0049472

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

060927

JUL 30 1998

Mr. Steve M. Alexander
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336-6018

Mr. Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352-0539

Dear Messrs. Alexander and Sherwood:

QUARTERLY RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) GROUNDWATER MONITORING DATA FOR THE PERIOD JANUARY 1, 1998, THROUGH MARCH 31, 1998

References: (1) M. J. Hartman, 1992, Results of Ground Water Quality Assessment Monitoring at the 1301-N Liquid Waste Disposal Facility and 1324-N/NA Facilities, WHC-SD-EN-EV-003, Rev. 1, Westinghouse Hanford Company, Richland, Washington..

(2) E:Mail to Marvin J. Furman and Donna M. Wanek from Phillip R. Staats, "Ground water monitoring plan," dtd. June 22, 1998.

The RCRA groundwater chemistry and water level data for the period January 1, 1998, through March 31, 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.

Eighteen RCRA sites were sampled during the reporting quarter (Attachment 1). Sampled sites include 12 monitored under indicator evaluation programs and 6 monitored under groundwater quality assessment programs.

Comparison to Concentration Limits

Contamination indicator parameter data (pH, specific conductance, total organic halogen [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.

Specific conductance at downgradient wells monitored for the 1324-N/NA site exceeded the critical mean. The current exceedances were expected, because the data are in trend with previous conductivity measurements. Previous groundwater quality assessment monitoring indicated that the high conductivity is caused by the nonhazardous constituents sulfate and sodium (Reference 1). Because an assessment has already been completed and the high conductivity is caused by nonhazardous constituents, verification sampling and additional assessment monitoring will not be conducted.

Groundwater in one downgradient well for 1324-N/NA exceeded the critical mean for TOC in a previous quarter. The result was confirmed during the January through March 1998 quarter and an assessment plan was submitted to the State of Washington Department of Ecology (Ecology). However, Ecology subsequently agreed that the contamination is from another source so that assessment monitoring is not required. This agreement was sent via E:Mail (Reference 2) with the stipulation that a formal letter would follow, no letter has been received to date.

At the Liquid Effluent Retention Facility, the average of quadruplicate TOX measurements from the upgradient well slightly exceeded the critical mean value. The data were highly variable and are being evaluated for potential problems. The well will be resampled.

TOX exceeded the critical mean at one downgradient well at Single-Shell Tanks (SSTs) Waste Management Area (WMA) U. The data are in line with historic trends. The groundwater in this area is affected by an encroaching plume of carbon tetrachloride from an upgradient source. A letter of notification is being sent separately.

A downgradient well monitored for the 216-A-29 Ditch exceeded the critical mean for TOC in samples collected during the fourth quarter of 1997. The reported values were not in line with historical trends. The well was resampled in April 1998 and the results were far below the critical mean value, indicating that the exceeding values were in error.

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

SSTs WMA B-BX-BY: Specific conductance is gradually increasing in well 299-E33-41, with the March 1998 value at 362 μS/cm. Specific conductance increased sharply in wells 299-E33-31and 299-E33-42 (to 424 and 418 μS/cm, respectively). The observed changes are primarily a result of increases in nitrate, along with some increase in sulfate, chloride, calcium, and magnesium. In February 1998, nitrate exceeded the 10-mg/L drinking water standard in wells on the west, north, and northeast side of the WMA. The highest concentrations of technetium-99 were observed north of the WMA in well 299-E33-5 (3010 pCi/L). This well is located adjacent to one of the BY Cribs, which received tank waste containing technetium-99. Technetium-99 concentrations are also rising in well 299-E33-41, east of the BX tank farm (2720 pCi/L in March 1998). A phase 2 assessment plan is being prepared and is scheduled for submittal to Ecology in October 1998.

SSTs WMA S-SX: The drinking water standard for nitrate was exceeded in one downgradient RCRA well (299-W22-46) and one non-RCRA well (299-W23-1) during the quarter. The concentration in samples collected in February 1998 at well 299-W22-46 was 10.7 mg/L (as N). The maximum nitrate concentration in samples collected in January 1998 from non-RCRA well 299-W23-1, located inside the S tank farm, was 11.3 mg/L (as N).

Technetium-99 exceeded the 900-pCi/L drinking water standard in well 299-W22-46 (4110 pCi/L), which was less than the maximum concentration (5010 pCi/L in May 1997). Technetium-99 also exceeded the drinking water standard in non-RCRA well 299-W23-1 (2890 pCi/L). Technetium-99 in downgradient RCRA well 299-W22-45 has been increasing gradually since about November 1996. The current concentration is 311 pCi/L.

Tritium concentrations exceeded drinking water standards in one upgradient well and two downgradient RCRA wells. The highest concentration (331,000 pCi/L) occurred in an upgradient RCRA well (299-W23-14) located on the west side of the SX tank farm. Tritium continues to increase in wells 299-W23-14 (upgradient RCRA well), 299-W22-39 and 299-W22-45. The elevated tritium concentrations are attributed to residual contamination from upgradient, past-practice sources.

Chromium appears to be declining gradually in well 299-W22-46, the same downgradient well with technetium-99 and nitrate exceedances. The concentration for the current quarter was 25 μg/L as compared to the maximum of 39 μg/L that occurred in May 1997. Technetium-99, nitrate and chromium are mobile co-contaminants in tank waste and their occurrence in this well has been attributed to a source within the WMA.

A strontium-90 result of 2.8 +- 0.7 pCi/L was reported for upgradient well 299-W23-13 in February 1998. Previous results for this well have all been non-detects (<0.1 pCi/L). If the result is not a computational or transcript error, archival samples will be reanalyzed (previous strontium-90 results for samples from the RCRA monitoring network at S-SX WMA are all non-detects).

An anomalous technetium-99 result for samples collected from non-RCRA well 299-W23-1 in January 1998 was most likely caused by the well type and sampling method used. A value of 513 pCi/L was reported for the sample collected with a bailer (no purging), while the result for a pumped sample collected immediately afterward yielded 2890 pCi/L. Indicator parameters suggested stagnant conditions might have existed in the well bore (an old well with perforated casing in the saturated zone). Dedicated sampling pumps have been acquired for all future sampling events.

A phase 2 assessment plan is being prepared and is scheduled for submittal to Ecology in October 1998.

SSTs WMA T and WMA TX-TY: Water levels near these WMAs continue to decline. Downgradient well 299-W11-27 (WMA T), upgradient well 299-W15-22 and downgradient well 299-W10-18 (WMA TX-TY) were sampled with a bailer or a Kabis sampler. The 200-ZP-1 Pump-and-Treat Operation is affecting water levels and flow directions in this portion of the 200 West Area, particularly in WMA TX-TY. Well 299-W15-22, formerly upgradient of the WMA, now appears to be downgradient or cross-gradient.

Technetium-99 in WMA T downgradient well 299-W11-27 continued to decrease, based on reported gross beta activities; however, the reported value for technetium-99 was less than the gross beta value. The laboratory has been requested to reanalyze the sample for technetium-99. Specific conductance decreased to 1006 μS/cm in February 1998, below the critical mean for the site (1,175 μS/cm). The reported gross alpha value was 97.9 pCi/L, consistent with the value reported for November 1997.

Reported technetium-99 activity in well 299-W11-23, a non-RCRA well located approximately 30 m east of 299-W11-27, rose to 1940 pCi/L in February 1998. This increase in technetium-99 was accompanied by an increase in nitrate, chromium, and calcium, possibly indicating that the contaminant plume detected in well 299-W11-27 has reached well 299-W11-23. Preliminary, unvalidated results for the May 1998 sampling indicate that this upward trend is continuing.

Available data for WMA-TX-TY downgradient well 299-W10-17 indicated no significant changes in chemistry or radionuclide concentrations since the last sampling. The decreasing trend in contaminant concentrations in downgradient well 299-W14-12, evident since 1995, appears to have leveled off. Specific conductance in this well was 641 μS/cm in November 1997, below the critical mean for the site (668 μS/cm). The February 1998 sampling of 299-W15-22 indicated significant increases in technetium-99 (2680 pCi/L), gross beta (792 pCi/L), and gross alpha (157 pCi/L). As discussed above, this well is no longer upgradient of the WMA, and it is unknown whether the increases in contaminants are caused by the tanks or other nearby facilities.

A phase 2 assessment plan is being prepared and is scheduled for submittal to Ecology in October 1998.

216-U-12 Crib: Concentrations of contaminant indicators associated with the crib are gradually declining. All the constituents reported for downgradient well 299-W22-42 increased slightly this quarter (departing from the overall gradual decline at the site). This type of sporadic increase has occurred before and is suspected to be related to residual drainage from the vadose zone, which may also be complicated by the low water level in the well.

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 rebounded above the critical mean following a sharp decline 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 and increased again in well 299-W22-42 (consistent with nitrate and conductivity trends for the wells). Tritium and iodine-129, two regional contaminants (not a crib source), were elevated above drinking water standards in wells 699-36-70A and 299-W22-42 and are declining consistently in all the wells.

Other Monitoring Changes

At SSTs WMA C, technetium-99 increased in downgradient well 299-E27-13 from 155 pCi/L to 487 pCi/L. There are corresponding increases in gross beta and nitrate. All of the values are below drinking water standards.

Specific conductance continued to increase in a downgradient well at the Liquid Effluent Retention Facility, with an average of 479 μS/cm, just below the critical mean of 489.4 μS/cm. Sulfate, calcium, chloride, magnesium, and nitrate are all increasing in this well. Tritium, which is present in the effluent discharged to this facility, is not elevated, indicating that the increase in specific conductance is caused by a contaminant plume from other 200 Area facilities.

Nitrate and sulfate concentrations are declining in some of the wells at Low-Level Burial Grounds WMA 4, possibly because of changes in flow directions caused by nearby pump-and-treat activities. Wells 299-W15-19, -20, -23, and –24 went dry during the January through March 1998 quarter because of the widespread water-table decline in the 200 Areas.

Quality Control

Results of the RCRA Quality Control program for the January through March 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 Ecology in accordance with WAC 173-303-400 and WAC 173-303-645. If you have questions about this quarterly data transmittal, 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

Table 1. Status of RCRA Sites, January through March 1998.

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

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

[1] TOC exceedance was the result of contamination from another facility. Ecology has agreed that no additional assessment is required. Specific conductance exceedance was caused by non-hazardous constituents.
[2] TOX in upgradient well exceeded critical mean. Data highly variable and under review. Well will be resampled.
[3] TOX exceeded critical mean in one downgradient well; caused by encroaching carbon tetrachloride plume from upgradient sources. No assessment required.
[4] U-12 Crib, PUREX Cribs, SST WMA B-BX-BY, SST WMA S-SX, SST WMA T, SST WMA TX-TY.

Attachment: Quality Control Results, January through March 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. 93% of the results were considered valid for the January through March 1998 quarter. The suspect data may be useful for general interpretive use but should not be used to make regulatory decisions.

Field QC data. 732 duplicate pairs were analyzed by the laboratory. Five sets of quantifiable duplicate results had a relative percent difference greater than ±20%. The flagged sets were for nitrogen in ammonium, manganese, vanadium, and gross beta. With one exception, the out-of-range results had relative percent differences of 22 to 39%. Gross beta had a relative percent difference of 107%. The groundwater project has requested that the laboratory reanalyze the samples.

1425 field blanks results were produced from the first quarter of 1998 field blank samples. Ninety-four of those results were outside of the QC limits for field blanks (i.e., about 7%). The majority of flagged results were for ICP metals; however results were also flagged for total dissolved solids (TDS), anions, volatile organics, phenols, total organic halides (TOX), and total organic carbon (TOC). The potential impacts on the data are minimal. Corrective actions that the lab is taking for ICP metals are described below. The above normal amount of volatile organic results out of limits is also of concern. The laboratory will be alerted that eight methylene chloride blanks had results well above the drinking water standard and that a number of chloroform results also required flagging. The results for most other constituents were below 1/3 the drinking water standard.

Several quarters ago, it was noted that a high percentage of ICP metal blank results were outside of the QC evaluation criteria. This trend has continued for over a year. Recent changes at the laboratory may help to correct this problem. In May, the laboratory was asked to add an additional method blank to their procedure. This blank would be used to eliminate any potential carryover from the interference check solution, which contains 500 ppm of aluminum, calcium, iron, and magnesium. Samples collected during the first Quarter of 1998 have not been affected by the procedure change. Not enough data have been returned since the change was implemented to determine if the change has had an effect.

Blind samples. Blind samples were forwarded to the laboratory in March. Well matrix samples were spiked with known concentrations of cyanide, chromium, nitrate, fluoride, carbon tetrachloride, chloroform, trichloroethylene, Co-60, Cs-137, Sr-90, Tc-99, Pu-239, U-238, and tritium. Samples for gross alpha analysis were spiked with Pu-239. Samples for gross beta analysis were spiked with Sr-90. A set of samples spiked with 2,4,6-trichlorophenol was forwarded for analysis of TOX. Another set of samples was spiked with the VOC mixture (carbon tetrachloride, chloroform, and trichloroethylene) for TOX analysis. Samples for TOC analysis were also sent to the labs. Those samples were spiked with potassium phthalate.

Results were out of limits for one Pu-239 sample, two gross alpha samples, all gross beta samples, two fluoride samples, all cyanide samples, one carbon tetrachloride sample, and all TOC and TOX samples (both types of TOX samples). The laboratory will reanalyze the radiological samples that were out of limits. Gross beta results have been out of limits several times in the past year. Cyanide blind results have been consistently out of limits for the last year.

The groundwater project is currently investigating this situation. When the next set of blinds is prepared in July, a verification analysis of the cyanide blind samples will be conducted in-house. Verification analyses will also be conducted for the TOC and anion samples. In October, verification sampling for the two types of TOX samples will also be added. The fluoride results were outside of the QC limits, but still reasonable considering fluoride levels present in the matrix water the last time the matrix water was analyzed. A preliminary recheck of the TOC and TOX results was conducted but the laboratory did not find any errors. Once the groundwater project has implemented verification of the TOC and TOX blinds, it may be easier to determine what the problems are with the TOX and TOC analyses. The carbon tetrachloride result that was out of limits was from a sample that was diluted by a factor of 50 because of high concentrations of methylene chloride in the sample. The presence of the methylene chloride was unexpected. The groundwater project is still trying to determine where it may have come from. Considering the large dilution, the actual carbon tetrachloride result was reasonable.

The primary analytical laboratory participates in the USEPA Water Supply/Water Pollution (WS/WP) 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, results are submitted to the EPA and 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 WS samples analyzed in March and WP samples analyzed in May of 1998. The percentage of EPA-acceptable results was high for both sets of data, indicating acceptable performance overall for the samples analyzed. Results were unacceptable once each for vinyl chloride, 1,1-dichloroethylene, dichloromethane, pH, orthophosphate, nitrate-nitrogen, total hardness, and oil and grease. The groundwater project does not request analysis for total hardness, oil and grease, and pH from the primary laboratory. Orthophosphate has been out of limits on the last four WP study results. No problems with the other constituents were evident on the previous WP or WS studies except for 1,1-dichloroethylene, which was out of limits for the second WS study in a row. The volatile organics were analyzed by a method not currently used for the groundwater project samples. Corrective actions received from the laboratory indicate that the laboratory was unable to determine the cause of the problem with the orthophosphate, nitrate nitrogen, vinyl chloride, 1,1-dichloroethylene, and pH results. The laboratory will monitor future results of performance evaluation samples. The dichloromethane result was high possibly because of contamination. The laboratory will monitor method blanks more carefully in the future. The failure on the oil and grease sample may have been due to an incorrect dilution. Future training will emphasize proper dilution of performance evaluation ampules. The problem with the total hardness sample may have been due to a buffer nearing its expiration date. Other results will be monitored to determine if the expiration date should be shortened.

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 laboratories participating in the intercomparison program. Plutonium samples are sent out annually. Control limits are at three normalized standard deviations above and below the known value. All of the results for the January through March quarter were within control limits.

Mixed Analyte Performance Evaluation Program – This program is conducted by the Department of Energy. Inorganic, volatile organic, semivolatile organic, pesticide, PCB, and radionuclide samples were sent to participating laboratories in January. The laboratory analyzed samples for Am-241, Cs-137, Co-57, Co-60, Mn-54, Pu-238, Pu-239/240, Sr-90, U-234/233, U-235, U-238, and Zn-65. All results were within the acceptable range.