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JAN 25 1999

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Nuclear Waste Program
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Department of Ecology
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Mr. Douglas R. Sherwood
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Dear Messrs. Alexander and Sherwood:

QUARTERLY RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) GROUNDWATER MONITORING DATA FOR THE PERIOD APRIL 1, 1998, THROUGH JUNE 30, 1998

The RCRA groundwater chemistry and water level data for the period April 1, 1998, through June 30, 1998, have been verified and evaluated. The data are publicly available in electronic form in the Hanford Environmental Information System (HEIS) database. The electronic availability of the data and the summary provided below fulfill the reporting requirements of WAC 173-303 (and by reference 40 CFR 265.94). Verification of data included a completion check (requested analyses were received), quality control checks (field blanks, field duplicates, and blind samples), and project scientist evaluation.

Fifteen RCRA sites were sampled during the reporting quarter (Attachment 1). Sampled sites include eight monitored under indicator evaluation programs, six monitored under groundwater quality assessment programs, and one monitored under final-status corrective action.

Comparison to Concentration Limits

A problem was identified with some of the meters and probes used to measure specific conductance in the field. Subsequent testing showed that results from these meters tended to be biased low, although the differences were not consistent. The faulty meters were in use between October 1997 and July 1998. Specific conductance values obtained with these meters have been flagged as suspect in the HEIS database. The meters and probes were taken out of use. The flagged data should not be used to make regulatory decisions.

The indicator parameters other than specific conductance (pH, total organic halides [TOX], and total organic carbon [TOC]) from downgradient wells were compared to background values at sites monitored under interim-status, indicator evaluation requirements, as described in 40 CFR 265.93.

TOX continued to exceed the critical mean at one downgradient well at Single-Shell Tanks Waste Management Area (WMA) U. The groundwater in this area is affected by an encroaching plume of carbon tetrachloride from an upgradient source. A letter of notification was sent separately to Messrs. D. R. Sherwood and E. R. Skinnarland from Mr. K. M. Thompson "Exceedance of Critical Mean for Total Organic Halogen (TOX) at Waste Management Area (WMA)-U," dated August 25, 1998.

Contamination indicator parameters in downgradient wells were below the critical mean values for all other sites monitored under indicator evaluation requirements that were sampled during the quarter. Hence, there is no indication that these sites are impacting groundwater quality.

Status of Assessment Programs

Single-Shell Tanks WMA B-BX-BY: Uranium has dropped significantly in well 299-E33-13, northeast of the 241 BY Tank Farm, from a maximum of 203 µg/L to 56.9 ug/L in May 1998. Uranium has increased on the west side of the WMA. May and June 1998, uranium data for well 299-E33-42 indicate that uranium may be increasing on the west side of WMA B-BX-BY. Values of 4.23 and 6 µg/L were reported for May 1998 and June 1998 in well 299-E33-42, up from 2.67 µg/L in February 1998 (background is ~ 2.5 µg/L). These results are corroborated with appropriate increases in gross alpha activity. Meanwhile, uranium in well 299-E33-41 is remaining steady at about 26 µg/L.

Well 299-E33-7, located north of the BY cribs, was added to the assessment network in June 1998. Data from surveillance monitoring of this well show that between May 1995 and June 1998, technetium-99 increased from 740 pCi/L to 17,700 pCi/L and is still increasing (drinking water standard is 900 pCi/L). In addition, tritium has increased from 5040 pCi/L to 10,500 pCi/L over the same time period. Corresponding anions and cations are also high, e.g., nitrate is 289,910 µg/L (drinking water standard is 45,000 µg/L). Cobalt-60 was measured at 66 pCi/L while cyanide has risen from 55 µg/L in June 1996 to 347 µg/L in June 1998 (drinking water standard is 100 pCi/L for cobalt-60 and 200 µg/L for cyanide).

Two wells routinely monitored south of 299-E33-7 are also showing increases in technetium-99: 299-E33-5 and 299-E33-38, contained 3770 and 2720 pCi/L respectively. The wells also contain elevated cobalt-60 and cyanide. The highest concentrations were in well 299-E33-7 (66 pCi/L cobalt-60, 347 µg/L cyanide, compared to drinking water standards of 100 pCi/L and 200 µg/L). Technetium-99 remained relatively stable in wells on the west side of the WMA, e.g., ~1600-1700 pCi/L in well 299-E33-41.

Well 299-E33-7 in the north part of the cribs contained lower concentrations of uranium than did wells 299-E33-38 and -E33-5, which are near the south end of the cribs but north of the 241 BY tanks farms. Wells 299-E33-5 and -E33-38 had uranium values of 41 pCi/L and 56 pCi/L while 299-E33-7 had a value of 3.6 pCi/L.

A new monitoring well, 299-E33-44, has been completed and was sampled in September 1998. Analytical results are not yet available. No significant contamination was detected in the vadose zone during drilling.

Single-Shell Tanks WMA S-SX: Technetium-99 exceeded the drinking water standard of 900 pCi/L in one downgradient RCRA well (299-W22-46) and in one non-RCRA well (299-W23-1) located inside the S tank farm. The concentration in well 299-W22-46 on May 13, 1998, was 4330 pCi/L, compared to the maximum of 5020 pCi/L that occurred in May 1997. The concentration in well 299-W23-1 was 1170 pCi/L in May 1998, versus a maximum of 2890 pCi/L in January 1998. Technetium-99 concentrations in the latter well appear to be declining. There is also a continuing gradual upward trend in downgradient well 299-W22-45. The technetium-99 concentration in May 1998, was 427 pCi/L versus 311 pCi/L for the previous quarter.

The 45,000 µg/L drinking water standard for nitrate was exceeded in downgradient well 299-W22-46, the same well with the elevated technetium-99. The nitrate concentration for this well was 50,400 µg/L in August 1998, versus 48,200 µg/L in February 1998. The standard was also exceeded in non-RCRA well 299-W23-9 (87,300 µg/L in June 1998).

Tritium exceeded the 20,000-pCi/L drinking water standard in upgradient well 299-W23-14 (376,000 pCi/L) and in downgradient well 299-W22-46 (57,100 pCi/L) in May 1998. Concentrations in the downgradient well appear to be declining from the maximum of 65,200 pCi/L in May 1997, while the upgradient well continues to exhibit an upward trend. The latter is attributed to residual contamination from the past-practice 216-S-21 crib.

There were no detections of either strontium-90 or cesium-137 in any RCRA monitoring wells in the network. However, cesium-137 was detected in non-RCRA well 299-W23-7, located inside the S-SX tank farm fence line. A concentration of 48.7 pCi/L (unfiltered) was observed in June 1998. It was not detected (< 0.2 pCi/L) in a filtered sample collected at the same time, indicating this occurrence is particulate in nature. A high turbidity was also associated with this sample (139 NTU). In addition to cesium-137, the gross alpha activity (unfiltered) was 32.7 pCi/L, which is about 10 times higher than can be accounted for by local background. Additional characterization of the well is planned as part of the on-going assessment.

Single-Shell Tanks WMA T and WMA TX-TY: Water levels near these waste management areas continued to decline. Well 299-W10-16 is no longer sampleable because of insufficient water. Five new monitoring wells, two at WMA T and three at WMA TX-TY have been

completed to replace dry wells, and at least four will be sampled in November 1998. New well 299-W10-24, which is a replacement for well 299-W11-27 at the northeast corner of WMA T, has been drilled through the Ringold lower mud with discrete interval groundwater sampling prior to being completed as a water table monitoring well. A sixth well, at WMA TX-TY, will be completed during calendar year 1998 and will also be drilled through the Ringold lower mud prior to completion as a shallow monitoring well.

The 200-ZP-1 Pump-and-Treat Operation, located south of WMA TX-TY, is affecting water levels and flow directions in this portion of the 200 West Area, particularly at WMA TX-TY where flow directions have swung sharply toward the south. As a result the new well that was originally intended to be a replacement for 299-W10-17 on the north side of the WMA has been relocated to a position along the eastern boundary of WMA TX-TY. This relocation helps fill a gap in the monitoring network resulting from the change in flow direction.

Technetium-99 in WMA T downgradient well 299-W11-27 continued to decrease. Reanalysis of the February 1998 sample yielded a technetium-99 activity of 12,100 pCi/L, consistent with the reported gross beta activity of 2,940 pCi/L. Technetium-99 activity reported for May 1998 was 10,500 pCi/L. Specific conductance was 943 µS/cm, below the critical mean for the site (1,175 µS/cm). The May 1998 sample for radionuclide analysis was filtered because of high turbidity. Gross alpha activity in the filtered sample was less than 1 pCi/L, indicating that the previously reported high value (97.9 pCi/L in February 1998) was a result of radionuclides sorbed on particulates.

Technetium-99 activity in well 299-W11-23, a non-RCRA well located approximately 30 m east of 299-W11-27, rose to 4490 pCi/L in June 1998. This increase in technetium-99 was accompanied by increases in nitrate, chromium, and calcium, consistent with the contaminant fingerprint in well 299-W11-27.

Changes in downgradient wells in WMA TX-TY have not been consistent since the last sampling. Groundwater chemistry in downgradient well 299-W10-17 did not change significantly since the last sampling. The decreasing trend in contaminant concentrations in downgradient well 299-W14-12, evident since 1995, however, appears to have ended. Specific conductance in this well was 902 µS/cm in June 1998, above the critical mean for the site (668 µS/cm). However, technetium-99 increased to 2300 pCi/L, tritium to 237,000 pCi/L, and iodine-129 to 12.2 pCi/L. The increased activities in well 299-W14-12 may be related to high tritium and iodine-129 in nearby well 299-W14-2 in June 1998. Reported values indicated 3,210,000 pCi/L of tritium, 81.4 pCi/L of iodine-129, and 334 pCi/L of technetium-99. Reanalysis of the sample confirmed the tritium and technetium-99 values. Reanalysis for iodine-129 yielded a value of 35 pCi/L; however, replicate analyses had a high variability, making the actual activity somewhat uncertain. Interpretation is pending further evaluation.

216-U-12 Crib: Concentrations of contaminant indicators associated with the crib are gradually declining. Specific conductance in downgradient wells 699-36-70A and 299-W22-41 continued to exceed the critical mean of 437 μS/cm; and specific conductance in well 299-W22-42 dropped below the critical mean following an increase last quarter. Nitrate concentrations are slowly trending down in all the wells mentioned. Technetium-99 remained slightly elevated above background in 299-W22-41 and 699-36-70A, but was well below the drinking water standard of 900 pCi/L. Tritium, a regional contaminant (not a specific crib source), was elevated above drinking water standard (20,000 pCi/L) in wells 699-36-70A and 299-W22-42. Iodine-129 was not measured this quarter.

PUREX Cribs (216-A-10, 216-A-36B, and 216-A-37-1): The drinking water standards for iodine-129, manganese, nitrate, strontium-90, and tritium continued to be exceeded at PUREX cribs wells during the second quarter of 1998. Arsenic, gross beta, and conductivity also remain elevated at some PUREX cribs network wells.

- Iodine-129 remained elevated at all upgradient and downgradient wells, consistent with previous quarters. Activity was highest in well 299-E24-16 (14.5 pCi/L in April 1998) (drinking water standard = 1.0 pCi/L).

- Manganese concentrations in wells downgradient of the 216-A-37-1 crib have increased in late 1997 and 1998. During the second quarter the levels exceeded the drinking water standard (50 μg/L) at wells 299-E25-19 (50.4 μg/L) and 299-E25-17 (50.1 μg/L).

- Nitrate concentrations remained above the drinking water standard (45,000 μg/L) at wells downgradient of the 216-A-10 and 216-A-36B cribs. Concentrations are decreasing at the 216-A-10 and 216-A-37-1 cribs, but are increasing at the 216-A-36B crib. The highest concentration at the latter crib during the second quarter of 1998 was 178,400 μg/L at well 299-E17-9.

- Tritium activity remained above the drinking water standard (20,000 pCi/L) at most PUREX cribs wells during the second quarter of 1998. Like nitrate, tritium levels have been decreasing at the 216-A-10 and 216-A-37-1 cribs since 1995. However, at the 216-A-36B crib the activity level remained fairly consistent with previous quarters. The highest activity level during the second quarter of 1998 was 3,400,000 pCi/L at well 299-E17-9.

- Gross beta was elevated in wells 299-E17-14 (63.4 pCi/L) and 299-E24-16 (40.6 pCi/L), and at several other wells downgradient of 216-A-10 and 216-A-36B cribs. These results are consistent with the presence of strontium-90. Strontium-90 activity was highest at well 299-E17-14 with an activity of 16.2 pCi/L (drinking water standard = 8.0 pCi/L).

Other Monitoring Changes

Background values were re-established for the 216-S-10 Pond and Ditch using a single upgradient well instead of two. The other upgradient well had gone dry.

An upward trend in specific conductance continues in upgradient well 299-E34-7 at Low-Level Burial Grounds Waste Management Area 2. The increase is caused by calcium and sulfate, but the source of these constituents is not known.

Quality Control

Results of the RCRA quality control program for the April 1998 through June 1998 quarter will be discussed in the annual report for fiscal year 1998. Highlights are summarized in Attachment 2. Quality control data that are not available in HEIS are available in electronic form upon request. The quality control program indicated that the data were acceptable for use in the statistical comparisons discussed above.

The information contained in this letter is submitted to the State of Washington Department of Ecology in accordance with WAC 173-303-400 and WAC 173-303-645. If you want to discuss this matter further or require additional information, please contact me at 373-9630.

Sincerely,

M. J. Furman, Project Manager
Groundwater Project

GWP:MJF

Attachments: As stated

cc w/attachs:
M. J. Hartman, PNNL
S. Leja, Ecology
S. P. Luttrell, PNNL
R. M. Smith, PNNL

ATTACHMENT #1

Table 1. Status of RCRA Sites, April through June 1998.

Site	Sampled Apr-Jun 1998	Statistical exceedance
Indicator Evaluation Sites [40 CFR 265.93(b)] (sampled semiannually)		
100-D Ponds	No	Not applicable
1301-N Facility	No[1]	Not applicable
1325-N Facility	No	Not applicable
1324-N/NA Site	No[2]	Not applicable
B-Pond	No	Not applicable
A-29 Ditch	Yes	No
B-63 Trench	Yes	No
S-10 Pond and Crib	Yes	No
LERF	No	Not applicable
LLBG WMA 1	Yes	No
LLBG WMA 2	Yes	No[3]
LLBG WMA 3	No	Not applicable
LLBG WMA 4	No	Not applicable
SST WMA A-AX	Yes[4]	No
SST WMA C	Yes[4]	No
SST WMA U	Yes[4]	Yes[5]
NRDWL	No	Not applicable
Groundwater Quality Assessment Sites [40 CFR 265.93(d)] (sampled quarterly)		
Six sites[6]	Yes	Not required
Final Status Sites (WAC 173-303-645)		
300 Area Process Trenches	Yes	Yes[7]
183-H Basins	No	Not applicable

[1] Sampling of well 199-N-105A was postponed from the January-March quarter. No exceedance.
[2] Well 199-N-59 was sampled, but not for detection purposes.
[3] No downgradient exceedance. Upgradient well 299-E34-7 exceeded the critical mean for specific conductance, continuing a previous trend caused by upgradient sources.
[4] Monitored quarterly. WMA U did not have quadruplicate samples.
[5] TOX exceeded critical mean in one downgradient well; caused by carbon tetrachloride plume from upgradient sources. No assessment required.
[6] U-12 Crib, PUREX Cribs, SST WMA B-BX-BY, SST WMA S-SX, SST WMA T, SST WMA TX-TY.
[7] Site has entered corrective action because of previous exceedances.

ATTACHMENT #2

LERF = Liquid Effluent Retention Facility
LLBG = Low-Level Burial Grounds
NRDWL = Nonradioactive Dangerous Waste Landfill
SST = Single-Shell Tanks
WMA = Waste Management Area

Attachment: Quality Control Results, April through June 1998.

Completeness: Completeness of data is determined by dividing the number of results that have not been rejected or flagged as suspect because of associated QC concerns by the total number of results received during the quarter. Greater than 90% completeness is considered acceptable. Out of a total of 19,749 results, 87% of the results were considered valid for the April through June 1998 quarter. This percentage is slightly lower than usual due to a large number of missed hold times for organic analyses. The analytical laboratory has hired several new staff members and serviced their instruments to ensure organic analyses are conducted within holding times in the future. The suspect data may be useful for general interpretive use but should not be used to make regulatory decisions.

Field QC data. 733 pairs of results were generated from 20 duplicate samples during the quarter. Nine pairs of quantifiable duplicate results had a relative percent difference greater than ±20%. The flagged sets were for carbon tetrachloride, chloroform, chromium, gross beta, iodine-129, and uranium. Re-analysis requests were submitted to the laboratory for the carbon tetrachloride, iodine-129, and uranium samples. The groundwater monitoring project will continue to monitor the precision of chromium analyses performed by the graphite furnace atomic absorption method. This method is not normally requested for chromium analyses by the groundwater project.

1527 field blanks results were produced from the second quarter of 1998 field blank samples. 76 of those results were outside of the QC limits for field blanks (i.e., about 5%). The majority of flagged results were for ICP metals and volatile organics; however results were also flagged for total dissolved solids (TDS), anions, total organic carbon (TOC), gross alpha, gross beta, and uranium. The two areas of greatest concern, volatile organics and metals, are briefly discussed below.

Several volatile organic compounds that were detected in field-transfer and full trip blanks exceeded the QC limits by a factor of 5 or more; this problem will be discussed with the laboratory. However, it should be noted that all of the high field-transfer blank results except for xylenes were found in two samples collected on April 21. These samples might have been contaminated in the field during the sampling process. Another possible explanation is that the laboratory experienced a contamination problem on the day the transfer blanks were analyzed. Volatile organic results for well samples associated with the April 21 blanks should be evaluated with caution.

Although 29 field blanks exceeded the QC limits for metals, most of the exceedances were within a factor of 2 of the QC limits. In addition, the relative number of exceedances (29 out of 405 results) was approximately half of what was observed for the first quarter of 1998 (i.e., 51 out of 360 results). Part of this reduction appears to be the result of having the laboratory analyze an additional method blank during the analysis of groundwater samples. The majority of the field blank results that exceeded the QC limits were for calcium, magnesium, and sodium. These elements are common mineral contaminants; it is suspected that the laboratory's reported instrument detection limit is too low for these metals.

Blind samples. Blind samples were prepared and submitted to the laboratory in May. Well matrix samples were spiked with known concentrations of cyanide, chromium, nitrate, fluoride, Co-60, Cs-137, Sr-90, Tc-99, Pu-239, U-238, and tritium. In addition, organic free, deionized water was spiked with known amounts of carbon tetrachloride, chloroform, trichloroethene for VOC samples and one set of TOX samples. A second set of TOX samples was spiked with 2,4,6-trichlorophenol, the compound used to calibrate the TOX analyzer. Samples for gross alpha analysis were spiked with Pu-239, and samples for gross beta analysis were spiked with Sr-90. Four samples containing potassium hydrogen phthalate were also sent to the lab for TOC analysis.

The acceptance limits for blind sample recoveries are 80 – 120%. Results were out of limits for one Pu-239 and one TOX-phenol sample and for all gross beta, fluoride, cyanide, chloroform, and TOC samples. The laboratory has been asked to reanalyze the radiological samples that were out of limits. The gross beta, fluoride, and TOC results have been biased high several times in the past year. Similarly, the cyanide results continue to be biased low. Beginning next quarter, the results of in-house verification analyses will be available for comparison with the TOC and TOX blind results. This should help diagnose the problems with these methods. Additional on-site verification analyses are also planned for the cyanide, fluoride, chloroform, carbon tetrachloride, trichloroethene, and gross beta standards beginning in the 4th quarter of 1998. Data rechecks have been requested for the out-of-limit chloroform results, and the groundwater project will discuss the TOC results of the last 2 quarters with the laboratory. The out-of-limit fluoride results may be the result of fluoride in the matrix water; this will be investigated by analyzing the matrix water next quarter.

EPA Water Supply/Water Pollution Programs. The primary analytical laboratory participates in the EPA Water Supply/Water Pollution (WS/WP) programs. In these programs, the EPA distributes standard water samples as blind samples to participating laboratories. These samples contain specific organic and inorganic analytes at concentrations unknown to the participating laboratories. After analysis, the labs submit their results to the EPA. Regression equations are used to determine acceptance and warning limits. The results of these studies independently verify the level of laboratory performance and are expressed as a percentage of EPA-acceptable results. Results from the EPA WP/WS studies were received for WP samples analyzed in May 1998. Most of the results, including those for ICP metals, TOC, volatile organics, pesticides, and PCBs were within the EPA's acceptance limits. Four of the 76 reported results were unacceptable. These latter results were for total hardness, nitrate-nitrogen, orthophosphate, and oil and grease by freon extraction. After reviewing their data, the laboratory was unable to explain any of the unacceptable results. However, a calculation error was found that accounts for and corrects the out-of-limit orthophosphate results of the previous 2 WP studies. In the current WP study the bias may be a limitation of the analytical method at such a low concentration. The groundwater project only rarely requests analyses for total hardness and oil and grease.

National Exposure Research Laboratory Performance Evaluation Studies. The National Exposure Research Laboratory (formerly known as the Environmental Monitoring and Systems Laboratory) sends out gamma, iodine-131, gross alpha, gross beta, tritium, radium, strontium, and uranium samples in a water matrix on a semi-annual basis to participating laboratories. Plutonium samples are sent out on an annual basis. Warning limits for laboratory results are at 2

normalized standard deviations above and below the known value. Control limits are at 3 normalized standard deviations above and below the known value.

The results from 2 NERL PE studies were reported since the last quarterly QC summary was written. These studies were for gamma in water (June 5, 1998) and uranium-radium in water (June 12, 1998). In the first study, the laboratory performed analyses for cobalt-60, zinc-65, cesium-134, cesium-137, and barium-133. In the second study, analyses were performed for natural uranium, radium-226, and radium-228. All of the results were within the limits established by the EPA.

Mixed Analyte Performance Evaluation Program. The Mixed Analyte Performance Evaluation Program is conducted by the Department of Energy. In this program, samples containing metals, volatile and semivolatile organic compounds, and radionuclides are sent to participating laboratories in January and July. No new results were available this quarter. The next study involving aqueous-samples will be conducted in January, 1999.

Department of Energy Quality Assessment Program. This program is conducted by the Environmental Measurements Laboratory and is designed to evaluate the performance of participating laboratories through the analysis of air filter, soil, vegetation, and water samples containing radionuclides. No new results for this program have been reported since the last quarterly QC summary.