Final

Phase II Investigation Report

104-Acre Parcel of Land Surrounding Poultry Road

Beltsville, MD 20705

Environmental Documentation in Support of
USACE Baltimore

Contract #: W912DR18D007
Delivery Order #: W912DR19F0371

Prepared for:

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and

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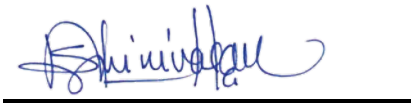
DECLARATIONS

SIA-TPMC, LLC prepared this Phase II Investigation Report for the 104-Acre Parcel of Land Surrounding Poultry Road in Beltsville, MD in support of USACE Baltimore. The objective of this Phase II Investigation was to obtain additional data associated with the recognized environmental conditions identified in previous investigations to further evaluate the potential impact of contaminants in soil and groundwater. The investigation was conducted in a manner consistent with ASTM E1903-11 *Standard Practice for Environmental Site Assessments*: Phase II Environmental Site Assessment Process and State of Maryland Jurisdiction standards. The conclusions and recommendations provided in this Phase II Investigation Report provide information to supplement the Bureau of Engraving and Printing Leadership decision-making process regarding this Site.



CEO

Phase II Assessor

INDEPENDENT TECHNICAL REVIEW

Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used, and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with existing USACE policy. This review was completed following the procedures detailed SIA's Project Quality Control Plan, revised in January 2019.

Independent Technical Reviewer

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LIST OF ACRONYMS

ºC	degree Celsius
%	Percent
AOC	Areas of Concern
ARS	Agricultural Research Service
ASTM	American Society for Testing and Materials International
BAI	Bureau of Animal Industry
BARC	Beltsville Agricultural Research Center
BEP	Bureau of Engraving and Printing
BGS	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CCV	Continuing Calibration Verification
COC	Chain of Custody
DoD	Department of Defense
DRO	Diesel Range Organics
ECP	Environmental Condition of Property
FDA	Food and Drug Administration
GIS	Geographic Information System
GPS	Global Positioning System
GRO	Gasoline Range Organics
IDW	Investigation-derived waste
ITR	Independent Technical Review
LCS	Laboratory Control Sample
LCS	Laboratory Control Sample Duplicates
LOQ	Limit of Quantitation
MB	Method blanks
MCL	Maximum Contaminant Level
MCPP	Mecoprop
MDE	Maryland Department of the Environment
MDL	Method Detection Limit
mg/kg	Milligram/Kilogram
MS/MSD	Matrix Spike and Matrix Spike Duplicate
MW	Monitoring Well
NFA	No Further Action
OCP	Oil Control Program
PAH	Polycyclic Aromatic Hydrocarbons
pCi/g	picocuries per gram
PID	Photoionization Detector
PM	Project Manager

PPM	parts per million
PS	Perimeter Sample
PVC	Polyvinyl chloride
QA/QC	Quality Assurance / Quality Control
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
R-O-S	Reserved Open Space
RPD	Relative percent difference
RSL	Regional Screening Levels
SB	Soil Boring
SDAT	Maryland State Department of Assessments & Taxation
SIA-TPMC	SIA-TPMC, LLC
SOP	Standard Operating Procedure
SVOC	Semi-Volatile Organic Compound
TestAmerica	TestAmerica Savannah
TPH	Total Petroleum Hydrocarbons
ug/L	micrograms per liter
U.S.	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground storage tanks
VOC	Volatile organic compounds
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

This Phase II Environmental Site Investigation Report (Phase II Report) has been developed for the Bureau of Engraving and Printing (BEP) at United States Department of Agriculture's (USDA) Beltsville Agricultural Research Center (BARC) Beltsville, Maryland located at the Poultry Research Area at USDA BARC, Poultry Road, Beltsville, MD 20705 in Prince George's County ("Site"). The United States Army Corps of Engineers (USACE) – Baltimore District, on behalf of BEP, retained SIA-TPMC, LLC (SIA-TPMC) via Contract # W912DR18D007 and Delivery Order # W912DR19F0371 to prepare this Phase II Investigation. The goals of this Phase II Investigation were to:

- Conduct a focused field investigation and sampling program designed to either confirm or deny the presence of suspect contamination resulting from the Recognized Environmental Conditions (RECs) identified in a Draft-Final Environmental Condition of Property (ECP) Report dated, August 2019 completed by SIA-TPMC, LLC.
- Determine whether additional investigative or remedial activities are warranted.

A REC is defined in ASTM International (ASTM) D5746-98 (2016) *Standard Classification of Environmental Condition of Property Area Types for Defense Base Closure and Realignment Facilities* is defined as:

> *The presence or likely presence of any hazardous substances or petroleum products on any DoD real property under conditions that indicate an existing release, a past release, or the material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to the public health or environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.*

This Phase II Investigation was conducted in accordance with the Final Phase II Investigation Work Plan (SIA 2019). The Work Plan was prepared in general conformance with the following standards:

- ASTM E 1903-11 *Standard Practice for Environmental Site Assessments*: Phase II Environmental Site Assessment Process (June 15, 2011).
- United States Environmental Protection Agency (USEPA) Screening Levels

This document provides a data summary regarding the collection, identification, and analysis of soil and water samples collected at the 104-Acre Parcel of Land surrounding Poultry Road; hereafter referred to as the Site. Samples collected at the Site were analyzed for full Resource Conservation and Recovery Act (RCRA) suite and radiological contaminants of concern.

2.0 BACKGROUND

2.1 SITE DESCRIPTION AND FEATURES

The Site is located in Prince George's County, Beltsville, Maryland and is identified as District 01, Tax Account 0070151, Map 0019, Grid 00D4, Parcel 0143 with the legal description "U S D A (0070136 & 44 &77 & 69&73 & PT 2 8 & 0070219 DL& COMB)" according to the Maryland State Department of Assessments & Taxation (SDAT) Real Property Data Search. The Site consists of a 104-acre parcel on which 23 buildings previously used for poultry research and one building serving as BARC's Wildlife Office reside. The remainder of the 104 acres is covered with cropland, forest, pasture, wetlands, two main parking areas, and paved/unpaved roads. The main road that runs north/south through the Site is Poultry Road. Currently, the only active buildings on the Site are Building 253A used by BARC Wildlife Office, Building 277 used to quarantine chickens and Building 267/surrounding area as a bee sanctuary.

2.2 PHYSICAL SETTING

The USDA Natural Resources Conservation Service soil maps for Prince George's County describe numerous soil associations and groups of soils within the facility. Many of these units are described as comprising of silty loam, loamy sand, and sandy loam of variable slope, drainage characteristics, and susceptibility to erosion. Surface soils are underlain by highly variable deposits ranging from gravels to clays, some as old as the Cretaceous Period.

The geology at BARC consists of Lower Cretaceous sediments of the Potomac Group, which consists of the Patuxent, the Arundel, and the Patapsco Formations, respectively decreasing in age. The Patuxent and Patapsco Formations are composed primarily of sand and gravel and comprise of the most prevalent water bearing aquifers in Prince George's County. The Arundel is mostly clay and creates artesian conditions in the underlying Patuxent Formation in some locations. Recharge of the Patuxent Formation occurs where it outcrops in the western portions of BARC. This wedge of sediments made up of the Patuxent, Arundel, and Patapsco Formations dips to the southeast, parallel to the regional groundwater flow (Apex, 1991).

The Site lies on the Patuxent Formation. Soil textures beneath the site are well-sorted sand and gravel with minor clay lenses. This sand and gravel sequence overlie several feet of clay, below which are the igneous and metamorphic rocks of the Piedmont Province.

The USACE defines wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Characteristics associated with wetlands were observed in the southern pasture on the eastern portion of the Site. However, according to Geographic Information System (GIS) data provided by USACE, there is only one identified wetland location within the Site which is located on the southwestern part of the property.

2.3 HISTORIC LAND USE AND ADJACENT PROPERTY

Located in the USDA's Agricultural Research Service's (ARS) BARC Central Farm, the Site was used for part of the Bureau of Animal Industry (BAI). In 1910, the Experimental Farm for Dairy & Animal Husbandry was established. In 1917, the Poultry Farm was established and by the late

1930s, several poultry research laboratories and buildings were constructed off Poultry Road. The poultry research conducted at the Site included experiments on poultry breeding, studying the incubation of eggs, and the effects of feeding on egg production. Researchers focused on breeding and nutritional studies with the goal of making chickens more economically productive for farmers and the poultry industries.

The Site is surrounded by USDA BARC owned land to the south (USDA BARC Poultry Research), east (USDA BARC 300 Building Cluster), and west (USDA BARC Cropland). The northern portion of the property is gated, and on the other side of the gate Odell Road runs east-west. Residential homes can be found bordering the northern part of Odell Road. All of the USDA owned land surrounding the property is zoned as Residential and Reserved Open Space (R-O-S), while the adjacent land to the north is zoned as Residential.

2.4 SUMMARY OF PREVIOUS ASSESSMENTS

Site history for the Site is outlined in a Draft ECP prepared by SIA-TPMC, dated August 2019. A summary of the RECs and noted property conditions outlined in the Draft ECP conducted by SIA-TPMC can be found below:

1. REC: Potential underground storage tanks (UST) at Building 261 (Boiler House)

Building 261 floor plans dated March 1934 for the Boiler House indicates the presence of a five-foot diameter oil tank and supply lines to the boilers. Additional floor plans of Building 261 from 1963, show the presence of a 6,000-gallon fuel oil UST and a 2,000-gallon fuel oil UST located east of the Boiler House. The Boiler House is listed on Maryland Department of Environment's (MDE) Oil Control Program (OCP). The presence of these USTs could not be determined during the ECP site reconnaissance conducted by SIA-TPMC. Based on the age of the buildings, there is a potential that the USTs may have leaked fuel oil to the subsurface soils and groundwater.

2. REC: Petroleum Related Spill Incidents

According to MDE's OCP database, 12 petroleum related spill incidents have occurred at the Site between 1987 and 2009. The following buildings were listed within the database and were identified as RECs: Building 236, Building 254, Building 255, Building 261 and Building 267

3. Other property conditions: Building 246

The Draft ECP states Building 246 stored radiological waste in the form of radioactive animal carcasses.

4. Other property conditions: Rusted equipment between Buildings 262 and 263

The Draft ECP photolog features a rusted piece of equipment, an Easy Way Oiler, located on the parking lot between Building 262 and Building 263. It appears this piece of equipment was used for the application of insecticide on livestock.

5. Other property conditions: Empty transformer pad west of Building 262

The Draft ECP photolog features an empty transformer pad west of Building 262.

Three (3) Areas of Concern (AOC), BARC 9, BARC 26, and ENECH R3 were also identified in reports conducted by BMT Entech, adjacent to the eastern border of the property which may have impacted environmental conditions on the Site. All the information provided below can be found at the USDA BARC Data Repository. A summary of the assessments can be found below:

BARC 9

The BARC 9 AOC covers approximately 70 acres in the Central Farm east of the Poultry Area and south of Odell Road. The western portion of the BARC 9 AOC extends onto the north-east part of the Site. This AOC was first identified in the 1991 Preliminary Assessment/Site Inspection as a surface disposal area. Evidence of possible surface disposal was first detected in 1943 aerial photographic coverage of the AOC. Disposal operations continued through the 1950s until approximately 1963 when the area was apparently abandoned and overgrown by vegetation.

A non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal action of surface debris was completed in 1997. Eighty-seven dump truck loads of miscellaneous solid waste were removed from the site for disposal. Subsequent investigations were carried out in 2001 and 2002 as part of the Site Screening Process to delineate the extent of elevated concentrations of lead, manganese, and Polycyclic Aromatic Hydrocarbons (PAHs) in surface soils. PAHs are found in oils and fuels and can be carcinogenic. High concentrations of these contaminants were not extensive and did not exceed the facility wide ecological cleanup goals.

The current status for this AOC is registered as No Further Action (NFA).

BARC 26

The Dump Off Poultry Road is located to the southwest of BARC 9 and is situated in an excavated area approximately 80 feet long by 100 feet wide near the crest of a south-facing hillside.

This AOC was identified in the 1991 PA/SI as being the site of a former "trench silo." BARC personnel indicated that this AOC was used to dispose of chicken manure and other unspecified wastes from poultry operations.

The site was investigated in 2001 as part of the Site Screening Process. Metals, including arsenic, were found in soil samples. The concentrations of contaminants detected at the site were not considered to be at levels that posed significant human or ecological risks, and no further action was recommended and accepted for the site.

The current status for this AOC is registered as NFA.

ENTECH R3

ENTECH R3 is located west of the Food and Drug Administration (FDA) facility, approximately 100 feet south of the BARC Well #5 pump house.

ENTECH R3 was identified and investigated during a 1996 field reconnaissance. Numerous surface-disposed items were identified at this AOC, including spray paint cans, scrap metal, small animal hutches, aluminum trash cans, metal buckets, and metal cones.

The 2000 Site Screening Process investigation identified concentrations of metals in soil (primarily manganese) in soil greater than their EPA Region III Human Health Risk screening levels. The concentrations of contaminants detected at the site were not considered to be at levels that posed

significant human or ecological risks, and no further action was recommended and accepted for the site.

The current status for this AOC is registered as NFA.

3.0 WORK PERFORMED AND RATIONALE

Prior to the field investigation activities, SIA's drilling subcontractor, Earth Matters, INC. (Earth Matters), coordinated with the Maryland's one-call utility clearance system - MISS UTILITY service (1-800-257-7777) and completed the underground utility clearance at the Property. As an additional measure of precaution, Earth Matters contracted a private utility locator, GPRS, who completed a utility locate at each proposed drilling location. A copy of the private utility job summary can be viewed in **Appendix C**.

On October 14, 2019, SIA-TPMC staff (Charlie Gaines, Tom Hope, and Anthony Dibartolo) mobilized to the Property and conducted onsite safety tailgate meeting with drilling subcontractor, Earth Matters. SIA-TPMC reviewed the safety procedures, the scope of work and discussed the planned sampling activities. The proposed sampling locations were visually inspected prior to the beginning of the investigation. The field effort took place from October 14, 2019 through November 4, 2019. Each day Earth Matters utilized the Geoprobe® to advance borings. SIA-TPMC conducted a safety tailgate meeting at 0730 and reviewed the appropriate AHAs according to the proposed site activities for that day. All Safety Tailgate Forms can be viewed in **Appendix C**.

The soil and groundwater sampling activities were conducted in accordance with the procedures and protocols detailed in the approved Work Plan (SIA 2019). All field calibration logs from the field investigation can be viewed in **Appendix C**.

The sample locations were established from the following rationale listed in Table 3-1 below:

Table 3-1: Sampling Location Rationale

REC	Sample Location	Rationale
Potential UST at Building 261 (Boiler House)	SB-1/MW1 SB-2/MW2B	Building 261 floor plans dated March 1934 for the Boiler House indicates the presence of a five-foot diameter oil tank and supply lines to the boilers. Additional floor plans of Building 261 from 1963, show the presence of a 6,000-gallon fuel oil UST and a 2,000-gallon fuel oil UST located east of the Boiler House. Two soil borings were advanced in the suspected USTs area to investigate the possibility of soil and groundwater contamination in the vicinity of the suspect USTs.
Petroleum Related Spill Incidents listed on MDE OCP Database	SB-3/MW3 SB-4 SB-5/MW5 SB-6/MW6	According to MDE's OCP database, 12 petroleum related spill incidents have occurred at the Property between 1987 and 2009. The following buildings were listed within the database and were identified as RECs: Building 236, Building 254, Building 255, Building 261 and Building 267. Four soil borings were advanced in the vicinity of the buildings listed on MDE's OCP database

Other Property Conditions	Sample Location	Rationale
BEP High interest Area	SB-7/MW7 SB-8 SB-9/MW9 SB-10/MW10	BEP expressed interest in sampling the areas around Building 281 and in the western corn field. Four soil borings were advanced in the area BEP has expressed as "high interest." These borings include two locations in the corn field located on the western portion of the Site and two locations located near Building 281
Building 246	SB-11	The Draft ECP states Building 246 stored radiological waste in the form of radioactive animal carcasses. One soil boring was advanced adjacent to the building to assess potential environmental contamination based on this building's past operation/use.
Rusted Equipment between Buildings 262 and 263	SB-12	The Draft ECP photolog features a rusted piece of equipment, an Easy Way Oiler, located on the parking lot between Building 262 and Building 263. It appears this piece of equipment was used for the application of insecticide on livestock. One soil boring was advanced in close proximity to the equipment to assess for potential environmental contamination.
Empty transformer pad west of Building 262	SB-14	The Draft ECP photolog features an empty transformer pad west of Building 262. Since there is no formal documentation stating the proper removal of these transformers, one soil boring was advanced adjacent the empty pad to assess for potential environmental contamination.
Additional Locations	SB-13 SB-15	Two soil borings were advanced to assess for environmental contamination, with the first adjacent to the buildings used for poultry research and for storing poultry equipment, and the second boring was advanced at the northern part of the Site.
	SB-PS-1 SB-PS-2 SB-PS-3 SB-PS-4 SB-PS-5	Five soil borings were advanced near the eastern boundary of the site at the areas closer to BARC Well #5 pump house, which is approximately 100-ft south of ENTECH-R3 to assess for potential environmental contamination. These sample locations were classified as perimeter samples (PS).
	MW11 MW14 MW15B MW12B MW13	Five soil borings were advanced to collect representative samples of the groundwater located within the site boundary.

3.1 SCOPE OF ASSESSMENT

As part of the Phase II Investigation scope, possible soil and groundwater contamination was investigated. SIA-TPMC collected Twenty-seven (27) soil and thirteen (13) groundwater samples from the soil borings and temporary groundwater monitoring wells, respectively. These samples were analyzed for full suite RCRA Analysis by Eurofins TestAmerica, a Department of Defense (DoD) accredited analytical laboratory. Ten (10) of the twenty-seven (27) soil samples were collected from the areas closer to BARC Well #5 pump house. These soil samples were analyzed for radiological constituents including uranium, thorium-232, and radium.

The purpose of the Phase II Investigation is to:

- Assess the potential risk posed to the property from possible contamination of hazardous substances;
- Assess the potential risk that hazardous substances may be located under the property; and
- Assess the potential risk that existing conditions on the property may violate applicable environmental laws.

The investigation scope is intended to provide the following:

- A due diligent site evaluation to identify environmental contamination;
- The level and extent of environmental contamination; and
- Information to support readily discernable environmental liabilities.

3.2 EXPLORATION, SAMPLING, AND TEST SCREENING METHODS

3.2.1 Soil Investigation

To evaluate subsurface conditions at the Site, twenty (20) soil borings were advanced utilizing a Geoprobe drill rig. A Trimble Global Positioning System (GPS) was used to accurately locate the soil boring locations prior to field mobilization. The twenty (20) borings (SB-1 through SB-15 and SB-PS-1 through SB-PS-5) are depicted on Figure 3 in **Appendix A**. Soil borings were performed by SIA-TPMC's subcontractor Earth Matters, who is qualified and licensed in Maryland. Prior to drilling activities, a private utility locate was completed and can be viewed in **Appendix C**. Soil samples were collected to depths ranging from 0 to 10 feet bgs using a track-mounted direct-push drill rig. Each boring was continuously logged in accordance with the Unified Soil Classification System (USCS); boring logs are provided as **Appendix C**. Continuous soil cores were collected by driving a hydraulic percussive stainless-steel sampling probe equipped with dedicated acetate tube liners. Soil cores were observed and visually documented for discoloration and screened for volatile organic compounds (VOCs) using a photoionization detector (PID). Table 4-1 in section 4.1 shows the PID readings for all the soil sample locations. Soil samples were collected from approximately 0-2, 2-4, 4-6 and 8-10 feet bgs at respective locations; select depth intervals were adjusted to target indications of chemicals (e.g., visual or olfactory observations, elevated PID measurements).

Soil samples were transferred into laboratory-supplied containers, maintained at the appropriate holding temperature, and submitted on expedited turnaround time to Eurofins TestAmerica. Soil samples were analyzed for full suite RCRA and radiological constituents depending on the area the

sample is collected from. Table 3-2 and 3-3 provide details on the soil samples collected and sent to Eurofins TestAmerica for analyses.

Table 3-2: Soil Samples and RCRA Analyses

Sample ID	Date Sampled	Lab Sample ID	Analyses	RCRA Analyses Analyte/Method
SB11-0-2	10/14/2019	680-175415-1	RCRA	VOCs/SW 8260B SVOCs(PNAs included)/SW 8270D Pesticides/SW 8081B PCBs SW/8082A Herbicides/SW 8151A DRO/SW 8015C GRO/SW 8015C RCRA Metals/SW 6010D/7471B TCLP Prep for VOCs (ZHE)/SW 1311 TCLP Prep for non-VOCs/SW 1311 SPLP Prep for VOCs (ZHE)/SW 1312 SPLP Prep for non-VOCs/SW 1312 Flashpoint/SW 1020B Corrosivity/SW 9045D Cyanide/SW 9010C/9012B Acid Soluble Sulfide/SW 9030B/9034
SB12-0-2	10/14/2019	680-175415-2	RCRA	
SB13-0-2	10/14/2019	680-175415-3	RCRA	
SB14-0-2	10/14/2019	680-175415-4	RCRA	
SB15-0-2	10/14/2019	680-175415-5	RCRA	
SB14-0-2-DUP	10/14/2019	680-175415-6	RCRA	
SB3-0-2	10/15/2019	680-175478-1	RCRA	
SB4-0-2	10/15/2019	680-175478-2	RCRA	
SB6-0-2	10/15/2019	680-175478-3	RCRA	
SB5-0-2	10/15/2019	680-175478-4	RCRA	
SB9-0-2	10/15/2019	680-175478-5	RCRA	
SB7-0-2	10/15/2019	680-175478-6	RCRA	
SB8-0-2	10/17/2019	680-175642-1	RCRA	
SB10-0-2	10/17/2019	680-175642-2	RCRA	
SB1-4-6	10/18/2019	680-175694-1	RCRA	
SB1-8-10	10/18/2019	680-175694-2	RCRA	
SB2-4-6	10/18/2019	680-175694-3	RCRA	
SB2-8-10	10/18/2019	680-175694-4	RCRA	

Table 3-3: Soil Samples and Radiological Analyses

Sample ID	Date Sampled	Lab Sample ID	Analyses Analyte/Method
SB-PS1-0-2	10/14/2019	680-175423-1	Gamma Scan/DOE HASL 300 4.5.2.3/Ga-01-R Tritium/EPA 906.0 Mod Carbon-14/EPA EERF C-01 Mod Gross Alpha, Beta/EPA 900.0 Mod/SW 9310 Mod Radium-226/EPA 903.1 Mod
SB-PS1-2-4	10/14/2019	680-175423-2	
SB-PS2-0-2	10/14/2019	680-175423-3	
SB-PS2-2-4	10/14/2019	680-175423-4	
SB-PS3-0-2	10/14/2019	680-175423-5	
SB-PS3-2-4	10/14/2019	680-175423-6	
SB-PS4-0-2	10/15/2019	680-175485-1	
SB-PS4-2-4	10/15/2019	680-175485-2	
SB11-0-2	10/14/2019	680-175485-3	
SB-PS5-0-2	10/15/2019	680-175485-4	
SB-PS5-2-4	10/15/2019	680-175485-5	

All field equipment used during soil investigative activities was decontaminated prior to sampling and between sample locations on a decontamination pad using Alconox detergent/potable water wash and potable water rinse. Sampling personnel used disposable nitrile gloves during sampling and changed gloves between each sample location. Decontamination fluids were captured and placed in a 55-gallon drum labeled “Non-hazardous Waste.”

One field duplicate soil sample was collected to evaluate sample homogeneity and laboratory accuracy. The field duplicate was collected, numbered, packaged, and sealed in the same manner as the primary samples. One equipment rinsate sample was collected at the end of the sampling event and used to evaluate the effectiveness of the decontamination process. Trip blank samples accompanied each sample shipment submitted for VOC analysis to check for potential cross contamination during shipment.

Soil boring logs from the field investigation can be located in **Appendix C**.

3.2.2 Groundwater Investigation

To further evaluate subsurface conditions at the Site, thirteen (13) one-inch diameter Polyvinyl chloride (PVC) temporary monitoring wells (MW) were installed utilizing a Geoprobe 7720. The temporary MWs were completed with 10-feet of one-inch screen and a one-inch PVC riser. A Trimble GPS unit was used to accurately locate the groundwater boring locations prior to field mobilization. Well permits were obtained from MDE prior to installing the temporary monitoring wells. The thirteen (13) temporary monitoring wells are depicted on Figure 3 in **Appendix A**. Prior to sample collection of the temporary wells, up to three (3) well volumes were purged, and physical parameters were recorded using a multiparameter water quality meter before sample collection. All groundwater sampling activities conducted at the Site were in accordance with EPA’s Operating Procedure, SESDPROC-301-R4, Groundwater Sampling. A duplicate groundwater sample was collected to evaluate field sampling precision or reproducibility of measurements of the same parameter under the given set of conditions. Once sampling activities were completed, SIA-TPMC abandoned the temporary monitoring wells in accordance with MDE well permit requirements. The State of Maryland issued Well Permit and Well abandonment logs can be viewed in **Appendix C**.

The one-inch PVC temporary monitoring wells were installed at the locations identified on Figure 3 in accordance with the procedures referenced in EPA’s Operating Procedure, SESDGUID-101-R1, “Design and Installation of Monitoring Wells,” EPA’s Operating Procedure, SESDPROC-105-R3, “Groundwater Level and Well Depth Measurement” and SESDPROC-111-R3, “In Situ Water Quality Monitoring”. Table 3-4 below includes data on the temporary well’s groundwater elevation data.

Table 3-4: Pre/Post Sampling Groundwater Depth to Water

Location Name	Total Depth of Boring (ft)	Measured DTW* (ft)	Final DTW** (ft)
MW1	36	21.00	13.90
MW2B	33	14.00	13.80
MW3	39	19.00	10.10
MW5B	24	13.80	13.50

Location Name	Total Depth of Boring (ft)	Measured DTW* (ft)	Final DTW** (ft)
MW6	24	13.51	6.10
MW7	18	6.00	5.60
MW9	23	9.00	6.10
MW10	30	16.10	12.50
MW11	24	7.74	5.11
MW12B	24	15.50	6.00
MW13	21	6.20	6.20
MW14	36	30.79	22.80
MW15B	21	14.85	7.50

*Measured depth to water (DTW) prior to sampling collected from the ground surface
**Final DTW collected after sampling from the ground surface

Soil cores generated from the installation of the temporary wells were visually observed and documented for discoloration and screened for VOCs using a PID. Table 4-2 in section 4.1 shows the PID readings for soils at all the groundwater sample locations.

Groundwater samples were transferred into laboratory-supplied containers, maintained at the appropriate holding temperature, and submitted on an expedited turnaround time to Eurofins TestAmerica, a DoD accredited analytical laboratory. Table 3-5 below provides details on the samples collected and sent to Eurofins TestAmerica for analyses.

Table 3-5: Groundwater Samples and Analyses

Sample ID	Date Sampled	Lab Sample ID	Analyses	RCRA Analyses Analyte/Method
MW-1	10/25/2019	680-176017-4	RCRA	VOCs/SW 8260B SVOCs (PNAs included)/SW 8270D Pesticides/SW 8081B PCBs/SW 8082A Herbicides/SW 8151A DRO/SW 8015C GRO/SW 8015C RCRA Metals/SW 6010D/7470A Cyanide/SW 9010C/9012B Acid Soluble Sulfide/SW 9030B/9034 Flashpoint/SW 1020B Corrosivity/SW 9040C
MW-1	10/25/2019	680-176017-4		
MW-1	10/28/2019	680-176070-7		
MW-10	10/25/2019	680-176017-7	RCRA	
MW-10	10/28/2019	680-176070-6		
MW-10	10/30/2019	680-176198-2		
MW-10	10/31/2019	680-176288-1		
MW-11	10/22/2019	680-175814-1	RCRA	
MW-12B	10/24/2019	680-175947-1	RCRA	
MW-12B	10/25/2019	680-176017-3		
MW-12B	10/25/2019	680-176017-3		
MW-12B	10/28/2019	680-176070-8		
MW-12B	10/29/2019	680-176133-1		
MW-13	10/18/2019	680-175694-5	RCRA	
MW-14	10/28/2019	680-176070-3	RCRA	
MW-14	10/28/2019	680-176070-3		
MW-14	10/29/2019	680-176133-1		
MW-14	10/31/2019	680-176288-3		

Sample ID	Date Sampled	Lab Sample ID	Analyses	RCRA Analyses Analyte/Method
MW-14	11/1/2019	680-176328-2		
MW-14	11/4/2019	680-176374-1		
MW-15B	10/23/2019	680-175868-3		
MW-15B	10/25/2019	680-176017-9		
MW-15B	10/28/2019	680-176070-5	RCRA	
MW-15B	10/29/2019	680-176133-3		
MW-15B	10/24/2019	680-175947-2		
MW-2B	10/28/2019	680-176070-1	RCRA	
MW-3	10/23/2019	680-175868-2		
MW-3	10/24/2019	680-175947-4	RCRA	
MW-3	10/25/2019	680-176017-1		
MW-5B	10/25/2019	680-176017-6		
MW-5B	10/28/2019	680-176070-2		
MW-5B	10/29/2019	680-176133-4	RCRA	
MW-5B	10/31/2019	680-176288-2		
MW-5B	11/1/2019	680-176328-1		
MW-5B	11/4/2019	680-176374-2		
MW-6	10/21/2019	680-175749-3	RCRA	
MW-6	10/22/2019	680-175814-2		
MW-7	10/21/2019	680-175749-1	RCRA	
MW-7-Dup	10/21/2019	680-175749-2	RCRA	
MW-9	10/21/2019	680-175749-4		
MW-9	10/22/2019	680-175814-3		
MW-9	10/23/2019	680-175868-1	RCRA	
MW-9	10/24/2019	680-175947-5		

VOCs/SW 8260B
SVOCs (PNAs included)/SW 8270D
Pesticides/SW 8081B
PCBs/SW 8082A
Herbicides/SW 8151A
DRO/SW 8015C
GRO/SW 8015C
RCRA Metals/SW 6010D/7470A
Cyanide/SW 9010C/9012B
Acid Soluble Sulfide/SW 9030B/9034
Flashpoint/SW 1020B
Corrosivity/SW 9040C

All field equipment used during groundwater investigative activities were decontaminated between each location on a decontamination pad using Alconox detergent/potable water wash and potable water rinse.

Appendix B includes a photolog of pictures taken during the field investigation. A copy of the field notes from this Phase II Investigation are included in **Appendix C**.

3.3 CHEMICAL ANALYTICAL METHODS

Eighteen (18) soil and fourteen (14) groundwater samples including duplicate samples, as well as an equipment blanks were submitted to Eurofins TestAmerica for full suite RCRA analysis:

Table 3-6: Full Suite RCRA Analysis

Analyte	Method	Matrix
VOCs	SW 8260B	Solid
SVOCs (PNAs included)	SW 8270D	Solid
Pesticides	SW 8081B	Solid
PCBs	SW 8082A	Solid
Herbicides	SW 8151A	Solid
DRO	SW 8015C	Solid
GRO	SW 8015C	Solid
RCRA Metals	SW 6010D/7471B	Solid
TCLP Prep for VOCs (ZHE)	SW 1311	Solid
TCLP Prep for non-VOCs	SW 1311	Solid
SPLP Prep for VOCs (ZHE)	SW 1312	Solid
SPLP Prep for non-VOCs	SW 1312	Solid
Flashpoint	SW 1020B	Solid
Corrosivity	SW 9045D	Solid
Cyanide	SW 9010C/9012B	Solid
Acid Soluble Sulfide	SW 9030B/9034	Solid
VOCs	SW 8260B	Water
SVOCs (PNAs included)	SW 8270D	Water
Pesticides	SW 8081B	Water

An additional eleven (11) soil samples were submitted to Eurofins TestAmerica for radiological constituents:

Table 3-7: Radiological Analysis

Analyte	Method	Matrix
Gamma Scan	DOE HASL 300 4.5.2.3/Ga-01-R	Solid
Tritium	EPA 906.0 Mod	Solid
Carbon-14	EPA EERF C-01 Mod	Solid
Gross Alpha, Beta	EPA 900.0 Mod/ SW 9310 Mod	Solid
Radium-226	EPA 903.1 Mod	Solid

3.4 SITE RESTORATION

Collection of the soil and groundwater samples caused minimal damage to the vegetation at the sample locations. After sample collection, excess soil from bore holes produced from soil borings were placed back into the bore hole from which it was produced, with any excess soil being spread around the sampling location.

On November 15, 2019, Earth Matters, accompanied by SIA-TPMC, abandoned the wells onsite.

3.4.1 Waste Management

A minimal quantity of investigation-derived waste (IDW) was generated. Per USACE direction, excess soil from bore holes produced from soil borings was placed back into the bore hole from which it was produced, with any excess soil being spread around the sampling location. All groundwater collected during sampling was containerized in a plastic 5-gallon bucket and discharged adjacent the boring location after sampling activities were completed and laboratory results confirmed there was no contamination. Each monitoring well had a dedicated plastic bucket where groundwater was stored adjacent the well. On January 10, 2020, the SIA team conducted a Site visit to dispose of the purge waters collected during sampling.

IDW in the form of personal protective equipment (PPE) (gloves, paper towels, etc.) were double-bagged and disposed of in the dumpster staged outside of the BARC Wildlife Office, as part of BARC's normal solid waste stream.

3.5 WORK PLAN ALTERATIONS

During the investigation, four temporary well locations were moved from their originally proposed location due to the site's underlying geology that was characteristic of deep clay lenses. Table 3-8 provides a summary of the following locations that were moved to successfully find groundwater and move out of large clay deposits.

Table 3-8: Field Shifted Boring Locations

Location Name	Relocation Distance and Direction		New Location Name	Rationale
MW2	40'	N	MW2B	Moved north due to excessive near surface water entering the boring
MW5	240'	S	MW5B	Moved south due to underlying geology
MW12	620'	S	MW12B	Moved south due to underlying geology
MW15	100'	NW	MW15B	Moved northwest due to underlying geology

Due to the deep clay lenses encountered at the Site, refusal was met at groundwater sampling locations MW4 and MW8 before groundwater was encountered. It was determined that replacement borings at these locations were not necessary because collected soil samples were considered representative of the location and groundwater samples collected provide adequate coverage for the site.

Also due to the Site's geological characteristics, several of the temporary monitoring wells had characteristics of slow groundwater recovery and recharge rates. Once the water table was located, the well screens were inserted so that minimal screen area was placed in the clay. At many locations the groundwater lenses discovered were very small. High turbidity levels can be attributed to the colored clays encountered during the Site investigation. Due to these characteristics, many groundwater sample locations were sampled over multiple days to ensure completion of the entire Full RCRA bottle set. Additionally, some of the groundwater locations groundwater ran dry. The groundwater at these locations were allowed to recharge prior to continuing sampling for the entire Full RCRA bottle set.

Due to the enormity of the bottle sets required for complete soil sample laboratory analysis, multiple borings were advanced at the same location to collect the necessary sample volume. The additional borings were advanced directly adjacent the sample location's primary boring.

4.0 PRESENTATION AND EVALUATION OF RESULTS

4.1 SUBSURFACE CONDITIONS

Soil boring logs were completed per USCS classification requirements to summarize the subsurface conditions at the site during the collection of soil samples and installation of temporary groundwater wells. A wide range of strata were identified within the underlying geology of the site. The majority of the soil borings comprised of a few inches of topsoil followed by either lean clay or medium to high plastic clay with small seams of silt/sand/gravel throughout the boring. Other borings contained a few inches of graded aggregate or bituminous concrete followed by lean clay, medium to highly plastic clay, fat clay, or clayed sand. Due to the thick clay lenses encountered at the Site, turbidity measurements taken during the low flow sampling at the temporary monitoring wells measured from 8.9 to 1471.6 NTUs, and the water at many locations was observed having high sediment content. Complete boring logs can be located in **Appendix C**. All PID readings from soil sampling borings and groundwater temporary monitoring well installation borings are found in Table 4-1 and 4-2.

Table 4-1: Soil PID Readings

Location Name	Soil Boring Depth Interval (ft)	PID Reading (PPM)
SB-1	0-5	0
	5-10	0
	10-15	0
SB-2	0-5	0
	5-10	0
	10-15	0
SB-3	0-2	0
	2-4	0
SB-4	0-2	0
	2-4	0
SB-5	0-2	0
	2-4	0
SB-6	0-2	0
	2-4	0
SB-7	0-2	0
	2-4	0
SB-8	0-2	2.1
	2-4	1.4
SB-9	0-2	0
	2-4	0
SB-10	0-2	1.4
	2-4	1.3
SB-11	0-5	0.7

Location Name	Soil Boring Depth Interval (ft)	PID Reading (PPM)
SB-12	0-5	0
SB-13	0-5	0
SB-14	0-5	0
SB-15	0-5	0
SB-PS-1	0-5	0
	5-10	0
SB-PS-2	0-5	0
	5-10	0
SB-PS-3	0-5	0
	5-10	0
SB-PS-4	0-2	0.5
	2-4	1.7
	6-8	0.9
	8-10	0.2
SB-PS-5	0-5	0
	5-10	0

Table 4-2: Groundwater PID Readings

Location Name	Soil Boring Depth Interval (ft)	Highest PID Reading (PPM)
MW-1	0-36	0
MW-2B	0-33	0
MW-3	0-39	0
MW-5B	0-24	0
MW-6	0-24	0
MW-7	0-18	0
MW-9	0-23	0
MW-10	0-30	1.4
MW-11	0-24	0
MW-12B	0-24	0
MW-13	0-21	0
MW-14	0-36	0
MW-15B	0-21	0

4.2 ANALYTICAL RESULTS

Samples from twenty soil borings (SB-1 through SB-15 and SB-PS-1 through SB-PS-5) and 13 temporary monitoring wells (MW-1, MW-2B, MW-3, MW-5B, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12B, MW-13, MW-14, and MW-15B) were collected between October 14 and November 4,

2019. The locations of the soil borings and temporary monitoring wells are depicted on Figure 1. Soil boring and groundwater samples were analyzed by Eurofins TestAmerica for full suite RCRA analysis. Soil borings SB-11 and SB-PS-1 through SB-PS-5 were analyzed Eurofins TestAmerica for radiological constituents.

4.2.1 Soil Sample Results – Inorganic Analyses

Metals – Arsenic was the only metal reported at concentrations exceeding the Regional Screening Level (RSL). Arsenic concentrations exceeded the RSL of 3 milligrams per kilogram (mg/kg) in samples collected from SB1-4-6, SB2-4-6, SB3-0-2, SB5-0-2, SB6-0-2, SB7-0-2, SB8-0-2, SB9-0-2, SB10-0-2, SB11-0-2, SB12-0-2, SB13-0-2, and SB14-0-2. Arsenic concentrations ranged from 2.7 mg/kg in SB-8-10 to 13 mg/kg in SB-12-0-2 with an average concentration of 6.5 mg/kg. Arsenic concentrations were greater in the shallow soil samples (0-2 feet), with an average concentration of 7.4 mg/kg. The average concentration of arsenic in the deeper soil boring samples (4-6 feet and 8-10 feet) was 3.5 mg/kg. No other metals exceed their respective RSLs.

Cyanide - Cyanide was detected at SB1-4-6, SB1-8-10, SB2-4-6, SB2 8-10, SB3-0-2, SB4-0-2, SB5-0-2, SB6-0-2, SB7-0-2, SB8-0-2, SB9-0-2, SB10-0-2, SB11-0-2, SB12-0-2, SB13-0-2, SB14-0-2, and SB15-0-2. The average cyanide concentration was 0.38 mg/kg. All cyanide concentrations were less than the Industrial RSL of 15 mg/kg.

Sulfide – Sulfide was detected at a concentration of 81 mg/kg in the sample from SB2 8-10. Sulfide was not detected in any other samples. Sulfide does not have a published RSL.

Figure 4 in **Appendix A** provides a visual representation of the soil inorganic analyses.

4.2.2 Soil Sample Results – Organic Analyses

Herbicides – Chlorinated herbicides were detected in shallow surface soil at five sample locations (SB3-0-2, SB4-0-2, SB8-0-2, SB14-0-2, and SB15-02). Mecoprop (MCPP) concentrations exceeded the RSL of 82 mg/kg in two soil borings, SB4-0-2 (190 mg/kg) and SB15-02 (290 mg/kg). No other herbicide concentrations exceeded their respective RSLs.

Total Petroleum Hydrocarbons (TPH) - Gasoline Range Organics (C6-C10) and Diesel Range Organics (C10-C28) – Gasoline Range Organics (GRO) were detected at one location, SB1 8-10 and Diesel Range Organics (DRO) were detected at all locations and depths (SB1-4-6, SB1-8-10, SB2-4-6, SB2 8-10, SB3-0-2, SB4-0-2, SB5-0-2, SB6-0-2, SB7-0-2, SB8-0-2, SB9-0-2, SB10-0-2, SB11-0-2, SB12-0-2, SB13-0-2, SB14-0-2, and SB15-0-2). Concentrations ranged from 3.2 mg/kg in the duplicate sample collected at SB14 to 21 mg/kg at SB10-0-2. The average concentration was 8 mg/kg. None of the results exceed the Industrial RSLs for TPH (Aliphatic Low) 2,200 mg/kg, TPH (Aromatic Low) 420 mg/kg, TPH (Aliphatic Medium) 440 mg/kg or TPH (Aromatic Medium) 560 mg/kg.

Pesticides – Pesticides (primarily 4,4'-DDE and 4,4'-DDT) were detected at SB1-4-6, SB5-0-2, SB7-0-2, SB9-0-2, SB11-0-2, SB12-0-2, SB13-0-2. All detected concentrations were less than their respective RSLs.

VOCs – VOCs were detected at all locations and depths (SB1-4-6, SB1-8-10, SB2-4-6, SB2 8-10, SB3-0-2, SB4-0-2, SB5-0-2, SB6-0-2, SB7-0-2, SB8-0-2, SB9-0-2, SB10-0-2, SB11-0-2, SB12-0-2, SB13-0-2, SB14-0-2, and SB15-0-2). All detected concentrations were less than their respective RSLs.

Semi Volatile Organic Compounds (SVOCs) – SVOCs were detected in samples from two locations, SB2-4-6 and SB7-0-2. All detected concentrations were less than their respective Industrial RSLs.

Figure 5 in **Appendix A** provides a visual representation of the soil organic analyses.

4.2.3 Soil Sample Results – Radionuclides

Radionuclides in soil samples were compared to EPA Screening Levels. Samples for radionuclide analyses were collected from soil borings SB11-0-2, SB-PS1-0-2, SB-PS1-2-4, SB-PS2-0-2, SB-PS2-2-4, SB-PS3-0-2, SB-PS3-2-4, SB-PS4-0-2, SB-PS4-2-4, SB-PS5-0-2, and SB-PS5-2-4. Concentrations of Radium-228 exceed the SL of 0.347 picocuries per gram (pCi/g) in all samples. Concentrations of Radium-228 ranged from 0.819 pCi/g in SB11-0-2 to 2.05 pCi/g in SB-PS4-2-4. The average concentration of Radium-228 was 1.58 pCi/g. Radium-226 exceed the SL of 1.09 pCi/g in three samples, SB-PS3-0-2 (1.3 pCi/g), SB-PS4-2-4 (1.23 pCi/g), SB-PS5-2-4 (1.18 pCi/g).

Gross Alpha concentrations were detected in all samples. Concentrations ranged from 9.06 pCi/g to 22.1 pCi/g. The average concentration is 13.7 pCi/g. Gross Beta concentrations were detected in all samples. Concentrations ranged from 15.5 pCi/g to 27.3 pCi/g. The average concentration is 19.8 pCi/g.

Figure 6 in **Appendix A** provides a visual representation of the soil radionuclides analyses.

4.2.4 Groundwater Sample Results – Inorganic Analyses

Metals – Samples were analyzed for total Dissolved and Total Recoverable Metals. Total Recoverable Metals and Dissolved metals were detected at concentrations greater than their respective MDLs in all wells (MW-1, MW-2, MW-3, MW-5B, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12B, MW-13, MW-14, and MW-15B). Total Recoverable arsenic concentrations exceeded the Maximum Contaminant Level (MCL) of 10 micrograms per liter (µg/L) in samples collected from MW-5B, MW-10, MW-12B, MW-13. Total Recoverable chromium concentrations exceeded the MCL of 100 µg/L in samples collected from MW-10 and MW-13. Total Recoverable lead concentrations exceeded the MCL of 15 µg/L in samples collected from MW-2, MW-10, and MW-13. No other reported total recoverable metals exceeded their respective MCLs. None of the metals in the dissolved metals fraction exceeded their respective MCLs.

Cyanide - Cyanide was detected at MW-2, MW-5B, MW-12B, MW-13, and MW-14. All detected cyanide concentrations were less than the MCL of 0.2 mg/L.

Figure 7 in **Appendix A** provides a visual representation of the groundwater inorganic analyses.

4.2.5 Groundwater Sample Results – Organic Analyses

VOCs – VOCs (primarily acetone, toluene and xylenes) were detected at MW-5B, MW-6, MW-9, MW-10, MW-12B, and MW-13. All detected concentrations were less than their respective MCLs.

SVOCs – SVOCs (phthalates) were detected in samples from two locations, MW-1 and MW-10. All detected concentrations were less than their respective MCLs.

Pesticides – One pesticide (Endrin aldehyde) was detected at MW-15B. There is no published MCL for this analyte.

Figure 8 in **Appendix A** provides a visual representation of the groundwater organic analyses.

4.3 DATA QUALITY ASSESSMENT

The data submitted by Eurofins TestAmerica laboratory was reviewed and verified following the guidelines outlined in the Work Plan. Information reviewed in the data packages included sample results; field and laboratory quality control results; case narratives; cooler receipt forms, and chain-of-custody (COC) forms.

Samples from twenty soil borings (SB-1 through SB-15 and SB-PS-1 through SB-PS-5) and 13 temporary monitoring wells (MW-1, MW-2B, MW-3, MW-5B, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12B, MW-13, MW-14, and MW-15B) were collected between October 14 and November 4, 2019. All sample analyses were performed by DoD accredited Eurofins TestAmerica Laboratory located in Savannah, Georgia with the following exception. Method 1010A for Flashpoint analyses were subcontracted to Eurofins Lancaster Laboratory in Lancaster, Pennsylvania.

The field quality control samples collected in this project included one set of field duplicate samples for the soil (SB-14-02 and SB14-0-2-DUP) and water (MW-7 and MW-7-Dup), eleven trip blanks, and one equipment blank.

All samples arrived at the laboratory properly preserved and on ice. The temperature of the coolers at time of receipt ranged from 1.1º C to 5.9º C. Several containers received on 10/6/2019 were broken. However, sufficient sample volume was available in the remaining containers for the specified analysis. Trip blanks collected on 10/14/19 and 10/15/19 were not listed on the COC. The trip blanks were logged in (Lab Sample IDs 680-175415-7, 680-175478-7, 680-175478-8) and analyzed for VOCs by Method 8260B.

4.3.1 Duplicates

Duplicate sample results are used to evaluate the degree of precision between the measurements.

4.3.1.1 Soil

Duplicate soil sample (SB-14-02 and SB14-0-2-DUP) detected results are listed in Table 4-3. Relative percent difference (RPD) was calculated for sample concentrations greater than the Limit of Quantitation (LOQ). The relative percent difference for two metals (mercury and lead) exceeded the RPD limit of 30 percent. The mercury concentrations in the sample and duplicate are 30 mg/kg and 19 mg/kg, respectively. The RL is 0.23 mg/kg. The lead concentrations in the sample and duplicate were 0.068 mg/kg and 0.031 mg/kg, respectively. The RL is 1.1 mg/kg. The RPD for these samples is 75 and 45 percent, respectively, which is greater than the guideline of 30 percent. The lack of precision for these sample results indicate that the concentrations of mercury and lead in the soil samples are heterogeneous and may not be representative of the site location for mercury and lead.

Table 4-3: Duplicate Soil Sample Analyses

Lab Sample ID	Client Sample ID	Analysis Method	CAS	Analyte	Result	Unit	Flag	High Limit	High Limit Type	Low Limit	Low Limit Type	Prep Type	RPD
680-175415-4	SB14-0-2	6010C	7440-38-2	Arsenic	5.9	mg/Kg		2.1	LOQ	0.86	DL	Total	20
680-175415-6	SB14-0-2-DUP	6010C	7440-38-2	Arsenic	4.8	mg/Kg		2.2	LOQ	0.86	DL	Total	
680-175415-4	SB14-0-2	6010C	7440-39-3	Barium	73	mg/Kg		1.1	LOQ	0.17	DL	Total	21
680-175415-6	SB14-0-2-DUP	6010C	7440-39-3	Barium	59	mg/Kg		1.1	LOQ	0.17	DL	Total	
680-175415-4	SB14-0-2	6010C	7440-39-3	Barium	0.083	mg/L	J	1.0	LOQ	0.017	DL	TCLP	NC
680-175415-6	SB14-0-2-DUP	6010C	7440-39-3	Barium	0.084	mg/L	J	1.0	LOQ	0.017	DL	TCLP	
680-175415-4	SB14-0-2	8015C DRO		C10-C28	5.1	mg/Kg		3.9	LOQ	2.5	DL		46
680-175415-6	SB14-0-2-DUP	8015C DRO		C10-C28	3.2	mg/Kg	J	4.0	LOQ	2.6	DL		
680-175415-4	SB14-0-2	6010C	7440-47-3	Chromium	25	mg/Kg		1.1	LOQ	0.22	DL	Total	4
680-175415-6	SB14-0-2-DUP	6010C	7440-47-3	Chromium	26	mg/Kg		1.1	LOQ	0.23	DL	Total	
680-175415-4	SB14-0-2	6010C	7440-47-3	Chromium	0.019	mg/L	J	0.20	LOQ	0.016	DL	TCLP	NC
680-175415-6	SB14-0-2-DUP	6010C	7440-47-3	Chromium	0.04	mg/L	U	0.20	LOQ	0.016	DL	TCLP	
680-175415-4	SB14-0-2	9012B	57-12-5	Cyanide, Total	0.44	mg/Kg		0.072	LOQ	0.019	DL		9
680-175415-6	SB14-0-2-DUP	9012B	57-12-5	Cyanide, Total	0.48	mg/Kg		0.078	LOQ	0.020	DL		
680-175415-4	SB14-0-2	8151A DOD	120-36-5	Dichlorprop	270	ug/Kg	M Q	10	LOQ	1.3	DL		NC
680-175415-6	SB14-0-2-DUP	8151A DOD	120-36-5	Dichlorprop	4.1	ug/Kg	U M	10	LOQ	1.4	DL		
680-175415-4	SB14-0-2	7471B	7439-97-6	Hg	0.068	mg/Kg		0.023	LOQ	0.0091	DL	Total	75
680-175415-6	SB14-0-2-DUP	7471B	7439-97-6	Hg	0.031	mg/Kg		0.022	LOQ	0.0086	DL	Total	
680-175415-4	SB14-0-2	1030		Ignitability	NB	mm/sec							NC
680-175415-6	SB14-0-2-DUP	1030		Ignitability	NB	mm/sec							
680-175415-4	SB14-0-2	6010C	7439-92-1	Lead	30	mg/Kg		1.1	LOQ	0.36	DL	Total	45
680-175415-6	SB14-0-2-DUP	6010C	7439-92-1	Lead	19	mg/Kg		1.1	LOQ	0.37	DL	Total	
680-175415-4	SB14-0-2	8260B	75-09-2	Methylene Chloride	6.2	ug/Kg	B	4.5	LOQ	0.88	DL		NC
680-175415-6	SB14-0-2-DUP	8260B	75-09-2	Methylene Chloride	3	ug/Kg	J B	5.8	LOQ	1.1	DL		
680-175415-4	SB14-0-2	6010C	7782-49-2	Selenium	2.8	mg/Kg		2.7	LOQ	1.0	DL	Total	16
680-175415-6	SB14-0-2-DUP	6010C	7782-49-2	Selenium	3.3	mg/Kg		2.7	LOQ	1.0	DL	Total	
680-175415-4	SB14-0-2	6010C	7782-49-2	Selenium	0.16	mg/L	J	0.50	LOQ	0.099	DL	TCLP	NC
680-175415-6	SB14-0-2-DUP	6010C	7782-49-2	Selenium	0.22	mg/L	J	0.50	LOQ	0.099	DL	TCLP	

The concentrations of DRO in the sample and duplicate exceed the RPD of 30%. The DRO concentration in the sample is 5.1 mg/kg. However, the duplicate sample concentration (3.2 mg/kg) is less than the LOQ of 4.0 mg/kg and qualified as estimated (J). Typically, analytical precision decreases as the results get closer to the LOQ. In addition, DRO was reported in the equipment blank at a concentration of 0.18 mg/L and external contamination of sampling equipment may have contributed to the disparity between the reported results. Therefore, the results are considered representative of the site location.

The concentration of Dichlorprop in sample SB-14-02 is 270 micrograms per kilogram (µg/kg). Dichlorprop was not detected in the duplicate. The surrogate recovery (163%) in sample SB-14-02 exceeded the limit of 27-122%. The sample results are considered biased high and indicate that the concentrations of Dichlorprop in the soil samples are heterogeneous and may not be representative of the site location.

Methylene chloride was detected in method blank associated with samples SB14-0-2 and SB14-0-2-DUP at a concentration of 4.02 ug/kg. The sample concentrations are less than three times the blank concentration. Therefore, the results are considered attributed to laboratory contamination and qualified (B) and RPD was not calculated.

4.3.1.2 Groundwater

Duplicate groundwater sample (MW-7 and MW-7-DUP) detected results are listed in Table 4-4. RPD was calculated for detected sample concentrations greater than the LOQ. All calculated RPDs were less than the limit of 30% with the exception of mercury (48%). The mercury concentrations in the MW-7 and MW-7-DUP are 0.49 ug/L and 0.30 ug/L, respectively. The LOQ for mercury is 0.20 ug/L. The duplicate result is less than two times the LOQ and analytical precision decreases as the results get closer to the LOQ. Therefore, no qualification is warranted, and results are considered representative of the site location.

Table 4-4: Duplicate Groundwater Sample Analyses

Lab Sample ID	Sample ID	Method	CAS	Analyte	Result	Unit	Flag	High Limit	High Limit Type	Low Limit	Low Limit Type	Prep Type	RPD
680-175749-1	MW-7	1010A		Flashpoint	>160	Degrees F		1.00	LOQ	1.00	DL		NC
680-175749-2	MW-7-Dup	1010A		Flashpoint	>160	Degrees F		1.00	LOQ	1.00	DL		
680-175749-1	MW-7	6010C	7440-39-3	Barium	37	ug/L		10	LOQ	1.7	DL	Dissolved	20
680-175749-2	MW-7-Dup	6010C	7440-39-3	Barium	45	ug/L		10	LOQ	1.7	DL	Dissolved	
680-175749-1	MW-7	6010C	7440-39-3	Barium	58	ug/L		10	LOQ	1.7	DL	Total Recoverable	5
680-175749-2	MW-7-Dup	6010C	7440-39-3	Barium	55	ug/L		10	LOQ	1.7	DL	Total Recoverable	
680-175749-1	MW-7	6010C	7440-47-3	Chromium	4.7	ug/L	J	10	LOQ	1.6	DL	Dissolved	NC
680-175749-2	MW-7-Dup	6010C	7440-47-3	Chromium	7.8	ug/L	J	10	LOQ	1.6	DL	Dissolved	
680-175749-1	MW-7	6010C	7440-47-3	Chromium	14	ug/L		10	LOQ	1.6	DL	Total Recoverable	7
680-175749-2	MW-7-Dup	6010C	7440-47-3	Chromium	13	ug/L		10	LOQ	1.6	DL	Total Recoverable	
680-175749-2	MW-7-Dup	6010C	7439-92-1	Lead	4.1	ug/L	J	10	LOQ	3.9	DL	Dissolved	NC
680-175749-1	MW-7	6010C	7439-92-1	Lead	8.5	ug/L	J	10	LOQ	3.9	DL	Total Recoverable	NC
680-175749-2	MW-7-Dup	6010C	7439-92-1	Lead	7.1	ug/L	J	10	LOQ	3.9	DL	Total Recoverable	
680-175749-1	MW-7	6010C	7782-49-2	Selenium	10	ug/L	J	20	LOQ	9.9	DL	Total Recoverable	NC
680-175749-2	MW-7-Dup	6010C	7782-49-2	Selenium	10	ug/L	J	20	LOQ	9.9	DL	Total Recoverable	
680-175749-1	MW-7	7470A	7439-97-6	Hg	0.49	ug/L		0.20	LOQ	0.080	DL		48
680-175749-2	MW-7-Dup	7470A	7439-97-6	Hg	0.30	ug/L		0.20	LOQ	0.080	DL		
680-175749-2	MW-7-Dup	8015C DRO		C10-C28	0.062	mg/L	J	0.098	LOQ	0.049	DL		NC
680-175749-1	MW-7	9012B	57-12-5	Cyanide, Total	0.0048	mg/L	J	0.010	LOQ	0.0025	DL		NC
680-175749-2	MW-7-Dup	9012B	57-12-5	Cyanide, Total	0.0038	mg/L	J	0.010	LOQ	0.0025	DL		

4.3.1.3 Blanks

Trip blank and equipment blank sample detected results are listed in Table 4-5. Trip blanks and equipment blanks are used to determine the existence and magnitude of contamination resulting from field activities and sample shipping. Eleven trip blanks (one per cooler containing samples for VOC analyses) and one equipment blank were collected. Carbon disulfide (1.3µg/L) was detected in the trip blank (Lab ID 680-175694-6) associated with the shipment on 10/18/2019. Carbon disulfide was detected in method blank associated with analysis of the Trip Blank (Lab ID 680-175694-6) at a concentration of 1.68 µg/L. Therefore, the results are attributed to laboratory contamination and qualified (B).

Table 4-5: Trip Blank and Equipment Blank Sample Analyses

Lab Sample ID	Sample ID	Date Sampled	Detection	Analyte	Result	Units	Qualifier
680-175415-7	Trip Blank	10/14/2019	ND				
680-175478-7	Trip Blank	10/15/2019	ND				
680-175478-8	Trip Blank	10/15/2019	ND				
680-175642-3	Trip Blank	10/17/2019	ND				
680-175694-6	Trip Blank	10/18/2019		Carbon disulfide	1.3	ug/L	J B
680-175749-5	Trip Blank	10/21/2019	ND				
680-175814-4	Trip Blank	10/22/2019	ND				
680-175868-4	Trip Blank	10/23/2019	ND				
680-175947-3	Trip Blank	10/24/2019	ND				
680-176017-5	Equipment Blank	10/25/2019		C10-C28	0.18	mg/L	B
680-176017-8	Trip Blank	10/25/2019	ND				
680-176070-4	Trip Blank	10/28/2019	ND				

Equipment blanks are used to evaluate carryover contamination resulting from successive use of sampling equipment. DRO was detected in the equipment blank collected on 10/25/2019 at a concentration of 0.18 mg/L. Sample concentrations less than three times this amount (0.54 mg/L) are attributed to laboratory contamination and qualified (B).

4.3.2 Nonconformance Summary

Case narratives, surrogate recoveries, and results from the analysis of laboratory quality control samples (LCS) laboratory control samples, laboratory control sample duplicates (LCSD), matrix spikes (MS), matrix spike duplicates (MSD), method blanks (MB) were evaluated to identify and summarize any quality control problems that occurred during laboratory analysis. The findings are detailed in the Nonconformance Summary included in **Appendix E**. Data associated with nonconforming results were flagged using the following qualifiers by the laboratory.

GC/MS VOA, GC/MS Semi VOA

J - Estimated: The analyte was positively identified; the quantitation is an estimation

M - Manual integrated compound.

Q - One or more quality control criteria failed.

U - Undetected at the Limit of Detection.

GC VOA

Q - One or more quality control criteria failed.

U - Undetected at the Limit of Detection.

GC Semi VOA

H - Sample was prepped or analyzed beyond the specified holding time

J - Estimated: The analyte was positively identified; the quantitation is an estimation

M - Manual integrated compound.

Q - One or more quality control criteria failed.

U - Undetected at the Limit of Detection.

Metals

J - Estimated: The analyte was positively identified; the quantitation is an estimation

U - Undetected at the Limit of Detection.

General Chemistry

HF - Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

J - Estimated: The analyte was positively identified; the quantitation is an estimation

U - Undetected at the Limit of Detection.

Not all compounds of interest perform equally well for a given analytical method or instrument. Typically, this is due to the chemical properties of these compounds and/or the limitations of the methods and instrumentation, as opposed to laboratory error. These compounds are commonly referred to as "poor performers," and the majority of QC nonconformances are attributed to these compounds. For GC/MS Method 8260 analyses these "poor performers" include acetone, bromoform, bromomethane, 1,2-dibromo-3-chloropropane, dichlorodifluoromethane, cis-1,3-dichloropropene, 1,4-dioxane, 2-hexanone, 2-butanone (MEK), 4-methyl-2-petanone (MIBK), naphthalene, styrene, and 1,1,2,2-tetrachloroethane. For GC/MS Method 8270 the following are poorly performing compounds: 4-chloraniline, 4-chloro-3-methylphenol, 4,6-dinitro-2-methylphenol, 2,4-dinitrophenol, 1,4-dioxane, hexachlorocyclopentadiene, 2-nitroaniline, 3-nitroaniline, 4-nitroaniline, 4-nitrophenol, pentachlorophenol, phenol, pyridene, 2,4,5-trichlorophenol and 2,4,6-trichlorophenol.

4.3.3 Radiological Data

The Ra-226 results should be considered to be potentially biased high. Ra-226 was reported without a 21-day waiting period to ensure short-lived alpha-emitting radium isotopes (e.g. Ra-224) have decayed out.

4.3.4 PARCCS Analysis

The PARCCS parameters (precision, accuracy, representativeness, comparability, completeness, and sensitivity) are used to describe the quality of analytical data in quantitative and qualitative terms using the information provided by field and laboratory data. An evaluation of the PARCCS parameters for this data set are discussed in the following paragraphs.

Precision

Precision is a measure of the reproducibility of sample results and measured through the calculation of the RPD of duplicate sample analyses and LCS/LCSD analyses. For this project, two duplicate samples (one soil and one groundwater sample) were collected. The duplicate results and calculated RPDs are included in **Table 4-3** (soil) and **Table 4-4** (groundwater). With the exception of DRO, lead, and mercury in the soil samples and mercury in the groundwater sample, the detected results in duplicate samples indicate a high degree of reproducibility. The mercury concentrations in both soil and groundwater were less than three times the LOQ and analytical precision decreases as the results get closer to the LOQ. DRO was detected in the trip blank and method blanks associated

with the soil sample indicating that external contamination may have biased the results. The RPD for lead (45%) suggests a moderate degree of heterogeneity in the sample matrix for this element and a low degree of precision.

LCS/LCSD MS/MSD RPDs for the majority of target analytes were within their respective RPD limits with the exception of the Method 8270 MS/MSD analyses. Many of the compounds that exceeded the RPD limits were "poor performers" as discussed in subsection 4.3.2. Target analytes that exceeded RPD limits were qualified as estimated.

Accuracy

Accuracy is used to describe the agreement between an observed value and an accepted reference or true value. Accuracy was evaluated through the calculation of percent recovery for LCS/LCSDs and MS/MSDs. LCS/LCSD MS/MSD recoveries were within their respective limits with few exceptions. Target analytes that exceeded percent recovery limits were qualified as estimated.

Representativeness

Representativeness is a qualitative measurement that describes how well the analytical data characterizes an area of concern. As discussed in subsection 3.5, four temporary well locations were moved from their originally proposed location to successfully find groundwater and refusal was met at groundwater sampling locations MW4 and MW8 before groundwater was encountered. The remaining groundwater sampling locations that were successfully collected provided an adequate representation for the entire Site. The soil and groundwater sampling activities were conducted in accordance with the procedures and protocols detailed in the approved Work Plan (SIA 2019). All samples arrived at the laboratory properly preserved and on ice. Several containers received on 10/6/2019 were broken. However, sufficient sample volume was available in the remaining containers for the specified analysis.

Comparability

Comparability refers to the equivalency of sets of data. This goal is achieved through the use of standard or similar techniques to collect and analyze representative samples. The samples for this project were collected in accordance with EPA's Operating Procedure, SESDPROC-300-R3, "Soil Sampling". Samples were analyzed using EPA SW-846 Methods by DoD accredited analytical laboratory.

Completeness

Completeness is a quantitative measure that is used to evaluate how many valid analytical data were obtained in comparison to the amount that was planned. Completeness is usually expressed as a percentage of usable analytical data. Percent completeness was not calculated for this data set because full data validation was not performed. However, results were provided for all samples and analyses submitted to the laboratory. Groundwater samples were not collected at proposed sampling locations MW4 and MW8. However, the remaining groundwater sampling locations that were successfully sampled and the data collected was considered representative for the entire Site.

Sensitivity

Sensitivity refers to the capability of a method or instrument to detect a given analyte at a given concentration and reliably quantitate the analyte at that concentration. To achieve this objective, the samples were analyzed by a DoD accredited analytical laboratory using EPA SW-846 Methods. The

LOQs for all analyses were less than applicable screening levels (RSL/MCL) with the exception of samples that required dilution.

4.3.5 Data Usability

Although a number of data were qualified because of various QC nonconformances the data are of sufficient quality to meet the project objectives with the limitations indicated by the data flags and outlined in the previous sections.

5.0 INTERPRETATION AND CONCLUSIONS

Arsenic concentrations exceeded the RSL of 3 mg/kg in samples collected from SB1-4-6, SB2-4-6, SB3-0-2, SB5-0-2, SB6-0-2, SB7-0-2, SB8-0-2, SB9-0-2, SB10-0-2, SB11-0-2, SB12-0-2, SB13-0-2, and SB14-0-2. Arsenic concentrations ranged from 2.7 mg/kg in SB-8-10 to 13 mg/kg in SB-12-0-2 with an average concentration of 6.5 mg/kg. Arsenic concentrations were greater in the shallow soil samples (0-2 feet), with an average concentration of 7.4 mg/kg. The average concentration of arsenic in the deeper soil boring samples (4-6 feet and 8-10 feet) was 3.5 mg/kg. Background data compiled by MDE reported detected arsenic concentrations for the Central Maryland region ranging from 0.75 to 6.7 mg/kg and stated USGS average concentration was identified as 7.2 mg/kg (MDE, 2018). Individual site concentrations are slightly higher than the concentrations reported by MDE. However, the average site concentrations correlate with the averages reported by MDE and USGS.

Chlorinated herbicides were detected in shallow surface soil at five sample locations (SB3-0-2, SB4-0-2, SB8-0-2, SB14-0-2, and SB15-02). MCPP concentrations exceeded the RSL of 82 mg/kg in two soil borings, SB4-0-2 (190 mg/kg) and SB15-02 (290 mg/kg). Although the data were qualified as estimated and biased high, the data indicate that MCPP is present in soil at the two sampling locations. The Draft ECP conducted at the Site stated no known use of herbicides within the property. Further sampling may be needed to determine the actual concentrations and extent of MCPP at these locations.

Groundwater sample results were compared to EPA MCLs. Inorganic Analyses (Figure 5) Metals – Samples were analyzed for total Dissolved and Total Recoverable Metals. Total Recoverable Metals and Dissolved metals were detected at concentrations greater than their respective MDLs in all wells (MW-1, MW-2, MW-3, MW-5B, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12B, MW-13, MW-14, and MW-15B). Total recoverable arsenic concentrations exceeded the MCL of 10 ug/L in samples collected from MW-5B, MW-10, MW-12B, MW-13. Total Recoverable chromium concentrations exceeded the MCL of 100 ug/L in samples collected from MW-10 and MW-13. Total Recoverable lead concentrations exceeded the MCL of 15 ug/L in samples collected from MW-2, MW-10, and MW-13. None of the metals in the dissolved metals fraction exceeded their respective MCLs. Therefore, the Total Recoverable concentrations are attributed to suspended sediment in the samples. As stated above, arsenic, chromium, and lead occur naturally in soil and sediment the detected concentrations in the Total Recoverable analyses may be typical for that area.

One pesticide (Endrin aldehyde) was detected at MW-15B. There is no published MCL for this analyte.

Radionuclides in soil samples were compared to EPA Screening Levels. Samples for radionuclide analyses were collected from soil borings SB11-0-2, SB-PS1-0-2, SB-PS1-2-4, SB-PS2-0-2, SB-PS2-2-4, SB-PS3-0-2, SB-PS3-2-4, SB-PS4-0-2, SB-PS4-2-4, SB-PS5-0-2, and SB-PS5-2-4. Concentrations of Radium-228 exceed the SL of 0.347 picocuries per gram (pCi/g) in all samples. Concentrations of Radium-228 ranged from 0.819 pCi/g in SB11-0-2 to 2.05 pCi/g in SB-PS4-2-4. The average concentration of Radium-228 was 1.58 pCi/g. Radium-226 exceed the SL of 1.09 pCi/g in three samples, SB-PS3-0-2 (1.3 pCi/g), SB-PS4-2-4 (1.23 pCi/g), SB-PS5-2-4 (1.18 pCi/g). Gross Alpha concentrations were detected in all samples. Concentrations ranged from 9.06 pCi/g to 22.1 pCi/g. The average concentration is 13.7 pCi/g. Gross Beta concentrations were detected in all samples. Concentrations ranged from 15.5 pCi/g to 27.3 pCi/g. The average concentration is 19.8 pCi/g.

The laboratory did not report all gamma isotopes detected, only the radium isotopes. All 11 soil samples showed the presence of natural radioactive minerals only (uranium, thorium, etc.). Included in this are the two radium isotopes (Ra-226 and Ra-228), which were reported. There was a separate analysis done for radium, using radiochemistry. The two methods for radium, gamma spectroscopy and radiochemistry, agree within their analytical errors.

The detected radium levels in soil were compared to published background levels. The USGS reported data for Montgomery County, Maryland. Data for the area around Beltsville was not available. The BARC site average concentrations correlate well with USGS background concentrations:

Table 5-1: BARC Rad Data vs USGS Montgomery County Background Concentrations

Source	Ra-226 pCi/g	Ra-228 pCi/g
BARC (avg)	1.0	1.5
USGS	1.1	1.7

6.0 RECOMENDATIONS

Sufficient investigation data has been collected to confirm or deny the presence of suspect contamination at the Site. The following RECs were identified in the Draft ECP Report conducted by SIA-TPMC:

1. REC: Potential underground storage tanks (UST) at Building 261 (Boiler House): No elevated readings of petroleum compounds were detected in soil or groundwater samples collected within the vicinity of the REC.

2. REC: Petroleum Related Spill Incidents: No elevated readings of petroleum compounds were detected in soil or groundwater samples collected within the vicinity of the REC.

3. Other property conditions – Building 246: No elevated readings of radionuclides were detected in soil samples collected within the vicinity of Building 246.

4. Other property conditions – Rusted equipment between Buildings 262 and 263: No elevated readings pertaining to the rusted equipment between Buildings 262 and 263 were detected in soil samples collected within the vicinity of the sample location.

5. Other property conditions – Empty transformer pad west of Building 262: No elevated readings of petroleum compounds were detected in soil samples collected within the vicinity of the empty transformer pad west of Building 262.

Based on the RECs identified at the Site, the presence and absence of soil, groundwater, and radiological impacts have been adequately described to meet the goals of the Phase II Investigation and further investigation is not warranted. Based on the evaluation of the laboratory data provided from TestAmerica, the following recommendations for the Site are as follows:

- Mecoprop (MCPP) concentrations exceeded the RSL of 82 mg/kg in two soil borings, SB4-0-2 (190 mg/kg) and SB15-02 (290 mg/kg). Although the data were qualified as estimated and biased high, the data indicate that MCPP is present in soil at the two sampling locations. While further sampling is not warranted, it can be conducted to determine the actual concentrations and extent of MCPP at these locations.
- Total Recoverable Metals and Dissolved metals were detected at concentrations greater than their respective MDLs in all wells (MW-1, MW-2, MW-3, MW-5B, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12B, MW-13, MW-14, and MW-15B). Arsenic, chromium, and lead occur naturally in soil and sediment the detected concentrations in the Total Recoverable analyses may be typical for that area. It may be beneficial conducting a background study for the metals stated above to make sure all the detections that exceeded the RSLs are accurate.

7.0 REFERENCES

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APPENDICES

APPENDIX A - FIGURES

APPENDIX B - PHOTOLOG

APPENDIX C - FIELD NOTES / FORMS / LOGS

APPENDIX D - ANALYTICAL LAB REPORTS

APPENDIX E - NONCONFORMANCE SUMMARY