DOE/RL-2016-71
Revision 0

Demonstration of Other Source or Natural Variation Causing Elevated Specific Conductance in Groundwater at the Liquid Effluent Retention Facility (LERF) Point of Compliance

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

U.S. DEPARTMENT OF ENERGY | Richland Operations Office

P.O. Box 550
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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Date Published
November 2016

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APPROVED
By Janis Aardal at 12:36 pm, Nov 17, 2016

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Terms

DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
GEL	Geotechnical Engineering Laboratory
LERF	Liquid Effluent Retention Facility
LLWMA	Low-Level Waste Management Area
N/A	not applicable
TASL	Test America St. Louis
TOC	total organic carbon
TOX	total organic halogens
UPR	unplanned release

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1 Background and Purpose

The Liquid Effluent Retention Facility (LERF) is a final status treatment, storage, and disposal facility under the *Resource Conservation and Recovery Act of 1976* and the implementing requirements in WAC 173-303-600, "Dangerous Waste Regulations," "Final Facility Standards." Groundwater at LERF is monitored under a detection monitoring program that includes semiannual sampling of indicator parameters (e.g., pH, specific conductance, total organic carbon [TOC], total organic halogens [TOX], and heavy metals) (WAC 173-303-645(9)(a), "Releases from Regulated Units").

Groundwater sampling results from the July 20, 2016, semiannual sampling event showed specific conductance exceeding the critical mean comparison value for LERF at downgradient well 299-E26-15 (Figure 1; Table 1). In accordance with WAC 173-303-645(9)(g)(vi), this report demonstrates that an upgradient source other than LERF is associated with increasing specific conductance; however, the exceedance at well 299-E26-15 was not verified, which suggests an analytical error. This demonstration provides references to previous analysis, groundwater assessments, notification letters, and current evaluations of groundwater quality beneath LERF.

After the specific conductance exceedance was discovered, actions included notifying the Washington State Department of Ecology (Ecology) and performing verification sampling to determine the quality of the results for field specific conductivity testing.

2 Specific Conductance Exceedance and Sample Verification

Sample results were reviewed for well 299-E26-15 on August 15, 2016. It was discovered that specific conductance had exceeded the critical mean comparison value for LERF, which was thought to be an analytical error (Table 1). The U.S. Department of Energy (DOE) submitted a notification letter to Ecology on August 22, 2016, indicating that verification samples would be collected to determine if an analytical error had occurred (16-AMRP-0252, "Notification of Groundwater Sampling Results Exceeding Specific Conductance for the Liquid Effluent Retention Facility 2013 Monitoring Well Network Plan per 40 CFR 365.93(2)(d)(1)" [see Appendix A]).

Verification samples were collected on August 22, 2016, and sent to Geotechnical Engineering Laboratory (GEL) and Test America St. Louis (TASL). Sample verification results were below the LERF critical mean comparison value (Table 1). Quadruplicate samples were not requested, so a second round of verification sampling was performed on September 13, 2016. The verification results were again below the LERF critical mean comparison value for specific conductance, confirming that the specific conductance exceedance was due to analytical error (Table 1).

Specific conductance values have continued to increase in the area to the west and north of LERF for several years since prior to the start of LERF operations in 1994. Currently, several aqueous constituents (calcium, chloride, magnesium, nitrate, potassium, and sulfate) associated with specific conductance upgradient of LERF are elevated beyond natural groundwater conditions (DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*[1]) (Table 2). Chapter 3 discusses two previous assessments and provides explanations for the increasing specific conductance in this area.

[1] DOE/RL-96-61 provides the most accurate representation of background distribution for chemicals in the unconfined aquifer considering the various lithologies.

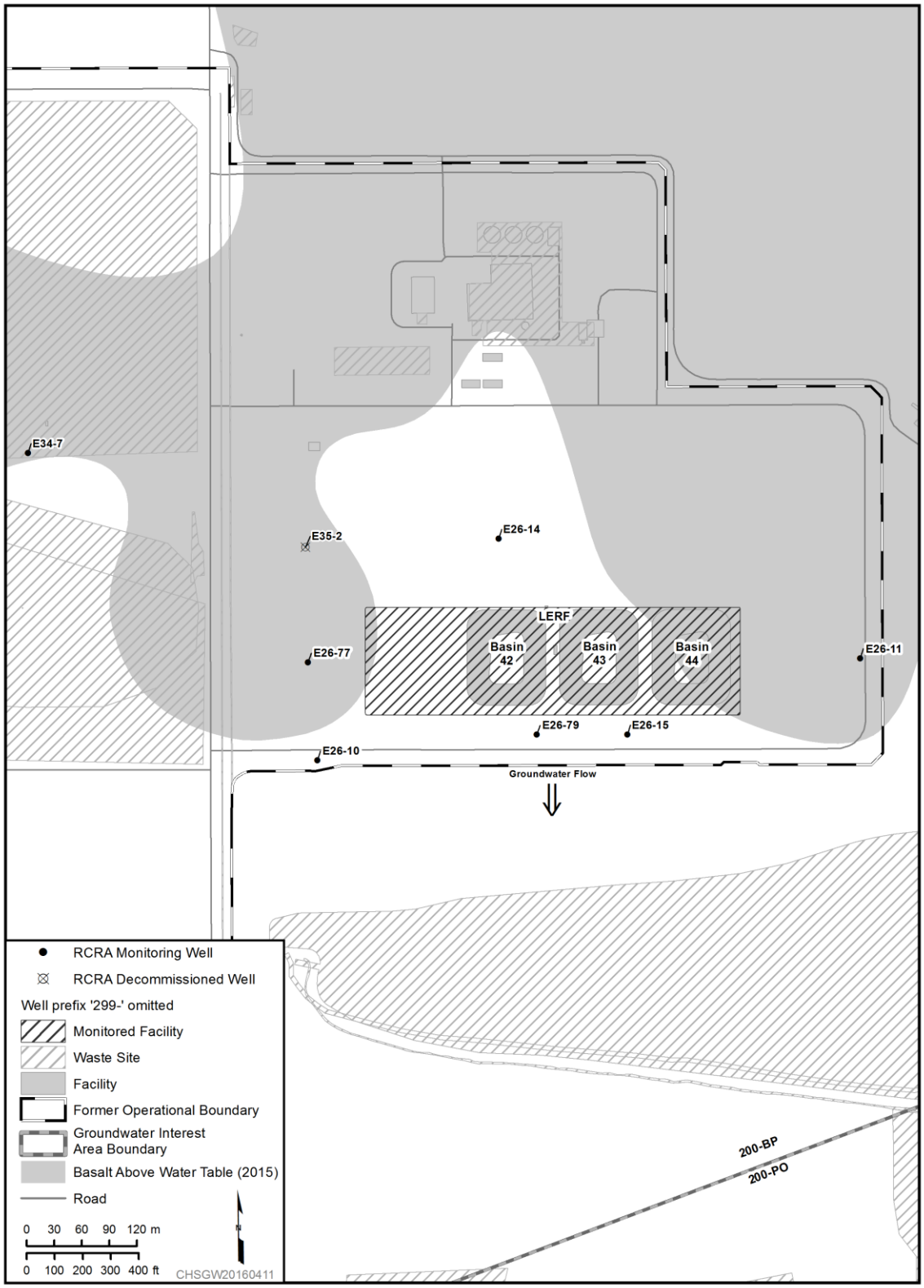


Figure 1. LERF Monitoring Network and Groundwater Flow Direction in 2015

Table 1. July 13, August 22, and September 13, 2016, LERF Semiannual Sampling and Verification Results

Well Name	Date Sampled	pH	SC	TOC	TOX	Cr^{+6}	CCL_4
299-E26-14	7/31/2016	7.97	799	1,525	6.15	1.5(U)	0.18(U)
299-E26-15	7/20/2016	7.73	834	808	4.41	1.5(U)	0.3(U)
299-E26-77[a]	7/13/2016	7.76	953	N/A	N/A	N/A	N/A
299-E26-79	7/13/2016	7.86	742	988.5	3.33(U)	1.5(U)	0.3(U)
299-E26-15 field verification	8/22/2016	N/A	821.5	N/A	N/A	N/A	N/A
299-E26-15 GEL verification	8/22/2016	N/A	799	N/A	N/A	N/A	N/A
299-E26-15 TASL verification	8/22/2016	N/A	826	N/A	N/A	N/A	N/A
299-E26-15 field verification	9/13/2016	N/A	831	N/A	N/A	N/A	N/A
299-E26-15 GEL verification	9/13/2016	N/A	814	N/A	N/A	N/A	N/A
299-E26-15 TASL verification	9/13/2016	N/A	831	N/A	N/A	N/A	N/A
Critical mean[b]	Low	7.66	N/A	N/A	N/A	N/A	N/A
	High	8.12	832	4,509	10.54	N/A	N/A

Note: Yellow-highlighted cell indicates specific conductance exceedance.

a. Well 299-E26-77 is a cross-gradient well sampled for geochemical parameters only and is not used for statistical measurements.

b. ECF-Hanford-16-0015, *Calculations of Critical Means for Calendar Year 2016 RCRA Groundwater Monitoring*.

CCL_4 = carbon tetrachloride

Cr^{+6} = hexavalent chromium

N/A = not applicable

SC = specific conductance

TOC = total organic carbon

TOX = total organic halide

U = sample was analyzed for, but not detected

Table 2. Comparison of July 2016 Aqueous Constituents Associated with Specific Conductance near and beneath the LERF with 95th Percentile Regional Background Concentrations

Constituents	Range of July 2016 Concentrations (mg/L)	DOE/RL-96-61 95th Percentile Background Concentration (mg/L)
Calcium	73.1 to 130	58.4
Chloride	50 to 92	19.6
Magnesium	24.1 to 36	31.1
Nitrate	39.8 to 66.4	41.7
Potassium	9.63 to 11	11.1
Sodium	30 to 37.3	32.9
Sulfate	150 to 270	55

Reference: DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*.

3 History of Specific Conductance at the Liquid Effluent Retention Facility

The two previous assessments discussed in this chapter provide alternative explanations for the continued increase of specific conductance at LERF. The latter assessment is expanded to establish a conceptual model, consistent with increasing trends of specific conductance at both upgradient and LERF monitoring wells.

In 1999, a groundwater assessment plan and report for the LERF (PNNL, 1999, "Groundwater Assessment Plan and Report for the 200 East Area Liquid Effluent Retention Facility") was submitted to Ecology (see Appendix B). The assessment plan and report were submitted because of the exceedance of the critical mean for specific conductance at downgradient wells 299-E26-9 and 299-E26-10. Three lines of evidence were used to demonstrate that the elevated specific conductance was not associated with LERF. First, although nitrate was found in the LERF leachate collection system, increasing nitrate trends in groundwater were noted as early as 1993, before the first waste was received at LERF in 1994. Second, tritium activity in groundwater had remained steady, even though tritium activity in the basins was high. Lastly, several aqueous constituents (calcium, potassium, magnesium, sulfate, and chloride) had also been increasing over time and were associated with specific conductance similar to nitrate. Thus, it was concluded that the aqueous constituents were nonhazardous and the increasing groundwater-specific conductivity was due to a return of natural groundwater conditions following the closure of the 216-B-3 Pond (00-GWVZ-065, "Notification of Specific Conductance Exceedance at the 200 East Area Liquid Effluent Retention Facility (LERF)" [see Appendix C]).

In 2010, an assessment of aqueous constituents associated with increasing specific conductance west of the LERF was provided in DOE/RL-2011-01, *Hanford Site Groundwater Monitoring Report for 2010*. Increasing nitrate and sulfate were attributed to two unplanned releases (UPRs): cerium rare earth crude (UPR-200-E-32) and strontium-nitrate crude (UPR-200-E-138) from the 216-B-2-1 and 216-B-2-2 Ditches (Figure 2). The lateral and downward driver of the elevated constituents was inferred from a 1986 wetting front observed in Trench 36 at Low-Level Waste Management Area (LLWMA)-2,

which is southwest of well 299-E34-7 (Figure 2). An earlier investigation established that infiltrating pore water at LLWMA-2 was associated with plugging of the back-end weir box in the unlined 216-B-2-3 Ditch (SD-WM-TI-260, *Water Inflow Investigation at the 218-E12A and 218-E12B Burial Grounds*). This ditch received over 1 million gallons daily. Lateral migration of the wetting front through the vadose zone was conceptualized from northeast-dipping, low-permeability sediments (WHC-SD-EN-TI-290, *Geologic Setting of the Low-Level Burial Grounds*), as well as the sudden and significant increase of UPR constituents at well 299-E34-7 in the mid-1990s (Figures 3 through 6).

The contaminants for UPR-200-E-138 are identified in Table 28 in ISO-986, *B-Plant Phase III Flowsheets*. The table lists 27 different contaminants, including nitrate, sulfate, and organics. Although calcium is not listed, a high concentration of sodium was present in the waste, which is known to displace calcium by cation exchange in the vadose zone at the Hanford Site. The dissolution of gypsum also produces mobile calcium and sulfate ions. The sudden and significant increase of these contaminants suggests contaminant loading from the vadose zone. The sudden and significant increase of TOC at well 299-E34-7 also provides convincing evidence of UPR migration. Other aquifer contaminant sites (absent of organic wastes) do not display significant TOC levels (Figure 7).

Elevated nitrate and sulfate are currently trending similarly at upgradient LERF well 299-E26-14 (Figure 8). In addition, the ratio between nitrate and sulfate at this well is nearly the same as found at well 299-E34-7 following the mid-1990 UPR. Another similarity is the sudden and significant increase in TOC at well 299-E26-14 (Figure 9).

The inferred groundwater flow direction east of well 299-E34-7 is depicted to the southeast (Figure 10). The convergence of the flow lines is the current location of well 299-E26-14.

Note that groundwater at well 299-E34-7 was characterized due to elevated specific conductance and TOC concentrations from 2000 to 2005. The characterization included semiannual sampling and analyses for the constituents identified in 40 CFR 264, “Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” Appendix IX, “Ground-Water Monitoring List.” Other analyses included coliform bacteria, total petroleum hydrocarbons (for diesel and gasoline), and oil and grease. PNNL-15670, *Hanford Site Groundwater Monitoring for Fiscal Year 2005*, concluded that “…no organic constituents were detected consistently and those detected were at low levels, often associated with blank contamination that appears to be false-positive results.”

4 Conclusion

Based on the results of verification sampling/analysis and the upgradient groundwater source of elevated specific conductance, DOE believes it has successfully demonstrated that LERF did not cause a critical mean exceedance at well 299-E26-15. DOE has also provided a modified groundwater monitoring plan that contains the appropriate changes necessary for successful future detection monitoring at LERF. Based on this demonstration, DOE recommends no change in current groundwater monitoring until the modified groundwater monitoring plan is implemented.

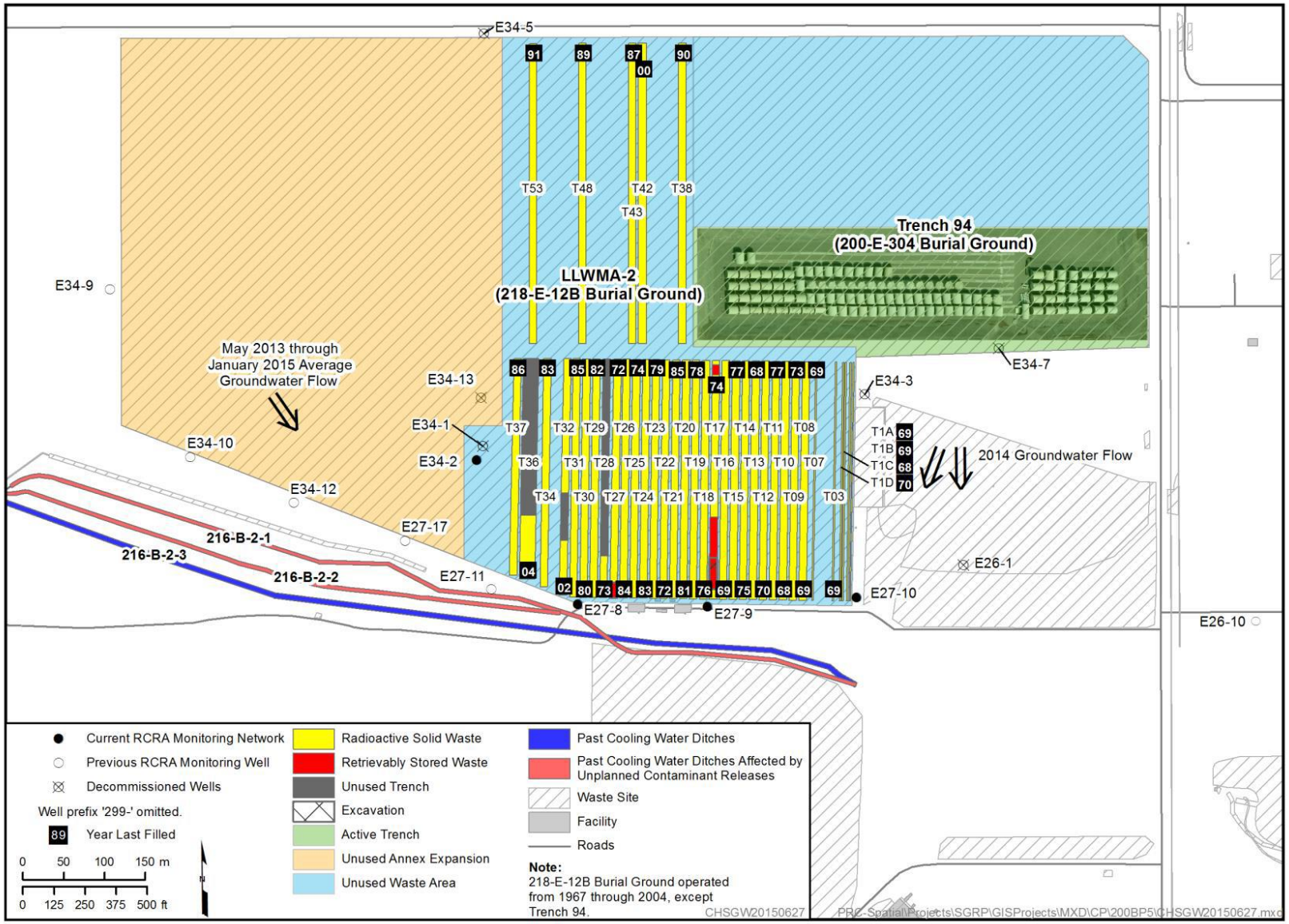


Figure 2. 218-E-12B and 200-E-304 Burial Grounds at LLWMA-2

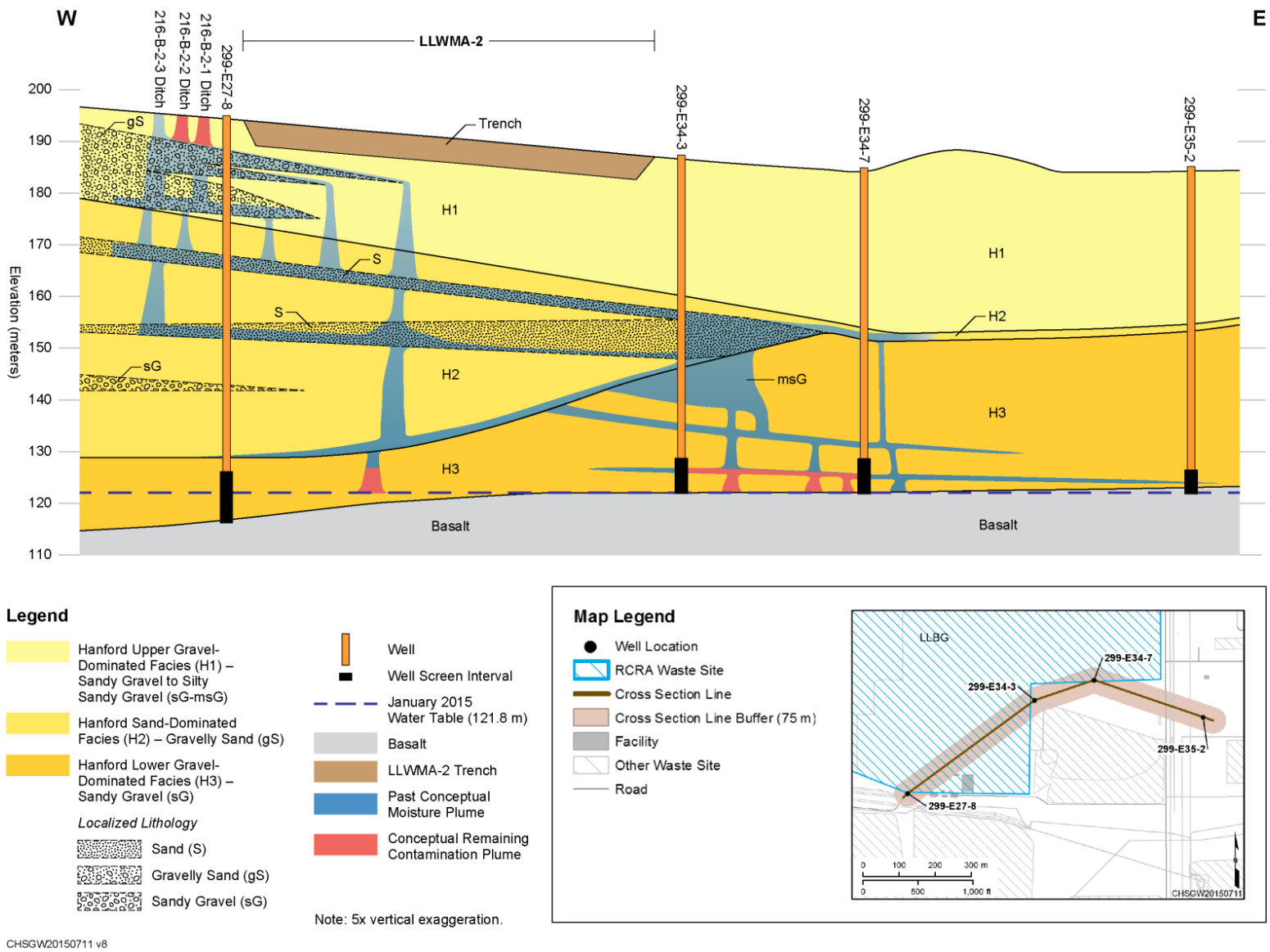


Figure 3. Conceptual Site Model of Previous Cooling Water and Contaminant Migration near and beneath LLWMA-2

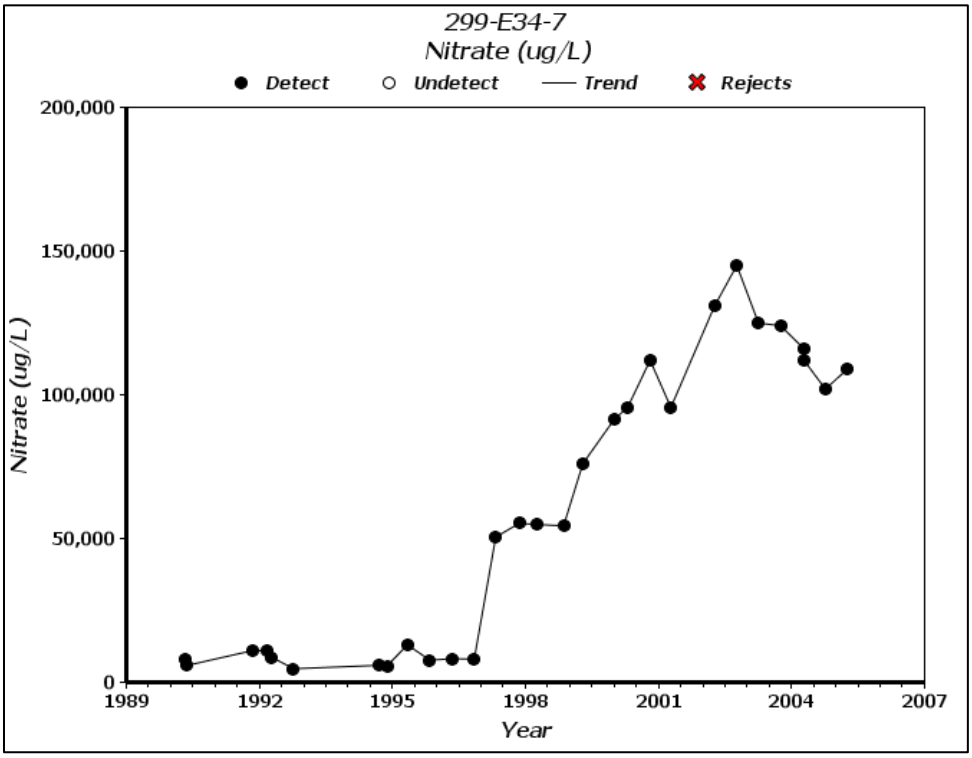


Figure 4. Nitrate Concentration Trends at Well 299-E34-7

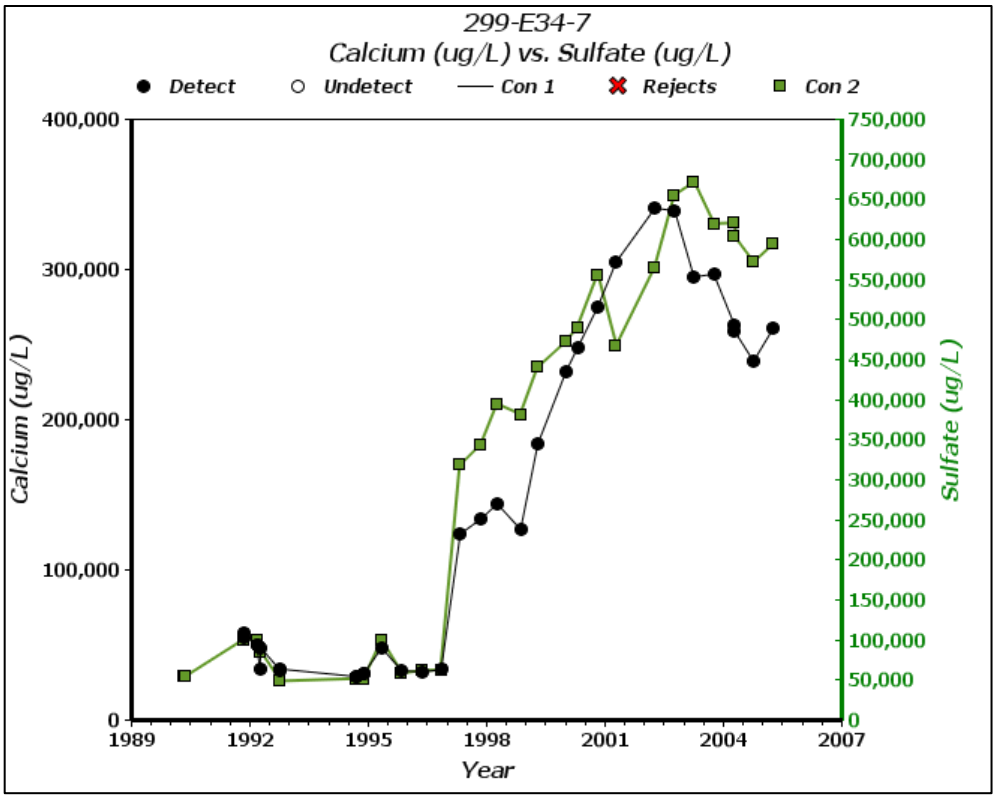


Figure 5. Calcium and Sulfate Concentration Trends at Well 299-E34-7

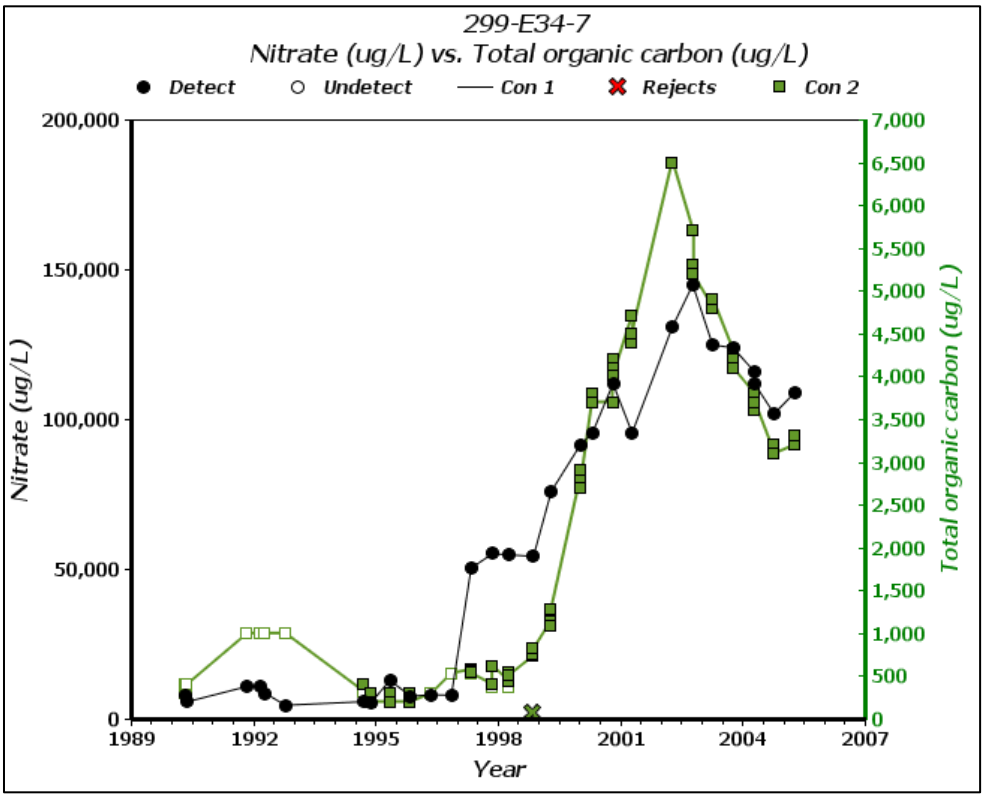


Figure 6. Nitrate and TOC Concentration Trends at Well 299-E34-7

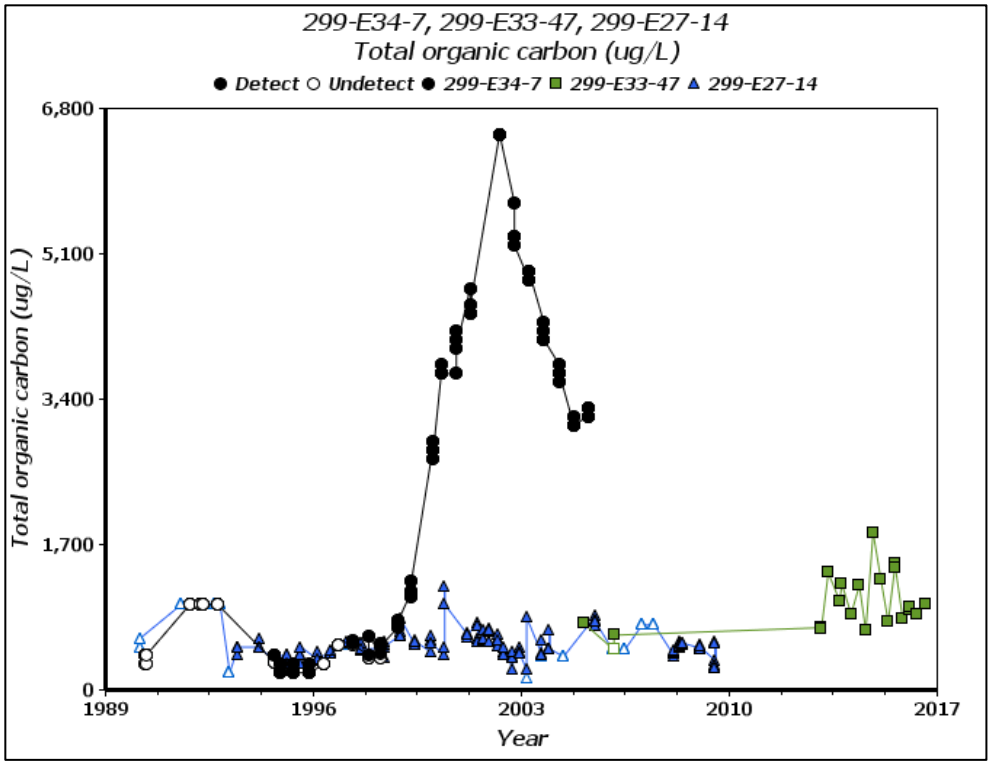


Figure 7. Comparison of TOC Concentration Trends at Well 299-E34-7 to Wells 299-E27-14 and 299-E33-47

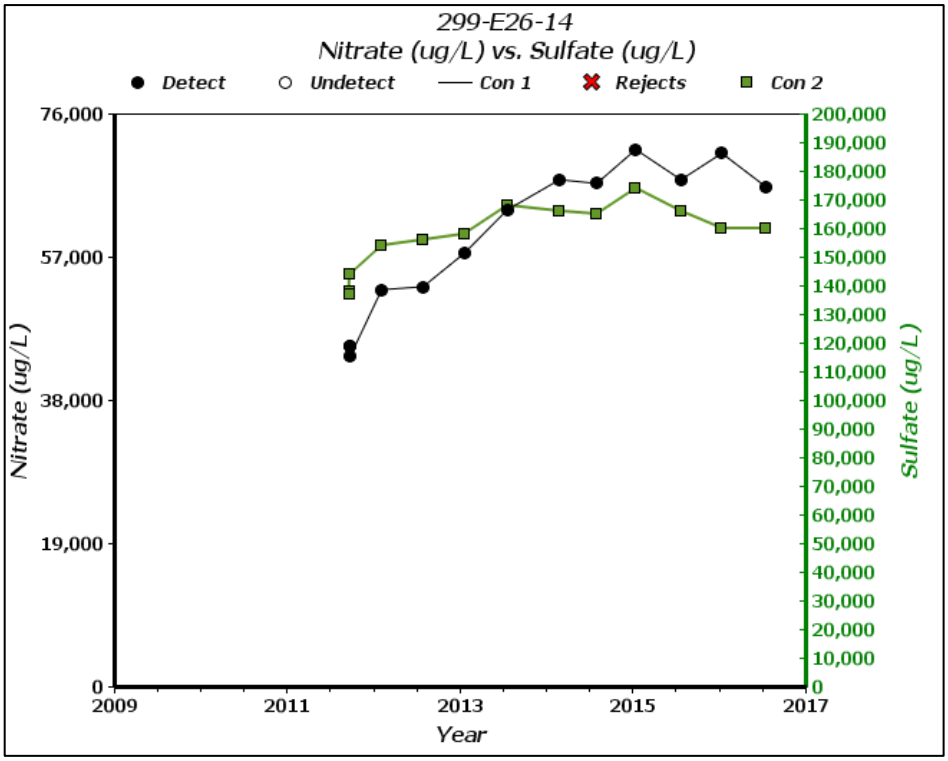


Figure 8. Nitrate and Sulfate Concentration Trends at Well 299-E26-14

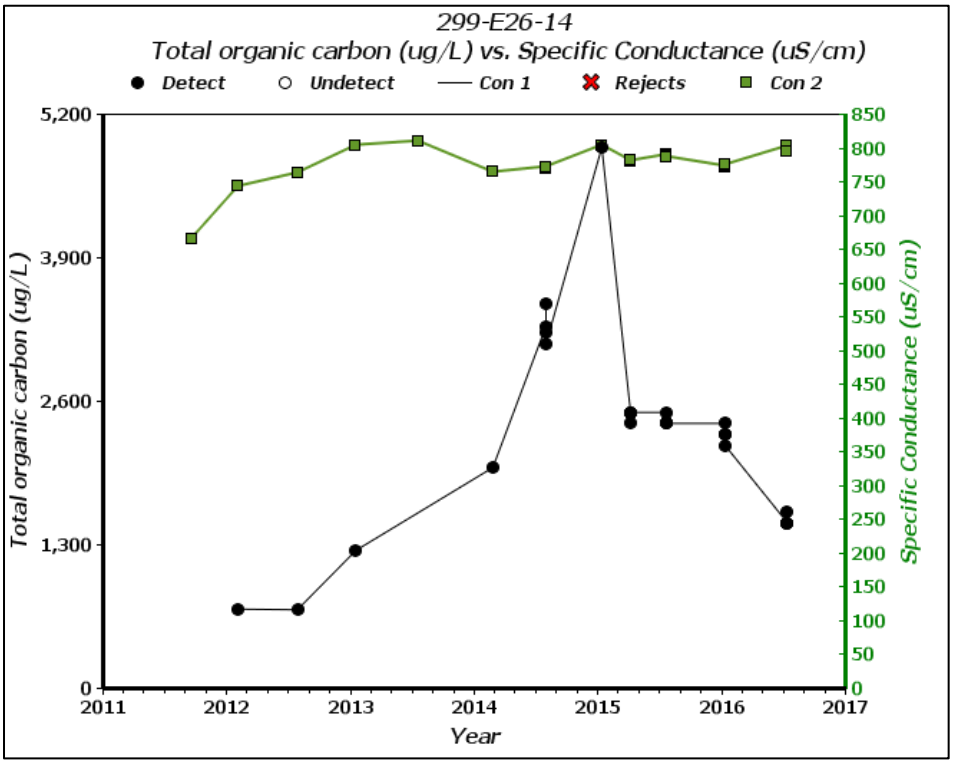
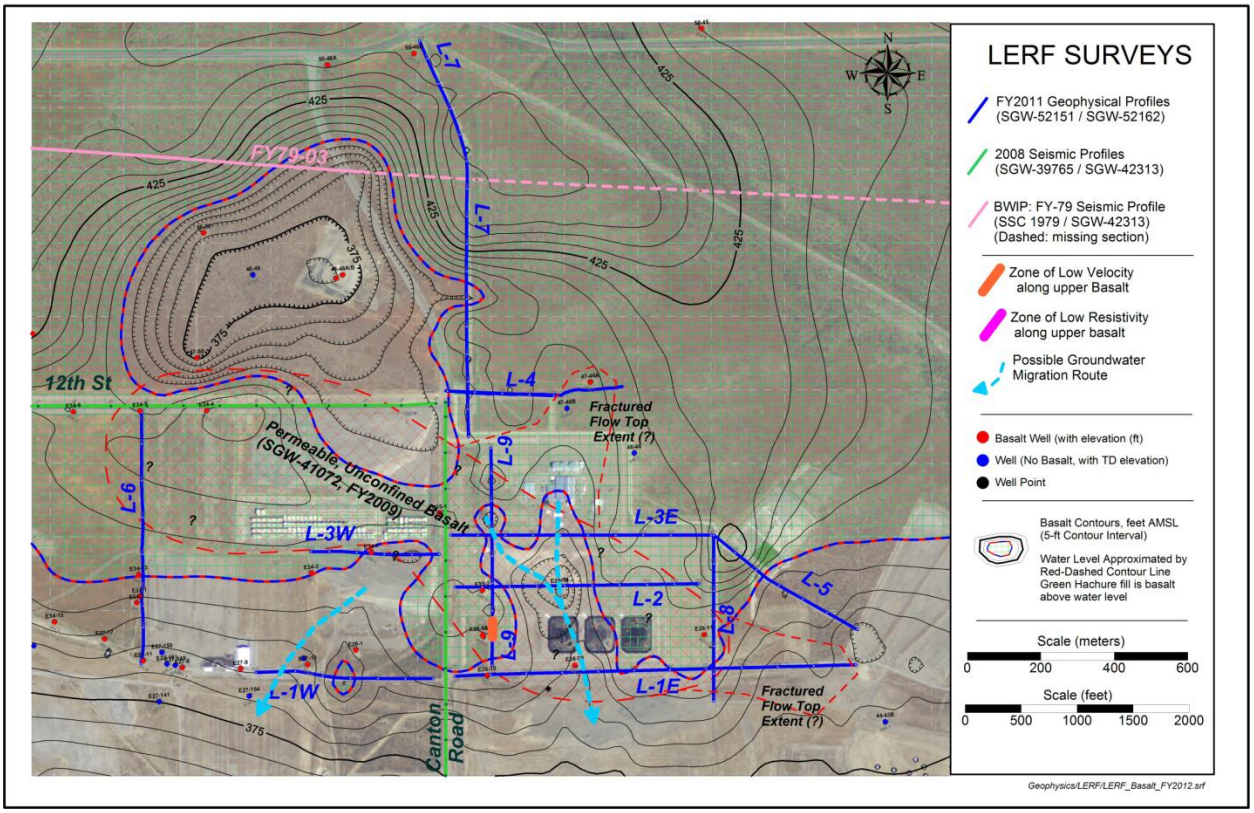


Figure 9. TOC and Specific Conductance Concentration Trends at Well 299-E26-14



Source: Figure 15 in SGW-52467, *Integrated Surface Geophysical Investigation Results at Liquid Effluent Retention Facility, 200 East Area, Hanford, Washington*.

Figure 10. Inferred Groundwater Flow in the LERF Area

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Appendix A

Notification of Groundwater Sampling Results Exceeding Specific Conductance for the Liquid Effluent Retention Facility (16-AMRP-0252 letter dated August 22, 2016)

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A1 Notification of Groundwater Sampling Results Exceeding Specific Conductance for the Liquid Effluent Retention Facility

This appendix provides a copy of the August 22, 2016, notification letter from the U.S. Department of Energy (DOE) to the Washington State Department of Ecology (Ecology). The letter notified Ecology of specific conductance exceedance of the critical mean comparison value for the Liquid Effluent Retention Facility at downgradient well 299-E26-15. In accordance with WAC 173-303-645(9)(g)(vi)[1], DOE stated split verification samples would be collected to determine if an analytical error had occurred.

[1] WAC 173-303-645, "Dangerous Waste Regulations," "Releases from Regulated Units," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

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

16-AMRP-0252

AUG 2 2 2016

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

Ms. Smith:

NOTIFICATION OF GROUNDWATER SAMPLING RESULTS EXCEEDING SPECIFIC CONDUCTANCE FOR THE LIQUID EFFLUENT RETENTION FACILITY 2013 MONITORING WELL NETWORK PLAN PER 40 CFR 365.93(2)(d)(1)

The sample results for the Liquid Effluent Retention Facility monitoring well network for July 2016 indicate that Well 299-E26-15 has exceeded the specific conductance mean value. The well is scheduled to be resampled, the sample will then be split and sent to two separate laboratories to ensure that the elevated results were not the result of a laboratory error.

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

Kevin W. Smith
Manager

AMRP:RDH

cc: S. N. Schleif, Ecology
J. A. Joyner, WRPS
J. A. Voogd, WRPS
Administrative Record (TSD ID# S-2-8 and T-2-8)
WRPS Correspondence Control

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Appendix B

Groundwater Assessment Plan and Report for the 200 East Area Liquid Effluent Retention Facility (letter with attached report dated March 18, 1999)

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B1 Groundwater Assessment Plan and Report for the 200 East Area Liquid Effluent Retention Facility

This appendix provides a copy of the March 18, 1999, "Groundwater Assessment Plan and Report for the 200 East Area Liquid Effluent Retention Facility," from Pacific Northwest National Laboratory to the U.S. Department of Energy. The plan and report were required under 40 CFR 265.93(a)[1] due to an exceedance of the critical mean value for specific conductivity. The plan provides introductory information regarding the date of the exceedance, confirmation of the exceedance, and notification date of the exceedance to the Washington State Department of Ecology. The second chapter provides history of the hydraulic conditions at the Liquid Effluent Retention Facility (LERF). The third chapter provides the three lines of evidence used to demonstrate that the elevated specific conductance was not associated with LERF. Chapter 3 also provides the reason for the increasing groundwater specific conductivity and the corrective action for offsetting the natural increase of aqueous constituents back to natural conditions as influences from B-3 Pond decline.

[1] 40 CFR 265.93, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Preparation, Evaluation, and Response," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol25/xml/CFR-2010-title40-vol25-sec265-93.xml.

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Pacific Northwest
National Laboratory
Operated by Battelle for the
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March 18, 1999

Mr. K. Michael Thompson
Groundwater Projects
U.S. Department of Energy
Richland Operations Office
Richland, WA 99352

Dear Mr. Thompson:

GROUNDWATER ASSESSMENT PLAN AND REPORT FOR THE 200 EAST AREA LIQUID EFFLUENT RETENTION FACILITY

This groundwater assessment plan and report is required under 40 CFR 265.93(a) (WAC 173-303-400) due to an exceedance the critical mean values for specific conductivity. On March 4, 1999, notification was sent to the Washington State Department of Ecology (Ecology) confirming an exceedance of specific conductance in wells 299-E26-9 and 299-E26-10. These wells are located downgradient from the 200 East Area Liquid Effluent Retention Facility (LERF). The initial exceedance was measured on January 11, 1999, and resampling on February 25, 1999 confirmed the exceedance.

This report fulfills the regulatory requirements for groundwater assessment by describing the investigatory process that was used to determine the impact that LERF has had on groundwater quality beneath the facility. The report also contains the conclusion that the LERF is not responsible for elevated specific conductivity and that the contributors are regionally-occurring constituents found in groundwater. Corrective actions for addressing the exceedance follow the discussion of the evidence that supports this conclusion.

A letter of notification to the Washington Department of Ecology and a copy of the assessment report has been sent electronically to Mr. M.J. Furman. The letter and report must be transmitted to Ecology to fulfill the regulatory requirements.

If you have any questions, please contact Mark Sweeney at 373-0703 or Stuart Luttrell at 376-6023.

902 Battelle Boulevard • P.O. Box 999 • Richland, WA 99352

Telephone (509) 376-5831 ■ e-mail rmsmith@pnl.gov ■ Fax (509) 372-1704

Mr. Thompson
March 18, 1999
Page 2

Sincerely,

Ronald M. Smith
Project Manager
Hanford Groundwater Monitoring Project

File/LB

cc: M.J. Furman, RL
A.G. Miskho, FDH
D.L. Flyckt, WMH

Groundwater Assessment Plan and Report for the 200 East Area Liquid Effluent Retention Facility

M. D. Sweeney
Pacific Northwest National Laboratory

March, 1998

1.0 INTRODUCTION

A groundwater assessment plan and report is required under 40 CFR 265.93(a) (WAC 173-303-400) when an exceedance of critical mean values for a facility have been confirmed by resampling. On March 4, 1999, notification was sent to the Washington State Department of Ecology (Ecology) confirming an exceedance of specific conductance in wells 299-E26-9 and 299-E26-10. These wells are located downgradient from the 200 East Area Liquid Effluent Retention Facility (LERF). The initial exceedance was measured on January 11, 1999, and resampling on February 25, 1999 confirmed the exceedance.

This report fulfills the regulatory requirements for groundwater assessment by describing the investigatory process that was used to determine the impact that LERF has had on groundwater quality beneath the facility. The report also contains the conclusion that the LERF is not responsible for elevated specific conductivity, and that the contributors are regionally-occurring constituents found in groundwater. Corrective actions for addressing the exceedance follow the discussion of the evidence that supports this conclusion.

2.0 GROUNDWATER QUALITY ASSESSMENT PROGRAM

The following subsections describe the process followed in evaluating the specific conductance exceedance, as well as provide background information for the assessment.

2.1 Investigatory Approach

To determine the impact of LERF waste handling and processing activities, this assessment relies on process chemistry results from the LERF operations, and historical groundwater data.

2.2 Hydrogeology of the LERF

The hydrogeology of the LERF has been described in detail in Delaney et al. (1991), Lindsey et al. (1992), and Sweeney et al. (1994). The principal stratigraphic units that comprise the depositional environment beneath the LERF are the gravel and sand facies of the Hanford formations (Lindsey et al. 1992). The uppermost aquifer is contained in an unconfined system flowing through the Hanford formation, bounded by the underlying Elephant Mountain Member of the Columbia River Basalt Group (Sweeney et al. 1994).

2.3 Description of Background Monitoring Network

Groundwater monitoring at the LERF is administered under an interim-status detection-monitoring program. The wells are sampled semiannually for constituents as outlined in Schmid (1991). Water level measurements are obtained as groundwater samples are gathered from the LERF monitoring network.

The LERF groundwater-monitoring network is composed of one upgradient and three downgradient wells (Figure 1). Well 299-E26-11 is the upgradient monitoring well and is situated east of the facility fenceline. Wells 299-E26-9, 299-E26-10, and 299-E35-2 comprise the downgradient monitoring wells positioned west of the facility.

Samples taken from LERF monitoring wells are analyzed for indicator parameters (pH, specific conductivity, TOC, and TOX) as well as facility-specific constituents of concern. The facility specific constituents include nitrate, volatile organics, phenolics, gross alpha, and gross beta. Samples are also analyzed for major anions and cations. Tritium is evaluated regionally and the LERF is sampled for this constituent as well.

2.4 Existing Data and Evaluation

The data that is reported to the Groundwater Project is loaded into the Hanford Environmental Information System (HEIS). As data is reported from the laboratory and becomes available in HEIS, a comparison of indicator parameters to their critical mean values is performed. Evaluation of the data involves assessing general and site-specific chemistry trend. The results are cumulatively reported in annual groundwater monitoring reports (e.g., Hartman 1999).

2.5 Groundwater Quality Assessment Monitoring System

No specific groundwater quality assessment monitoring system is planned for this evaluation. The conclusions discussed in this report rely on existing information from groundwater and process chemistry data.

2.6 Groundwater Quality Sampling Schedule

This assessment will rely on existing data available from HEIS and from the Liquid Effluent Monitoring Information System (LEMIS). No other sampling has been scheduled.

2.7 Water Table Monitoring

Water table elevation measurements are obtained semiannually and during groundwater sampling. The data is reported to the Groundwater Project and entered into HEIS. No additional water table measurements were obtained for this assessment.

2.8 Sampling and Analytical Methods

Sampling and analytical methods follow the guidance outlined in the *Quality Assurance Project QA Plan* (PNNL 1998) and is discussed in Hartman (1999).

2.9 Quality Assurance

No additional quality assurance standards will be developed for this assessment. Quality standards for the groundwater project are administered under *Quality Assurance Project QA Plan* (PNNL 1998). Process chemistry data meet or exceed Resource Conservation and Recovery Act (RCRA) standards.

2.10 Laboratory, Internal Quality Control

No additional laboratory or internal quality control measures will be employed for this assessment.

2.11 External Quality Control

No additional external quality control measures will be employed for this assessment.

2.12 Data Evaluation Procedures

The data evaluated for this assessment included semiannual groundwater results from samples obtained from LERF monitoring wells. Regional comparisons were made to wells outside the LERF network to evaluate the trend in specific conductance, and to identify the constituents that have led to the increase at the LERF. Identifying the possible cause of the increase included evaluating process chemistry results from LERF operations.

3.0 CONCLUSIONS

The determination that the LERF has not contributed to groundwater contamination is based on three lines of evidence:

1) Nitrate results from samples obtained from the LERF basins,
2) Leachate results of samples taken from the inter-liner collection system,
3) Current and historical groundwater results from the LERF monitoring network and regional groundwater wells.

Construction of the LERF began in February 1990 with a geotechnical investigation of the site. The facility was completed in November 1993 and was ready to begin receiving waste from the 242-A Evaporator. The evaporator upgrades necessary for the re-start were not completed until 1993, and the first waste-reduction campaign did not begin until April of 1994. Groundwater monitoring results precede the waste handling operations at the LERF by approximately three years.

Nitrate is a principal component of the 242-A Evaporator waste stream that is stored in LERF Basin 42, which is the RCRA regulated basin. Nitrate results of samples obtained from the LERF basins and piping system are shown in Table 1. The double-liner design of the LERF is intended to capture waste products before they are able to

reach the subsurface. A monitoring program to sample the leachate collection system has been in effect since the start of operations at the LERF. Analytical results of leachate samples (Table 2) indicate that several waste components including nitrate, lead, and nickel were reported above the Drinking Water Standards (DWS), as indicated by samples collected September 16, 1998.

The cause for the nitrate elevation in leachate has not been determined, but the leachate volume correlates strongly with seasonal variations, increasing in late spring and decreasing in late summer. The maximum leachate rate per area was about 26 gallons/acre-day in 1998. This is much less than 2100 gallons/acre-day, which is the "action leak rate" in the RCRA Permit. This information indicates that the LERF liner has not been breached (Mark Bowman, Waste Management Hanford, verbal communication).

Nitrate concentrations were recorded in regional monitoring wells prior to groundwater monitoring activities at the LERF, and results obtained since the installation of the facility's monitoring network indicate that nitrate has increased in most of the LERF wells (Figure 2). The most significant increase in nitrate concentration is in well 299-E26-10. The conclusion that this increase is due to regional groundwater contamination is based on a similar rise in nitrate in 299-E26-9 and 299-E35-2. It is also based on the increasing trend in concentration that was established in 1993, before the first waste was received at the LERF in 1994.

Tritium is also a principal component of the effluent stored in the LERF. Although tritium data from leachate samples are not available, sample results of effluent stored in the LERF basins shows that tritium activity has been high (Table 3). Tritium activity in groundwater surrounding the LERF has remained steady since the installation of the monitoring network (Figure 3), with the exception of a rapid decrease soon after the wells were installed.

Specific conductance is an indicator parameter under interim-status regulations and LERF monitoring wells have shown a progressive increase in measurement over time (Figures 4 and 5). As in the case of nitrate, several of these wells showed increasing specific conductance trends prior to LERF operations (Figures 4-6). Several aqueous constituents have also shown an increasing trend over time. These constituents, Ca^{+2}, K^{+}, Mg^{+2}, SO_4^{-2}, and Cl^{-}, have been identified as being responsible for the increase in specific conductance at the LERF (Figures 7-10). These constituents are non-hazardous and have similar concentrations in naturally occurring groundwater.

The conclusion drawn from these facts is that the elevated conductivity in the LERF downgradient monitoring wells is due to the groundwater beneath the LERF increasing in concentration to regional background values.

The recommended corrective action for specific conductance elevation in the LERF groundwater monitoring wells is to reestablish the critical mean for this indicator parameter. Beginning in the third quarter of 1999, well 299-E26-11 will be sampled for

specific conductance quarterly until a new critical mean has been established. The new critical mean would more accurately reflect background conditions at the facility and would eliminate triggering an assessment of groundwater quality with each incremental rise in specific conductance.

4.0 REFERENCES

Public Laws

Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

Code of Federal Regulations

40 CFR 265, Code of Federal Regulations, Title 40, Part 265. *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.*

Washington Administrative Code

WAC 173-303-400, Washington Administrative Code. *Interim Status Facility Standards.* Olympia, Washington.

Delaney, C. D., K. A. Lindsey, and S. P. Reidel. 1991. *Geology and Hydrology of the Hanford Site: A Standardized Text for use in Westinghouse Hanford Company Documents and Reports.* WHC-SD-EN-TI-003, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Hartman, M. J. 1999. *Hanford Site Groundwater Monitoring for Fiscal Year 1998.* PNNL-12086, Pacific Northwest National Laboratory, Richland, Washington.

Lindsey, K. A., B. N. Bjornstad, J. W. Lindberg, and K. M. Hoffman. 1992. *Geologic Setting of the 200 East Area: An Update.* WHC-SD-EN-TI-012, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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Schmid, J. S. 1991. *Interim Status Ground Water Monitoring Plan for the 200 East Area Liquid Effluent Retention Facility.* WHC-SD-EN-AP-024, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Sweeney, M. D., K. A. Lindsey, J. S. Schmid, and J. V. Borghese. 1994. *Site Characterization Report for the Liquid Effluent Retention Facility.* WHC-SD-EN-EV-024, Rev.0, Westinghouse Hanford Company, Richland, Washington.

Table 1. LERF Basin Nitrate Analysis

Liquid Effluent Monitoring Information System, Report Date March 15, 1999			
Sample Location	**Sample Date**	**Results**	**Units**
INFLUENT SAMPLE LERF BASIN 43	4/2/97	74	mg/L
INFLUENT SAMPLE LERF BASIN 43	4/9/97	48	mg/L
INFLUENT SAMPLE LERF BASIN 43	4/16/97	56.2	mg/L
INFLUENT SAMPLE LERF BASIN 43	4/23/97	52.2	mg/L
INFLUENT SAMPLE LERF BASIN 43	4/29/97	50.2	mg/L
INFLUENT SAMPLE LERF BASIN 43	5/7/97	48.8	mg/L
INFLUENT SAMPLE LERF BASIN 43	5/14/97	70.3	mg/L
INFLUENT SAMPLE LERF BASIN 43	5/21/97	38.6	mg/L
INFLUENT SAMPLE LERF BASIN 43	5/28/97	38.5	mg/L
INFLUENT SAMPLE LERF BASIN 43	6/12/97	72.8	mg/L
INFLUENT SAMPLE LERF BASIN 43	6/18/97	57	mg/L
INFLUENT SAMPLE LERF BASIN 43	6/25/97	42	mg/L
INFLUENT SAMPLE LERF BASIN 43	7/9/97	62.8	mg/L
INFLUENT SAMPLE LERF BASIN 43	7/23/97	75.3	mg/L
INFLUENT SAMPLE LERF BASIN 43	8/14/97	49.3	mg/L
INFLUENT SAMPLE LERF BASIN 43	9/10/97	67.8	mg/L
INFLUENT SAMPLE LERF BASIN 43	10/15/97	69.2	mg/L
INFLUENT SAMPLE LERF BASIN 43	11/13/97	66.3	mg/L
INFLUENT SAMPLE LERF BASIN 43	1/7/98	62.17	mg/L
INFLUENT SAMPLE LERF BASIN 43	2/25/98	62.93	mg/L
INFLUENT SAMPLE LERF BASIN 43	3/20/98	68.43	mg/L
INFLUENT SAMPLE LERF BASIN 43	4/1/98	61.56	mg/L
INFLUENT SAMPLE LERF BASIN 43	5/8/98	61.96	mg/L
INFLUENT SAMPLE LERF BASIN 43	6/11/98	60.6	mg/L
INFLUENT SAMPLE LERF BASIN 43	7/15/98	60.86	mg/L
INFLUENT SAMPLE LERF BASIN 43	8/13/98	60.4	mg/L
INFLUENT SAMPLE LERF BASIN 43	9/16/98	58.08	mg/L
INFLUENT SAMPLE LERF BASIN 43	10/14/98	54.7	mg/L
INFLUENT SAMPLE LERF BASIN 43	11/11/98	54.37	mg/L
INFLUENT SAMPLE LERF BASIN 43	12/16/98	54.18	mg/L
INFLUENT SAMPLE LERF BASIN 43	1/13/99	52.26	mg/L
INFLUENT SAMPLE LERF BASIN 43	2/17/99	57.2	mg/L
LERF BASIN 42 - SAMPLE RISER 2	4/30/97	4.69	mg/L
LERF BASIN 42 - SAMPLE RISER 2	10/2/97	1.37	mg/L
LERF BASIN 44 - SAMPLE RISER 2	9/10/98	6.764	mg/L
LERF BASIN 44 - SAMPLE RISER 3	7/15/97	7.84	mg/L
LERF BASIN 42 - SAMPLE RISER 3	10/2/97	1.34	mg/L
LERF BASIN 42 - SAMPLE RISER 4	4/30/97	4.91	mg/L
LERF BASIN 44 - SAMPLE RISER 4	7/15/97	8.57	mg/L
LERF BASIN 44 - SAMPLE RISER 4	9/10/98	3.672	mg/L
LERF BASIN 42 - SAMPLE RISER 5	10/1/97	1.34	mg/L
LERF BASIN 42 - SAMPLE RISER 6	5/1/97	4.38	mg/L
LERF BASIN 42 - SAMPLE RISER 6	10/3/97	1.35	mg/L
LERF BASIN 44 - SAMPLE RISER 6	9/11/98	3	mg/L
LERF BASIN 44 - SAMPLE RISER 7	9/11/98	3.202	mg/L
LERF BASIN 42 - SAMPLE RISER 8	5/1/97	4.27	mg/L

Table 2. Leachate Analytical Results

Site	Test Performed	Method	RQ	Result	Units	MDL	Sampled	Received
BASIN 42	Aluminum by ICP-MS	1		20.7	ug/L	0.7	9/16/98	9/16/98
BASIN 42	Antimony by ICP-MS	1		18.9	ug/L	0.1	9/16/98	9/16/98
BASIN 42	Arsenic by ICP-MS	1		5.1	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Barium by ICP-MS	1		140	ug/L	0.8	9/16/98	9/16/98
BASIN 42	Beryllium by ICP-MS	1	<	0.2	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Cadmium by ICP-MS	1		0.4	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Chromium by ICP-MS	1		0.8	ug/L	0.6	9/16/98	9/16/98
BASIN 42	Cobalt by ICP-MS	1		1	ug/L	0.1	9/16/98	9/16/98
BASIN 42	Copper by ICP-MS	1		57	ug/L	0.3	9/16/98	9/16/98
BASIN 42	Lead by ICP-MS	1		31.4	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Manganese by ICP-MS	1		86.9	ug/L	0.7	9/16/98	9/16/98
BASIN 42	Mercury by ICP-MS	1	<	0.2	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Molybdenum by ICP-MS	1		13.2	ug/L	0.1	9/16/98	9/16/98
BASIN 42	Nickel by ICP-MS	1		2270	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Selenium by ICP-MS	1	<	1.2	ug/L	1.2	9/16/98	9/16/98
BASIN 42	Silver by ICP-MS	1	<	0.2	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Thallium by ICP-MS	1	<	0.1	ug/L	0.1	9/16/98	9/16/98
BASIN 42	Thorium by ICP-MS	1		0.2	ug/L	0.1	9/16/98	9/16/98
BASIN 42	Uranium by ICP-MS	1		2	ug/L	0.1	9/16/98	9/16/98
BASIN 42	Vanadium by ICP-MS	1		3.5	ug/L	0.2	9/16/98	9/16/98
BASIN 42	Zinc by ICP-MS	1		17.2	ug/L	0.3	9/16/98	9/16/98
BASIN 42	Ce-144 Rel.% Count Error (GEA)	2		487	%	0	9/16/98	9/16/98
BASIN 42	Ce-144 by GEA	2	U	-8.50E+00	pCi/L	71.5	9/16/98	9/16/98
BASIN 42	CePr-144 Rel.% Count Error	2		487	%	0	9/16/98	9/16/98
BASIN 42	CePr-144 by GEA	2	U	-1.70E+01	pCi/L	143	9/16/98	9/16/98
BASIN 42	Co-60 Rel.% Count Error (GEA)	2		694	%	0	9/16/98	9/16/98
BASIN 42	Co-60 by GEA	2	U	1.10E+00	pCi/L	14	9/16/98	9/16/98
BASIN 42	Cs-134 Rel.% Count Error (GEA)	2		249	%	0	9/16/98	9/16/98
BASIN 42	Cs-134 by GEA	2	U	-2.99E+00	pCi/L	12.7	9/16/98	9/16/98
BASIN 42	Cs-137 Rel.% Count Error (GEA)	2		242	%	0	9/16/98	9/16/98
BASIN 42	Cs-137 by GEA	2	U	3.18E+00	pCi/L	14.2	9/16/98	9/16/98
BASIN 42	Eu-152 Rel.% Count Error (GEA)	2		101	%	0	9/16/98	9/16/98
BASIN 42	Eu-152 by GEA	2	U	3.27E+01	pCi/L	37.9	9/16/98	9/16/98
BASIN 42	Eu-154 Rel.% Count Error (GEA)	2		160	%	0	9/16/98	9/16/98
BASIN 42	Eu-154 by GEA	2	U	1.43E+01	pCi/L	39	9/16/98	9/16/98
BASIN 42	Eu-155 Rel.% Count Error (GEA)	2		245	%	0	9/16/98	9/16/98
BASIN 42	Eu-155 by GEA	2	U	9.35E+00	pCi/L	41.5	9/16/98	9/16/98
BASIN 42	Nb-94 Rel.% Count Error (GEA)	2		521	%	0	9/16/98	9/16/98
BASIN 42	Nb-94 by GEA	2	U	1.34E+00	pCi/L	12.6	9/16/98	9/16/98
BASIN 42	Ru-103 Rel.% Count Error (GEA)	2		580	%	0	9/16/98	9/16/98
BASIN 42	Ru-103 by GEA	2	U	1.28E+00	pCi/L	13.5	9/16/98	9/16/98
BASIN 42	Ru-106 Rel.% Count Error (GEA)	2		203	%	0	9/16/98	9/16/98
BASIN 42	Ru-106 by GEA	2	U	2.96E+01	pCi/L	111	9/16/98	9/16/98
BASIN 42	Sb-125 Rel.% Count Error (GEA)	2		330	%	0	9/16/98	9/16/98
BASIN 42	Sb-125 by GEA	2	U	-5.92E+00	pCi/L	33.2	9/16/98	9/16/98
BASIN 42	Sn-113 Rel.% Count Error (GEA)	2		325	%	0	9/16/98	9/16/98
BASIN 42	Sn-113 by GEA	2	U	-2.89E+00	pCi/L	16.1	9/16/98	9/16/98

Site	Test Performed	Method	RQ	Result	Units	MDL	Sampled	Received
BASIN 42	Zn-65 Rel.% Count Error (GEA)	2		100	%	0	9/16/98	9/16/98
BASIN 42	Zn-65 by GEA	2	U	-1.81E+01	pCi/L	24.7	9/16/98	9/16/98
BASIN 42	Bromide (Br) by IC	3	<	1.02E+00	mg/L	1.02	9/16/98	9/16/98
BASIN 42	Chloride (Cl) by IC	3		2.56E+01	mg/L	0.42	9/16/98	9/16/98
BASIN 42	Fluoride (F) by IC	3	<	1.00E-01	mg/L	0.1	9/16/98	9/16/98
BASIN 42	Nitrate (N) by IC	3		1.14E+02	mg/L	1.616	9/16/98	9/16/98
BASIN 42	Nitrite (N) by IC	3	<	1.20E-01	mg/L	0.12	9/16/98	9/16/98
BASIN 42	Phosphate (P) by IC	3	<	8.40E-01	mg/L	0.84	9/16/98	9/16/98
BASIN 42	Sulfate (SO4) by IC	3		1.10E+02	mg/L	5	9/16/98	9/16/98
BASIN 42	Sample Screen1- LAB USE ONLY	4		2.26	pCi/mL	20	9/16/98	9/16/98
BASIN 42	Sample Screen2 - LAB USE ONLY	4		646.12	pCi/mL	20	9/16/98	9/16/98
BASIN 42	Ammonia (N) by IC	5		0.08	mg/L	0.08	9/16/98	9/16/98
BASIN 43	Aluminum by ICP-MS	1		42.1	ug/L	0.7	9/16/98	9/16/98
BASIN 43	Antimony by ICP-MS	1		22.9	ug/L	0.1	9/16/98	9/16/98
BASIN 43	Arsenic by ICP-MS	1		7.9	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Barium by ICP-MS	1		93.4	ug/L	0.8	9/16/98	9/16/98
BASIN 43	Beryllium by ICP-MS	1	<	0.2	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Cadmium by ICP-MS	1		0.4	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Chromium by ICP-MS	1		0.8	ug/L	0.6	9/16/98	9/16/98
BASIN 43	Cobalt by ICP-MS	1		1.3	ug/L	0.1	9/16/98	9/16/98
BASIN 43	Copper by ICP-MS	1		64	ug/L	0.3	9/16/98	9/16/98
BASIN 43	Lead by ICP-MS	1		51.7	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Manganese by ICP-MS	1		55.9	ug/L	0.7	9/16/98	9/16/98
BASIN 43	Mercury by ICP-MS	1	<	0.2	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Molybdenum by ICP-MS	1		16.5	ug/L	0.1	9/16/98	9/16/98
BASIN 43	Nickel by ICP-MS	1		1390	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Selenium by ICP-MS	1		2.7	ug/L	1.2	9/16/98	9/16/98
BASIN 43	Silver by ICP-MS	1	<	0.2	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Thallium by ICP-MS	1	<	0.1	ug/L	0.1	9/16/98	9/16/98
BASIN 43	Thorium by ICP-MS	1		0.1	ug/L	0.1	9/16/98	9/16/98
BASIN 43	Uranium by ICP-MS	1		4.6	ug/L	0.1	9/16/98	9/16/98
BASIN 43	Vanadium by ICP-MS	1		5.6	ug/L	0.2	9/16/98	9/16/98
BASIN 43	Zinc by ICP-MS	1		31.3	ug/L	0.3	9/16/98	9/16/98
BASIN 43	Ce-144 Rel.% Count Error (GEA)	2		1000	%	0	9/16/98	9/17/98
BASIN 43	Ce-144 by GEA	2	U	-1.94E+00	pCi/L	45.5	9/16/98	9/17/98
BASIN 43	CePr-144 Rel.% Count Error	2		1000	%	0	9/16/98	9/17/98
BASIN 43	CePr-144 by GEA	2	U	-3.88E+00	pCi/L	91.1	9/16/98	9/17/98
BASIN 43	Co-60 Rel.% Count Error (GEA)	2		436	%	0	9/16/98	9/17/98
BASIN 43	Co-60 by GEA	2	U	-8.93E-01	pCi/L	6.83	9/16/98	9/17/98
BASIN 43	Cs-134 Rel.% Count Error (GEA)	2		106	%	0	9/16/98	9/17/98
BASIN 43	Cs-134 by GEA	2	U	4.04E+00	pCi/L	7.93	9/16/98	9/17/98
BASIN 43	Cs-137 Rel.% Count Error (GEA)	2		1000	%	0	9/16/98	9/17/98
BASIN 43	Cs-137 by GEA	2	U	1.48E-01	pCi/L	7.72	9/16/98	9/17/98
BASIN 43	Eu-152 Rel.% Count Error (GEA)	2		1000	%	0	9/16/98	9/17/98
BASIN 43	Eu-152 by GEA	2	U	4.15E-01	pCi/L	22.8	9/16/98	9/17/98
BASIN 43	Eu-154 Rel.% Count Error (GEA)	2		146	%	0	9/16/98	9/17/98
BASIN 43	Eu-154 by GEA	2	U	7.34E+00	pCi/L	20	9/16/98	9/17/98
BASIN 43	Eu-155 Rel.% Count Error (GEA)	2		339	%	0	9/16/98	9/17/98

Site	Test Performed	Method	RQ	Result	Units	MDL	Sampled	Received
BASIN 43	Eu-155 by GEA	2	U	-4.06E+00	pCi/L	22.9	9/16/98	9/17/98
BASIN 43	Nb-94 Rel.% Count Error (GEA)	2		293	%	0	9/16/98	9/17/98
BASIN 43	Nb-94 by GEA	2	U	-1.41E+00	pCi/L	7.08	9/16/98	9/17/98
BASIN 43	Ru-103 Rel.% Count Error (GEA)	2		222	%	0	9/16/98	9/17/98
BASIN 43	Ru-103 by GEA	2	U	1.91E+00	pCi/L	7.54	9/16/98	9/17/98
BASIN 43	Ru-106 Rel.% Count Error (GEA)	2		117	%	0	9/16/98	9/17/98
BASIN 43	Ru-106 by GEA	2	U	-3.50E+01	pCi/L	66	9/16/98	9/17/98
BASIN 43	Sb-125 Rel.% Count Error (GEA)	2		123	%	0	9/16/98	9/17/98
BASIN 43	Sb-125 by GEA	2	U	-9.67E+00	pCi/L	19.2	9/16/98	9/17/98
BASIN 43	Sn-113 Rel.% Count Error (GEA)	2		127	%	0	9/16/98	9/17/98
BASIN 43	Sn-113 by GEA	2	U	-4.38E+00	pCi/L	9.03	9/16/98	9/17/98
BASIN 43	Zn-65 Rel.% Count Error (GEA)	2		100	%	0	9/16/98	9/17/98
BASIN 43	Zn-65 by GEA	2	U	-9.76E+00	pCi/L	12.5	9/16/98	9/17/98
BASIN 43	Bromide (Br) by IC	3	<	1.02E+00	mg/L	1.02	9/16/98	9/16/98
BASIN 43	Chloride (Cl) by IC	3		2.21E+01	mg/L	0.42	9/16/98	9/16/98
BASIN 43	Fluoride (F) by IC	3	<	1.00E-01	mg/L	0.1	9/16/98	9/16/98
BASIN 43	Nitrate (N) by IC	3		4.85E+01	mg/L	0.816	9/16/98	9/16/98
BASIN 43	Nitrite (N) by IC	3	<	1.20E-01	mg/L	0.12	9/16/98	9/16/98
BASIN 43	Phosphate (P) by IC	3	<	8.40E-01	mg/L	0.84	9/16/98	9/16/98
BASIN 43	Sulfate (SO4) by IC	3		1.02E+02	mg/L	5	9/16/98	9/16/98
BASIN 43	Sample Screen1- LAB USE ONLY	4		1.6	pCi/mL	20	9/16/98	9/16/98
BASIN 43	Sample Screen2 - LAB USE ONLY	4		419.88	pCi/mL	20	9/16/98	9/16/98
BASIN 43	Ammonia (N) by IC	5		0.08	mg/L	0.08	9/16/98	9/16/98
Method ID: 1 = EPA 200.8, 2 = LA-508-462, 3 = LA-533-410, 4 = LO-150-450, 5 = EPA 300.7								

Table 3. LERF Operational Tritium Sample Results

Sample Location	Sample Technique	Sample Purpose	Sample Date	Results	Units
LERF BASIN 43 - SAMPLE RISER 1	COMPOSITE	PRIMARY	8/3/95	6860000	pCi/L
LERF BASIN 42 - SAMPLE RISER 1	COMPOSITE	PRIMARY	8/8/95	5210000	pCi/L
LERF BASIN 42 - SAMPLE RISER 2	GRAB	PRIMARY	6/5/96	36000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 2	GRAB	PRIMARY	6/5/96	4100000	pCi/L
LERF BASIN 42 - SAMPLE RISER 3	GRAB	PRIMARY	6/5/96	38000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 3	GRAB	PRIMARY	6/6/96	4000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 4	GRAB	PRIMARY	6/6/96	4000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 4	GRAB	PRIMARY	6/7/96	4100000	pCi/L
LERF BASIN 42 - SAMPLE RISER 5	GRAB	PRIMARY	6/7/96	4300000	pCi/L
LERF BASIN 42 - SAMPLE RISER 5	GRAB	PRIMARY	6/7/96	4000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 6	GRAB	PRIMARY	6/10/96	4000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 6	GRAB	PRIMARY	6/10/96	4100000	pCi/L
LERF BASIN 42 - SAMPLE RISER 7	GRAB	PRIMARY	6/10/96	4100000	pCi/L
LERF BASIN 42 - SAMPLE RISER 7	GRAB	PRIMARY	6/11/96	4000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 8	GRAB	PRIMARY	6/11/96	3900000	pCi/L
LERF BASIN 42 - SAMPLE RISER 8	GRAB	PRIMARY	6/11/96	3800000	pCi/L
LERF BASIN 43 - SAMPLE RISER 2	GRAB	PRIMARY	9/17/96	7100000	pCi/L
LERF BASIN 43 - SAMPLE RISER 3	GRAB	PRIMARY	9/17/96	7100000	pCi/L
LERF BASIN 43 - SAMPLE RISER 6	GRAB	PRIMARY	9/17/96	7100000	pCi/L
LERF BASIN 43 - SAMPLE RISER 7	GRAB	PRIMARY	9/17/96	7100000	pCi/L
LERF BASIN 44 - SAMPLE RISER 2	GRAB	PRIMARY	1/14/97	8200	pCi/L
LERF BASIN 44 - SAMPLE RISER 3	GRAB	PRIMARY	1/14/97	8000	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	4/23/97	770	pCi/L
LERF BASIN 42 - SAMPLE RISER 2	GRAB	PRIMARY	4/30/97	4200000	pCi/L
LERF BASIN 42 - SAMPLE RISER 4	GRAB	PRIMARY	4/30/97	4000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 6	GRAB	PRIMARY	5/1/97	3700000	pCi/L
LERF BASIN 42 - SAMPLE RISER 8	GRAB	PRIMARY	5/1/97	3700000	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	7/23/97	38000	pCi/L
LERF BASIN 42 - SAMPLE RISER 5	GRAB	PRIMARY	10/1/97	5100000	pCi/L
LERF BASIN 42 - SAMPLE RISER 2	GRAB	PRIMARY	10/2/97	5000000	pCi/L
LERF BASIN 42 - SAMPLE RISER 3	GRAB	PRIMARY	10/2/97	4900000	pCi/L
LERF BASIN 42 - SAMPLE RISER 6	GRAB	PRIMARY	10/3/97	5000000	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	10/15/97	580	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	1/7/98	410	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	4/1/98	630	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	7/15/98	570	pCi/L
LERF BASIN 44 - SAMPLE RISER 2	GRAB	PRIMARY	9/10/98	1300000	pCi/L
LERF BASIN 44 - SAMPLE RISER 4	GRAB	PRIMARY	9/10/98	9900000	pCi/L
LERF BASIN 44 - SAMPLE RISER 6	GRAB	PRIMARY	9/11/98	12000000	pCi/L
LERF BASIN 44 - SAMPLE RISER 7	GRAB	PRIMARY	9/11/98	12000000	pCi/L
INFLUENT SAMPLE LERF BASIN 43	GRAB	PRIMARY	10/14/98	760	pCi/L

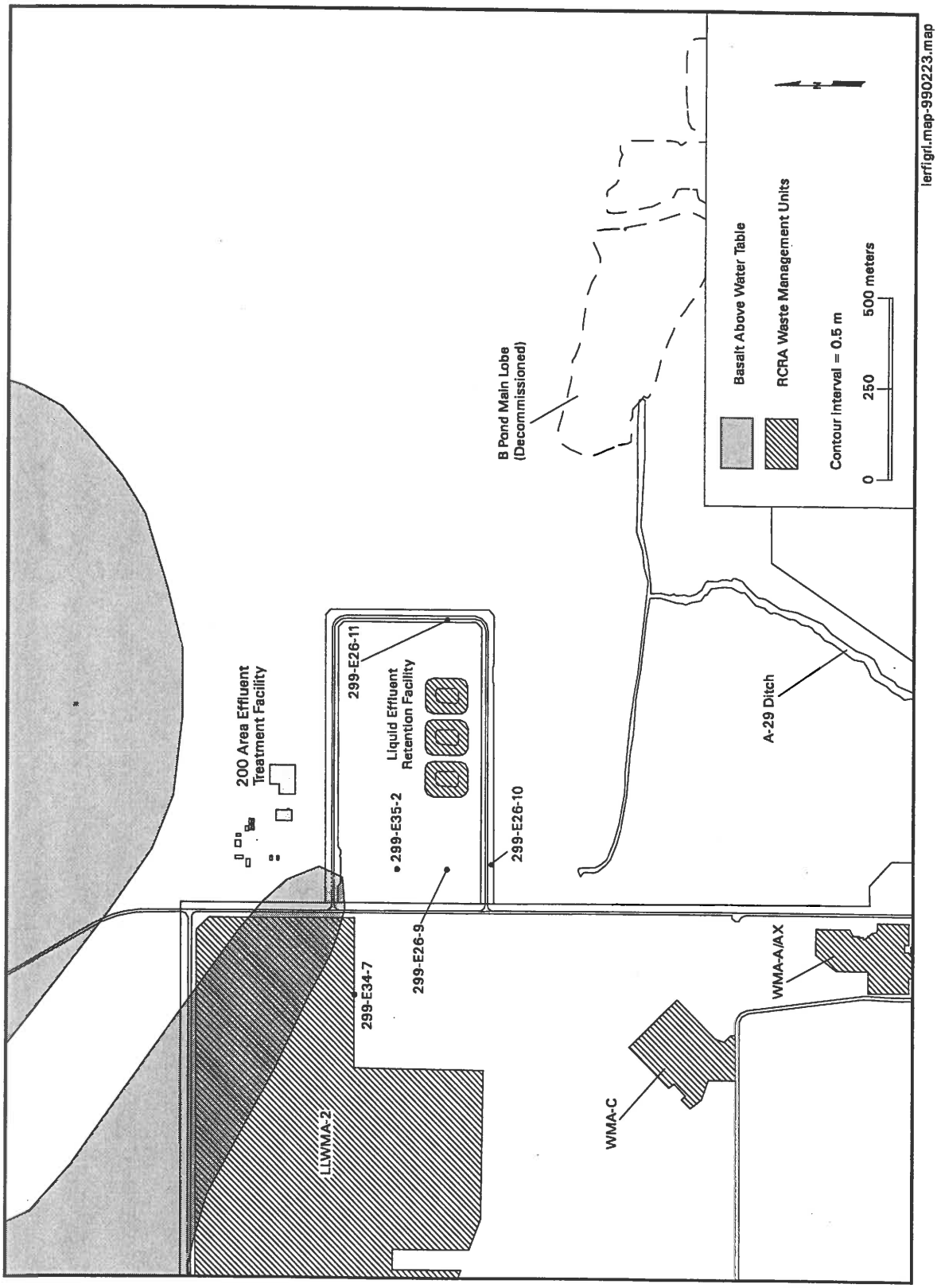

Figure 1. LERF Monitoring Network

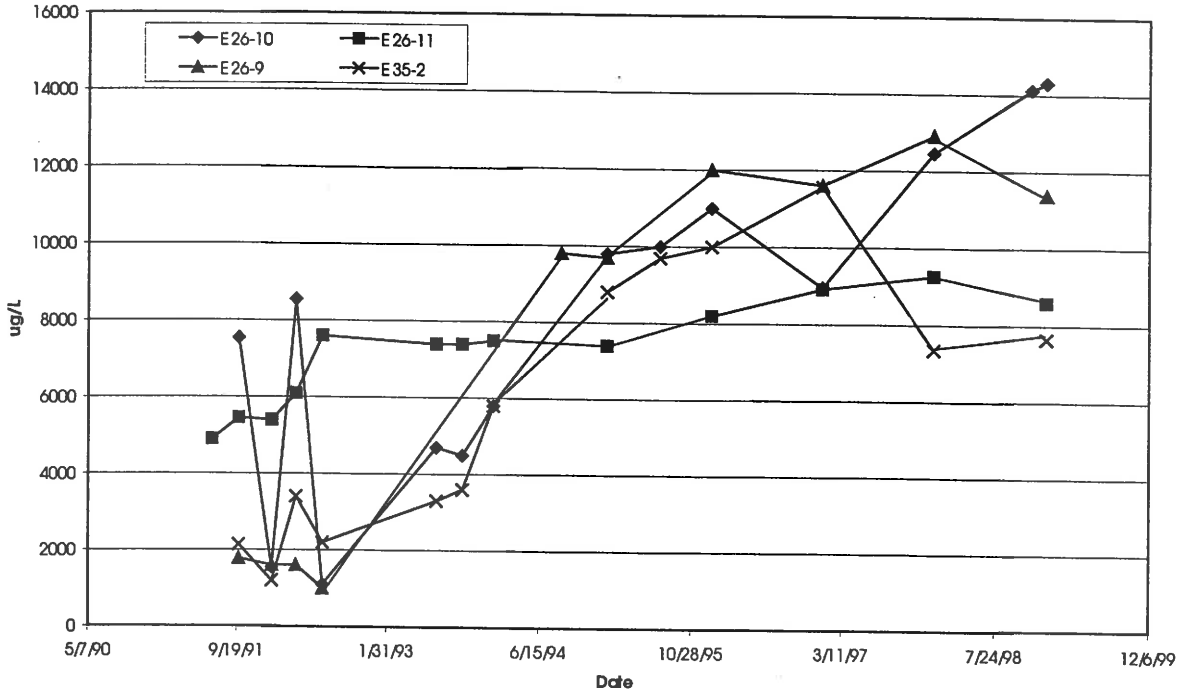

Figure 2. LERF Wells Nitrate

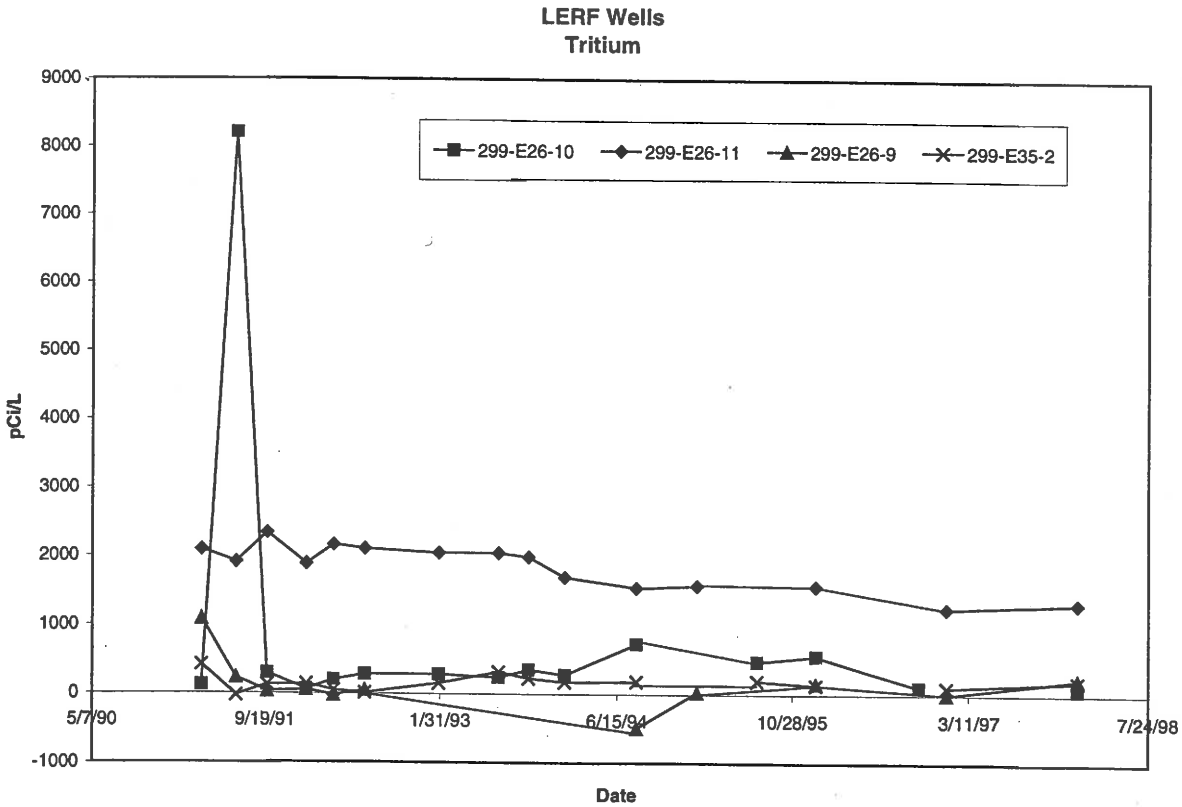

Figure 3. LERF Wells Tritium

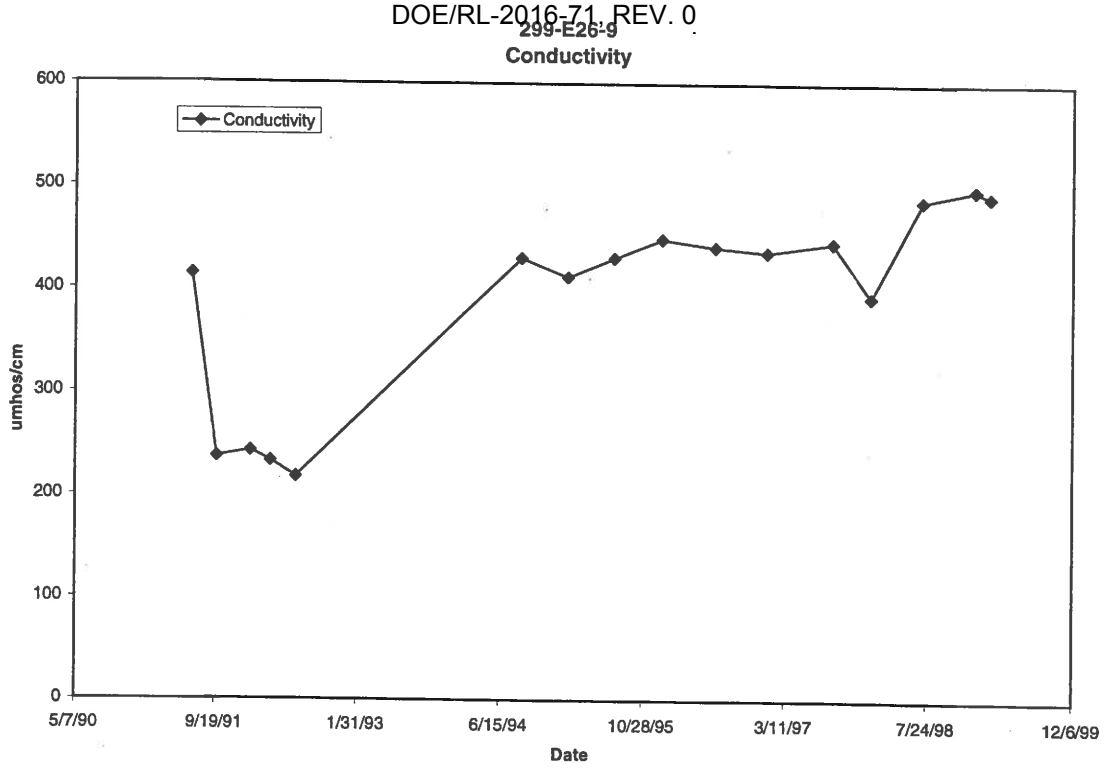

Figure 4. 299-E26-9 Conductivity

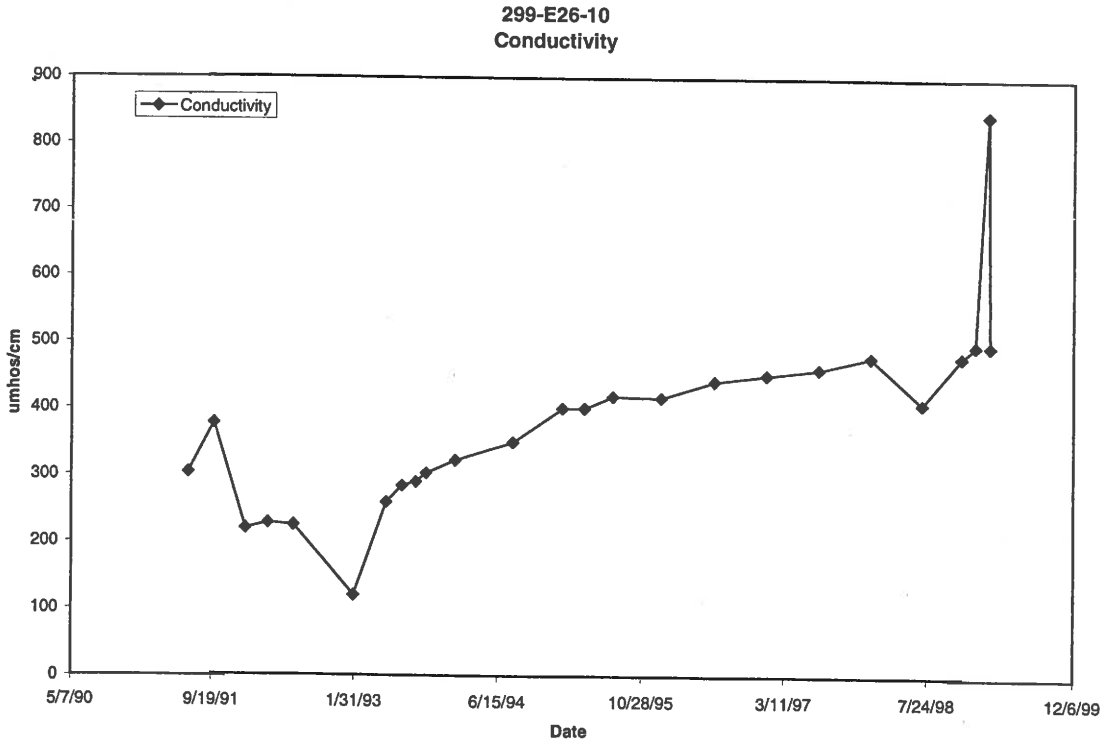

Figure 5. 299-E26-10 Conductivity

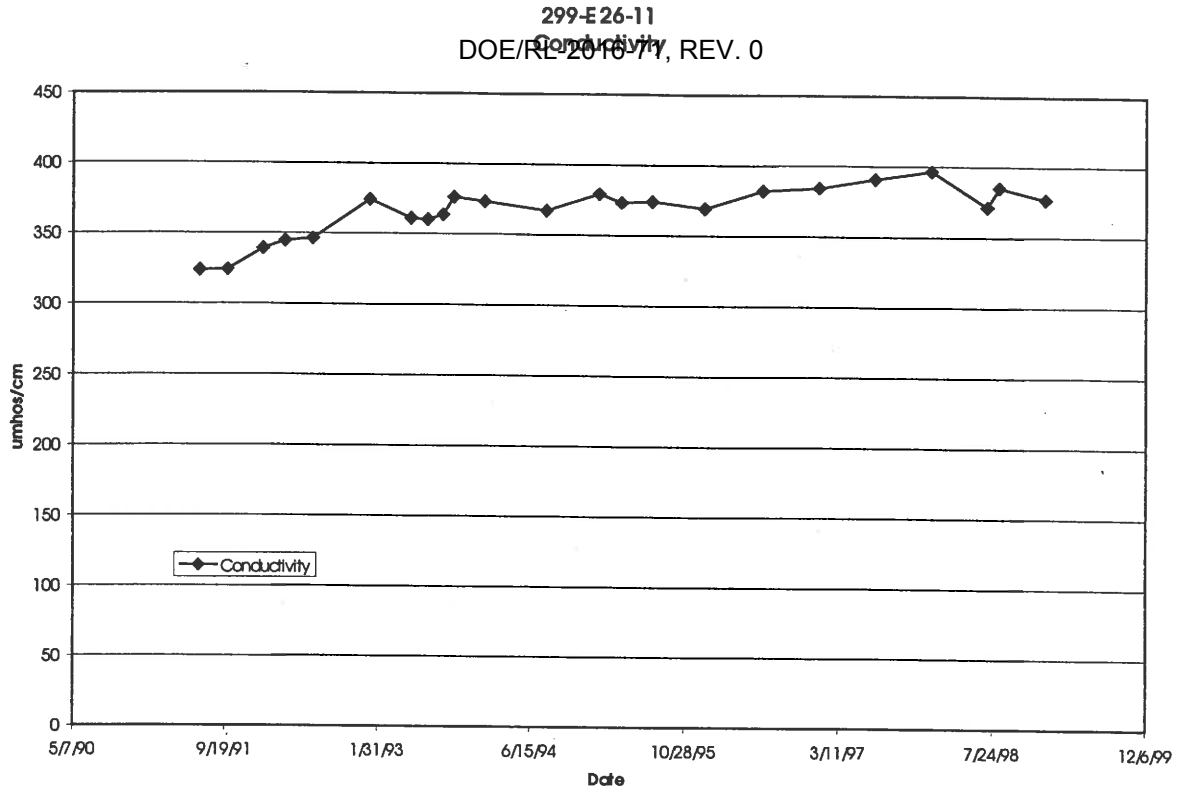

Figure 6. 299-E26-11 Conductivity

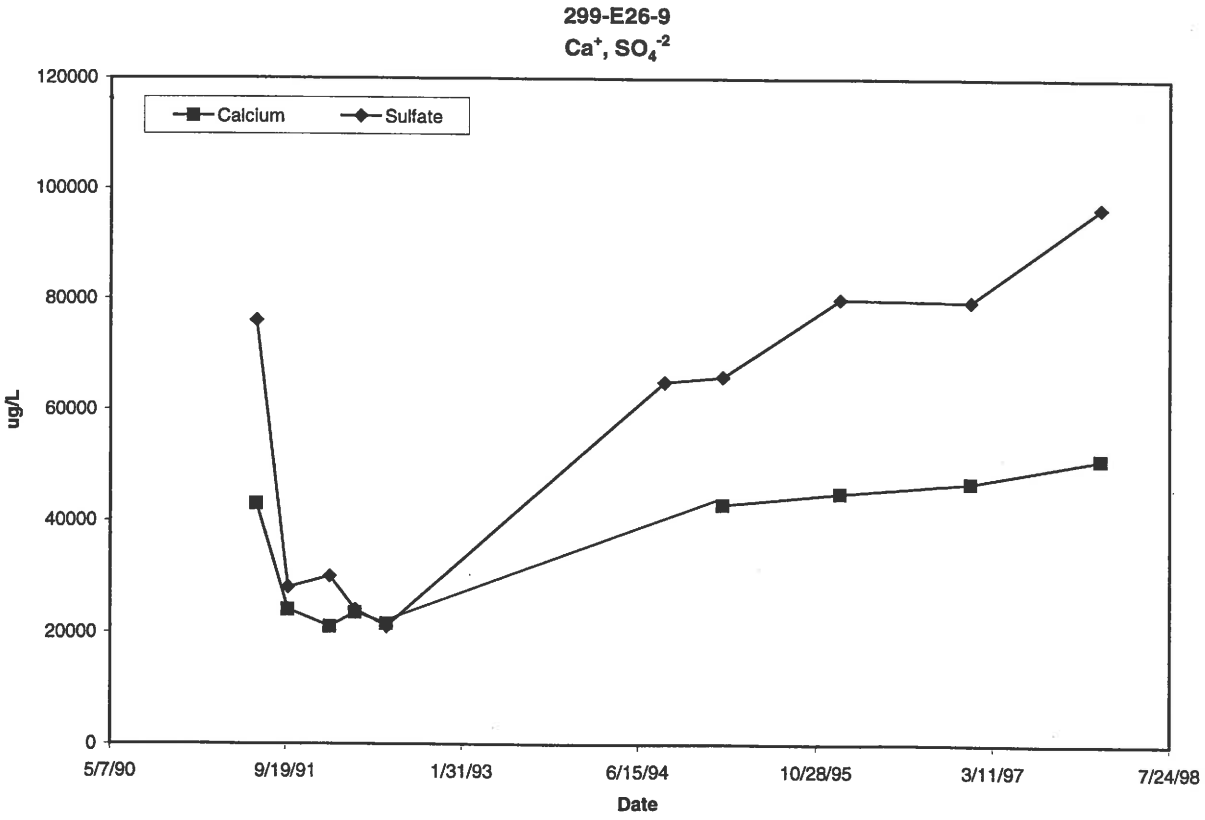

Figure 7. 299-E26-9 Calcium and Sulfate

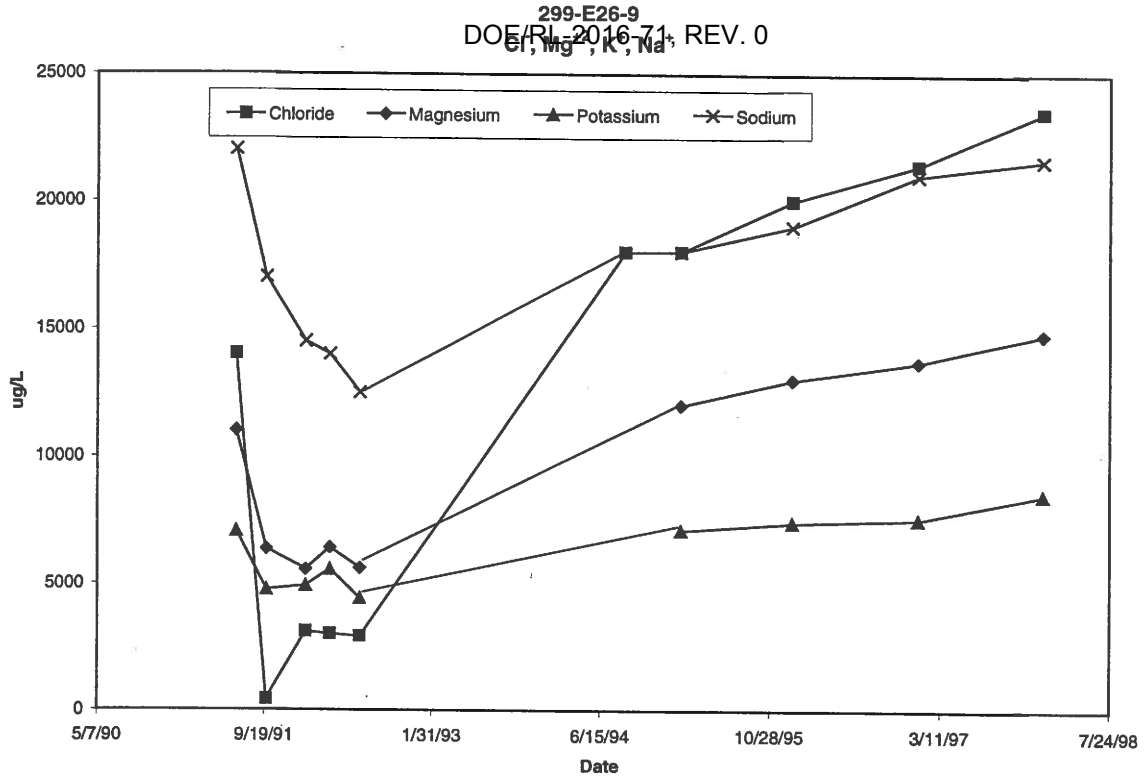

Figure 8. 299-E26-9 Chloride, Magnesium, Potassium, and Sodium

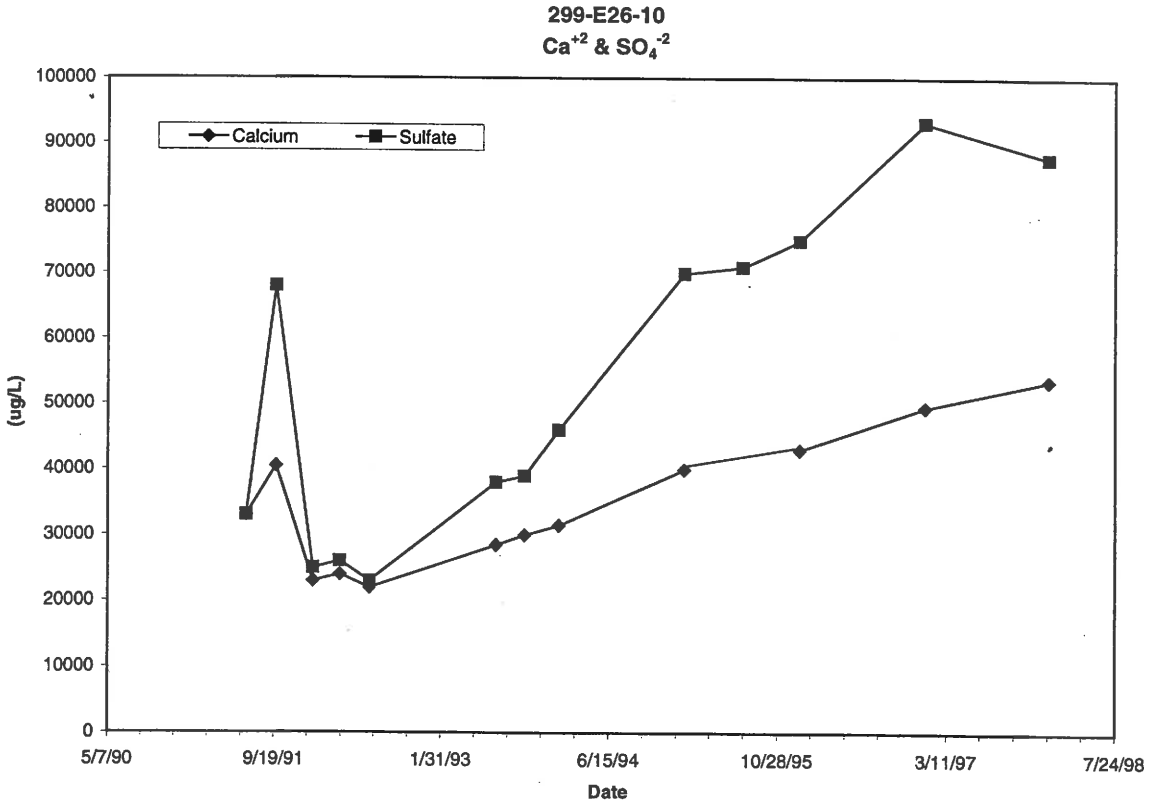

Figure 9. 299-E26-10 Calcium and Sulfate

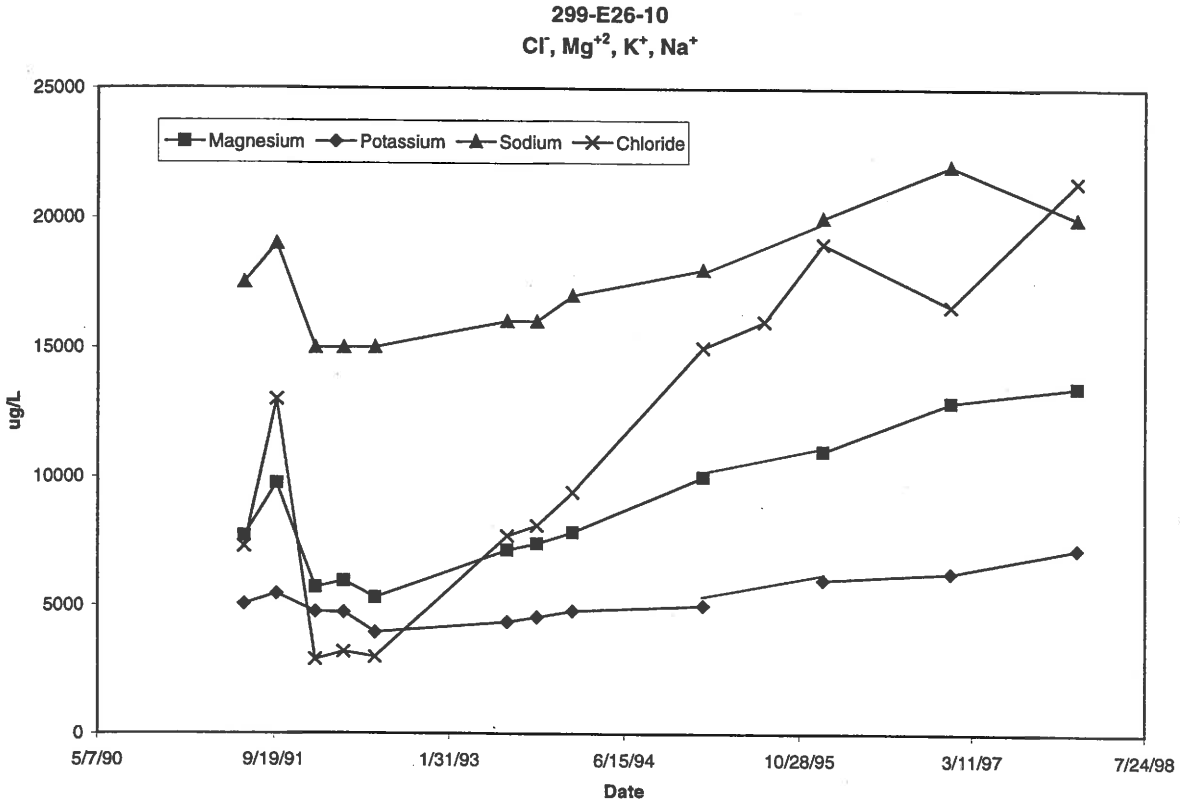

Figure 10. 299-E26-10 Chloride, Magnesium, Potassium, and Sodium

Appendix C

Notification of Specific Conductance Exceedance at the 200 East Area Liquid Effluent Retention Facility (LERF) (00-GWVZ-065, letter dated August 17, 2008)

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C1 Notification of Specific Conductance Exceedance at the 200 East Area Liquid Effluent Retention Facility (LERF)

This appendix provides a copy of the August 17, 2000, notification letter from the U.S. Department of Energy to the Washington State Department of Ecology (Ecology). The letter notified Ecology of specific conductance exceedance of the critical mean comparison value for the Liquid Effluent Retention Facility at downgradient well 299-E26-10. The letter states that "increase in specific conductance is not attributed to the detection of contamination from the facility, but to changes in groundwater conditions as a result of closure of the 216-B-3 Pond System." The letter fulfilled the reporting requirements of 40 CFR 265.93(d)(1)[1].

[1] 40 CFR 265.93, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," "Preparation, Evaluation, and Response," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol25/xml/CFR-2010-title40-vol25-sec265-93.xml.

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

AUG 1 7 2000

00-GWVZ-065

Ms. Jane Hedges
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336

RECORD COPY
PROJ. 28023
CAT. T 1.17
WORKING COPY

Dear Ms. Hedges:

NOTIFICATION OF SPECIFIC CONDUCTANCE EXCEEDANCE AT THE 200 EAST AREA LIQUID EFFLUENT RETENTION FACILITY (LERF)

The LERF is a Resource Conservation and Recovery Act (RCRA) unit in the 200 East Area that has been monitored under interim-status detection program (40 CFR 265.92). Specific conductance measurements in downgradient well 299-E26-10 exhibit increases and exceed the critical mean of 446.6 uS/cm. The calculated average of specific conductance values for June 2, 2000, at 299-E26-10 is 571 uS/cm.

The increase in specific conductance is not attributed to the detection of contamination from the facility, but to changes in groundwater conditions as a result of closure of the 216-B-3 Pond System (B Pond). The specific ionic indicators of the return to natural groundwater conditions are described in the March 1999 assessment report. Sampling is continuing to re-establish background. The specific conductance measurements for this quarter follow the established trend of increasing specific conductance since the cessation of discharges to B Pond. Verification sampling is therefore not considered to be necessary.

This letter is intended to fulfill the reporting requirement of 40 CFR 265.93(d)(1). No further action is planned at this time. If you want to discuss this matter further or require additional information, please contact M. J. Furman at (509) 373-9630.

Sincerely,

K. Michael Thompson, Acting Program Manager
Groundwater/Vadose Zone Program

GWVZ:MJF

cc: See page 2

cc: K. Conaway, Ecology
D. N. Goswami, Ecology
J. J. Wallace, Ecology
J. S. Fruchter, PNNL
M. D. Sweeney, PNNL
C. K. Girres, WMH
Administrative Record (LERF)