25-32P. Instead of providing the groundwater monitoring records, Letter 16-ESQ-0032 reporting the exceedance results for the 216-A-29 Ditch was provided. Records that were missing from the sampling records originally provided, are documented with an asterisk in the above table. As required in 40 CFR 265.93(d)(1), I observed that Ecology was notified that the 216-A-29 Ditch may be affecting groundwater quality within seven days of confirmation of exceedances. I observed that Letter 16-ESQ-0032 indicated that the latest verification sampling results were received on January 7, 2016 for Well 299-E25-48. I observed that Letter 16-ESQ-0032 stated the following:

> *"On January 14, 2016, RL and the CH2M Hill Plateau Remediation Company called Ecology staff to provide information on the confirmed specific conductance exceedances of the critical mean for the three ground water monitoring wells."*

In a subsequent records request, received by Ecology on August 24, 2016, I observed that a Certified Groundwater Quality Assessment Program for 216-A29 Ditch was submitted to Ecology on January 27, 2016. As required in 40 CFR 265.93(d)(2), this submittal was within 15 days (13 days) of the notification that the 216-A-29 Ditch may be affecting groundwater quality. This record request response also indicated that the Groundwater Quality Assessment Program for 216-A29 Ditch was implemented in April, 2016.

Review of 216-A-29 Ditch Interim Status Groundwater Quality Assessment Monitoring Plan

As required 40 CFR 265.93(d)(3), I observed that DOE/RL-2016, Rev. 0, Dated January 27, 2016 – *216-A-29 Ditch Interim Status Groundwater Quality Assessment Monitoring Plan* included the following:

- The number, location, and depth of wells.
- Sampling and analytical methods for those dangerous wastes and dangerous waste constituents at the facility.
- A schedule of implementation.

Review of Maintenance Records – 216-A-29

- On November 3, 2015, Well 299-E25-28 had an electrical maintenance inspection to check the cable for the well.
- On November 4, 2015, Well 299-E25-34 had a well maintenance inspection to repair the hasp. I observed a new hole was drilled in the hasp. The well was reported to have a transducer and it was noted that the removable post is 5 inches above the ground.

Review of Inspection Records – 216-A-29

I reviewed the March 28, 2016, (Wells 299-E25-26, 299-E25-34, 299-E25-35, 299-E25-48), March 29, 2016, (Wells 299-E26-12, 299-E26-13, and 699-43-45) and April 6, 2016 (Well 299-E25-32P) Appendix K Groundwater Well Pre-Trip Inspection for at 216-A-29 Ditch. I observed that the inspection records included the date and time of the inspection, the printed name, and handwritten

signature of the inspector, and notations of the observations made. I observed for Well 299-E25-48, that the well was reported to not have clear access that was free of hazards. I observed the inspection report indicated that there was some construction debris that needs to be removed as it could cause a tripping hazard. I did not observe any other problems that required any repairs or remedial actions on the inspection record.

I reviewed the April 4, 2016, (Wells 299-E25-34, 299-E25-48, 299-E26-13, and 699-43-45) pump check inspection records on the groundwater sample reports for 216-A-29 Ditch. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any other problems that required any repairs or remedial actions.

I reviewed the April 4, 2016, (Well 299-E25-26), April 6, 2016, (Wells 299-E25-32P, 299-E25-35 and 699-43-45), and April 7, 2016, (Wells 299-E26-12 and, 299-E26-13,) pump check inspection records on the groundwater sample reports for 216-A-29 Ditch. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any other problems that required any repairs or remedial actions.

16.571 – 216-A-36B Crib

Monitoring Well Records Review – 216-A-36B

I conducted a documents review of 216-A-36B groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 299-E17-14, 299-E17-16, 299-E17-18, and 299-E17-19 were all at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I did not observe any exceedances in 2015 for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I observed that each time an indicator parameter sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded. I observed that Wells 299-E17-14, 299-E17-16, 299-E17-18, and 299-E17-19 were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate.

Review of Maintenance Records – 216-A-36B

I observed the following statement on the Ecology response table for the records request:

> *Note: There was no groundwater well maintenance performed and/or groundwater well concern reports generated for the following groundwater wells: 216-S-10, 216-B-63, and 216-A-36B for the requested period.*

Review of Inspection Records – 216-A-36B

I reviewed the December 28, 2015, Appendix K Groundwater Well Pre-Trip Inspection for Wells 299-E17-14, 299-E17-16, 299-E17-18, and 299-E17-19 at 216-A-36B Crib. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I observed for Well 299-E17-16, that the inspection record noted that the well needed to be relabeled. I did not observe any other problems that required any repairs or remedial actions.

I reviewed the December 4, 2015, (Well 299-E17-16), January 4, 2016, (Wells 299-E17-14 and 299-E17-19), and January 5, 2016, (Well 299-E17-18) pump check inspection records on the groundwater sample report for 216-A-36B Crib. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions

16.572 – 216-A-37-1 Crib

Monitoring Well Records Review – 216-A-37-1

I conducted a documents review of 216-A-37-1 groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 299-E25-17, 299-E25-19, 299-E25-20, and 299-E25-47 were all at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I did not observe any exceedances in 2015 for specific conductance, Total Organic Carbon, and Total Organic Halides. I observed that each time an indicator groundwater sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded. I observed that Wells 299-E25-17, 299-E25-19, 299-E25-20, and 299-E25-47 were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate. I observed the below significant differences (highlighted in orange) of the critical mean for pH in the upgradient Well 299-E25-47:

Well Number	Well Type	Indicator Parameter	Value Reported	Sample Average	Critical Mean	Date Sampled
299-E25-47	Up Gradient	pH	8.59	8.54	7.55 to 8.36	January 9, 2015
			8.57			
			8.51			
			8.50			
299-E25-47	Up Gradient	pH	8.41	8.42	7.55 to 8.36	September 17, 2015
			8.41			
			8.42			
			8.42			

In accordance with 40 CFR 265.93(c)(1) and 40 CFR 265.94(a)(2)(ii), I observed that DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015* documented the significant increases in pH for the upgradient Well 299-E25-47.

Review of Maintenance Records – 216-A-37-1

- On August 12, 2015, Well 299-E25-47 had a maintenance inspection to test the pump.
- On September 15, 2015, Well 299-E25-47 had a maintenance inspection to replace a broken Hydrostar pump with an RF-3 pump.

Review of Inspection Records – 216-A-37-1

I reviewed the December 28, 2015, Appendix K Groundwater Well Pre-Trip Inspection for Wells 299-E25-17, 299-E25-19, 299-E25-20, and 299-E25-47 at 216-A-37-1 Crib. I observed that the inspection record included the date and time of the inspection, the printed name and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any problems that required any repairs or remedial actions.

I reviewed the January 7, 2016, (Wells 299-E25-20 and 299-E25-47) pump check inspection records on the groundwater sample report for 216-A-37-1 Crib. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions

I reviewed the January 5, 2016, (Wells 299-E25-17 and 299-E25-19), pump check inspection records on the groundwater sample reports for 216-A-37-1 Crib. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any other problems that required any repairs or remedial actions.

16.573 – Low Level Burial Grounds Used Trenches (Green Islands)

Note: In regard to the LLBG Green Islands, the scope of this inspection focused solely on the general inspection requirements in WAC 173-303-320, the review of annual maintenance records, and well construction records review. See facility background write up in this report for more information.

Review of Maintenance Records – Low Level Burial Grounds - Green Islands – Waste Management Area 2

- On October 14, 2015, Well 299-E27-17 had the actuator rod replaced. The report indicated that the Hydrostar pump test worked good.

Review of Inspection Records – Low Level Burial Grounds - Green Islands– Waste Management Area 2

I reviewed the March 29, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 299-E27-8, 299-E27-9, 299-E27-10, 299-E27-11, 299-E27-17, 299-E34-2, 299-E34-9, 299-E34-10, and 299-E34-12 at Low Level Burial Grounds Green Islands Waste Management Area 2. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I did not observe any problems that required any repairs or remedial actions.

I reviewed the April 1, 2016, (Wells 299-E27-8, 299-E27-9, 299-E27-10, 299-E27-11, 299-E34-2,) pump check inspection records on the groundwater sample report for Low Level Burial Grounds Green Islands Waste Management Area 2. I observed that the inspection record included the date and time of the inspection, the printed name, and handwritten signature of the inspector, and a notation of the observations made. I did not observe any noted problems during the inspection that required any repairs or remedial actions

I reviewed the April 1, 2016 (Wells 299-E27-17, 299-E34-9, 299-E34-12) and April 7, 2016 (Well 299-E34-10) pump check inspection records on the groundwater sample reports for Low Level Burial Grounds Green Islands Waste Management Area 2. I observed that the inspection record included the date and time of the inspection, the handwritten signature of the inspector, and a notation of the observations made. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name. I did not observe any other problems that required any repairs or remedial actions.

Well Construction Records Review – Low Level Burial Grounds - Green Islands

I reviewed the well construction record for Well 299-E27-8. I observed that Well 299-E27-8 was completed on September 30, 1987, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E27-9. I observed that Well 299-E27-9 was completed on August 31, 1987, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E27-10. I observed that Well 299-E27-10 was completed on August 19, 1987, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E27-11. I observed that Well 299-E27-11 was completed on October 18, 1989, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E27-17. I observed that Well 299-E27-17 was completed on November 11, 1991, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E34-2. I observed that Well 299-E34-2 was completed on September 30, 1987, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E34-9. I observed that Well 299-E34-9 was completed on October 11, 1991, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E34-10. I observed that Well 299-E34-10 was completed on October 10, 1991, and pre-dated the applicability date for Chapter 173-160 WAC.

I reviewed the well construction record for Well 299-E34-12. I observed that Well 299-E34-12 was completed on January 14, 1992, and pre-dated the applicability date for Chapter 173-160 WAC.

16.574 – Non-Radioactive Dangerous Waste Landfill

Monitoring Well Records Review – Non-Radioactive Dangerous Waste Landfill

I conducted a documents review of the Non-Radioactive Dangerous Waste Landfill groundwater monitoring records for 2015 against the requirements in 40 CFR part 265 Subpart F as modified and incorporated by reference in WAC 173-303-400(3). I observed that Wells 699-25-34A, 699-25-34B, 699-25-34D, 699-26-33, 699-26-34A, 699-26-34B, and 699-26-35A were at least sampled semi-annually for specific conductance, pH, Total Organic Carbon, and Total Organic Halides. I observed that the new replacement Wells 699-26-33A and 699-25-34F were sampled for specific conductance, pH, Total Organic Carbon, and Total Organic Halides on October 21, 2015. I did not observe any exceedances in 2015 for specific conductance, pH, Total Organic Carbon, and Total Organic Halides.

I observed the following in DOE/RL-2016-12, Rev. 0, *Hanford Site RCRA Groundwater Monitoring Report for 2015:*

> *Critical mean for TOX was not calculated due to a high percentage of nondetects; sampling results were compared to the following laboratory LOQs: first quarter 2015: TASL (LOQ = 15.3), GEL (LOQ = 12.2), third quarter 2015: TASL (LOQ = 12.5), GEL (LOQ = 10.5).*

I observed that each time an indicator parameter sample was collected, the elevation of the groundwater surface at each monitoring well measured and recorded. I observed that Wells 699-25-34A, 699-25-34B, 699-25-34D, 699-26-33, 699-26-34A, 699-26-34B, and 699-26-35A were all sampled at least annually for Chloride, Iron, Manganese, Phenols, Sodium, and Sulfate.

Review of Maintenance Records – Non-Radioactive Dangerous Waste Landfill

- On November 3, 2015, Well 699-25-34B had a new landing plate installed.
- On February 24, 2015, Well 699-25-33A was relabeled.
- On November 11, 2015, Well 699-26-33A had a new RF3 pump installed in the well.
- On November 11, 2015, Well 699-25-34F had a new RF3 pump installed in the well.
- On November 23, 2015, Well 699-25-34B had a new Cable Grip Bushing (CGB) installed and had its landing plate inspected.
- On January 22, 2016, Well 699-26-33A had its pump replaced.

Note: Cable Grip Bushing (CBG) cord or cable bushing fittings are installed to provide means for passing a cord or cable (unarmored) or flexible conduit into an enclosure through a bulkhead or into a ridge conduit to form an environmental seal for cord or unarmored round cables.

Review of Inspection Records – Non-Radioactive Dangerous Waste Landfill

I reviewed the March 28, 2016, (Well 699-25-34D) and March 29, 2016, (Wells 699-25-34F, 699-25-34B, 699-26-33A, 699-26-34A, 699-26-34B, and 699-26-35A) Appendix K Groundwater Well Pre-Trip Inspection for Wells at the Non-Radioactive Dangerous Waste Landfill. I observed that the inspection record included the date and time of the inspection, the printed name, and the handwritten signature of the inspector, and a notation of the observations made. I observed for Well 699-26-34A, that the well was reported to have a cracked well pad. I did not observe any other problems that required any repairs or remedial actions on the inspection record.

General Records Review

Review of GRP-FS-04-G-004, Operational Monitoring Groundwater Sampling, Revision 4, Change4, Dated January 25, 2016.

I observed the procedure required the following in compliance with WAC 173-303-320 requirements:

- To record the start time of the well inspections on the Appendix K – Groundwater Well Pre-Trip Inspection record sheet.
- Inspect security and condition of well:
  - For above ground completions:
    - Well cap is in place and in good condition (if applicable)
    - Hasp is in good condition (if applicable)
    - Well cap is locked (if applicable)
    - Well casing not damaged
  - For flush mount wells:
    - Bolt down lid is in place and in good condition
    - Lid is secured with a bolt (or other appropriate mechanism)
  - For all wells:
    - Bollards are in good condition (if present)
    - Concrete pad is free of cracks and gaps that may make the surface seal ineffective (if present)

- Inspect (visually) all components (electrical plugs/cables, pipe threading, etc.) looking for wear or damage that would render component unsafe to operate or inoperable.
- Determine if well is ready to sample.
- If any abnormalities/deficiencies are visually evident, then perform following:
  - Record abnormalities/deficiencies in "Comments" section on Appendix K.
  - Initiate a Groundwater Well Concern Report (Appendix L).
  - Notify Field Work Supervisor for further direction.
- Finish inspection by printing and signing full name of inspector and noting date inspection was completed on Appendix K.

Review of ECF-Hanford-15-0016, Revision 0 – Calculation of Critical Means for Calendar Year 2015 RCRA Groundwater Monitoring

I observed the following statement under Section 4 Assumptions and Inputs:

> *6. Data sets with large numbers of nondetects (where data are censored below the detection limits) will result in unreliable Critical Means (CMs). Typically, the CMs will be close to the detection limits but less than quantitation limits (which are approximately three times the detection limits). Therefore, when more than 50 percent of the reference (composite) results are nondetects, the Limit of Quantitation (LOQ) is used as the comparison value for detecting facility effect (in place of a CM). LOQ calculations and comparisons are made elsewhere.*

I observed that for final status units (i.e. 1301-N, 1325-N, 1324-N and 1324-NA, 183-H, and 300 Area Process Trenches), that WAC 173-303-645(8)(h) states in part:

> *Where practical quantification limits (pqls) are used in any of the following statistical procedures to comply with (i)(v) of this subsection,* ***the pql must be proposed by the owner or operator and approved by the department****. Use of any of the following statistical methods must be protective of human health and the environment and must comply with the performance standards outlined in (i) of this subsection.* (Emphasis added.)

I observed that WAC 173-303-645(8)(h)(v) stated the following:

> *The statistical method must account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantification limit (pql) approved by the department under (h) of this subsection that is used in the statistical method must be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.*

I did not observe any limit of quantification, which is a practical quantification limit, for any of the closure units (1301-N, 1325-N, and 1324-N and 1324-NA) identified in this document for units in the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C.

Sampling and Analysis Plans for 1301-N, 1325-N, 1324-N and 1324-NA, and 183-H

In my records request, I asked for Sampling and Analysis Plan(s) and associated Quality Assurance Project Plan(s) for, 1301-N, 1325-N, 183-H, and 1324-N & NA and I received the below response from CHPRC:

Note: There are no specific Sampling and Analysis Plan(s) or Quality Assurance Project Plan(s) for these groundwater well units.

WAC 173-303-645(8)(e) states:

The groundwater monitoring program must include consistent sampling and analytical methods that ensure reliable groundwater sampling, accurately measure dangerous constituents and indicator parameters in groundwater samples, and provide a reliable indication of groundwater quality below the waste management area.

Calculation of Critical Means Document Question

In my records request, I asked the following question:

How were exceedance determined from 2015, 2014, and 2013 sampling results when the Calculation of Critical Means documents were not developed until June 10, 2015, August 21, 2014, and December 4, 2013, respectively?

I received the below response to this question from CHPRC:

Note: The notation relating to ECF, is referencing the document number for the Calculation of Critical Means for Groundwater Monitoring (e.g. ECF-Hanford-15-0016, Revision 0)

Data used for calculating the critical mean(s) are derived from the year's prior empirical groundwater well network sampling results [e.g. 2016 critical mean(s) were calculated from samples collected from wells in 2015].

The ECF documenting the critical mean is always published as soon as possible for the coming year (e.g. in 2016 the critical mean ECF was published April 18, 2016), however, the critical mean values themselves were derived in January/February timeframe (of 2016) and put into the program for 2016, as soon the calculations being checked.

DOE-RL do not wait until the ECF document itself is published to begin using the new critical mean(s). In years when workload does not allow the critical mean to be calculated early in the year (January/February), the critical mean values from the prior year continue to be used to bridge the time gap. There is never a time when DOE-RL does not have a critical mean(s) value to use and all values are calculated from actual Hanford site groundwater data.

RCRA Unit Wells that Do Not Have Dedicated Pumps

In my records request I asked, "What groundwater wells do not have dedicated pumps at the following units?

- 1301-N – 16.562
- 1325-N – 16.563
- 183-H – 16.564
- 1324-N & 1324-NA – 16.565
- 300 Area Process Trenches – 16.566
- 216-B-3 Main Pond – 16.567
- 216-S-10 Pond & Ditch – 16.568
- 216-B-63 Trench – 16.569
- 216-A-29 Ditch – 16.570
- 216-A-36B Crib – 16.571

- 216-A-37-1 Crib – 16.572
- LLBG Used Trenches (Green Islands) – 16.573
- NRDWL –16.574"

I received the below response to this question from CHPRC:

The following RCRA TSD Units do not have dedicated pumps:

- *183-H*
  - *199-HR-8*
  - *199-H-12A*
  - *199-H4-84*
- *300 APT*
  - *399-1-10A*

Note: Well-HR-8 mentioned above, should actually be Well 199-H4-8

Low Level Burial Grounds Green Islands WMA-2 Follow-up Question on Groundwater Monitoring Wells

In my records request, I asked, "Please explain the status of groundwater well 299-E34-13 at the LLBG Green Islands WMA-2 and why it was not incorporated into the groundwater monitoring well network."

I received the below response to this question from CHPRC:

During drilling of well 299-E34-13, groundwater was not observed prior to reaching basalt. Drilling then extended ~2.1 meters into the basalt to check for groundwater associated with the flow top. Groundwater was not observed in the well after 105 minutes, and examination of the basalt chips indicated no fractured flow top at this location. The lack of a fractured flow top is consistent with previous observations of basalt chips from adjacent wells 299-E34-2 and 299-E34-4. Drilling later continued to ~3.1 meters into the basalt to check for groundwater associated with fractures in the basalt. Groundwater was encountered; however, the groundwater infiltration rate was 0.4 meters over 1.5 hours (13.2 liters per hour). A sample of the groundwater was collected and analyzed, showing a calcium-sulfate chemistry. The sulfate was reported as 244 mg/L, and elevated nitrate was present at 40.3 mg/L. Because the well did not produce sufficient groundwater and the groundwater produced did not appear to be associated with the upper unconfined aquifer, the well was decommissioned and subsequently, well 299-E34-14 was not drilled.

In my records request, I asked, "Provide the proposed schedule for installing wells 299-E34-14, 299-E34-15, and 299-E34-16 at LLBG Green Islands WMA-2."

I received the below response to this question from CHPRC:

Based on information provided during the drilling of well 299-E34-13 (refer to DOE-RL/CHPRC response to Ecology Request Item 12) and well 299-E34-14 will not be drilled. Additionally, there is no schedule for the installation of wells 299-E34-15 and 299-E34-16.

In my records request, I asked, "Provide a photo of Well 299-E34-9 with an explanation of when the cap was secured and locked on the well."

I received the below response to this question from CHPRC:

Copy of following requested photograph:

- *299-E34-9 with well cap secured taken June 9, 2016*

Ecology Request Item 14

The cap for well 299-E34-9 was found unsecured and off the well head during the regulatory inspection on the morning of June 9, 2016. The sample group supervisor was contacted immediately upon discovery of this condition and the supervisor sent a Nuclear Chemical Operator to the location to secure the cap. A photograph of the secured cap was taken early afternoon on that same day. The photograph that was taken is shown below.

Follow-up on Unknown Material Observed Near Trench 94

In my records request, I asked, "South of Trench 94, as we observed at the end of the field inspection LLBG Green Islands WMA-2 on 6/9/2016, explain what the pile of orange and white material is in the MSA pit. Explain if the material is a product that can be used or if it is a waste. Explain how long the material has been at this location and why it was stored at this location."

I received the below response to this question from CHPRC:

The material that is in 200-BP Pit is ice melt that is used on Hanford Site roads in the winter months and has been there for several years. Mission Support Alliance (MSA) was responsible for this area, but this pit was turned over to CHPRC for eventual closure. The ice melt material in the pit has been identified to be potentially contaminated because of tumbleweed fragments that have entered the pit from the low-level burial grounds. The potentially contaminated ice melt is used to coat the ramp leading into the pit in the winter months since the ramp itself is potentially contaminated.

Compliance Problems

The Dangerous Waste inspections on June 7, 8, and 9, 2016, found the following compliance problems.

Each problem is covered in three parts:
(1) **Citation from the regulations**
(2) **Specific observations** from the inspection that highlight the problem
(3) **Required actions** needed to fix the problem and achieve compliance.

The problems listed below must be corrected to comply with Washington Dangerous Waste Regulations (Chapter 173-303 WAC), or other environmental laws or regulations. Complete the required actions listed below and respond to Ecology within 60 days of receipt of this inspection report. Include all supporting documentation such as photographs, records, and statements explaining the actions taken and dates completed to return to compliance.

Attention: Jared Mathey
Washington Department of Ecology
Nuclear Waste Program
3100 Port of Benton Blvd
Richland, WA 99354

You may request an extension of the deadlines to achieve compliance. Make the request in writing, including the reasons an extension is necessary and proposed date(s) for completion, and send it to Jared Mathey before the date specified above. Ecology will provide a written approval or denial of your request.

If you have any questions about information in this Compliance Report, please call:
Jared Mathey at (509) 372-7949

This does not relieve you of your continuing responsibility to comply with the regulations at all times.

Violations

Incomplete Inspection Records

1) 16.562 – 1301-N Liquid Waste Disposal Facility,
16.563 – 1325-N Liquid Waste Disposal Facility,
16.564 – 183-H Solar Evaporator Basins
16.566 – 300 Area Process Trenches

Hanford Facility RCRA Permit Rev. 8C - Condition II.O.1 - The Permittees will inspect the Facility to prevent malfunctions and deterioration, operator errors, and discharges, which may cause or lead to the release of dangerous waste constituents to the environment, or threaten human health. Inspections must be conducted in accordance with the provisions of WAC 173-303-320(2).

and

16.568 – 216-S-10 Pond & Ditch,
16.569 – 216-B-63 Trench,
16.570 – 216-A-29 Ditch,
16.572 – 216-A-37-1 Crib, and
16.573 – LLBG Used Trenches (Green Islands)

WAC 173-303-400(3), as referenced by the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion Revision 8C - Condition I.A Effect of Permit.

WAC 173-303-320(2)(d) The owner or operator must keep an inspection log or summary, including at least the date and time of the inspection, the printed name and the handwritten signature of the inspector, a notation of the observations made, an account of spills or discharges in accordance with WAC 173-303-145, and the date and nature of any repairs or remedial actions taken.

Observations: I reviewed the March 9, 2016, (Well 199-N-105A) and March 10, 2016 (Wells 199-N-2 and 199-N-3), pump check inspection records on the groundwater sample report for 1301-N. I did not observe the printed name of the inspector on the inspection records. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the March 10, 2016, (Well 199-N-74) pump check inspection record on the groundwater sample report for 1325-N. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the March 4, 2016, (Well 399-1-10A, 399-1-10B, 399-1-16A, 399-1-16B, 399-1-17A, 399-1-18A, and 399-1-18B) pump check inspection records on the groundwater sample report for 300 Area Process Trenches. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the May 20, 2016, (Well 199-H4-8) pump check inspection records on the groundwater sample report for 183-H. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the May 2, 2016, Appendix K Groundwater Well Pre-Trip Inspection for Wells 299-W26-13, 299-W26-14, 699-32-76, 699-33-75, and 699-33-76 at 216-S-10 Pond and Ditch. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the May 20, 2016, (Wells 299-W26-13, 299-W26-14, 699-32-76, 699-33-75, and 699-33-76) pump check inspection records on the groundwater sample reports for 216-S-10 Pond and Ditch. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the April 1, 2016, (Wells 299-E27-16, 299-E27-18, 299-E27-19, 299-E33-33, 299-E34-8, and 299-E34-12) pump check inspection records on the groundwater sample reports for 216-B-63 Trench. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the April 4, 2016, (Well 299-E25-26), April 6, 2016, (Wells 299-E25-32P, 299-E25-35 and 699-43-45), and April 7, 2016, (Wells 299-E26-12 and, 299-E26-13) pump check inspection records on the groundwater sample reports for 216-A-29 Ditch. I did not observe the printed name of the inspector

on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the January 5, 2016, (Wells 299-E25-17 and 299-E25-19), pump check inspection records on the groundwater sample reports for 216-A-37-1 Crib. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

I reviewed the April 1, 2016, (Wells 299-E27-17, 299-E34-9, 299-E34-12) and April 7, 2016 (Well 299-E34-10) pump check inspection records on the groundwater sample reports for Low Level Burial Grounds Green Islands Waste Management Area 2. I did not observe the printed name of the inspector on the inspection record. Instead, I observed what appeared to be the first and middle name initials with the printed last name.

Action Required: No further action required. On July 20, 2016, Mr. Moses Jaraysi, CHPRC Environmental Manager, e-mailed all managers at CHPRC to uphold the agreement between Ecology and USDOE-RL to include the first and last name in lieu of initials and last name on RCRA driven inspection records. Ecology also recommends that stamps with initials and the printed last name be removed from circulation to avoid continued non-compliances.

No Exceedance Confirmation Sampling

2) 16.570 – 216-A-29 Ditch

WAC 173-303-400(3), as referenced by the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion Revision 8C - Condition I.A Effect of Permit.

40 CFR 265.90 Applicability (b) Except as paragraphs (c) and (d) of this section provide otherwise, the owner or operator must install, operate, and maintain a ground-water monitoring system which meets the requirements of §265.91, and must comply with §§265.92 through 265.94. This ground-water monitoring program must be carried out during the active life of the facility, and for disposal facilities, during the post-closure care period as well.

40 CFR 265.92(b)(3) Parameters used as indicators of ground-water contamination:
- **(i) pH**
- **(ii) Specific Conductance**
- **(iii) Total Organic Carbon**
- **(iv) Total Organic Halogen**

40 CFR 265.93(b) For each indicator parameter specified in §265.92(b)(3), the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well monitored in accordance with §265.92(d)(2), and compare these results with its initial background arithmetic mean. The comparison must consider individually each of the wells in the monitoring system, and must use the Student's t-test at the 0.01 level of significance (see appendix IV) to determine statistically significant increases (and decreases, in the case of pH) over initial background.

40 CFR 265.93(c)(2) If the comparisons for downgradient wells made under paragraph (b) of this section show a significant increase (or pH decrease), the owner or operator must then

immediately obtain additional ground-water samples from those downgradient wells where a significant difference was detected, split the samples in two, and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error.

Observations: I observed in the 2015 groundwater monitoring records for 216-A-29 Ditch, that the average specific conductance exceeded the critical means value of 401 µS/cm on April 8, 2015, in downgradient Well 299-E25-35 (497 uS/cm) and on April 17, 2015 in downgradient Well 299-E25-48 (598 uS/cm). From the 2015 groundwater monitoring records that I reviewed, I did not observe that Wells 299-E25-35 and 299-E25-48 were resampled with samples split in two and analyzed to determine whether the significant difference was a result of laboratory error.

Action Required: No further action required. Ecology Compliance Report #15.522 dated September 30, 2015, included 216-A-29 Ditch, and cited this same violation from 2014 groundwater monitoring records. The sampling data from the spring sampling of 2015, occurred before Compliance Report #15.522 was issued, therefore, not allowing CHPRC and USDOE-RL to respond timely to the violations. In a subsequent Ecology records request, received on August 24, 2016, I observed that a Certified Groundwater Quality Assessment Program for 216-A29 Ditch was submitted to Ecology on January 27, 2016. As required in 40 CFR 265.93(d)(2), this submittal was sent within 15 days (13 days) of the notification that the 216-A-29 Ditch may be affecting groundwater quality. This record request response also indicated that the Groundwater Quality Assessment Program for 216-A29 Ditch was implemented in April, 2016.

Failure to Sample for ICP Metals Mercury, Selenium, and Lead

3) 16.562 – 1301-N Liquid Waste Disposal Facility,
16.563 – 1325-N Liquid Waste Disposal, and
16.565 – 1324-N Impoundment and 1324-NA Percolation Pond

Hanford Facility RCRA Permit Rev. 8C - Chapter 3.0 Groundwater Monitoring Section 3.4.1 Monitoring Program. Groundwater monitoring will be done in accordance with the existing groundwater-monitoring program (Borghese, et. al 1996).

BHI-00725, Revision 0, *100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program* (Borghese, et. al., 1996)

Table 3.2 Constituent List for 1301-N and 1325-N

Analyzed Semiannually	Analyzed Annually
Contamination Indicator Parameters (Quadruplicate samples):	ICP Metals (filtered)
Specific conductance (field)	Anions
pH (field)	Alkalinity
Total Organic Carbon	
Total Organic Halogen	
Turbidity (field)	

ICP = Inductively Coupled Plasma

Table 3.2 Constituent List for 1324-N Surface Impoundment and 1324-NA Percolation Pond

Analyzed Semiannually	Analyzed Annually
Contamination Indicator Parameters (Quadruplicate samples): Specific conductance (field)pH (field)Total Organic Carbon Total Organic Halogen Turbidity (field)	ICP[1] Metals (filtered) Anions Alkalinity

[1] ICP = Inductively Coupled Plasma

Section 3.4.1 from Chapters 3.0 Groundwater Monitoring for 1301-N, 1324-N and NA, and 1325-N: "Groundwater monitoring will be done in accordance with the existing groundwater-monitoring program (Borghese, et. al., 1996)."

Section 4.3 from BHI-00725, Rev. 0, *100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program* (Borghese, et. al., 1996):

> ***Table 4 lists the constituent for the 100-N RCRA sites. The list includes semiannual analysis for the indicator parameters pH, conductivity, TOC, TOX [40 CFR 265.92(b)(3)], and turbidity, and annual analyses for metals, anions, and alkalinity. The metals and anions include constituents required by 40 CFR 265.92(b)(1) and (b)(2).***
>
> ***Lead was formerly analyzed for in samples from 1301-N and 1325-N monitoring wells, because process knowledge indicated that it may have been introduced to the waste stream. It has been dropped from the constituent lists because it was never detected in the effluent and has never been detected in groundwater at these sites.***

Analysis for phenol is required annually by 40 CFR 265.92. This plan proposes dropping phenol from the constituent list for all three RCRA sites at 100-N because it was not discharged to the facilities and has never been detected in groundwater.

40 CFR 265.92(b)(1) states, "Parameters characterizing the suitability of the ground water as a drinking water supply, as specified in appendix III."

Appendix III references the following metals and anions

Arsenic	**Metal**
Barium	**Metal**
Cadmium	**Metal**
Chromium	**Metal**
Fluoride	**Anion**
Lead	**Metal**
Mercury	**Metal**
Nitrate (as N)	**Anion**
Selenium	**Metal**
Silver	**Metal**

Observations: I observed that Wells 199-N-105A, 199-N-2, 199-N-3, 199-N-34, 199-N-57 (1301-N), 199-N-32, 199-N-41, 199-N-74, 199-N-81 (1325-N), 199-N-71, 199-N-72, 199-N-73 and 199-N-165 (1324-N and 1324-NA) were sampled at least annually in 2015 for alkalinity, anions (Fluoride, Chloride, Nitrate, and Sulfate), and ICP metals (Arsenic, Barium, Cadmium, Chromium, Iron, Manganese, Selenium, Sodium, and Silver). I observed that Mercury was not sampled at least annually in 2015 for 1301-N, 1325-N, and 1324-N and 1324-NA. I observed that Well 199-N-72 (1324-N and 1324-NA) was also not sampled for Selenium or Lead in 2015. EPA Method 6010C for Inductively Coupled Plasma-Atomic Emission Spectrometry includes the metals Selenium, Lead, and Mercury.

Action Required: Within 60 days of receipt of this compliance report, CHPRC and USDOE-RL must:

1) Update the operating record, to indicate that the ICP metal mercury was not sampled at groundwater Wells 199-N-105A, 199-N-2, 199-N-3, 199-N-34, 199-N-57 (1301-N), 199-N-32, 199-N-41, 199-N-74, 199-N-81 (1325-N), 199-N-71, 199-N-72, 199-N-73 and 199-N-165 in 2015 (1324-N and 1324-NA) and that the ICP metals selenium and lead were not sampled in Well 199-N-72 in 2015 (1324-N and 1324-NA).
2) Submit information to Ecology showing that the operating record was updated with this information.
3) Before the end of 2016, conduct an ICP metals test for mercury in Wells 199-N-105A, 199-N-2, 199-N-3, 199-N-34, 199-N-57 (1301-N), 199-N-32, 199-N-41, 199-N-74, 199-N-81 (1325-N), 199-N-71, 199-N-72, 199-N-73 and 199-N-165 (1324-N and 1324-NA) and for Lead and Selenium in Well 199-N-72 (1324-N and 1324-NA) and within 60 day of receipt of this compliance report, CHPRC and USDOE-RL must submit evidence to Ecology that this sampling occurred in 2016.

Failure to Implement Groundwater Quality Assessment Program or Failure to Conduct Sampling for Constituents in the Appendix "Ground-Water Monitoring List"

4) 16.563 – 1325-N Liquid Waste Disposal and
16.565 – 1324-N Impoundment and 1324-NA Percolation Pond

Section 3.2.2 Sampling and Analysis Plan from the 1324-N and NA and 1325-N Chapter 3.0 Groundwater Monitoring from the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C: The Groundwater Monitoring Plan for the 1301-N, 1324-N/NA, and 1325-N Sites (Hartman 1996b) describes the interim status sampling and analysis plan for RCRA monitoring.

Section 5.2 Statistical Analysis in WHC-SD-EN-AP-038, Rev. 2, Dated September 26, 1996, Groundwater Monitoring Plan for the 1301-N, 1324-N/NA, and 1325-N Sites: The 1301-N, 1324-N/NA, and 1325-N sites are all monitored in accordance with interim-status regulations under indicator evaluation monitoring (40 CFR 265.93).

Section 3.4.1 Monitoring Program from the 1324-N and NA and 1325-N Chapter 3.0 Groundwater Monitoring from the Hanford facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C: Groundwater monitoring will be done in accordance with the existing groundwater-monitoring program (Borghese, et. al 1996).

Section 4.1.1.1 RCRA Groundwater Monitoring Requirements from BHI-00725, Rev. 0, Dated November 26, 1996, 100-N Pilot Project Proposed Consolidated Groundwater Monitoring Program (Borghese, et. al 1996): The TSD is currently implementing a compliance monitoring program in accordance with Subpart F (40 CFR 265.90-25.94) of RCRA. This act was incorporated by reference in WAC 173-303-400(3)b.

40 CFR 265.93(d)(2) Within 15 days after the notification under paragraph (d)(1) of this section, the owner or operator must develop a specific plan, based on the outline required under paragraph (a) of this section and certified by a qualified geologist or geotechnical engineer, for a ground-water quality assessment at the facility. This plan must be placed in the facility operating record and be maintained until closure of the facility.

(3) The plan to be submitted under §265.90(d)(1) or paragraph (d)(2) of this section must specify:

(i) The number, location, and depth of wells;

(ii) Sampling and analytical methods for those hazardous wastes or hazardous waste constituents in the facility;

(iii) Evaluation procedures, including any use of previously-gathered ground-water quality information; and

(iv) A schedule of implementation.

(4) The owner or operator must implement the ground-water quality assessment plan which satisfies the requirements of paragraph (d)(3) of this section, and, at a minimum, determine:

(i) The rate and extent of migration of the hazardous waste or hazardous waste constituents in the ground water; and

(ii) The concentrations of the hazardous waste or hazardous waste constituents in the ground water.

The Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, Permit Condition II.F. The permittees will comply with the ground water monitoring requirements of WAC 173-303-645. This Condition will apply only to those wells the Permittees use for ground water monitoring programs applicable to the TSD units incorporated into Parts III, V, and/or VI of this Permit.....

WAC 173-303-645(9)(g) If the owner or operator determines pursuant to (f) of this subsection that there is statistically significant evidence of contamination for chemical parameters or dangerous constituents specified pursuant to (a) of this subsection at any monitoring well at the compliance point, he or she must:

(ii) Immediately sample the groundwater in all monitoring wells and determine whether constituents in the Appendix "Ground-Water Monitoring List" in Chemical Testing Methods for Designating Dangerous Waste which is incorporated at WAC 173-303-110 (3)(c) are present, and if so, in what concentration. However, the department, on a discretionary basis, may allow sampling for a site-specific subset of constituents from the "Ground-Water Monitoring List" Appendix and other representative/related waste constituents.

Observations: On June 8, 2016, during the compliance inspection, Mr. Hildebrand told Ecology he just received a phone call that confirmed exceedances of specific conductance for 1325-N and 1324 N and 1324-NA. From Ecology e-mail records, I observed that Mr. Hildebrand sent Ecology written notification of the confirmed exceedances at 1324-N and 1324-NA, and 1325-N on June 13, 2016.

I did not observe that CHPRC or USDOE-RL submitted a groundwater quality assessment program as required in 40 CFR. 265.93(d)(4), when confirmation sampling conducted on April 26, 2016, confirmed exceedances of specific conductance in 1324-N and 1324-NA and 1325-N.

On June 13, 2016, Mr. Hildebrand sent a written notification to Ecology by e-mail. This e-mail implied that USDOE-RL and CHPRC is making a determination that shows a source other than a regulated unit caused the increase for exceedances of specific conductance. Records provided in this e-mail included an informal report that demonstrated that a source other than the regulated units caused the increase. Below is the information from the June 13, 2016 e-mail to Ecology.

In a separate record, received by Ecology on August 24, 2016, I observed the following:

The RCRA monitoring wells scheduled for March 2016 were sampled March 8 - 10, 2016. Specific conductance measurements exceeded the critical mean comparison values in samples collected from the 1325-N and 1324-N/NA downgradient monitoring wells listed below. Sample results did not exceed critical mean values for the remaining indicator parameters. Verification samples were collected on April 26, 2016 for laboratory analysis. Note that well 199-N-77 is a deep screened monitoring well and not used for statistical analysis, but verification sample was also collected from this well for completeness. The specific conductance values from the verification samples confirmed the critical mean value was exceeded at the wells. The verification samples were also analyzed for

sulfate and sodium to evaluate if the exceedance was a continuation of previously assessed exceedance attribute to the non-regulated constituent sulfate. The sulfate / specific conductance trends continue to support the source of high specific conductance is sulfate. The attached file provides a summary of previous assessments and additional information on evaluation of migration of sulfate from 1324-N/NA to 1325-N monitoring wells.

In groundwater sampling records received by Ecology on August 24, 2016, I observed, Wells 199-N-72, 199-N-73, 199-N-77, 199-N-165 (1324 N and 1324-NA), Wells 199-N-41 and 199-N-81 (1325-N) were sampled for pH, Specific Conductance, Temperature, and Turbidity on April 26, 2016. I did not observe that any of the wells at 1324 N and 1324-NA and 1325-N had verification sampling for sulfate and sodium as reported to Ecology in an August 24, 2016 records request.

I observed that Wells 199-N-32 and 199-N-74 for 1325-N and Well 199-N-71 for 1324-N and 1324-NA were not sampled for confirmation of exceedances and all Wells at 1324-N and 1324-NA and 1325-N were not sampled to determine whether constituents in the Appendix "Ground-Water Monitoring List" in Chemical Testing Methods for Designating Dangerous Waste which is incorporated at WAC 173-303-110(3)(c) are present. Additionally, CHPRC and USDOE-RL did not request and Ecology did not approve an allowance to sample a site specific subset of constituents from the ground-water monitoring list appendix incorporated by reference in WAC 173-303-110(3)(c).

Action Required: Within 60 days of receipt of this compliance report, CHPRC and USDOE-RL must:

Either, Implement and submit to Ecology, a groundwater quality assessment program as required in 40 CFR. 265.93 for 1325-N, and 1324-N and 1324-NA.

OR

Conduct sampling at all groundwater wells at 1325-N, 1324-N, and 1324-NA to determine whether constituents in the Appendix "Ground-Water Monitoring List" in Chemical Testing Methods for Designating Dangerous Waste which is incorporated at WAC 173-303-110(3)(c) are present and submit results to Ecology.

If any "Ground-Water Monitoring List" Appendix compounds are found in the analysis pursuant to WAC 173-303-645(9)(g)(ii), CHPRC and USDOE-RL will follow the requirements of WAC 173-303-645(9)(g)(iii) through (vi) and include Ecology compliance on all notifications and correspondence.

Areas of Concern

1) Conflicting Permit Conditions for the 300 Area Process Trenches Post Closure Plan

Language in Permit Condition II.F.2 and Permit Attachment 8 – Hanford Well Maintenance Inspection Plan conflicts with the requirements for inspection schedules in Section 8.1.2 and Table 8.1 in the Post Closure Plan for the 300 Area Process Trenches. Table 8.1 from the 300 Area Process Trenches Post-Closure Plan states that the inspection frequency for subsurface well condition inspections are to be conducted every 3 to 5 years where as the II.F.2 and Permit Attachment 8 – Hanford Well Maintenance Inspection Plan, require downhole camera inspections on an as needed basis. This error need be fixed in the 300 Area Process Trenches Post-Closure Plan. If the downhole camera inspections are not conducted within the required timeframes at the 300 Area Process Trenches, it will subject the permittee to future violations.

2) Unprotected Resource Protection Well

On June 9, 2016, during the inspection of the Low Level Burial Grounds Green Islands - Waste Management Area 2, I found that groundwater Well 299-E34-9 had a well cap that was not locked on top of the casing. WAC 173-160-420(11) All resource protection wells shall be capped and protected using one of the following methods: (a) If the well is cased with metal and completed above the ground surface, you must attach a watertight cap with a lock to the top of the casing.

Well 299-E34-9 was completed on October 11, 1991, before the applicability date of Chapter 173-160 WAC. If this was a final status unit with a newly constructed well, it would have been listed as a non-compliance in the compliance report. The intent of this regulation is to ensure that resource protection wells are protected from damage, so it should be a practice that wells are not left unprotected at all sites. This compliance report shows that the well cap for this well was replaced and locked on the well on the same day that we observed that the cap was left unsecured.

3) Limits of Quantification/Practical Quantification Limit Calculations and Approvals

I recommend as soon as possible that CHPRC, USDOE-RL, and Ecology set up a process with Ecology chemists for approving Limits of Quantifications (LOQ) / Practical Quantification Limits (PQLs) for dangerous waste constituents that are used in Unit Groups incorporated into the final status dangerous waste permit.

In reviewing ECF-Hanford-15-0016, Revision 0 – *Calculation of Critical Means for Calendar Year 2015 RCRA Groundwater Monitoring*, I observed the following statement under Section 4 Assumptions and Inputs:

> *6. Data sets with large numbers of nondetects (where data are censored below the detection limits) will result in unreliable Critical Means (CMs). Typically, the CMs will be close to the detection limits but less than quantitation limits (which are approximately three times the detection limits). Therefore, when more than 50 percent of the reference (composite) results are nondetects, the Limit of Quantitation (LOQ) is used as the comparison value for detecting facility effect (in place of a CM). LOQ calculations and comparisons are made elsewhere.*

I observed that for final status units (i.e. 1301-N, 1325-N, 1324-N and 1324-NA, 183-H, and 300 Area Process Trenches), that WAC 173-303-645(8)(h) states in part:

> *Where practical quantification limits (pqls) are used in any of the following statistical procedures to comply with (i)(v) of this subsection,* ***the pql must be proposed by the owner or operator and approved by the department****. Use of any of the following statistical methods must be protective of*

human health and the environment and must comply with the performance standards outlined in (i) of this subsection. (Emphasis added.)

I observed that WAC 173-303-645(8)(h)(v) stated the following:

> *The statistical method must account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantification limit (pql) approved by the department under (h) of this subsection that is used in the statistical method must be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.*

I did not observe any limit of quantification, which is a practical quantification limit, for any of the closure units (1301-N, 1325-N, and 1324-N and 1324-NA) identified in this document for units in the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C.

I observed that in the Calculation of Critical Means for Calendar Year 2015 RCRA Groundwater Monitoring document references "*LOQ calculations and comparisons are made elsewhere*", but does not specifically state the locations of where that information is presented.

If limits of quantification or practical quantification limits are used for determining if a hazardous constituents are exceeded in a final status unit group with groundwater monitoring requirements, CHPRC and USDOE must first get the approval from Ecology prior to formally using limits of quantification or practical quantification limits to excuse an exceedance of any hazardous constituent. It is recommended that when Calculation of Critical Means is presented, (e.g. the above-referenced 2015 report), that the presented either include the LOQ calculations or provide a traceable reference. LOQ calculations and comparisons should be approved by Ecology and be a part of the Calculation of Critical Means documents for RCRA Groundwater Monitoring.

4) Sampling and Analysis Plans for 1301-N, 1325-N, 1324-N, and 1324-NA, and 183-H

I observed references to groundwater monitoring plans with sampling and analysis requirements in many of the final status unit groups, however, those records were not requested as a part of this inspection. A full review should be conducted to determine if proper sampling and analysis procedures are being followed for the unit groups incorporated into the Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C.

In my records request, I asked for Sampling and Analysis Plan(s) and associated Quality Assurance Project Plan(s) for, 1301-N, 1325-N, 183-H, and 1324-N & NA and I received the below response from CHPRC:

> *Note: There are no specific Sampling and Analysis Plan(s) or Quality Assurance Project Plan(s) for these groundwater well units.*

Sampling and Analysis Plans are a requirement of the dangerous waste regulations for groundwater monitoring programs.

WAC 173-303-645(8)(e) states:

> *The groundwater monitoring program must include consistent sampling and analytical methods that ensure reliable groundwater sampling, accurately measure dangerous constituents and indicator parameters in groundwater samples, and provide a reliable indication of groundwater quality below the waste management area.*

5) Outdated Groundwater Exceedance Reports

On June 13, 2016, Mr. Hildebrand sent a written notification to Ecology by e-mail regarding the exceedances confirmed at 1324-N, 1324-NA, and 1325-N. USDOE-RL and CHPRC made a determination that showed a source other than a regulated unit caused the increase at 1324-N, 1324-NA, and 1325-N. Records provided in this e-mail included an informal report that demonstrated that a source other than the regulated units caused the increase. A formal report showing that a source other than a regulated unit has not been completed since 1992 for 1324-N and 1324-NA and 1999 for 1325-N. Various remedial actions have significantly changed groundwater flow and direction through this portion of 100-N Area. These groundwater exceedance documents are approximately 20 years old and are no longer applicable. A revised complete and formal report should be submitted the next time exceedances are confirmed and USDOE and CHPRC want to demonstrate that a source other than the regulated unit caused the exceedance.

Permit Deficiencies

1) Need for a Complete Groundwater Monitoring Plan for Each Unit Group

Chapter 3.0 Groundwater Monitoring Plans for 1301-N, 1325-N, and 1324-N and 1324-NA reference many of the groundwater requirements in older outdated groundwater monitoring plans. In addition, the referenced groundwater monitoring plans also reference additional requirements in other documents. This makes determining applicable requirements more difficult and subjects the permittee to errors in interpretation. In a final status permit, there should only be one groundwater monitoring plan that is included in the permit for each applicable unit group. This plan should include all of the applicable requirements under the dangerous waste regulations.

Chapter 3.0 Groundwater Monitoring Plans for 1301-N, 1325-N, and 1324-N and 1324-NA states that "Groundwater monitoring will be done in accordance with the existing groundwater-monitoring program (Borghese, et. al., 1996)." In Section 3.1, Borghese, et. al., 1996, states "The 1301-N and 1325-N LWDFs are monitored under indicator evaluation programs as described in the groundwater monitoring plan (Hartman 1993a). The 1324-N/NA site was monitored under a groundwater quality assessment program, as described in the assessment plan (Hartman 1993b, 1995)."

Additionally, the requirements (in Borghese, et. al., 1996) are outdated. Many of the wells described as requiring sampling are no longer part of the groundwater monitoring network, which subjects the permittee to potential non-compliances. Requirements in these groundwater monitoring plans reference requirements to follow the interim status groundwater monitoring requirements, while the II.F permit condition requires compliance with the final status groundwater requirements of WAC 173-303-645. This creates a situation where the permittee is subject to a multitude of requirements that are not in conflict with each other, but that may be more burdensome than if just a single final status groundwater monitoring plan was incorporated into the permit with final status requirements under WAC 173-303-645.

2) Failure to Update 300 Area Process Trenches Permit

There are multiple sections in the 300 Area Process Trenches Groundwater Monitoring Plan that need to be revised or deleted. On August 10, 1998, Ecology sent a letter to USDOE which stated the below in part:

> *The Washington State Department of Ecology (Ecology) has reviewed and approved the above referenced documents 1, 2, and 3. Ecology concurs with the determination made by the U.S. Department of Energy (USDOE) that clean closure performance standards (pursuant to Washington Administrative Code [W AC 173-303-610]) have been met for the 300 Area Process Trenches (300 APT) soil column. Postclosure requirements for the groundwater will continue as stipulated by the Hanford Facility Resource Conservation and Recovery Act (RCRA) Site Wide Permit, the Ground Water Monitoring 'Plan for the 300 Area Process Trenches (i.e., WHC-SDEN-AP-185 Rev. OA), and the 300 FF-5 Record of Decision (as applicable).*
>
> *Reference 4 transmitted to Ecology an application for modification of the 300 APT portion of the Hanford Facility Dangerous Waste Permit (Permit). This application was prompted due to exceedances of dangerous constituents (specifically, cis-1, 2-dichloroethene) in the groundwater above action levels prescribed in the Permit, and it fulfilled the requirements of WAC 173-303-645 10(g)(ii) for submittal of an application within 90 days of notification to Ecology of the exceedances. Notification was made to Ecology on June 16, 1997 (Reference 5). The application for modification contained changes to the groundwater monitoring program from a compliance*

monitoring program to a corrective action program in compliance with WAC 173-303-645(11) and added a corrective action plan.

Since submittal of the application for modification, Ecology has revisited the need for modifying the Permit to reflect corrective action, and has concluded that modification of the Permit is currently not required. The current groundwater monitoring plan for 300 APT that is contained in the Permit (Groundwater Monitoring Plan for the 300 Area Process Trenches, WHC-SD-ENAP-185, Rev. OA) states in Chapter 6.0 that should exceedances of dangerous constituents occur in the groundwater, a corrective action program will be initiated. It further states that groundwater monitoring will continue as described in Chapters 4.0 and 5.0 of the plan and that corrective action will be accomplished through integration with remediation of the 300-FF-1 (source contamination) and 300-FF-5 (groundwater contamination) Operable Units.
Remediation of these operable units has been authorized through a separate Record of Decision. Corrective action for groundwater contamination at 300 APT has been initiated as part of the 300-FF-5 groundwater remedial actions.

Ecology considers the groundwater monitoring plan that is currently effective in the Permit and described in Chapters 4.0 and 5.0 of the Groundwater Monitoring Plan for the 300 Area Process Trenches, WHC-SD-EN-AP-185, Rev. OA, to be adequate for monitoring the effectiveness of corrective action at 300 APT. The groundwater monitoring plan in fact proposed utilization of the existing compliance monitoring program to meet the corrective action monitoring. Integration of corrective action at 300 APT with remedial actions at these operable units was also previously defined in the Permit (for example, Conditions VI.I.B.b and VI.I.B.n). Because these corrective actions are currently in place and were previously defined in the Permit, Ecology concludes that no modification to the Permit is required to modify the groundwater monitoring plan....

This letter indicates that the 300 Area Process Trenches is in corrective action monitoring; however since Ecology did not require the groundwater monitoring plan to be updated, the groundwater monitoring plan does not clearly identify this. Leaving the groundwater plan unmodified causes significant regulatory problems and can result in compliance issues, including issuance of violations for not following the current plan's requirements. It is now time to revise the 300 Area Process Trenches Groundwater Monitoring Plan to indicate that this Unit Group is in a Corrective Action Monitoring Program.

3) Missing Sampling Requirements for 183-H Groundwater Well

I observed there was no corrective action sampling requirements in Table 3.1 for Well 199-H4-84; however there are conflicting requirements for sampling this well for corrective action in Section 3.2 of the Chapter 3.0 Groundwater Monitoring Plan. Section 3.2 RCRA Corrective Action Groundwater Monitoring Schedule from Chapter 3.0 Groundwater Monitoring for 183-H Solar Evaporator Basins states the following in part:

The resulting schedule for the 183-H Solar Evaporation Basins RCRA network is presented in Table 3.1. This table identifies the wells being sampled, the frequency of sampling, and an analysis suite code for the previous RCRA compliance monitoring schedule and for the revised corrective action monitoring schedule. Table 3.2 provides a complete description of the constituent analysis suites....

The RCRA sampling and analysis schedule includes a network of four wells sampled annually. The wells are 199-H4-8, 199-H4-12A, 199-H4-12C, and 199-H4-84 (Figure 3.1). (Well 199-H4-12C is

also used as an extraction well for the pump-and-treat system.) Water samples will be analyzed for the constituents of concern previously identified for tracking contamination attributable to the 183-H Solar Evaporation Basins (nitrate, fluoride, chromium, uranium, and technetium-99). Additional analyses will be performed for alkalinity, other anions, and other metals, to aid in interpreting results. Field parameters (pH, temperature, specific conductance, and turbidity) will also be measured.

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