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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 JULY 1, 1997, THROUGH SEPTEMBER 30, 1997

- References: (1) RL ltr. to Steve M. Alexander, Ecology, and Douglas R. Sherwood, EPA, from M. J. Furman, "Quarterly Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Data for the Period April 1, 1997, through June 30, 1997," dtd. November 12, 1997 (CCN 053279).
- (2) 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.
- (3) Lindberg, 1997, Combination RCRA Groundwater Monitoring Plan for the 216-A-10, 216-A-36B, and 216-A-37-1 Cribs, PNNL-11523, Pacific Northwest National Laboratory, Richland, Washington.

The RCRA groundwater chemistry and water level data for the period July 1, 1997, through September 30, 1997, have been verified and evaluated. The data are publicly available in electronic form in the Hanford Environmental Information System 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.

Nineteen RCRA sites were sampled during the reporting quarter (Attachment 1). Sampled sites include 11 monitored under indicator evaluation programs, 7 monitored under groundwater quality assessment programs, and 1 monitored under a final status compliance program.

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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. Exceedances had been observed during the first and second quarter of 1997 at the 1324-N/NA site, 216-S-10 Pond and Ditch, Low-Level (LL) Waste Management Area (WMA)-4, Single-Shell Tank (SST) WMA's A-AX and WMA U. Except for the exceedance at 1324-N/NA these values were outside of historical trends. Third quarter data were below the critical mean values for WMA A-AX and WMA U. The exceeding well at LLWMA-4 has gone dry and cannot be sampled. The 216-S-10 network was sampled during the fourth quarter of 1997 and results have not yet been received.

Status of Detection Monitoring

1324-N/NA: TOC exceeded its critical mean in one downgradient well at the 1324-N/NA site in August 1997. The critical mean had also been exceeded in March 1997, but verification sampling was postponed because of laboratory quality control issues, discussed in Attachment 2. The new data suggest that TOC may be increasing in this well, and verification sampling has been scheduled. Two samples will be collected and sent to separate laboratories for analysis. If the exceedances are confirmed, the State of Washington Department of Ecology (Ecology) will be notified and an assessment plan will be prepared.

Specific conductance at downgradient wells monitored for the 1324-N/NA site also exceeded the critical mean. In 1996, this site reverted to indicator evaluation monitoring after being monitored under assessment for elevated conductivity and TOX. The current exceedances were expected, because the data are in trend with previous conductivity measurements. Groundwater quality assessment monitoring at the 1324-N/NA site indicated that the high conductivity is caused by the nonhazardous constituents sulfate and sodium (Reference 2). 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.

1325-N: The critical mean for TOC was exceeded in one downgradient well at the 1325-N facility in August 1997. This result was much higher than previous trends. Verification sampling has been requested.

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

183-H: Two RCRA sites at Hanford, the 183-H Solar Evaporation Basins are monitored under final-status programs (WAC 173-303-645). The 183-H Basins were not scheduled for sampling this quarter. A revised Post-Closure Plan and a Corrective Action Groundwater Monitoring Plan have been completed for incorporation into the next modification of the Hanford Site RCRA Permit, scheduled for early 1998. Corrective action is deferred to the 100-HR-1 and 100-HR-3 Operable Units, under the Comprehensive Environmental Response, Compensation, and Liability Act.

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300 Area Process Trenches: The 300 Area Process Trenches are monitored under final- status (WAC 173-303-645) and have exceeded final-status concentration limits for 1,2-cis-dichloroethylene and trichloroethylene in two downgradient wells, and for uranium in three downgradient wells. Similar exceedances have been reported previously, and a modified Closure/Post-Closure Plan and Corrective Action Groundwater Monitoring Plan have been submitted to Ecology. The changes in monitoring will be implemented on the effective date of a modification to the Hanford Site RCRA Permit (currently scheduled for December 1998), or earlier, if approved by Ecology.

Status of Assessment Monitoring

SST's WMA B-BX-BY: A draft phase I assessment report was submitted to the U.S. Department of Energy (DOE) for review in December 1997 with the conclusion that the WMA has affected groundwater quality. Phase II of the assessment program began with samples collected during the fourth quarter of 1997.

Conductivity and technetium-99 fluctuated widely and rapidly in downgradient well 299-E33-41 during 1997. Conductivity was measured twice in this well during the July 1997 through September 1997 quarter. It was 542 $\mu\text{S}/\text{cm}$ in early August 1997 and dropped to 316 $\mu\text{S}/\text{cm}$ three weeks later. Technetium-99 varied from 12,000 pCi/L to 1,490 pCi/L during the same period.

Technetium-99 has been increasing in downgradient wells on the northwest side of the WMA since the last half of 1996. Samples from well 299-E33-42 have the greatest activity, reaching 751 pCi/L in August 1997.

SST's WMA S-SX: A draft phase I assessment report was submitted to DOE for review; the report concludes that the WMA has affected groundwater quality. Following incorporation of comments, the final report will be issued in January 1998. A phase II assessment plan will be prepared in collaboration with Ecology and vadose program staff. Until the plan is released, quarterly sampling is continuing and dedicated sampling pumps will be installed in older monitoring wells inside the tank farm fence line. The older wells (299-W23-3, 299-W23-7 and 299-W23-6) will provide better downgradient coverage east and southeast of the WMA. Progress has been slow due to constraints on working inside the tank farm. Portable systems are being used until permanent pumps can be installed.

Water levels continued to decline, but at a slower rate than observed at other 200 West sites. Deepening or replacing wells because of declining water levels at this WMA can be deferred until 1999 or 2000.

The following contaminants exceeded Maximum Contaminant Levels (MCL) or interim Drinking Water Standards (DWS) in the RCRA-compliant monitoring wells:

- (a) A gross alpha activity of 202 pCi/L was reported for well 299-W23-45. Based on gross alpha for surrounding wells and previous results for this well, the result is suspect. Other co-contaminants associated with tank waste (technetium-99 and nitrate) were not elevated. Reanalysis of the archived sample will be requested for confirmation.

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- (b) Nitrate (as N) remained slightly above the MCL (11.2 ppm vs the 10 ppm standard) in well 299-W22-46, located at the southeast corner of the SX tank farm. Nitrate is following the same increasing trend as technetium-99 in this well.
- (c) The reported concentration for technetium-99 for well 299-W22-46 (sampled on August 7, 1997) declined to 4,010 pCi/L from the maximum of 5,020 pCi/L observed in May 1997. Technetium-99 in this well is believed to be related to the same source that caused the 1993 technetium-99 transient in well 299-W23-15. Technetium-99 also exceeded the 900-pCi/L interim DWS in a non-RCRA well (299-W23-1) located inside the S tank farm. Duplicate results for this well, sampled on August 28, 1997, were 1,150 and 1,490 pCi/L.
- (d) Tritium continued to be elevated in one upgradient and two downgradient wells. The well with the highest concentration (202,000 pCi/L on August 7, 1997) is an upgradient well, so the tritium in downgradient wells (maximum of 64,700 pCi/L in well 299-W22-46) is attributed to an upgradient source.

SST's WMA T and WMA TX-TY: A draft phase I assessment report was submitted to DOE for review; the report concludes that WMA TX-TY has affected groundwater quality. Water levels in WMA T downgradient well 299-W10-15 dropped too low for sampling during the July 1997 through September 1997 quarter. Technetium-99 in downgradient well 299-W11-27 continued to decrease, dropping to 16,000 pCi/L; however, specific conductance rose slightly to 1126 μ S/cm. This value for specific conductance was below the critical mean for the site (1,175 μ S/cm).

Available data for WMA-TX-TY downgradient well 299-W10-17 indicate 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 846 μ S/cm in August 1997, above the critical mean for the site (668 μ S/cm).

The following constituents exceeded MCL or interim DWS during the July 1997 through September 1997 quarter:

- Technetium-99 was reported at 16,000 pCi/L in well 299-W11-27 (interim DWS = 900 pCi/L).
- Tritium exceeded the 20,000-pCi/L interim DWS in five wells, including the upgradient well for WMA T. The highest value was 53,800 pCi/L in well 299-W14-12.
- Iodine-129 was reported at 5.74 pCi/L in well 299-W14-12 (interim DWS = 1 pCi/L).
- Nitrate (as N) exceeded the 10 mg/L MCL in seven wells, including the upgradient wells for WMA T and WMA TX-TY. The highest value was 53 mg/L in well 299-W10-16.

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216-U-12 Crib: Specific conductance in wells 699-36-70A and 299-W22-41 continued to exceed the critical mean of 437 $\mu\text{S}/\text{cm}$ and specific conductance in well 299-W22-42 was back above the critical mean after dropping below it last quarter. Technetium-99 activities remained slightly elevated above background in wells 299-W22-41, 299-W22-42, and 699-36-70A (consistent with previous downgradient well data).

The following constituents exceeded MCL or interim DWS during the July 1997 through August 1997 quarter:

Results for nitrate (as N) (MCL = 10 mg/L), the principal constituent causing elevated conductivity at the crib, were 25, 60, and 33 mg/L, respectively, for the wells with elevated specific conductance. Nitrate concentrations are trending down in all the wells mentioned.

- (a) Iodine-129 continued to be elevated above the 1-pCi/L interim DWS in wells 699-36-70A (16.20), and 299-W22-42 (7.54).
- (b) Tritium remained elevated above the 20,000-pCi/L interim DWS and is increasing slightly in well 699-36-70A (130,000 pCi/L), and in well 299-W22-42 (54,500 pCi/L).
- (c) Carbon Tetrachloride remained elevated above the 5- $\mu\text{g}/\text{L}$ -MCL in well 699-36-70A.

Other Monitoring Changes

Three disposal cribs for the Plutonium Uranium Extraction facility (216-A-10, 216-A-36B, and 216-A-37-1) are now monitored as a single WMA under an assessment program. Before July 1, 1997, 216-A-10 and 216-A-36B were monitored under separate indicator evaluation programs. The 216-A-37-1 crib was not monitored for RCRA. There is evidence that all three of these cribs have affected groundwater quality, so an assessment program is warranted (Reference 3).

B-Pond, previously monitored under an assessment program, returned to indicator evaluation monitoring as of October 1, 1997. Critical mean values of indicator parameters were re-established after the July 1997 through September 1997 quarter.

TOC concentrations are increasing in upgradient wells for the 1301-N facility and 100-D Ponds. Critical mean values may need to be recalculated if the upward trends continue.

The critical mean value for TOX has been recalculated for the 216-S-10 facility, using the most recent four quarters of data from the two upgradient wells. The new values will be applied when data from the October 1997-December 1997 sampling are received.

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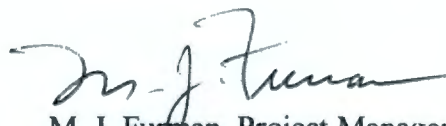
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Quality Control

Results of the RCRA Quality Control program for the July 1997 through September 1997 quarter will be discussed in detail in the Annual Report for fiscal year 1997. Highlights are summarized in Attachment 2. Quality control data that are not available in the Hanford Environmental Information System 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. Furtman, 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, July-September, 1997.

| Site | Sampled July-Sept 1997 | Statistical exceedance | 056711 |
|--|---------------------------|------------------------|--------|
| Indicator Evaluation Sites [40 CFR 265.93(b)] (sampled semiannually) | | | |
| 100-D Ponds | Yes | No | |
| 1301-N Facility | Yes | No | |
| 1325-N Facility | Yes | Yes | |
| 1324-N/NA Site | Yes | Yes | |
| A-29 Ditch | No | Not applicable | |
| B-63 Trench | No | Not applicable | |
| S-10 Pond and Crib | No | Not applicable | |
| LERF | Yes | No | |
| 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 | No | |
| NRDWL | Yes | No | |
| Groundwater Quality Assessment Sites [40 CFR 265.93(d)] (sampled quarterly) | | | |
| Seven sites ¹ | X | Not required | |
| Final Status Sites (WAC 173-303-645) | | | |
| 300 Area Process Trenches | X | Yes ¹ | |
| 183-H Basins | No ² | 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 Site has entered corrective action because of previous exceedances.

² Sampling will change to annual sampling under corrective action monitoring plan.

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Quality Control (QC) Results, July 1997 through September, 1997.

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 percent completeness is considered acceptable. Out of a total of 9600 Resource Conservation and Recovery Act (RCRA) results, 91 percent of the results were considered valid for the July 1997 through September 1997 quarter. The suspect data may be useful for general interpretive use but should not be used to make regulatory decisions.

Field QC data: A total of 460 duplicate pairs were analyzed during the quarter. Six sets of quantifiable duplicate results had a relative percent difference greater than ± 20 percent. The flagged sets were for gross alpha, gross beta, technetium-99, uranium-235, methylene chloride, and total dissolved solids. The most significant differences between duplicate results were for gross beta (3400 and 399 pCi/L) and technetium-99 (15 and 96 pCi/L). As discussed above, Pacific Northwest National Laboratory (PNNL) is evaluating problems with technetium-99 and gross beta analyses.

A total of 1074 field blanks collected during the 3rd quarter of 1997 were analyzed. One hundred one of those results were outside of the QC limits for field blanks. The majority of flagged results were for ICP metals, but results were also flagged for TDS, anions, methylene chloride, 1,4-dichlorobenzene, carbon tetrachloride, acetone, 2-butanone, total organic halides, potassium-40, gross beta, and technetium-99. Similar out-of-limit blank results have been noted for ICP metals in recent quarters. PNNL is reviewing the criteria of evaluating ICP metals blank contamination. The levels of potential blank contamination for these constituents are much lower than the concentrations naturally found in Hanford groundwater, so the potential effect on data use is negligible. Groundwater results that are associated with the high field blanks are flagged in the database.

Blind samples: Blind samples were forwarded to the primary analytical laboratory and an alternate laboratory in triplicate in August 1997. 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 and samples for gross beta analysis were spiked with Sr-90. Two sets of samples at two different concentrations were forwarded to the laboratories for analysis of total organic halogen (TOX). Those samples were spiked with 2,4,6-trichlorophenol and the VOC mixture (carbon tetrachloride, chloroform, and trichloroethylene). The primary laboratory reported results that were outside of the QC limits for Tc-99, gross alpha, gross beta, fluoride, cyanide, and TOX. The laboratory was asked to reanalyze the out-of-limits samples. All other results are within acceptable limits.

Earlier this year PNNL observed an apparent high bias and poor precision of total organic carbon (TOC) data. The laboratory implemented some changes in their TOC instrument calibration to address this problem on July 22, 1997, as reported previously. Triplicate blind samples spiked with potassium hydrogen phthalate were submitted to the laboratory in August 1997. The procedure changes seem to have reduced the bias. The results were within acceptable limits, but still somewhat high (116 to 118 percent of spiked value). Blind samples were also submitted to

another laboratory in August 1997, with results ranging from 87 to 93 percent of the spiked value.

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This was the 2nd consecutive set of blinds that were out of limits for gross beta and TOX. The recent gross beta results (116 percent to 120 percent of spiked value) were much better than the previous quarters (up to 567 percent). The previous quarter's blinds appear anomalous and are being reanalyzed. Additional gross beta blinds are also being analyzed. Out-of-limit results for TOX were mostly in low-concentration blinds (10-15 ug/L), although one sample spiked at 50 ug/L was also out of limits. The alternate laboratory also had out-of-limits results for TOX. It may not be possible to achieve better precision and accuracy at low levels of TOX. The practice of analyzing quadruplicate samples and conducting verification sampling help mitigate this problem for RCRA detection monitoring.

The primary analytical laboratory participates in the U.S. Environmental Protection Agency (EPA) Water Supply/Water Pollution (WS/WP) Programs. 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 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 studies were received for samples analyzed in May 1997 and WS samples analyzed in September 1997. The percentage of EPA-acceptable results was high for both sets of data, indicating excellent performance overall for the samples analyzed. Results were unacceptable once each for arsenic, orthophosphate, oil and grease, 1,1-dichloroethylene, trans-1,2-dichloroethylene, and turbidity. The out-of-limits arsenic results were from an ICP analysis. RCRA groundwater samples are analyzed by the atomic absorption method. Turbidity is measured in the field for RCRA. None of the other constituents is of concern for RCRA monitoring at Hanford.

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. Only uranium was outside control limits during the past quarter. The laboratory has been asked for corrective action.

¹ B-Pond, U-12 Crib, PUREX Cribs, SST WMA B-BX-BY, SST WMA S-SX, SST WMA T, SST WMA TX-TY.