Block E Underground Storage Tank Closure Report
Lockheed Martin Middle River Complex
2323 Eastern Boulevard
Middle River, Maryland

Facility ID – 14810

Case # 14-0076BA

Prepared for:

Lockheed Martin Corporation

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ACRONYMS

Clean Harbors	Clean Harbors Environmental Services
DRO	diesel-range organic
Elite	Elite Environmental and Petroleum Services, Inc.
GRO	gasoline-range organic
Lockheed Martin	Lockheed Martin Corporation
MDE	Maryland Department of the Environment
µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
MRC	Middle River Complex
MSA	Martin State Airport
PCB	polychlorinated biphenyl
PID	photoionization detector
ppm	part(s) per million
SVOC	semivolatile organic compounds
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
Tetra Tech	Tetra Tech, Inc.
TPH	total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VC	vinyl chloride
VOCs	volatile organic compounds

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Section 1
Narrative

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech Inc. (Tetra Tech) has prepared this report detailing underground storage tank (UST) removal activities at the Middle River Complex (MRC), located in Baltimore County at 2323 Eastern Boulevard, Middle River, Maryland. The MRC site is comprised of approximately 160 acres with 12 main buildings. The property includes an active industrial area and yard, perimeter parking lots, an athletic field, a vacant concrete-covered lot, a trailer and parts storage lot, and numerous grassy areas along the facility perimeter. Locked chain-link fences surround all exterior lots and the main industrial area. The site is bounded by Eastern Boulevard (Route 150) to the north, Dark Head Cove to the south, Cow Pen Creek to the west, and Martin State Airport (MSA) to the east.

On July 18–19, 2013 Tetra Tech Inc. discovered two USTs in Block E of the MRC during excavation associated with the installation of a groundwater remediation system. Block E is in the southeastern portion of the MRC. Major features in Block E include the concrete foundation for the former Building D, a former aircraft assembly building that was demolished in the 1970s, and a 500,000-gallon fire-water tank. The USTs were discovered along the southeastern edge of the building foundation.

A location map for the two underground storage tanks (USTs), designated UST 1 and UST 2, is in Appendix A. The historical use of these USTs is unknown. On July 19, 2013, Tetra Tech collected a sample of the liquid contained in each tank by lowering disposable tubing through the fill pipe and pumping out the liquid using a peristaltic pump. The liquid in UST 1 was mostly clear and had a petroleum odor, whereas the liquid in UST 2 had no odor and had a purple sheen on the surface.

On July 20 and 21, 2013 the contents of the two tanks were transferred to Maryland Department of the Environment (MDE)-approved 55-gallon drums using contracted services provided by Clean Harbors Environmental Services (Clean Harbors) of Baltimore, Maryland. The tank

contents were then disposed of off-site. All product was removed from both USTs and placed in drums; some water was added to the tanks to help remove solids from the tank bottoms. The contents were then sampled for appropriate disposal parameters. Based on these data, the contents of UST 1 were appropriately disposed of as non-hazardous waste and the contents of UST 2 were disposed of as hazardous waste.

On July 31, 2013, Elite Environmental and Petroleum Services, Inc. (Elite) mobilized equipment to Block E of the MRC to remove UST 1 (500 gallon capacity) and UST 2 (275 gallon capacity). UST removal activities in Block E were conducted by MDE-certified technician Mr. Lawrence Macher (MDIC 2013-1907R; expires April 1, 2015) of Elite, under the supervision of MDE manager Ms. Jenny Herman. UST 1 was located between a footer of the former building and a storm sewer. UST 2 was located adjacent to a storm sewer and the basement floor of the former building. A concrete pad was encountered below UST 2. Photographic documentation of the UST removal is in Appendix B.

Both USTs were removed from the ground and cleaned by pressure washing over the excavation to remove any residual soil. Disposal receipts are in Appendix C. During excavation, a MiniRae® combustible-gas indicator monitored the workers' breathing zone; no alarms sounded during the removal activities. Multiple visible perforations were observed in the removed tanks, including small holes and tears in both tanks.

The on-site field technician used a MiniRae® photoionization detector (PID) to conduct field screening and personnel monitoring. Soils surrounding UST 1 were not stained or discolored. Soils near UST 1 had a maximum PID reading of 62 parts per million (ppm). Soils near UST 2 had a maximum PID reading of 2,000 ppm (i.e., the maximum organic-vapor range the MiniRae® can detect).

Soil excavation proceeded around UST 1, to excavate trenches for the remediation system being installed. During excavation of UST 2, contaminated soil was detected and could not be completely removed. MDE will oversee future remediation activities associated with the contaminated soil surrounding UST 2; these activities will be subject to MDE's Land Restoration Program.

The total depth of excavation around USTs 1 and 2 was approximately seven feet below ground surface during the tank removal. Some follow-up excavation was conducted at UST 2 on August 26, 2013, but the total excavation depth was not increased. The soil consisted mostly of silty clays and clayey silts. The excavations were backfilled with certified-clean soil from an off-site borrow source. The excavation was surface completed with gravel during the groundwater system installation. Soils excavated from beneath and along the sides of each tank were separated and temporarily staged on plastic sheeting at the site. These soils were later placed in a lined roll-off container for proper profiling and disposal. The soils were profiled as hazardous, and were removed from the site by SJ Transportation on November 11, 2013 and transported to Veolia Environmental Services, Port Arthur, Texas.

Additional groundwater and soil delineation was conducted at the location of USTs 1 and 2 in October 2013.

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Section 2
Soil and Groundwater Sampling

This section describes soil and groundwater samples collected for chemical analysis during underground storage tank (UST) removal. Appendix D contains a sampling location diagram. Analytical laboratory results for soil and groundwater samples are in Appendix E. The delineation report for soil and groundwater samples collected in October 2013 is included in Appendix F.

Following tank removal and soil excavation, two soil samples (UST-1-OH-1 and UST-2-OH-1) from beneath each UST were collected at seven feet below ground surface. Both soil samples were placed in wide-mouth laboratory-supplied glass jars and immediately placed on ice in a clean cooler. The cooler temperature was maintained at less than or equal to four degrees Celsius. Soil samples were analyzed by Caliber Analytical Services for full-suite volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Method 8260, for semivolatile organic compounds (SVOCs) by USEPA Method 8270, for total petroleum hydrocarbon (TPH)-diesel-range organics (DRO) and TPH-gasoline-range organics (GRO) by Method 8015, for polychlorinated biphenyls (PCBs) by USEPA method 2082, for toxicity characteristic leaching procedure (TCLP) SVOCs by USEPA Method 1311, and for TCLP VOCs by USEPA Method 1311.

One groundwater sample was collected from each UST excavation area (UST-MB-1 and UST-2-PW-1). Groundwater sample UST-MB-1 was analyzed by TestAmerica Laboratories (North Canton, Ohio) for full-suite VOCs by USEPA Method 8260, for SVOCs by USEPA Method 8270, for TPH-DRO and TPH-GRO by USEPA Method 8015, for PCBs by USEPA Method 2082, for TCLP SVOCs by USEPA Method 1311, and for TCLP VOCs by USEPA Method 1311. UST-2-PW-1 was analyzed by Caliber Analytical Services for full-suite VOCs by USEPA Method 8260, for SVOCs by USEPA Method 8270, for TPH-DRO and TPH-GRO by USEPA Method 8015, for PCBs by USEPA Method 2082, for TCLP SVOCs by USEPA Method 1311, and for TCLP VOCs by USEPA Method 1311.

Additional soil and groundwater delineation samples were collected around both tanks on October 1–10, 2013. The sampling activities, including sample locations, analytical parameters, and results are presented in Appendix F.

Section 3
Analytical Results

The analytical results for the water and soil samples are in Appendix E. Table 3-1 presents positive detections in the two soil samples (UST-1-OH-1 and UST-2-OH-2) collected after the USTs had been removed and before additional soil removal on August 26. The two soil samples were compared to Maryland Department of the Environment (MDE) soil standards (MDE, 2008). No exceedances of residential or non-residential screening criteria were detected in the soil sample collected beneath UST 1. Toxicity characteristic leaching procedure (TCLP) trichloroethene (TCE), detected at 1,400 micrograms per liter (µg/L), was the only analyte detected above its screening criterion (500 µg/L) at UST 2.

Table 3-2 presents positive detections for the two water samples (UST-MB-1 and UST-MW-1) collected from the bottom of each UST excavation area. Analytical results from these two water samples were compared to MDE groundwater standards (MDE, 2008). Naphthalene (29 µg/L) and total petroleum hydrocarbon (TPH)-diesel range organics (DRO) [9,800 µg/L] exceeded MDE groundwater standards (10 µg/L and 470 µg/L, respectively) in the groundwater sample collected at UST 1. TCE (32,000 µg/L) and Aroclor 1260 (3 µg/L) were the only compounds to exceed MDE groundwater standards (5 µg/L and 0.5 µg/L, respectively) in the water sample collected at UST 2.

Additional soil and groundwater delineation samples were collected around both tanks on October 1–10, 2013. The delineation sampling report and results are in Appendix F. Six SVOCs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were detected near UST 1 at concentrations above their respective MDE residential-soil cleanup criteria. Four of these six (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and dibenz[a,h]anthracene) also exceed their MDE non-residential-soil cleanup criteria. Aroclor-1260 was also detected around UST 1 above its residential and non-residential cleanup criteria.

Soil delineation sampling around UST 2 detected two VOCs (TCE and vinyl chloride [VC]) above the residential-soil cleanup criteria. TCE was the only VOC around UST 2 detected above its non-residential-soil cleanup criterion. Five SVOCs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were detected around UST 2 above their respective MDE residential-soil cleanup criteria, but only benzo(a)pyrene was detected above its non-residential-soil cleanup criterion.

The following six compounds were detected above MDE groundwater cleanup criteria around UST 2 during groundwater delineation sampling (see Appendix F): TCE, acetone, cis-1,2-dichloroethene, carbon tetrachloride, methyl tert-butyl ether, and VC. Groundwater samples were not collected around UST 1 during soil delineation sampling. No exceedances of compounds associated with the Oil Control Program were detected during site sampling.

Table 3-1
Underground Storage Tank Soil Sampling Results,
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Sample ID	MDE residential-soil cleanup standard	MDE non-residential-soil cleanup standard	UST-1-OH-1	UST-2-OH-1
Sampling date			8/14/2013	8/7/2013
Semivolatile organic compounds (µg/kg)				
Naphthalene	160,000	4,100,000	1,900	ND
2-Methylnaphthalene	160,000	4,100,000	1,400	ND
Volatile organic compounds (µg/kg)				
Cyclohexane	—	—	9,800	ND
Methylcyclohexane	—	—	37,000	ND
Ethylbenzene	780,000	20,000,000	5,600	ND
m&p-Xylenes	16,000,000	410,000,000	7,100	ND
Isopropylbenzene	780,000	20,000,000	3,600	ND
Trichloroethene	580,000	520,000	ND	140,000
Polychlorinated biphenyls (µg/kg)				
Aroclor 1254	320	2,900	0.9	ND
Toxicity characteristic leaching procedure (TCLP) volatile organic compounds (µg/L)				
TCLP trichloroethene	500	500	ND	1,400

Notes:

Shaded areas denote exceedance of cleanup criteria
MDE: Maryland Department of the Environment
ND: not detected
TCLP: toxicity characteristic leaching procedure
UST: underground storage tank
µg/kg: microgram(s) per kilogram
µg/L: microgram(s) per liter
—: no MDE cleanup standard

Table 3-2
Underground Storage Tank Groundwater-Sampling Results,
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Sample ID	MDE groundwater cleanup standard	UST-MB-1	UST-2-PW-1
Sampling date		8/1/2013	8/2/2013
Semivolatile organic compounds (µg/L)			
1,1'-Biphenyl	—	0.72*J*	ND
1,4-Dioxane	—	1.5	ND
2-Methylnaphthalene	20	15	ND
Acenaphthene	37	0.28	ND
Acenaphthylene	37	0.13*J*	ND
bis(2-ethylhexyl)phthalate	20	1.1*J*	ND
Diethyl phthalate	2900	3.3	ND
Fluorene	24	0.59	ND
N-Nitrosodiphenylamine	50	0.8*J*	ND
Phenanthrene	180	0.43	ND
Pyrene	18	0.39	ND
Volatile organic compounds (µg/L)			
1,1,2-Trichlorotrifluoroethane	—	ND	70
1,2,3-Trimethylbenzene	—	21	ND
1,2,4-Trimethylbenzene	—	55	ND
2-Butanone	190	3.3*J*	ND
p-Isopropyltoluene	—	0.52*J*	ND
4-Methyl-2-pentanone	50	2.1*J*	ND
Acetone	61	6.1*J*	ND
Chloroform	80	ND	20
cis-1,2-Dichloroethene	70	ND	40
Ethylbenzene	700	5.4	ND
Isopropylbenzene	66	1.5*J*	ND
m&p-Xylene	—	25	ND
Naphthalene	10	29	ND
n-Propylbenzene	—	4.3	ND
o-Xylene	—	18	ND
sec-Butylbenzene	—	0.65*J*	ND

Notes:

Shaded areas denote exceedance of cleanup criteria
B: analyte detected in associated laboratory blank
J: analyte detected at an estimated concentration
MDE: Maryland Department of the Environment
ND: not detected
TCLP: toxicity characteristic leaching procedure
UST: underground storage tank
µg/L: microgram(s) per liter
—: no MDE cleanup standard

Table 3-2
Underground Storage Tank Groundwater-Sampling Results,
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Sample ID	MDE groundwater cleanup standard	UST-MB-1	UST-2-PW-1
Sampling date		**8/1/2013**	**8/2/2013**
Volatile organic compounds (µg/L) (continued)			
Tetrachloroethene	5	2.3	ND
Toluene	1000	1.6*J*	ND
Trichloroethene	5	1.5*J*	32,000
Xylenes (total)	10000	43	ND
Polychlorinated biphenyls (µg/L)			
Aroclor 1260	0.5	ND	3
Total petroleum hydrocarbons (µg/L)			
Gasoline-range organics	470	330*B*	ND
Diesel-range organics	470	9,800	ND
Toxicity characteristic leaching procedure metals (µg/L)			
Barium	—	0.0018*JB*	ND

Notes:

Shaded areas denote exceedance of cleanup criteria
B: analyte detected in associated laboratory blank
J: analyte detected at an estimated concentration
MDE: Maryland Department of the Environment
ND: not detected
TCLP: toxicity characteristic leaching procedure
UST: underground storage tank
µg/L: microgram(s) per liter
—: no MDE cleanup standard

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Section 4
Conclusions and Recommendations

The Middle River Complex (MRC) is an industrial site at 2323 Eastern Boulevard in Middle River, Maryland. On July 18–19, 2013, Tetra Tech Inc. (Tetra Tech) discovered two underground storage tanks (USTs) near Block E in the MRC. The USTs were removed and analytical samples were collected. Soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and toxicity characteristic leaching procedure (TCLP) volatiles and semivolatiles.

No regulatory exceedances were detected in the soil sample collected from beneath UST 1. The soil sample collected from beneath UST 2 had one exceedance: TCLP trichloroethene (TCE). Groundwater samples were analyzed for VOCs, SVOCs, PCBs, and TCLP metals. Naphthalene and total petroleum hydrocarbon-diesel-range organics exceeded MDE groundwater standards in the water sample collected at UST 1. Trichloroethene and Aroclor 1260 (a PCB) were the only compounds to exceed MDE groundwater standards in the water sample collected at UST 2.

An additional investigation was conducted on the soils and groundwater surrounding the USTs to delineate the extent of contamination. A copy of that report is in Appendix F. Because the USTs were removed and analytical results from confirmatory soil samples collected subsequent to removal of the USTs do not indicate the presence of compounds regulated by the Maryland Department of the Environment (MDE) Oil Control Program, the MDE Land Restoration Program will oversee further remediation of soil and groundwater contamination near the USTs. Tetra Tech is currently preparing a plan for this remediation.

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Section 5
References

1. MDE (Maryland Department of the Environment), 2008. *Cleanup Standards for Soil and Groundwater.* Interim Final. Update No. 2.1. June.

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APPENDIX A—UST LOCATION MAP

APPENDIX B—PHOTOGRAPHIC DOCUMENTATION

UST #1 extraction

UST # 1 perforations

Close-up of UST #2 following extraction and washing

APPENDIX C—RECEIPTS

APPENDIX D—SAMPLING LOCATION DIAGRAM

APPENDIX E—ANALYTICAL LABORATORY REPORT

APPENDIX F—UST 1 AND UST 2 DELINEATION REPORT

APPENDIX G—30-DAY NOTIFICATION FORM, REGISTRATION FORMS, AND MDE TANK REMOVAL REPORT