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Commander
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street (Bldg. N-26)
Norfolk, Virginia 23511-2699

Attn: Ms. Katherine Landman
Navy Technical Representative
Code 18232

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
Contract Task Order (CTO) 0333
Long-Term Monitoring Summary Report
Operable Unit No. 7 (Sites 1 and 28)
MCB, Camp Lejeune, North Carolina

Dear Ms. Landman:

Baker Environmental, Inc. (Baker), is pleased to submit three (3) copies of the Supplemental and Data Evaluation Report for Operable Unit No. 7, Sites 1 and 28. This report presents the results of the August, 1995 sampling event and provides recommendations for the long-term monitoring of the sites. Copies of this report have also been forwarded to MCB, Camp Lejeune (3 copies), USEPA Region IV (3 copies), and NC DEHNR (4 copies). The following text, tables, figures, forms, and raw data are included herein:

- Summary Report - Sampling Round (SR-1) - Summarizes all data for each site for the August sampling event.
- Comparisons with Drinking Water Standards (SC-1) - Compares results of the sampling round with Federal and State Drinking Water Standards [Maximum Contaminant Levels (MCLs) and North Carolina Water Quality Standards (NCWQS)].
- Data Comparisons (DC-1) - Compares results of this sampling round with previous sampling rounds.
- Concentration Distribution Map - Maps showing the distribution of contaminants in the media sampled.
- Field Data - Attachment A
- Chain-of-Custody Documentation - Attachment B
- Positive Detection Tables - Attachment C
- Well Construction Logs - Attachment D

- Well Development Logs - Attachment E
- Field Notes - Attachment F

RESULTS

Site 1 Groundwater

Groundwater samples were collected from 15 monitoring wells (12 shallow and 1 deep) and one water supply well. The location of the wells are depicted (in color) on Figure 1. Ten of the fifteen samples were analyzed for Target Compound List (TCL) volatiles and Target Analyte List (TAL) metals (total). The remaining five samples were analyzed for TAL metals only. Furthermore, one shallow monitoring well (1-GW18) was installed within the northern area of the site, northwest of Building FC-120. The purpose of this well is to further evaluate shallow groundwater quality within the suspected disposal area.

Volatile compounds were detected in two of the ten wells sampled. Monitoring well 1-GW10 had detections of 1,2-dichloroethene (total) and trichloroethene (TCE) of 23 and 10 J micrograms per liter (ug/L), respectively. Moreover, monitoring well 1-GW12 had detections of toluene, ethylbenzene, and xylenes (total) at 4 J, 4 J, and 150 ug/L, respectively. The detection of TCE in well 1-GW10 exceeds both Federal (5.0 ug/L) and state (2.5 ug/L) drinking water standards. Note that both of these wells are located off-site, north of the Site 1 as depicted on Figure 2.

Iron and manganese were the only metals which exceeded Federal (secondary MCLs) and/or state drinking water standards at Site 1. The highest iron concentration was detected in monitoring well 1-GW12 (37,000 ug/L); the highest manganese concentration was detected monitoring well 1-GW10 (1,220 ug/L). Note that both of these wells are located off-site, north of the Site 1 as depicted on Figure 3.

Volatile and metal groundwater analytical results from two previous sampling rounds (May, 1994 and December, 1994) were compared to this round. As shown on Table 1, the volatile compound levels from round to round have both increased and decreased depending on the compound. With the exception of 1,2-DCE, the halogenated compounds (vinyl chloride, 1,1-DCE, and TCE) have exhibited a general decline in concentration level from round one (May, 1994) to this round. In contrast, the non-halogenated compounds (toluene, ethylbenzene, and xylenes) have exhibited a general increase in concentration level. No definitive reason can be suggested for this trend although water table fluctuations, which occur over these months (i.e., general the water table is higher in the winter months and lower in the fall months), may affect contaminant levels. Note that the TCE plume observed in the vicinity of shallow well 1-GW17 during the previous two sampling rounds was not encountered during this round.

It should be noted that different sampling techniques were employed for each round. A bailer was used for round one, an environmental submersible pump was used for round two, and a peristaltic pump was used for round three. A comparison of metals in groundwater from each round is shown on Table 2. The results indicate a significant reduction in metal concentrations from round one compared to rounds two and three. The primary reason for this concentration reduction is due to sampling technique. The submersible and peristaltic pumps utilize low-flow purging at rates of one gallon or less per minute. Purging at a low-flow rate minimizes sediment disturbances, thus providing a more representative groundwater sample.

Site 1 Soil

Nine soil borings (and one monitoring well boring) were advanced within a grid pattern northwest of Building FC-120 (Figure 1) to further evaluate the suspected disposal area. A subsurface sample, above the water table (approximately 12 feet below ground surface), was collected from each boring. Because this portion of Site 1 is covered by fill material which is often regraded, surface samples (ground surface to 12 inches) were not collected from each boring. The samples were analyzed for full TCL organics (volatiles, semivolatiles, and pesticides/PCBs) and TAL metals.

Volatile, semivolatile, and PCB compounds were not detected in any of the ten soil samples. Low concentrations of the pesticides dieldrin (1.9 J to 7 J ug/kg), endrin (2.3 J ug/kg), 4,4'-DDD (1.9 J to 2.6 J ug/kg), 4,4'DDE (3.2 J to 9.5 J ug/kg), 4,4'-DDT (2.2 J to 13 ug/kg), alpha-chlordane (1.1 J to 1.8 ug/kg), and gamma-chlordane (1.1 J to 1.8 ug/kg) were detected in six of the ten soil samples. Figure 4 shows the sample locations with the pesticide concentrations. The wide distribution and low concentrations of the pesticides suggests that the source is likely due to routine applications.

Site 1 Surface Water and Sediment

Surface Water

Two surface water samples were collected from the retention pond located behind Building FC-134 on the northern portion of the site (Figure 1). The samples were analyzed for full TCL organics and TAL metals.

Volatiles, semivolatiles, and PCBs were not detected in either surface water sample. The pesticide 4,4'-DDT was detected in both samples at concentrations of 0.12 J and 0.096 J ug/L in 1-SW01 and 1-SW02, respectively. Federal and state surface water quality standards have not been established for this compound. The likely source of the pesticides in the surface water is from past applications.

Ten metals were detected in 1-SW01 and 11 metals were detected in 1-SW02 as depicted on Figure 5. None of the metals exceeded Federal or state surface water criteria.

Sediment

Two sediment samples were collected at the same locations as the surface water (Figure 1). The samples were analyzed for full TCL organics and TAL metals.

Volatiles, pesticides, and PCBs were not detected in either sediment sample. The polynuclear aromatic hydrocarbons (PAHs) fluoranthene, pyrene, benzo(a)anthracene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene were detected in sample 1-SD01 at 50 J, 45 J, 56 J, 50 J and 46 J micrograms per kilogram (ug/kg), respectively. Moreover, benzo(a)pyrene was detected in sample 1-SD02 at 46 J ug/kg. The potential sources of these compounds in the sediment are fuel overflows from the oil/water separator located on the east side of Building FC-134 or runoff from the asphalt parking lot.

Site 28 Groundwater

Groundwater samples were collected from eight monitoring wells (six shallow and two deep) as depicted in color on Figure 6. All of the samples were analyzed for TCL volatiles and total TAL metals. Furthermore, one existing shallow monitoring well (28-GW08) was abandoned due to well construction problems. A new well was installed approximately 15 feet northwest of the abandoned well.

Volatile compounds were not detected in any of the eight wells sampled.

Iron, manganese, and cadmium were the only metals detected which exceeded Federal (secondary and primary MCLs) and/or state drinking water standards at Site 28. The highest iron and manganese concentrations were detected in monitoring well 28-GW13 (50,100 and 454 ug/L, respectively); the highest concentration of cadmium (only one detection) was detected monitoring well 1-GW07 (10.7 ug/L). The wells and their corresponding concentrations are depicted on Figure 7.

Groundwater analytical results for metals from two previous sampling rounds (May, 1994 and December, 1994) were compared to this round. As shown on Table 3 there is a significant reduction of metal concentrations from round one compared to rounds two and three. The primary reason for this concentration reduction is due to sampling technique as mentioned for Site 1.

Quality Control Samples

SITE 1

Volatiles were detected in two of the QA/QC samples. Chloroform was detected at 30 ug/L in a field blank collected from the potable water source used for decontamination of the drilling equipment. The potable water was collected from a water supply source located within Hadnot Point. Trichloroethene was detected at 1 J ug/L from a rinsate sample collected from a split spoon. This compound was not detected in any of the soil samples.

The semivolatile bis(2-ethylhexyl)phthalate was detected at 1 J ug/l in the field blank collected from the potable water source. This compound is a common laboratory contaminant and, thus, is not likely to have originated from the site.

SITE 28

Volatiles were not detected in any of the QA/QC samples.

Metals were detected in field and equipment rinsate blanks at concentrations below the Federal and state drinking water standards.

CONCLUSIONS

SITE 1

The following conclusions of Site 1 were derived based on the analytical findings:

- Volatiles were detected in two of the off-site wells. TCE was detected in well 1-GW10 at a

concentration above the Federal and state drinking water standards. The source of the volatiles does not appear to be related to the past disposal activities or current operations at Site 1. The potential source may be from the spills of solvents and/or fuel from the motor cross training area or from vehicles traveling along the dirt access road behind Building FC-134.

- The contaminant levels of volatiles in groundwater within the northern portion of the site have generally declined from the December, 1994 sampling event.

- The concentration of metals in groundwater are generally consistent with the December, 1994 sampling event.

- Soils and surface water within the investigated area did not exhibit contamination (i.e., volatile or semivolatile compounds) that could be associated with the previous disposal activities or current operations.

- Sediment samples contained low levels of PAH compounds. The potential sources of these compounds in the sediment are fuel overflows from the oil/water separator located on the east side of Building FC-134 or runoff from the asphalt parking lot.

SITE 28

The following conclusions of Site 28 were derived based on the analytical findings:

- Volatiles were not detected in any of the wells sampled.

- The concentration of metals in groundwater are generally consistent with the December, 1994 sampling event.

RECOMMENDATIONS

SITE 1

The following are recommendations for the long-term monitoring of Site 1 based on the analytical findings:

- The volatile groundwater plume within the northern portion of the site should be monitored to determine if the plume is migrating beyond the existing wells or vertically into the drinking water aquifer. According, groundwater samples should be collected from the following wells and analyzed for TCL volatiles:

  1-GW01, 1-GW02, 1-GW03, 1-GW10, 1-GW11, 1-GW12, 1-GW17, 1-GW17DW, 1-GW18, and HP-638 (supply well).

- In addition to volatiles, groundwater samples should be collected and analyzed for TAL metals since metals have been detected in previous sampling rounds. The following wells should be sampled:

  1-GW01, 1-GW02, 1-GW03, 1-GW04, 1-GW09, 1-GW10, 1-GW11, 1-GW12, 1-GW16, 1-GW16DW, 1-GW17, 1-GW17DW, 1-GW18, and HP-638 (supply well)

SITE 28

The following are recommendations for the long-term monitoring of Site 28 based on the analytical findings:

- Groundwater samples should be collected and analyzed for TAL metals since metals have been detected in previous sampling rounds. The following wells should be sampled:

  28-GW01, 28-GW01DW, 28-GW02, 28-GW03, 28-GW04, 28-GW07, 28-GW07DW, 28-GW08, and 28-GW13

Baker appreciates the opportunity to serve LANTDIV on this important project. If you have any comments or questions, please do not hesitate to contact me at (412) 269-2033 or Mr. Matthew Bartman (Activity Coordinator) at (412) 269-2053.

Sincerely,

BAKER ENVIRONMENTAL, INC.

Richard E. Bonelli
Project Manger

REB/lq

cc: Ms. Lee Anne Rapp, Code 18312 (w/o attachments)
Ms. Beth Collier, Code 02115 (w/o attachments)
Mr. Neal Paul, MCB, Camp Lejeune (with attachments)