Summary of March 2012 Frog Mortar Creek
Surface Water Sample Results
Martin State Airport, Middle River, Maryland

Forty (40) surface water samples were collected from Frog Mortar Creek at the Dump Road Area (DRA) site on March 20, 2012. Four samples were collected along each of nine transects, spaced approximately 350 feet apart, along the west shoreline of Frog Mortar Creek and four samples were collected along a transect extending out from the eastern shoreline at

260 mg/L, rather than the standard 100 mg/L. The surface water samples collected in March were analyzed for hardness and 260 mg/L was the lowest hardness value reported. Gray shading in Table 1 indicates that a result exceeds one surface water screening criterion.

Several VOCs and metals were detected in surface water samples. Hexavalent chromium was

was detected in two samples (0.4 µg/L and 0.48 µg/L). Acetone is a common laboratory contaminant and is not a constituent of the DRA VOC plume.

Concentrations of TCE were greatest in samples MSA-SW40A and MSA-SW40B (11.0 µg/L and 21.0 µg/L, respectively). This transect is located north–northeast and slightly hydraulically side-gradient of DRA monitoring wells that contain some of the highest concentrations of site-related constituents in shallow and intermediate depth groundwater (e.g., wells DMW2S, DMW2A, DMW3I). Further from shore but along the same transect, lower TCE concentrations were detected in samples MSA-SW40C and MSA-SW40D (4.1 µg/L and 1.7 µg/L, respectively). TCE concentrations were mostly below 5 µg/L throughout the other sample locations with the exception of slightly-elevated concentrations detected in MSA-SW38A, MSA-SW41A, and MSA-SW42B (7.9, 6.2 and 10.0 µg/L, respectively), located both north and south of transect SW40. TCE was detected at low levels in EL-SW01A, EL-SW01B, EL-SW01-C and EL-SW01D (1.0 µg/L, 1.1 µg/L, 1.4 µg/L and 1.6 µg/L, respectively), located on the eastern shoreline of Frog Mortar Creek. These TCE results are consistent with concentrations of TCE in samples collected at this location in January 2012.

Generally, TCE concentrations decreased progressively in samples located north and south of transect SW40 (see Figure 2). Along sample transects SW37, SW42, SW40, SW43, SW44, and SW-45 TCE concentrations were highest in the samples located approximately 50 feet from the shoreline and decreased progressively in samples collected further from the shoreline. Along sample transects SW38 and SW41, the highest concentration was detected in the sample located closest to the shoreline. For the other sample transects, the TCE concentrations are relatively consistent along each transect. Compared to those detected during the December 2011 event, March 2012 TCE concentrations have decreased in transects SW38 and SW41, and increased in transect SW40.

As shown in Figure 3, the two highest cis-1,2-DCE concentrations, 39 µg/L and 18 µg/L, were detected at MSA-SW40A and MSA-SW41A, respectively. In December 2011, the highest detected concentration of cis-1,2-DCE was for SW38A (21 µg/L), located between transects SW40 and SW41. Concentrations of cis-1,2-DCE typically decreased to the north of transect SW40 and to the south of transect SW41 moving outward, with the exception of one slightly

elevated concentration detected at SW37A (10 µg/L). The cis-1,2-DCE concentrations typically decreased with increasing distance from the shoreline; in four transects - SW37, SW38, SW40 and SW41; the highest cis-1,2-DCE concentration was detected in the samples collected 50 feet from the shoreline. The cis-1,2-DCE concentrations in transect EL-SW01, located along the eastern shoreline, were similar in all four samples (range of 0.9J µg/L to 1.4 µg/L).

The concentration of cis-1,2-DCE in the near-shore samples in transect SW40 increased significantly in March 2012 (39 µg/L) compared to the concentrations detected in December 2011 (7.5 µg/L). In transect SW38, the near-shore concentration of cis-1,2-DCE decreased from 21 µg/L in December 2011 to 5.4 µg/L in March 2012. Concentrations of cis-1,2-DCE remained consistent between December 2011 and March 2012 in near-shore samples in transect SW41 (18 µg/L). In the other transects, the concentrations of cis-1,2-DCE in March 2012 were generally slightly elevated compared to the December 2011 concentrations, with the largest increase (from 0.76J to 10 µg/L) in sample at MSA-SW37A.

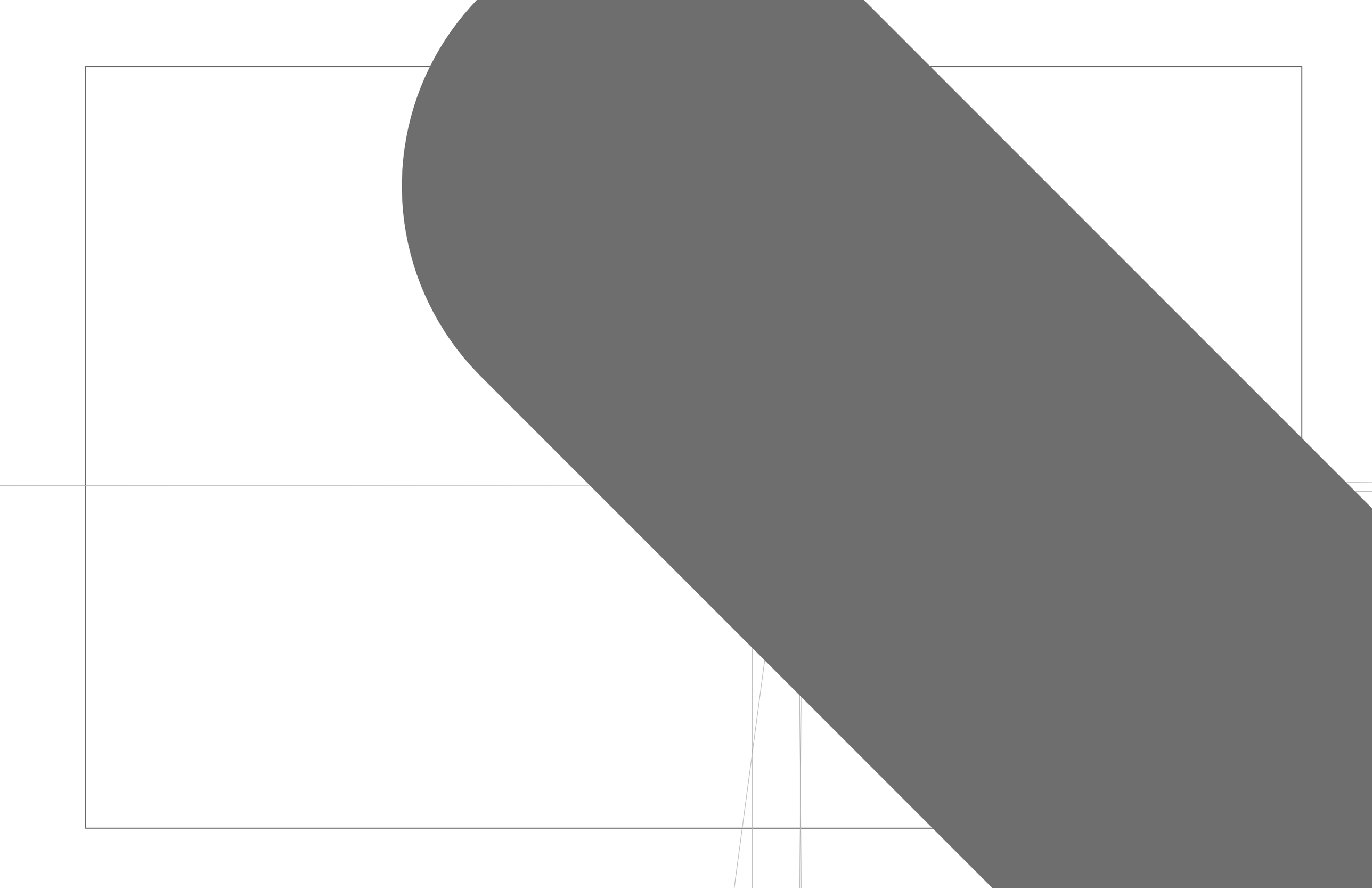
As shown in Figure 4, VC shows spatial distributions and trends similar to TCE and cis-1,2-DCE. Relatively consistent with the pattern of cVOC detections seen in past rounds, and similar to TCE and cis-1,2-DCE in this round, the maximum VC concentration of 40 µg/L was detected at sample MSA-SW40A. During the December 2011 sampling event, the highest VC concentration was detected in SW38A (14 µg/L). During the March 2012 sample event, VC was detected at slightly higher concentrations in samples transects located north of transect SW40 (SW42, and SW37), than it was in the samples collected further to the south (SW38, SW41, SW43, SW44, SW45, and SW39). The highest VC concentrations were detected in the samples collected 50 feet offshore at five of the 10 transects (SW41, SW42, SW43, SW44, and SW45). Concentrations decreased with increasing distance from the shoreline at three other transects (SW37, SW38 and SW40). At transects SW39 and EL–SW01, VC was detected in trace concentrations in the samples located 100 feet and 200 feet offshore only (range 0.24J µg/L to 1.1 µg/L).

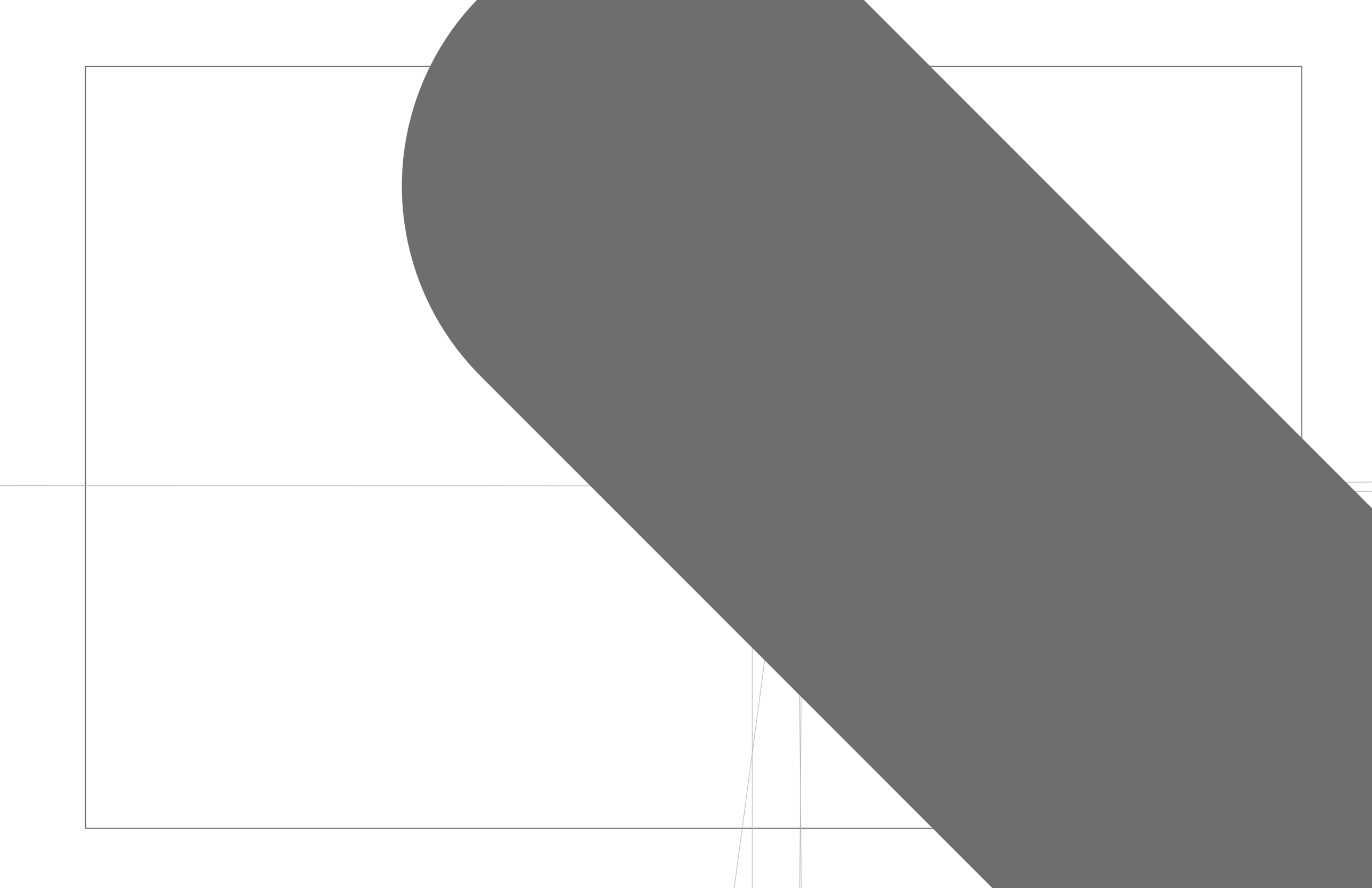
During the March 2012 sampling event, dissolved arsenic was detected in all samples, but only two samples (MSA-SW42A and MSA-SW42C) had concentrations (each 1.5J µg/L) slightly above the human health risk screening criterion of 1.4 µg/L. In December 2011, dissolved

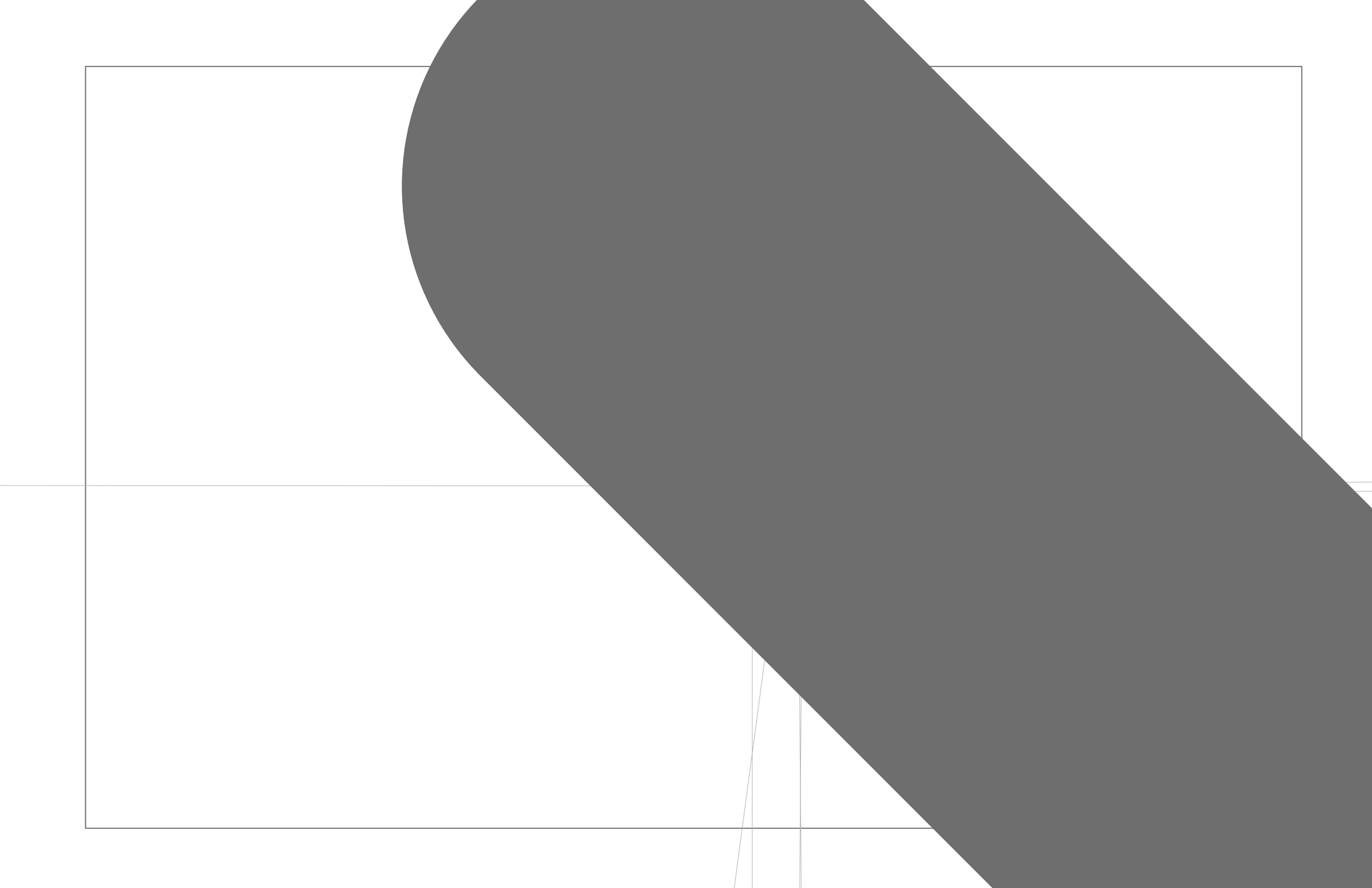
arsenic was detected above the human health screening criteria, but less than the ecological and AWQC criteria, in all samples, at concentrations ranging from 1.6J to 2.4J µg/L. Dissolved barium concentrations (ranging from 25 µg/L to 27 µg/L) exceeded the BTAG ecological screening level of 4 µg/L in all samples. No other metals had exceedances of any screening criteria.

During the March 2012 sampling event, dissolved hexavalent chromium was detected in all samples at trace concentrations ranging from 0.054 µg/L to 0.092L µg/L, well below the screening criteria. All concentrations of hexavalent chromium detected during the March 2012 sampling episode are L-qualified, meaning the results are biased low. Hexavalent chromium (total) was detected in all samples during the December 2011 sampling event, with the maximum concentration detected at MSA-SW41B (5.21 µg/L).

Lockheed Martin Corporation plans to conduct surface water monitoring for the same 40 locations on Frog Mortar Creek during the calendar year 2012. Subsequent sampling rounds are scheduled for June, July, August, September and December 2012.







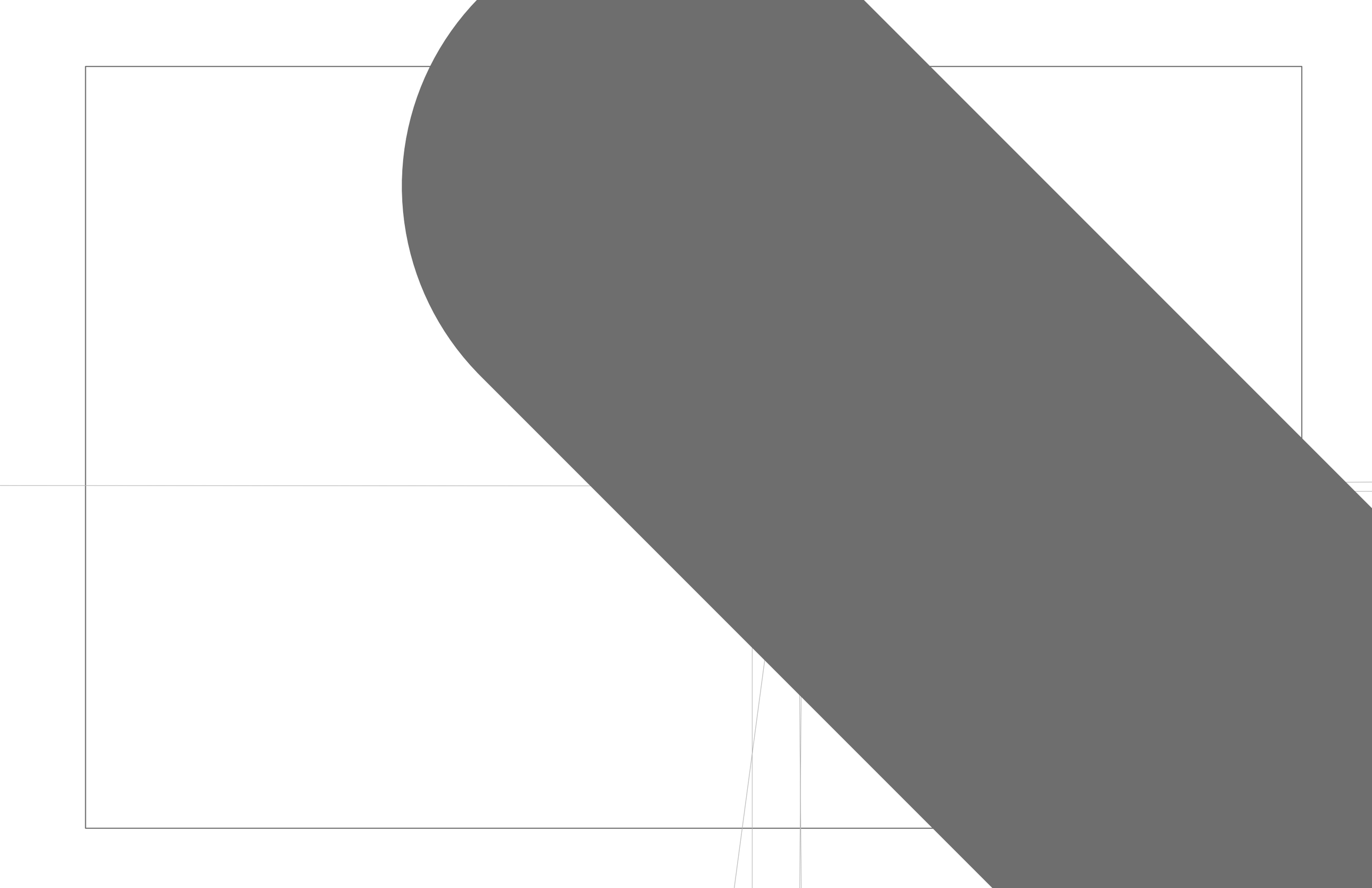


TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA
FOR FROG MORTAR CREEK SURFACE WATER SAMPLES- MARCH 2012
LOCKHEED MARTIN, MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

SAMPLE ID: LABORATORY ID SAMPLE DATE LOCATION	Acute	Chronic	Ecological Surface Water Screening Level[2]	Human Health Consumption of Organism Only[1]	EL-SW01A-032012 240-9383-37	EL-SW01B-032012 240-9383-38	240-9383-39 3/20/2012	240-9383-40 3/20/2012
VOLATILES (ug/l)								
1,1-DICHLOROETHENE	NA	NA	25	7100	--	--	--	--
1,4-DICHLOROBENZENE	NA	NA	26	190	--	--	--	--
ACETONE	NA	NA	1500	NA	--	--	--	--
CARBON DISULFIDE	NA	NA	0.92	NA	--	--	--	--
CHLOROBENZENE	NA	NA	1.3	1600	--	--	--	--
CIS-1,2-DICHLOROETHENE	NA	NA	NA	NA	0.9 J	1	1.2	1.4
ETHYLBENZENE	NA	NA	90	2100	--	--	--	--
M+P-XYLENES	NA	NA	NA	NA	--	--	--	--
O-XYLENE	NA	NA	NA	NA	--	--	--	--
TOLUENE	NA	NA	2	15000	--	--	--	--
TOTAL XYLENES	NA	NA	13	NA	--	--	--	--
TRANS-1,2-DICHLOROETHENE	NA	NA	970	10000	--	--	--	--
TRICHLOROETHENE	NA	NA	21	300[3]	1	1.1	1.4	1.6
VINYL CHLORIDE	NA	NA	930	24[3]	--	--	0.33 J	0.4 J
FILTERED METALS (ug/l)								
ARSENIC	340	150	5	1.4[3]	1.1 J	1.2 J	1.1 J	1.2 J
BARIUM	NA	NA	4	NA	26	26	26	26
BERYLLIUM	NA	NA	0.66	NA	--	--	--	--
CHROMIUM	1246[5]	162[5]	74	NA	--	--	--	--
COBALT	NA	NA	23	NA	0.1 B	0.11 B	0.096 B	0.097 B
COPPER	33.06[5]	20[5]	9	NA	3.5	3.6	3.6	4
LEAD	179.6[5]	7[5]	2.5	NA	--	--	--	--
NICKEL	1051[5]	117[5]	52	4600	1.7 J	2.5	1.6 J	1.6 J
SELENIUM	NA	5	1	4200	--	--	--	--
VANADIUM	NA	NA	20	NA	--	0.49 J	0.59 J	--
ZINC	263.3[5]	265[5]	120	26000	8.9 J	9 J	9.1 J	11 J
MISCELLANEOUS PARAMETERS (ug/l)								
HEXAVALENT CHROMIUM[4]	16	11	11	NA	0.077 L	0.08 L	0.077 L	0.077 L

TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA

TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA
FOR FROG MORTAR CREEK SURFACE WATER SAMPLES- MARCH 2012

TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA
FOR FROG MORTAR CREEK SURFACE WATER SAMPLES- MARCH 2012
LOCKHEED MARTIN, MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

SAMPLE ID:	
LABORATORY ID	
SAMPLE DATE	
LOCATION	

TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA

TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA
FOR FROG MORTAR CREEK SURFACE WATER SAMPLES- MARCH 2012
LOCKHEED MARTIN, MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

SAMPLE ID:	MSA-SW44B-032012	MSA-SW44C-032012	MSA-SW44D-032012	MSA-SW45A-032012	MSA-SW45B-032012	MSA-SW45C-032012	MSA-SW45D-032012
LABORATORY ID	240-9383-30	240-9383-31	240-9383-32	240-9383-33	240-9383-34	240-9383-35	240-9383-36
SAMPLE DATE	3/20/2012	3/20/2012	3/20/2012	3/20/2012	3/20/2012	3/20/2012	3/20/2012
LOCATION	MSA-SW-44B	MSA-SW-44C	MSA-SW-44D	MSA-SW-45A	MSA-SW-45B	MSA-SW-45C	MSA-SW-45D
VOLATILES (ug/l)							
1,1-DICHLOROETHENE	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	--	--	--	--	--	--	--
ACETONE	--	--	--	2 J	--	--	--
CARBON DISULFIDE	--	--	--	--	--	--	--
CHLOROBENZENE	--	--	--	--	--	--	--
CIS-1,2-DICHLOROETHENE	3.3	3.2	2.9	2.6	2.8	0.9 J	0.63 J
ETHYLBENZENE	--	--	--	--	--	--	--
M+P-XYLENES	--	--	--	--	--	--	--
O-XYLENE	--	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--	--
TOTAL XYLENES	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	0.34 J	--	--	--
TRICHLOROETHENE	3.5	3.3	3.1	3.2	3.3	1	0.71 J
VINYL CHLORIDE	1.4	1.2	1.1	0.62	0.91	0.25 J	--
FILTERED METALS (ug/l)							
ARSENIC	1.3 J	1.1 J	1.2 J	1.3 J	1.1 J	1.1 J	1 J
BARIUM	26	26	25	25	25	25	26
BERYLLIUM	--	--	--	--	--	--	--
CHROMIUM	--	--	--	--	--	--	--
COBALT	0.25 B	0.18 B	0.19 B	0.2 B	0.2 B	0.083 B	0.093 B
COPPER	3.2	3.6	3.2	3.3	3.4	3	3.1
LEAD	--	--	--	--	--	--	--
NICKEL	1.8 J	1.7 J	1.7 J	1.8 J	1.8 J	1.5 J	1.5 J
SELENIUM	--	--	--	--	--	--	--
VANADIUM	--	--	0.54 J	0.46 J	--	--	--
ZINC	11 J	11 J	7.6 J	6.2 J	8.3 J	6.5 J	7.3 J
MISCELLANEOUS PARAMETERS (ug/l)							
HEXAVALENT CHROMIUM[4]	0.078 L	0.072 L	0.079 L	0.069 L	0.069 L	0.075 L	0.085 L

TABLE 1
CHEMICAL RESULTS AND SCREENING CRITERIA
FOR FROG MORTAR CREEK SURFACE WATER SAMPLES- MARCH 2012
LOCKHEED MARTIN, MARTIN STATE AIRPORT, MIDDLE RIVER, MARYLAND

1 National Recommended Water Quality Criteria, http://water.epa.gov/scitech/swguidance/standards/current/index.cfm;
and Maryland Numerical Criteria for Toxic Substances in Surface Waters, COMAR 26.08.02.03,