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Subject:
Final Off-Post Monitoring Well Sampling Report—Year 3
Fort George G. Meade
Fort Meade, Maryland

ENVIRONMENT

Contract Number: W912DR-09-D-0021 Delivery Order 0004

Dear Mr. Knight:

This 2014 Off-Post Monitoring Well Sampling Letter Report-Year 3 (Report) for monitoring wells (MW)-123s, MW-124s, MW-125d and MW-126d has been prepared on behalf of the United States (U.S.) Army to further remedial activities at Fort George G. Meade (FGGM), Maryland. This Report has been prepared by ARCADIS, under U.S. Army Corps of Engineers (USACE) Baltimore District, Contract Number W912DR-09-D-0021 Delivery Order 0004.

Date:
26 August 2014

Contact:
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The sections of this Report are as follows:

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A. Background

As part of the Remedial Investigation (RI) of the Closed Sanitary Landfill (CSL) at FGGM, four groundwater monitoring wells (identified as MW-123s, MW-124s, MW-125d, and MW-126d), were installed in 2003 on the Anne Arundel County right-of-way just outside the southeastern boundary of the installation on the east edge of North Patuxent Road (**Figure 1**). There are two well clusters, each with a deep and shallow well (MW-125d/ MW-123s and MW-126d/ MW-124s), which were initially sampled in June 2004. The deep monitoring wells (MW-125d and MW-126d) were also sampled in March 2005 as part of the CSL RI. Upon completion of the RI in 2007, tetrachloroethylene (PCE), trichloroethylene (TCE), and carbon tetrachloride (CCl₄) were identified as contaminants within the Lower Patapsco aquifer (i.e., the aquifer associated with the deep wells), including at the subject well locations. Therefore, the constituents of concern (COCs) for this project were established as CCl₄, PCE, and TCE with cis-1,2-dichloroethene (cis-1,2-DCE) as a breakdown product of PCE and TCE.

Concentrations of CCl₄ and PCE were detected above their respective federal maximum contaminant levels (MCLs) in the deep wells beginning with the 2004 sampling event. TCE was detected above its MCL at MW-125d and MW-126d beginning in 2008. However, none of the COCs were detected in the shallow wells during these sampling events.

In November 2008, FGGM redeveloped and re-sampled the two deep monitoring wells, MW-125d and MW-126d, as part of the Army's continual effort to monitor groundwater associated with the CSL. The results of this sampling event showed concentrations of CCl₄ from MW-125d and CCl₄, TCE, and PCE from MW-126d all had increased in concentration from the 2004 sampling event results and were all above their respective MCL. Thus, the U.S. Environmental Protection Agency (USEPA) issued the Interim Measure Required letter to FGGM (USEPA, 2009), requiring FGGM to conduct interim measure activities for monitoring wells MW-125d and MW-126d. Results of these interim measures are presented in the *Final FGGM Off-Post Well Investigation Interim Measures Report* (ARCADIS/Malcolm Pirnie, 2011a).

As part of the interim measure activities, the Army sampled the four wells in April 2009 and June 2009 for Volatile Organic Compounds (VOCs). As stated above, the Interim Measures Required letter only required activities to be conducted at monitoring wells MW-125d and MW-126d. Monitoring wells MW-123s and MW-124s (associated with the Upper Patapsco aquifer) were also sampled to ensure all contamination was confined to the Lower Patapsco aquifer. The results of these sampling events showed concentrations of CCl₄ in MW-125d at concentrations consistently above the MCL. In MW-126d, the concentrations of CCl₄ and TCE consistently exceeded their respective MCLs, and PCE exceeded the MCL during the June 2009 event. Chloroform was detected in both MW-125d and MW-126d, and cis-1,2-DCE was detected in MW-126d. However, neither compound was detected above its respective MCL (**Table 1**). None of the COCs were detected in either of the shallow wells in the 2009 sampling events.

In early January 2012, all wells were redeveloped. On 31 January 2012 and 1 February 2012 monitoring wells MW-123s, MW-125d, MW-124s, and MW-126d were sampled. They were sampled again on 31 January 2013 and 1 February 2013. Consistent with previous sampling events, there were no detections of the COCs in either of the shallow wells (MW-123s and MW-124s) during either event. Both CCl₄ and PCE concentrations exceeded their respective MCLs in MW-126d. In MW-125d, CCl₄ exceeded its MCL in 2013, but not in 2012 (**Table 1**).

B. Purpose

This Off-Post Monitoring Well Sampling Report—Year 3 documents analytical results for Year 3 of the annual monitoring well sampling program. All sampling activities were conducted in accordance with the Final Off-Post Monitoring Well Repair and Sampling Work Plan (ARCADIS/Malcolm Pirnie, 2011b).

C. Monitoring Well Sampling

MW-123s and MW-124s were sampled on 29 January 2014; MW-125d and MW-126d were sampled on 30 January 2014.

Groundwater samples were collected using the low-flow method an average rate of approximately 200 to 250 milliliters/minute, as presented in **Attachment A**. Groundwater was collected directly into laboratory prepared VOC sample vials. Quality Assurance / Quality Control samples were collected in accordance with the Final Off-Post Monitoring Well Repair and Sampling Work Plan (ARCADIS/Malcolm Pirnie, 2011b).

D. Data Analysis and Results

Groundwater samples were analyzed using USEPA method SW846/8260 for the full Target Compound List (TCL) for VOCs. Data analyses were completed by ALS Global, a National Environmental Laboratory Accreditation Program (NELAP) laboratory, with a turnaround time of five business days. A third-party data quality review and validation was conducted on all samples (100%) by Laboratory Data Consultants, Inc. The data validation was performed under USEPA Region III, Level M3 guidelines. The analyses were validated using the following documents, as applicable to each method:

- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 4.1, April 22, 2009
- USEPA Region III Innovative Approaches for Data Validation, June 1995
- USEPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

VOC detections for the sampled wells are shown in **Table 2**. The following compounds were detected at concentrations below their respective MCL in the corresponding wells:

- Bromomethane (MW-123s, MW-124s, and MW-125d)
- cis-1,2-DCE (MW-125d and MW-126d);
- Chloroform (MW-125d and MW-126d);
- PCE (MW-123s, MW-124s, MW-125d, and MW-126d);
- Toluene (MW-123s, MW-124s);
- TCE (MW-125d and MW-126d); and
- Total Xylenes (MW-123s and MW-124s).

The 29 January 2014 event was the first event that COCs were detected in the shallow wells.

Although bromomethane was reported as being detected in the groundwater samples collected from three of the wells, it was also detected at similar concentrations in the equipment blank (0.58 µg/L) and in the trip blank (0.53 µg/L) during the 30 January 2014 sampling event. As such, these results were qualified by the data validator. Because bromomethane has not been detected in any of the wells during previous sampling events and was found in the QA/QC samples, it is concluded to be a laboratory contaminant and not present in the groundwater.

As shown in **Table 2**, CCl₄ exceeded its MCLs in both MW-125d and MW-126d. As shown in **Table 1**, the concentrations of CCl₄ in MW-125d have decreased slightly from 11.5 micrograms per liter (µg/L) to 7.7 µg/L since the 2013 sampling event. Similarly, concentrations of CCl₄ in MW-126d have also decreased since the 2013 sampling event (73.4 µg/L in January 2013 to 57.5 µg/L in January 2014).

PCE concentrations have decreased in MW-125d from 4.6 µg/L in January 2013 to 1.5 µg/L in January 2014; however, both of these concentrations are below the MCL of 5 µg/L. PCE concentrations have decreased in MW-126d from 6.5 µg/L in January 2013 to 4.3 µg/L in January 2014, bringing the concentration below the MCL of 5 µg/L. PCE was also detected for the first time in the two shallow wells, MW-123s and MW-124s, at concentration of 1.8 µg/L and 2.2 µg/L, respectively.

The full laboratory report is presented in **Attachment B**. The full data validation report is reported in **Attachment C**. Monitoring wells MW-123s, MW-124s, MW-125d, and MW-126d are included in Operable Unit 4 (OU4) and are being evaluated as part of the on-going OU4 RI and Feasibility Study (FS).

E. Investigation Derived Waste

Approximately 16 gallons of purge water were generated during the January 2014 groundwater sampling activities and collected in five gallon buckets. The buckets were transported to FGGM and emptied into an empty 55-gallon drum during classification. All purge water was determined to be non-hazardous (based on results of detections in the monitoring wells) and was combined with nonhazardous purge water from the OU4 investigation prior to being transported to an off-Post

treatment facility on 20 February 2014, by a licensed waste hauler/processor/disposal facility. The manifest is presented in **Attachment D**.

F. References

ARCADIS/Malcolm Pirnie. 2011a. *Final FGGM Offpost Well Investigation Interim Measures Report*. September 2011.

ARCADIS/Malcolm Pirnie. 2011b. *Final Off-Post Monitoring Well Repair and Sampling Work Plan*. October 2011.

USEPA III, 2004. *USEPA Region III Modifications to the National Functional Guidelines for Organic Data Review*.

USEPA III, 2009. "Interim Measure Required" letter from U.S. Environmental Protection Agency to Fort George G. Meade dated 29 January 2009.

Sincerely,

ARCADIS U.S., Inc..

A handwritten signature in blue ink, appearing to read "Daniel P. Sheehan".

Daniel P. Sheehan, PE, BCEE
Project Manager

CC:
Mick Butler, Fort George G. Meade Environmental Division
Francis Coulters, United States Army Environmental Command

TABLES

Table 1: Detections of COCs and Chloroform in Monitoring Wells 2004 - 2014

Well No.	Round	Date Collected	Compound Detected (MCL)				
			Chloroform (80 µg/L)	CCl ₄ (5 µg/L)	cis-1,2-DCE (70 µg/L)	PCE (5 µg/L)	TCE (5 µg/L)
MW-123s	1	4/16/09	ND	ND	ND	ND	ND
	2	6/18/09	ND	ND	ND	ND	ND
	--	1/31/12	ND	ND	ND	ND	ND
	--	1/30/13	ND	ND	ND	ND	ND
	--	1/29/14	ND	ND	ND	1.8	ND
MW-124s	1	4/16/09	ND	ND	ND	ND	ND
	2	6/18/09	ND	ND	ND	ND	ND
	--	1/31/12	ND	ND	ND	ND	ND
	--	1/31/13	ND	ND	ND	ND	ND
	--	1/29/14	ND	ND	ND	2.2	ND
MW-125d	--	2004	--	21.3	--	2.8	0.5
	--	11/7/08	1 J	25	< 0.8	5	1 J
	1	4/16/09	ND	20.3	ND	0.66J	ND
	2	6/18/09	1.0	17.0	ND	ND	ND
	--	1/31/12	ND	3.5	ND	0.83J	0.52J
	--	1/30/13	1.6B	11.5J	ND	4.6J	1.6J
	--	1/30/14	2.2	7.7	0.34J	1.5	0.75J
MW-126d	--	2004	--	4.1	--	12.4	3.5
	--	11/7/08	2 J	51	3 J	51	16
	1	4/16/09	ND	21.8	0.69J	11.5	4.9
	2	6/18/09	1.6	65.8	2.3	31.4	13.1
	--	2/1/12	ND	64.3	0.75J	9.2	3.2
	--	1/31/13	1.5B	73.4J	0.65J	6.5J	2.1J
	--	1/30/14	ND	57.5	0.66J	4.3	1.6

Note: Values in parenthesis indicate the associated MCL

Round 1 and 2 are the 16 April 2009 and 18 June 2009, respectively, two Interim Measures sampling events.

ND = Not Detected at or above the reporting detection limit

Cells shaded gray exceed the MCL.

µg/L = micrograms per liter

J= estimated concentration below the method detection limit

B= compound was not detected substantially above the level reported in laboratory or field blanks

Table 2: Detections of VOCs in Monitoring Wells MW-123s, MW-124s, MW-125d, and MW-126d (2014)

Well No.	Date Collected	Compound Detected (MCL)							
		Bromomethane (NS)	CCl ₄ (5 µg/L)	cis-1,2-DCE (70 µg/L)	Chloroform (70 µg/L)	PCE (5 µg/L)	Toluene (1,000 µg/L)	TCE (5 µg/L)	Total Xylenes (10,000µg/L)
MW-123s	1/29/14	0.42JB	ND	ND	ND	1.8	0.85J	ND	1.2J
MW-124s	1/29/14	0.47JB	ND	ND	ND	2.2	7.9	ND	1.2J
MW-125d	1/30/14	0.44JB	7.7	0.34J	2.2	1.5	ND	0.75J	ND
MW-126d	1/30/14	ND	57.5	0.66J	1.7	4.3	ND	1.6	ND

Note: Values in parenthesis indicate the associated MCL. Only the detected concentrations are presented in this table.

NS = No standard

ND = Not Detected at or above the reporting detection limit

Cells shaded gray exceed the MCL.

µg/L =micrograms per liter

J= estimated concentration below the method detection limits defined by Department of Defense Quality Service Manual Version 4.2 but are within the laboratory's acceptance limits which are below the MCLs set for the COCs for the project.

B= compound was not detected substantially above the level reported in laboratory or field blanks

Figures

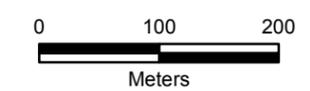
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- Installation Boundary
- Deep Monitoring Well
- Shallow Monitoring Well
- Railroad



Data Sources: ESRI, World Imagery, 2003
 FGGM, GIS Data, 2005

Coordinate System: UTM Zone 18
 Datum: NAD 1983
 Units: Meters



ATTACHMENT A
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