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February 20, 2017

VIA PRIVATE CARRIER

Mr. James R. Carroll
Program Administrator
Land Restoration Program
Land Management Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 625
Baltimore, Maryland 21230

Subject: Block E Soil Remedial Investigation Addendum Report:
Radiological Sediment Sampling of Outfall 006 and 008 Storm Drain Systems
Middle River Complex, Middle River, Maryland

Dear Mr. Carroll:

An investigation was performed of select storm drain manholes and storm drain catch basin inlets to determine if accumulated sediment contained radioactive material related to historical operations in Building D. The field activities occurred on September 12 and 13, 2016.

The Block E Soil Remedial Investigation Work Plan Addendum was implemented to meet Objective No. 9 listed in Section 1.2 of the parent Block E soil remedial investigation work plan. Objective 9.a, included in the aforementioned work plan addendum, specified that sediment samples be analyzed for both radiological constituents and polychlorinated biphenyls (PCBs). This letter report, however, explicitly addresses radiological constituent analysis of the samples; results regarding PCB sampling results will be provided in a separate document.

Investigation Approach and Methodology—Catch basins, inlets, and manholes were visually inspected to determine if they had an adequate sediment volume for laboratory analysis. On August 15, Tetra Tech personnel positioned sandbags in 11 manholes and storm-water inlets throughout Block E of the Middle River Complex (MRC) to promote sediment accumulation and facilitate sampling. Tetra Tech personnel then returned to the site on August 18th to assess the stability and efficacy of the original positioning, and to adjust the sandbag placement (where necessary) to optimize sediment deposition. The sandbags were left in place for four weeks to allow for sufficient sediment accumulation. The table below lists the initial sediment depth, locations where sandbags were placed, and notes if the location had enough sediment for sample collection.

Location	Initial depth of sediment accumulation	Adequate sample volume observed on August 15, 2016?	Sandbag placed?	At least 4-ounces of accumulated sediment available for sample collection observed on September 12-13, 2016?
CB-4	No sediment	No	Yes	No
CB-6	No sediment	No	Yes	Yes
CB-8	No sediment	No	Yes	No
IL-1	No sediment	No	Yes	No
IL-2	No sediment	No	Yes	No
IL-3	0.5 inches	Yes	No	Yes
IL-4	Blocked with airplane wing; unable to access			
IL-5	<0.5 inches	Yes	No	Yes
IL-6	No sediment	No	No	No
IL-7	<0.5 inches	Yes	Yes	Yes
IL-8	No sediment	Yes	Yes	Yes
IL-9	No sediment	No	Yes	No
IL-10	>2 inches	Yes	No	Yes
IL-11	Blocked with concrete top; unable to access			
IL-12	No sediment	No	Yes	No
IL-14	Unable to remove concrete lid			
IL-15	1-3 inches	Yes	No	Yes
IL-16	1 inch	Yes	No	Yes
IL-17	Sediment present under standing water; depth unknown	Yes	No	Yes
IL-18	Sediment present under standing water; depth unknown	Yes	No	Yes
IL-19	>2 inches	Yes	No	Yes
IL-20	>6 inches	Yes	No	Yes
IL-23	2 inches	Yes	No	Yes
IL-24	No sediment	No	Yes	No
IL-25	No sediment	No	Yes	No
MH-4	>6 inches	Yes	No	Yes
MH-7	6 inches	Yes	No	Yes
MH-7A	Caved-in vault; unable to access			
MH-9	2 inches	Yes	No	Yes

Radiological Surveys—Ten one-minute static measurements were collected outside the impacted area to establish the background and investigation levels. The calculated investigation level (mean background plus three standard deviations) was 4,785 counts per minute (cpm).

Adequate volume was available to collect 16 samples on September 12 and 13, 2016. Of those 16 samples, eight were shipped for offsite radiological analysis. One-minute static counts were obtained on each of the 16 samples. The values ranged from 2,908 to 4,695 cpm, and none exceeded the investigation level. The samples were analyzed by TestAmerica for isotopic uranium using methods 6020A, inductively coupled plasma-mass spectrometry (ICP-MS) and A-01-R, alpha spectrometry and for isotopic thorium using method A-01-R, alpha spectrometry. Sample results for the radionuclides of concern can be found in Table 1 and on Figure 1. Chain-of-custody forms and sediment sample log sheets corresponding with the sampling event are in Appendix A and B, respectively.

Sampling Results—All sample results were consistent with the results of previously analyzed samples, with the exception of sample E-SD-MH7-091216, which had a Th-232 result (1.44 picocuries per gram [pCi/g]) that exceeded the Block E background range. Previous sample result ranges were Th-232 – 0.354 – 1.07 pCi/g, U-234 – 0.028 – 7.53 pCi/g, U-235 – ND – 0.63 pCi/g, U-236 – ND and U-238 – ND – 1.37 pCi/g. Full laboratory sample reports are contained in Appendix C of this report.

Investigation Derived Waste—To reduce the investigation-derived waste (IDW) that was generated during this project, disposable spoons and nitrile gloves were used during sample collection, and the volume of sediment removed from the manholes and inlets was limited to that required to fill the sampling containers. At the end of each work day, the sampling spoons and nitrile gloves (the latter used as personal protective equipment [PPE]) were disposed of within facility trash receptacles; consequently, all IDW management responsibilities associated with the field work were fulfilled prior to demobilization.

If you have any questions regarding the work plan, please feel free to contact me at (301) 548-2209.

Sincerely,



Thomas D. Blackman
Project Lead, Environmental Remediation

cc: (via email without enclosure)
Gary Schold, MDE
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Table 1

Table 1
Sediment Sampling Results - Radiological
Block E Soil Remedial Investigation Addendum Report
Lockheed Martin Corporation
Middle River Complex, Middle River, Maryland

Sample ID	Alpha Spectroscopy (pCi/g)						ICP-MS (pCi/g)				
	Th-228 ¹	Th-230 ¹	Th-232	U-233/234	U-235	U-238	U-233	U-234	U-235	U-236	U-238
E-SD-IL18-091216	0.577	0.639	0.551	5.42	0.164	.0413	1.67 U	5.58 U	0.125	0.0116 U	0.299
E-SD-IL17-091216	0.811	0.736	0.601	1.51	0.0933	0.748	1.23 U	1.01 U	0.0416	0.0139 U	0.343
E-SD-MH9-091216	0.441	0.327	0.173	1.09	0.0316 U	0.450	1.15 U	1.25 U	0.0231 U	0.00258 U	0.246
E-SD-MH7-091216	1.41	1.31	1.44	3.66	0.123	1.29	4.32 U	2.04 U	0.0260 U	0.00864 U	0.371
E-SD-IL3-091216	0.954	0.168	0.0177 U	3.85	.0134	1.31	2.00 U	3.57 U	0.0915	0.0239 U	0.839
E-SD-IL20-091216	0.710	0.746	0.575	0.364	0.0190 U	0.424	1.89 U	1.33 U	0.0113 U	0.00526 U	0.200
E-SD-IL19-091216	0.585	0.702	0.604	0.454	-0.00328 U	0.435	0.901 U	0.539 U	0.0104 U	0.000672 U	0.138
E-SD-MH4-091216	0.604	0.461	0.539	0.984	0.0156 U	0.472	1.05 U	1.55 U	0.0249 U	0.0141 U	0.160

¹ – Not previously reported or tracked

U – Non-detect

Bolded and grey highlighted cell indicates exceedance of the Th-232 Block E background range

APPENDIX A- SAMPLING AND ANALYSIS FORMS

APPENDIX B- CHAIN-OF-CUSTODY FORMS

APPENDIX C- LABORATORY SAMPLE REPORTS