
2014 Block E PCB Groundwater Delineation Summary Report— Middle River Complex, Middle River, Maryland

Tetra Tech, Inc. (Tetra Tech) has prepared this summary report to describe groundwater sampling conducted in March and April 2014 in Block E at the Lockheed Martin Middle River Complex (MRC) in Middle River, Maryland. Specifically, this report addresses the sampling and analysis of eight monitoring wells in the southern region of Block E for polychlorinated biphenyl (PCBs) homologs using United States Environmental Protection Agency (USEPA) Method 680. Groundwater samples collected before this time were analyzed for PCB Aroclors by USEPA Method 8082A. In its comments on the *Block E Remedial Action Plan (RAP)*, USEPA noted on February 18, 2014 that analysis of groundwater for PCB Aroclors did not have sufficiently low detection limits and might not adequately quantify total PCBs in groundwater. USEPA recommended using Method 680, which analyzes for PCB homologs, as more appropriate for evaluating the potential groundwater to surface water migration pathway.

This groundwater delineation investigation is focused on determining the extent of PCB contamination in the groundwater within and downgradient of the area of Block E where elevated concentrations of PCBs have been detected in soil below the groundwater table. PCB migration in groundwater is a concern because it can occur directly or through infiltration into Block E storm drains and could discharge PCBs to Dark Head Cove. The Maryland Department of the Environment (MDE) will establish groundwater use restrictions for Block E that will prohibit groundwater use.

The investigation consisted of two sampling events, the first in March 2014, and the second in April 2014. These two sampling episodes entailed the following activities:

- mobilizing Tetra Tech personnel, sampling equipment, and materials
- low-flow sampling of monitoring wells:
 - upgradient of the area with elevated PCB concentrations (MW62A and MW62C)
 - within the area with elevated PCB concentrations (MW43A)

- downgradient of the area with elevated PCB concentrations (MW44A, MW113A, MW114A, MW103A, and MW103B)
- shipping samples under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) chain of custody protocols
- laboratory analysis of PCB homologs using Method 680, with a five-day turnaround
- conducting data validation (to evaluate completeness, holding times, calibrations, precision, accuracy, laboratory and field-blank contamination, and detection limits), completed concurrent with the data evaluation, and conducted using the *USEPA Region III Modifications to the National Functional Guidelines for Data Review* (USEPA, 1993 and 1994)¹
- handling and disposal of investigation-derived waste (IDW):
 - personal protective equipment (PPE) IDW was placed in trash bags and subsequently into a facility trash receptacle, to be disposed of as general refuse
 - purge water was collected and stored in United States Department of Transportation (USDOT)-approved 55-gallon drums
 - IDW was characterized and disposed of in accordance with applicable state and federal regulations and the MRC waste management plan

Results from the March sampling round include a trichlorobiphenyl homolog detection (0.0035J micrograms per liter [µg/L]) in the method blank. In accordance with USEPA validation guidelines, an action level of 0.0175 µg/L was used for detections of trichlorobiphenyl. Detected concentrations of trichlorobiphenyl at or below this action level were considered to be the result of laboratory blank contamination and were qualified as not-detected. Therefore, the following trichlorobiphenyl concentrations were considered not-detected:

Well	Detected concentration of trichlorobiphenyl before data usability assessment (µg/L)
MW-62C	0.0065*
MW-103A	0.0045B*
MW-103B	0.0050B*
*Results are considered non-detect because trichlorobiphenyl was detected in the method blank.	

¹United States Environmental Protection Agency (USEPA), Region 3, 1993. *Region III Modifications to the Laboratory Data-Validation Functional Guidelines for Evaluating Inorganics Analyses*. April.

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A second sampling round was scheduled for April 2014, with the primary objective of obtaining higher quality data. The March sampling round was repeated, and in addition a set of April samples were filtered through a 0.45-micron filter before analysis. Filtered sample results are expected to more accurately represent mobile contamination concentrations. Block E PCB groundwater sampling results acquired through these efforts are provided in Table 1 and illustrated in Figure 1. Data results are summarized below:

- upgradient well MW62A—trichlorobiphenyls (0.042 µg/L) were detected in March; no detections in April in either the unfiltered or filtered samples.
- upgradient well MW62C—no detections in March or April
- well near elevated PCB soil concentrations at MW43A—five of seven homologs were detected in March, and all seven were detected in April; only two of the more soluble homologs were detected in filtered samples: monochlorobiphenyls (0.026 µg/L) and dichlorobiphenyls (0.0055 µg/L)
- downgradient wells generally had no detections in March or April; the only exception is a consistent detection of monochlorobiphenyls in MW114A (the nearest of the downgradient locations), at the following concentrations:
 - March—monochlorobiphenyls at 0.012 µg/L in both the primary and duplicate samples
 - April—monochlorobiphenyls at 0.0066 µg/L
 - no PCB homologs were detected in filtered samples collected from downgradient locations

PCB homologs were detected in groundwater near elevated PCB concentrations in soil. The data suggest that despite the elevated concentrations in soils, only low concentrations of PCBs are present in groundwater in the immediate vicinity; data from downgradient well MW114A approximately 40 feet away have only trace concentrations that are below MDE groundwater standard/federal Maximum Contaminant Level (MCL) for PCBs (0.5 µg/L) and the National Recommended Water Quality Criteria (NRWQC) freshwater chronic concentration for surface water (0.014 µg/L). However, detected PCB concentrations exceeded the NRWQC for human health consumption of organisms adjusted for the 1×10^{-5} risk level (0.00064 µg/L). Wells farther downgradient (MW103A and MW103B) show no detectable PCBs.

Table 1
PCB Groundwater Delineation
March - April 2014
Block E, Middle River Complex, Middle River, Maryland
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LOCATION		MRC-MW62A		MRC-MW62C		MRC-MW43A	
SAMPLE ID	MDE groundwater standard	MRC-MW62A- 031814	MRC-MW-62A- 041714	MRC-MW62C- 031814	MRC-MW-62C- 041714	MRC-MW43A- 032014	MRC-MW-43A- 041714
SAMPLE DATE		3/18/2014	4/17/2014	3/18/2014	4/17/2014	3/20/2014	4/17/2014
SAMPLE CODE		NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX		GW	GW	GW	GW	GW	GW
PCB homologs (µg/L)							
MONOCHLOROBIPHENYLS	0.5 ⁽¹⁾	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.22	0.23
DICHLOROBIPHENYLS	0.5 ⁽¹⁾	0.0044 U	0.0044 U	0.0044 U	0.0044 U	0.072	0.034
TRICHLOROBIPHENYLS	0.5 ⁽¹⁾	0.042	0.0034 U	0.0065 U	0.0034 U	0.017 U	0.012
TETRACHLOROBIPHENYLS	0.5 ⁽¹⁾	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.041	0.048
PENTACHLOROBIPHENYLS	0.5 ⁽¹⁾	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.18	0.23
HEXACHLOROBIPHENYL	0.5 ⁽¹⁾	0.01 UJ	0.01 U	0.01 UJ	0.01 U	0.062	0.054
HEPTACHLOROBIPHENYLS	0.5 ⁽¹⁾	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.012 J
Filtered PCB homologs (µg/L)							
MONOCHLOROBIPHENYLS	0.5 ⁽¹⁾	NA	0.0017 U	NA	0.0017 U	NA	0.026
DICHLOROBIPHENYLS	0.5 ⁽¹⁾	NA	0.0052	NA	0.0044 U	NA	0.0055

Table 1
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LOCATION	MRC-MW44A		MRC-MW113A		MRC-MW114A	
SAMPLE ID	MRC-MW44A-031814	MRC-MW-44A-041714	MRC-MW113A-032014	MRC-MW-113A-041814	MRC-MW114A-032014	MRC-MW114A-032014-AVG
SAMPLE DATE	3/18/2014	4/17/2014	3/20/2014	4/18/2014	3/20/2014	3/20/2014
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	SAMPLE	AVG
MATRIX	GW	GW	GW	GW	GW	GW
PCB homologs (µg/L)						
MONOCHLOROBIPHENYLS	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.012	0.012
DICHLOROBIPHENYLS	0.0044 U	0.0044 U	0.0044 U	0.0044 U	0.0044 U	0.0044 U
TRICHLOROBIPHENYLS	0.0034 U	0.0034 U	0.0034 U	0.0034 U	0.0034 U	0.0034 U
TETRACHLOROBIPHENYLS	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U
PENTACHLOROBIPHENYLS	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U
HEXACHLOROBIPHENYL	0.01 UJ	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
HEPTACHLOROBIPHENYLS	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Filtered PCB homologs (µg/L)						
MONOCHLOROBIPHENYLS	NA	0.0017 U	NA	0.0017 U	NA	NA
DICHLOROBIPHENYLS	NA	0.0044 U	NA	0.0044 U	NA	NA

Table 1
PCB Groundwater Delineation
March - April 2014
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LOCATION	MRC-MW114A		MRC-MW103A		MRC-MW103B	
SAMPLE ID	MRC-MW114A-032014-D	MRC-MW-114A-041814	MRC-MW103A-031814	MRC-MW-103A-041814	MRC-MW103B-031814	MRC-MW-103B-041814
SAMPLE DATE	3/20/2014	4/18/2014	3/18/2014	4/18/2014	3/18/2014	4/18/2014
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX	GW	GW	GW	GW	GW	GW
PCB homologs (µg/L)						
MONOCHLOROBIPHENYLS	0.012	0.0066	0.0017 U	0.0017 U	0.0017 U	0.0017 U
DICHLOROBIPHENYLS	0.0044 U	0.0044 U	0.0044 U	0.0044 U	0.0044 U	0.0044 U
TRICHLOROBIPHENYLS	0.0034 U	0.0034 U	0.0045 U	0.0034 U	0.005 U	0.0034 U
TETRACHLOROBIPHENYLS	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U	0.0054 U
PENTACHLOROBIPHENYLS	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U
HEXACHLOROBIPHENYL	0.01 U	0.01 U	0.01 UJ	0.01 U	0.01 UJ	0.01 U
HEPTACHLOROBIPHENYLS	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Filtered PCB homologs (µg/L)						
MONOCHLOROBIPHENYLS	NA	0.0017 U	NA	0.0017 U	NA	0.0017 U
DICHLOROBIPHENYLS	NA	0.0044 U	NA	0.0044 U	NA	0.0044 U

1 Standard is for total PCBs.

Bold font indicates a postive detection

J - estimated concentration

µg/L - micrograms per liter

MDE - Maryland Department of the Environment

NA - not analyzed

PCB - polychlorinated biphenyl

U - not detected

