Supplemental Investigation Block E and Block I 2013 Work Plan
Lockheed Martin Middle River Complex
2323 Eastern Boulevard
Middle River, Maryland

Prepared for:

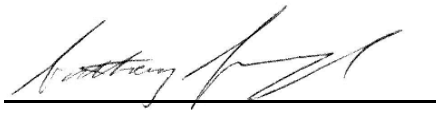
Lockheed Martin Corporation

Prepared by:

Tetra Tech, Inc.

August 2013

Michael Martin, P.G.
Program Manager



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Project Manager

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

APPENDICES

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

COC	chemical(s) of concern
DO	dissolved oxygen
DRO	diesel-range organics
EESH	Energy, Environment, Safety and Health (Lockheed Martin Corporation)
EGIS	environmental geographic information system
GRO	gasoline-range organics
HASP	health and safety plan
IDW	investigation-derived waste
LMCPI	LMC Properties, Inc.
Lockheed Martin	Lockheed Martin Corporation
MDE	Maryland Department of the Environment
mg/kg	milligram(s) per kilogram
µg/L	microgram(s) per liter
MRC	Middle River Complex
ORP	oxidation-reduction potential
PAHs	polycyclic aromatic hydrocarbons
PARCC	precision, accuracy, representativeness, comparability, and completeness
PCB	polychlorinated biphenyl
PDF	portable document format
PID	photoionization detector
PM	project manager
PPE	personal protective equipment
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RAP	remedial action plan
REC	recognized environmental condition
RTO	Remediation Technical Operations
SOP	standard operating procedure
SVOC	semivolatile organic compound
TB	trip blank
1,2,4-TCB	1,2,4-trichlorobenzene
TCE	trichloroethene

Tetra Tech	Tetra Tech, Inc.
TPH	total petroleum hydrocarbon
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
VLS	vertical launch system
VOC	volatile organic compound

Section 1
Introduction

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc. (Tetra Tech) has prepared the following work plan for a supplemental investigation of the Block E and Block I tax parcels (tax blocks) at the Lockheed Martin Middle River Complex (MRC) in Middle River, Maryland. The location of the Middle River Complex is shown in Figure 1-1. Site investigations at the Middle River Complex have identified impacts to soil and groundwater associated with historical plant activities. Past soil and groundwater sampling detected elevated levels of polychlorinated biphenyls (PCBs) in soil in the southwestern portion of Block E and chlorinated and aromatic volatile organic compounds (VOCs) in groundwater in several areas of Block I.

A soil remedy consisting of soil excavation (and subsequent offsite disposal) is planned for shallow soil containing polychlorinated biphenyls and polycyclic aromatic hydrocarbons (PAHs) at Block E. However, additional groundwater chemical data are required in the southwestern portion of Block E to monitor groundwater for polychlorinated biphenyls directly downgradient of an area where they were detected at elevated concentrations in soil eight to 16 feet below grade. Likewise, at Block I, more data are needed east of Building C to delineate the downgradient extent of chlorinated volatile organic compounds that were detected in shallow groundwater at concentrations above the Maryland groundwater standards, and to evaluate the presence of volatile organic compounds in groundwater in the area of a proposed building.

The investigation described herein seeks to provide long-term groundwater monitoring points in Block E, to evaluate the presence/absence of polychlorinated biphenyls in groundwater, and in Block I, to further characterize the extent of volatile organic compounds in groundwater in an area east of Building C.

The following project activities will address these objectives:

- develop this work plan for stakeholder approval
- mobilize/demobilize staff and equipment for sampling

- obtain site and utility clearance

- install and develop two shallow groundwater monitoring wells (approximately 16 to 20 feet deep, in the shallow surficial aquifer) south and southeast of existing well MRC-43A to evaluate the presence/absence of polychlorinated biphenyls in groundwater directly downgradient of an area in the southwestern portion of Block E where elevated concentrations of polychlorinated biphenyls were detected in deep soil

- install and develop two shallow groundwater monitoring wells (each approximately 30 to 40 feet deep in the surficial aquifer); one well is between existing wells MRC-MW94B and MRC-MW95B, and the other is between existing wells MRC-MW93A/B and MRC-MW94B. Data from these wells will further delineate the extent of the chlorinated volatile organic compounds at concentrations above Maryland groundwater standards in an area east of Building C

- collect five soil samples from each of four new well boreholes (twenty samples total) for laboratory chemical analyses

- measure static groundwater levels at each newly installed groundwater monitoring well

- collect groundwater samples from the four newly installed groundwater monitoring wells for laboratory chemical analyses

- survey the new groundwater monitoring wells using a Maryland-licensed surveyor

- perform laboratory chemical analyses and chemical data validation of soil and groundwater samples

- collect, store, and characterize investigation-derived waste (IDW) and dispose of the waste at an off-site, Lockheed Martin Corporation-approved treatment or disposal facility

- evaluate environmental sampling data

- report results

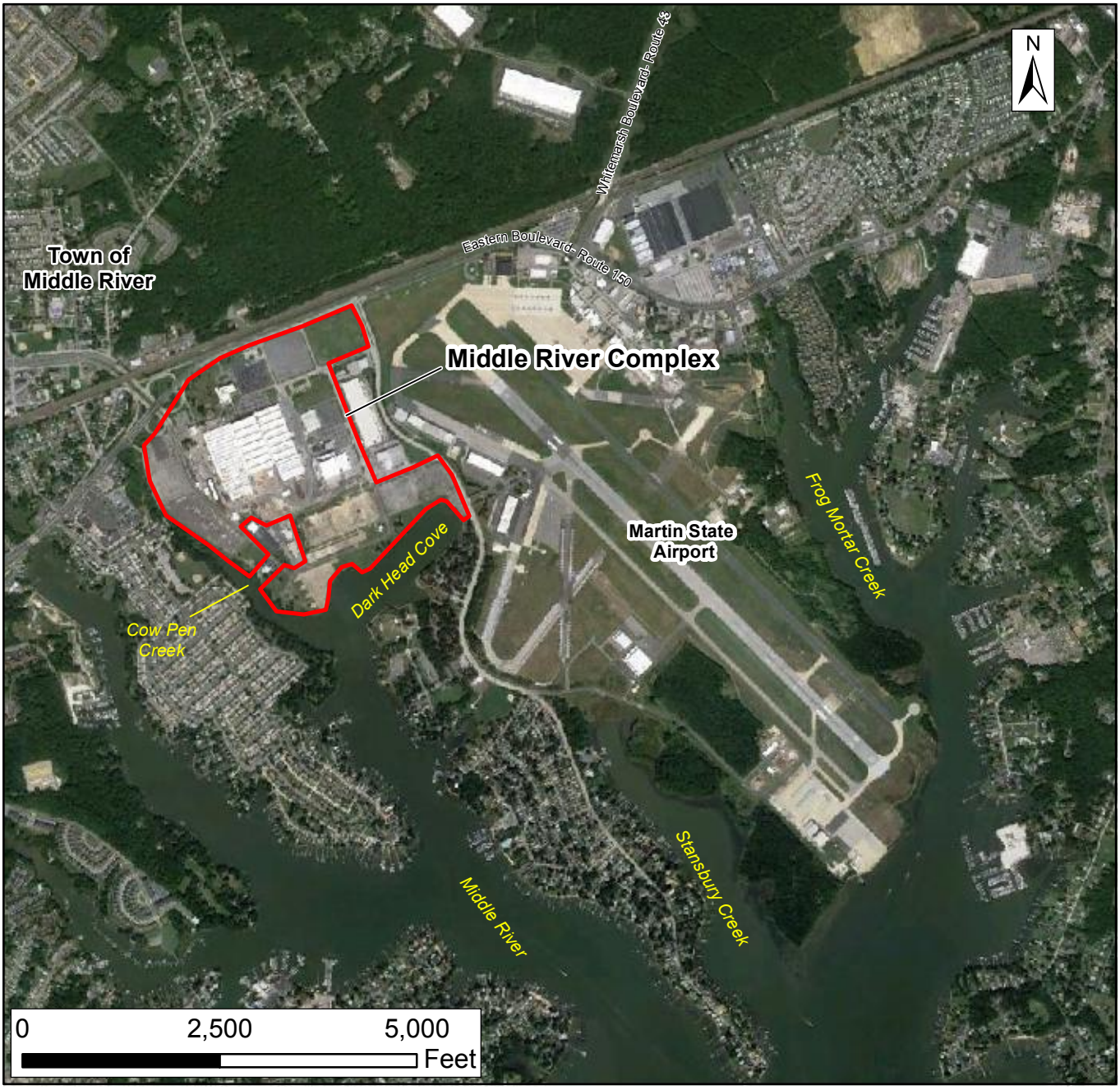
This work plan is organized as follows:

Section 2—Site Background and Data Needs: Briefly describes the location and current conditions of the Middle River Complex, references reports where details of site characteristics and previous investigations can be found, and presents data needs for tasks to be completed as part of this investigation.

Section 3—Investigation Approach and Methodology: Presents the technical approach to the investigation and describes the methodologies that will be used.

Section 4—Project Deliverables: Describes the report(s) that will summarize the investigation findings.

Section 5—References: Lists references used to compile this work plan.



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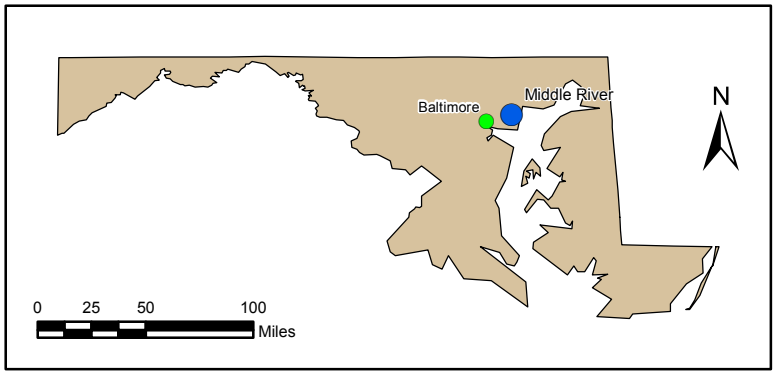

FIGURE 1-1

MIDDLE RIVER COMPLEX
LOCATION MAP

Lockheed Martin Middle River Complex
Middle River, Maryland

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Section 2
Site Background and Data Needs

2.1 FACILITY LOCATION AND CURRENT ACTIVITIES

The Middle River Complex (MRC) is at 2323 Eastern Boulevard in Middle River, Maryland, approximately 11.5 miles northeast of downtown Baltimore, Maryland. The MRC is part of the Chesapeake Industrial Park and is comprised of approximately 161 acres, including 12 main buildings, an active industrial area, perimeter parking lots, an athletic field, a vacant concrete lot, a trailer and parts storage lot, and numerous grassy areas along its perimeter (Figure 2-1). The MRC is bounded by Eastern Boulevard (Route 150) to the north, Dark Head Cove to the south, Cow Pen Creek to the west, and Wilson Point Road and Martin State Airport to the east. As shown in Figure 2-1, the MRC currently consists of eight tax parcels or "tax blocks," including tax Blocks E and I, which are the subjects of this investigation.

Currently, the primary activities of LMC Properties, Inc. (LMPCI), a subsidiary of the Lockheed Martin Corporation (Lockheed Martin), at the MRC include facility and building management and maintenance. The main tenant at the site, MRA Systems, Inc. (a subsidiary of General Electric Company), designs, manufactures, fabricates, tests, overhauls, repairs, and maintains aeronautical structures, parts, and components for military and commercial applications. Lockheed Martin Mission Systems & Training (a business segment of Lockheed Martin) conducts engineering activities and fabricates, assembles, tests, and otherwise supports vertical-launch systems. A subsidiary of Lockheed Martin, Applied Nanostructured Solutions LLC, also occupies a portion of MRC, and engages in research and design of nanotechnology applications.

In 2003, an environmental site assessment identified 13 recognized environmental conditions (RECs) associated with the MRC (Earth Tech, Inc., 2003). RECs indicate the presence (or likely presence) of hazardous substances or petroleum products on a property under conditions that

indicate the potential for an existing release, a past release, or a material threat of a release, into structures on the property, or into the ground, groundwater, or surface water of the property. In 2004, a more detailed historical review identified 18 additional RECs along the facility's perimeter, within the active industrial yard, and within Buildings A, B, and C (Tetra Tech, Inc. [Tetra Tech], 2004). The MRC RECs are shown in Figure 2-2. Numerous environmental investigations have been conducted at these RECs since 2004, and remedies are being implemented to mitigate conditions at various RECs within the MRC, including Block E and Block I, the subject areas of this investigation.

2.2 HISTORY, PHYSICAL CHARACTERISTICS, AND PREVIOUS STUDIES

Details of the MRC history and physical characteristics such as surrounding land use, physiography, soils, hydrology, geology, hydrogeology, and previous investigations related to Blocks E and I are presented in the *2012 Block E Soil Investigation Report* (Tetra Tech, 2012c) and *Supplemental Block I Source Investigation Report* (Tetra Tech, 2012b), respectively, and are not repeated herein.

2.3 BLOCK E AND BLOCK I DATA NEEDS

Since 1988, numerous environmental investigations have been conducted at the MRC to investigate chemical impacts to soil, groundwater, sediment, subsurface air, and indoor air associated with past industrial activities conducted at the property. These studies included sampling and chemical analyses of soil and groundwater at the MRC. Elevated levels of polychlorinated biphenyls (PCBs) were detected in subsurface soil to a depth of eight to 16 feet in the southwestern portion of Block E, and chlorinated and aromatic volatile organic compounds (VOCs) were detected in groundwater in several areas of the property, including large groundwater plumes of chlorinated VOCs in the southeastern and southwestern portions of Block I. Two wells are required in Block E to further evaluate the presence or absence of PCBs in groundwater downgradient of elevated PCB concentrations in subsurface soil, and two additional wells are required to further characterize VOC concentrations in Block I.

2.3.1 Block E

Block E soil is planned to be remediated to meet cleanup standards for current and future industrial land use of the property. Shallow soil with elevated levels of PCBs and polycyclic aromatic hydrocarbons (PAHs) will be excavated to achieve the remedial action objectives of: (1) reducing site-related chemicals of concern (COC) in Block E soils to a 1×10^{-5} (one in 100,000) cumulative human health cancer-risk limit for industrial workers exposed to COC via ingestion, dermal contact, and inhalation; and (2) preventing erosion of PCB- and PAH-contaminated soil from reaching Cow Pen Creek or Dark Head Cove by overland storm water runoff.

A response action for MRC groundwater (including southeastern portion of Block E) was presented to the Maryland Department of the Environment (MDE) in a separate groundwater response action plan (Tetra Tech, 2012a). The groundwater response for the southeastern area of Block E (*in situ* bioremediation in high concentration areas and land use controls) is under way; complete construction is anticipated by early 2014.

Figure 2-3 shows the area in Block E with elevated PCB concentrations in deep soil. This area is beneath concrete at locations of a former nuclear laboratory, a former electrical transformer room, and former waste collection area; all former features were associated with a previous building on the property (i.e., former Building D). PCBs were detected at a depth of nine feet at concentrations of 24,000 milligrams per kilogram (mg/kg) in soil boring SB-833, and at 19,000 mg/kg at an 8–12 foot-depth near the former transformer room (SB-852). Results from several additional borings advanced in this area indicate that elevated levels of PCBs are present within soils in the saturated zone of the upper surficial aquifer to depths up to 16 feet below grade. Free product (i.e., non-aqueous liquid) was observed trapped in the soil matrix at SB-833 in the sample collected nine feet below ground surface. Product was not observed in surrounding boreholes or in other samples, but elevated PCB concentrations were detected in soil as deep as 16 feet below grade. Groundwater in this area occurs at depths of less than one foot below grade to several feet below grade.

Groundwater samples from wells MRC-MW43A and MRC-MW44A (Figure 2-3) were analyzed for PCBs in 2005, 2011, and 2012. Groundwater samples from wells MRC-MW62A, MRC-MW62C, MRC-MW103A, and MRC-MW103B (Figure 2-3) were analyzed for PCBs in

2011 and 2012 only. One PCB, Aroclor-1254, was detected in one groundwater sample from monitoring well MRC-MW43A in 2011, at a concentration (0.24 micrograms per liter [µg/L]) less than the Maryland PCB groundwater standard (0.5 µg/L). This well is located in the area with the highest PCB concentrations in soil, so its results do not necessarily represent PCB concentrations in groundwater downgradient and south of the high-concentration area. PCBs were not detected in groundwater samples collected from well MRC-MW43A (earlier) in 2005 or (later) in 2012. Furthermore, PCBs have not been detected in groundwater samples from nearby wells (MRC-MW62A, MRC-MW62C, and MRC-MW44A), or in samples from wells located hydraulically downgradient of the high-concentration area (MRC-MW103A and MRC-MW103B). These results provide limited supporting data that PCBs are not migrating from the site via groundwater. However, two additional groundwater monitoring wells are required south and southwest of this elevated concentration area to further evaluate the presence/absence of PCBs in downgradient groundwater.

The VOCs 1,2,4-trichlorobenzene (1,2,4-TCB) and 1,4-dichlrorobenzene are likely emanating from PCB-contaminated soils. These VOCs have been routinely detected in groundwater samples from well MRC-MW43A at concentrations above their respective Maryland groundwater standards; the maximum detected 1,2,4-TCB concentration (11,000 µg/L in 2010) exceeds the Maryland groundwater standard (70 µg/L) by more than a factor of 150. Chlorobenzene compounds and other VOCs have been detected in groundwater samples from wells MRC-MW103A and MRC-MW103B, indicating that VOCs are migrating from the high (VOC and PCB) concentration area in the southwestern portion of former Building D. Groundwater samples from this area offer no evidence that PCBs are leaching to groundwater at concentrations above the groundwater standard.

2.3.2 Block I

As shown in Figure 2-4, two large groundwater plumes and several smaller areas of the chlorinated VOC trichloroethene (TCE) are present in groundwater at the MRC. The plumes consist primarily of TCE and its degradation products cis-1,2-dichloroethene and vinyl chloride, although 1,4-dioxane and metals have also been detected at concentrations exceeding the Maryland groundwater standards. A groundwater response action plan (Tetra Tech, 2012a) for the MRC (including Block I) was presented to MDE in 2012. The groundwater response for the

Block I (*in situ* bioremediation in high concentration areas and land use controls) is underway; complete construction is anticipated by early 2014.

A small area east of Building C has the highest TCE concentrations detected in this area; well MRC-MW88A had concentrations ranging from 440 µg/L in 2010 to 1,500 µg/L in 2009 (TCE was detected at 710 µg/L in 2012; see Figure 2-3). Well MRC-MW88A is screened in the upper portion of the surficial aquifer at a depth of 20-30 feet below grade. TCE was not detected at concentrations above its human health screening level (5 µg/L) in the deeper well at this location (MRC-MW88B at 48-58 feet) or in surrounding wells (MRC-MW93A/B, MRC-MW94B, and MRC-MW95B). Groundwater flow in this area of the MRC is to the east-southeast, and groundwater directly downgradient (i.e., groundwater to the east-southeast) of MRC-MW88A (the well that contains the highest TCE concentration in the area) has not been fully characterized. Therefore, installation of a new well between existing wells MRC-MW94B (located northeast of well MRC-MW88A) and MRC-MW95B (located south-southeast of well MRC-MW88A) is proposed to characterize the extent of TCE contamination in groundwater directly downgradient of MRC-MW88A.

The construction of a new building has been proposed at the MRC north of the vertical launch system (VLS) laboratory building and in the area of well MRC-MW94B (Figure 2-4). The extent of VOC contamination in soil and groundwater beneath the proposed building has not been determined between wells MRC-MW93A/B and MRC-MW-94B. Information regarding the presence or absence of subsurface contamination is required in this area to design mitigation features for the building, if required. Therefore, a shallow groundwater monitoring well will be installed to characterize subsurface soil and groundwater conditions between wells MRC-MW93A/B and MRC-MW-94B in the area of the proposed building footprint.

Town of Middle River

AMTRAK RAILROAD

EASTERN BOULEVARD

MARTIN BLVD.

BLOCK 'A'

BLOCK 'A'

BLOCK 'B'

BLOCK 'I'

BLOCK 'H'

BLOCK 'G'

BLOCK 'E'

BLOCK 'D'

BLOCK 'F'

EXXON GAS STATION

PARKING LOT NO. 4

ATHLETIC FIELD

PARKING LOT NO. 5

BUILDING "E"

CHESAPEAKE PLAZA

POST OFFICE

WILSON POINT ROAD

ANNEX BUILDING

ENG. DEV. LAB BLDG.

Martin State Airport

PARKING LOT NO. 1

BUILDING "M"

BUILDING "P"

GATE "A"

BUILDING "C"

BUILDING "B"

PROGRAM BUILDING

JOHNSON AND TOWERS

BUILDING "L"

PARKING LOT NO. 2

MAINTENANCE OFFICE AND SHOP

BUILDING "A"

VERTICAL ASSEMBLY BUILDING

FIRECOAT BUILDING

DARK HEAD COVE ROAD

PARKING LOT NO. 6

FOUR #2 FUEL OIL USTs ABANDONED IN-PLACE

DROP HAMMER BUILDING ACTIVE FIRING RANGE

MAINTENANCE GARAGE

POWER HOUSE

DRUM STORAGE FACILITY

CHESAPEAKE PARK PLAZA

FLAME CUT

DIE STORAGE

PARKING LOT NO. 3

HAZARDOUS WASTE STORAGE BUILDING

500,000-GAL. WATER TANK

TRANSFER SHED

CONSERVATION BUILDING

FORMER BUILDING "D"

FIRE PUMP BUILDING WITH 275-GAL DIESEL FUEL AST

TILLEY CHEMICAL COMPANY

FORMER 500-GAL. UST

FORMER 500,000-GAL. DIESEL FUEL AST

FORMER SEWAGE TREATMENT PLANT

NORTH AMERICAN ELECTRIC

CHESAPEAKE PARK PLAZA

WATERFRONT LOT

DARK HEAD COVE

FORMER AERO PYHSICS LAB./WIND TUNNEL TEST BUILDING

FORMER HYDRAULIC AND FIELD TEST BUILDING

SEVEN 1,000-GAL. AVIATION FUEL USTs ABANDONED IN-PLACE

COW PEN CREEK

FORMER TRAINING SCHOOL

FORMER RAMP STORAGE BUILDING

FORMER BOAT HOUSE

FIGURE 2-1

MIDDLE RIVER COMPLEX
SITE LAYOUT AND TAX BLOCKS

LEGEND

MIDDLE RIVER COMPLEX TAX BLOCK BOUNDARY

STRUCTURE

RAILROAD TRACKS

Lockheed Martin Middle River Complex
Middle River, Maryland

0 150 300 600 Feet

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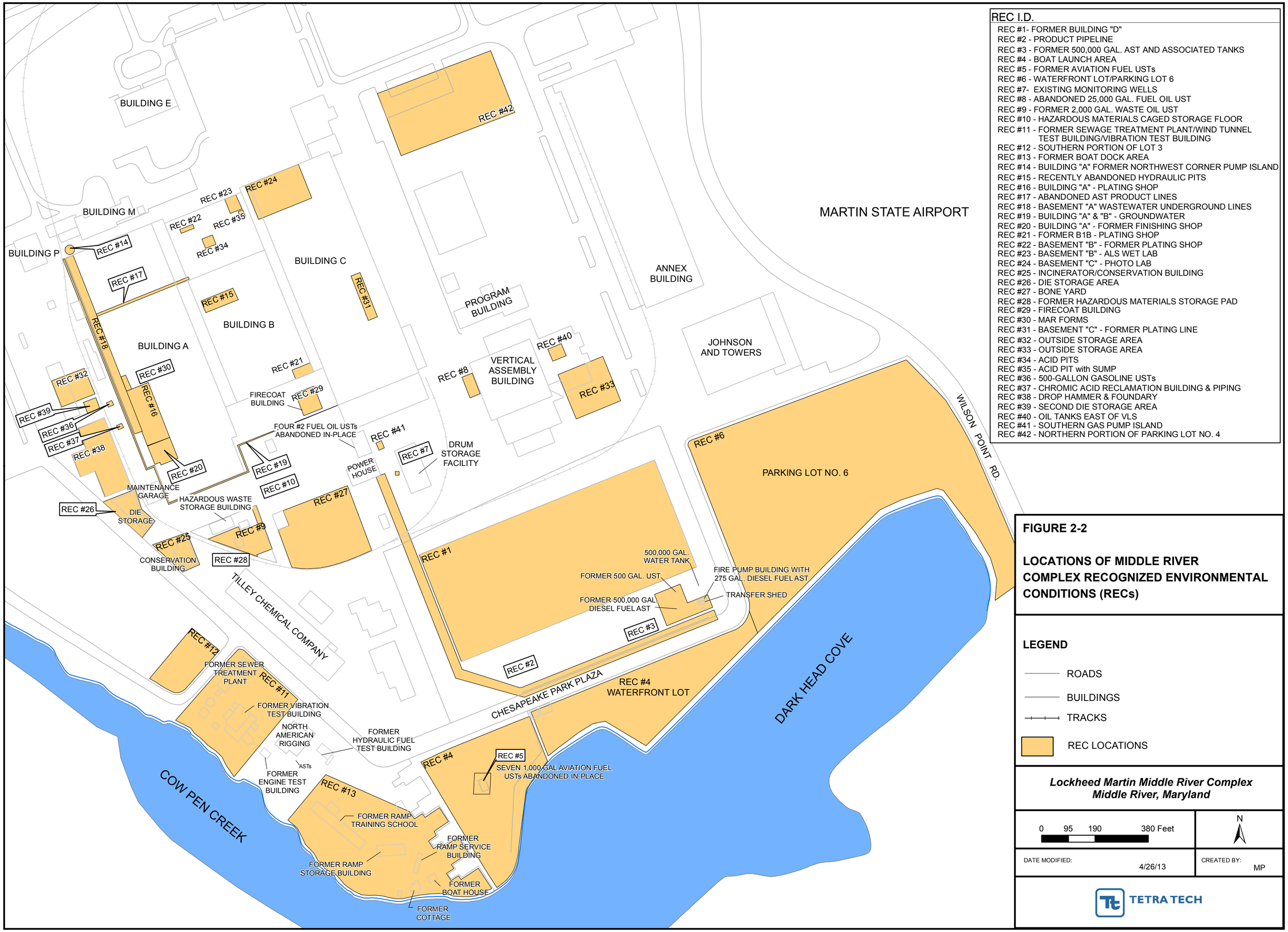

REC I.D.

- REC #1- FORMER BUILDING "D"
- REC #2 - PRODUCT PIPELINE
- REC #3 - FORMER 500,000 GAL. AST AND ASSOCIATED TANKS
- REC #4 - BOAT LAUNCH AREA
- REC #5 - FORMER AVIATION FUEL USTs
- REC #6 - WATERFRONT LOT/PARKING LOT 6
- REC #7- EXISTING MONITORING WELLS
- REC #8 - ABANDONED 25,000 GAL. FUEL OIL UST
- REC #9 - FORMER 2,000 GAL. WASTE OIL UST
- REC #10 - HAZARDOUS MATERIALS CAGED STORAGE FLOOR
- REC #11 - FORMER SEWAGE TREATMENT PLANT/WIND TUNNEL TEST BUILDING/VIBRATION TEST BUILDING
- REC #12 - SOUTHERN PORTION OF LOT 3
- REC #13 - FORMER BOAT DOCK AREA
- REC #14 - BUILDING "A" FORMER NORTHWEST CORNER PUMP ISLAND
- REC #15 - RECENTLY ABANDONED HYDRAULIC PITS
- REC #16 - BUILDING "A" - PLATING SHOP
- REC #17 - ABANDONED AST PRODUCT LINES
- REC #18 - BASEMENT "A" WASTEWATER UNDERGROUND LINES
- REC #19 - BUILDING "A" & "B" - GROUNDWATER
- REC #20 - BUILDING "A" - FORMER FINISHING SHOP
- REC #21 - FORMER B1B - PLATING SHOP
- REC #22 - BASEMENT "B" - FORMER PLATING SHOP
- REC #23 - BASEMENT "B" - ALS WET LAB
- REC #24 - BASEMENT "C" - PHOTO LAB
- REC #25 - INCINERATOR/CONSERVATION BUILDING
- REC #26 - DIE STORAGE AREA
- REC #27 - BONE YARD
- REC #28 - FORMER HAZARDOUS MATERIALS STORAGE PAD
- REC #29 - FIRECOAT BUILDING
- REC #30 - MAR FORMS
- REC #31 - BASEMENT "C" - FORMER PLATING LINE
- REC #32 - OUTSIDE STORAGE AREA
- REC #33 - OUTSIDE STORAGE AREA
- REC #34 - ACID PITS
- REC #35 - ACID PIT with SUMP
- REC #36 - 500-GALLON GASOLINE USTs
- REC #37 - CHROMIC ACID RECLAMATION BUILDING & PIPING
- REC #38 - DROP HAMMER & FOUNDARY
- REC #39 - SECOND DIE STORAGE AREA
- REC #40 - OIL TANKS EAST OF VLS
- REC #41 - SOUTHERN GAS PUMP ISLAND
- REC #42 - NORTHERN PORTION OF PARKING LOT NO. 4

FIGURE 2-2

LOCATIONS OF MIDDLE RIVER COMPLEX RECOGNIZED ENVIRONMENTAL CONDITIONS (RECs)

LEGEND

ROADS

BUILDINGS

TRACKS

REC LOCATIONS

Lockheed Martin Middle River Complex
Middle River, Maryland

0 95 190 380 Feet

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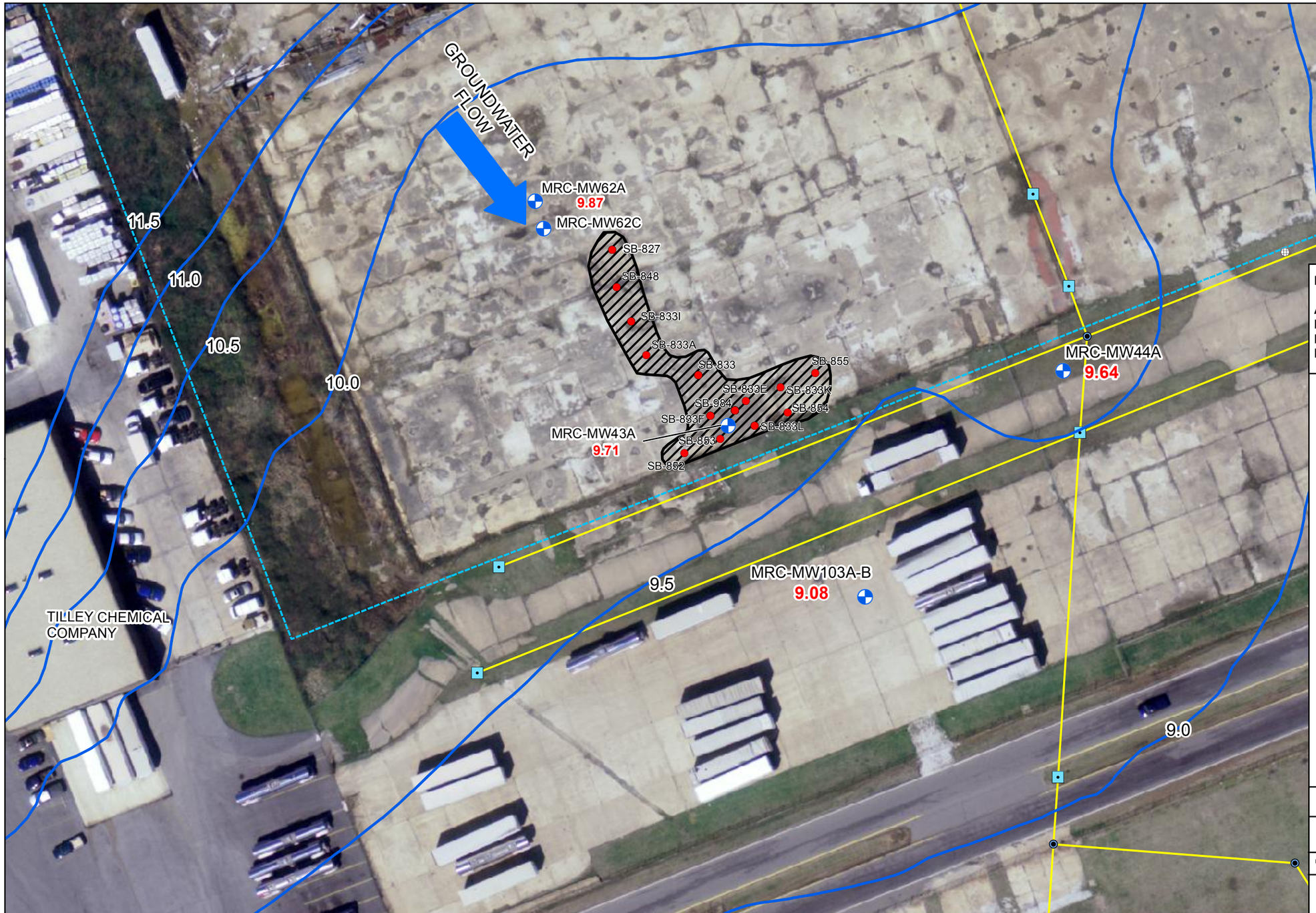

FIGURE 2-3

AREA OF ELEVATED PCBs IN DEEP SUBSURFACE SOIL, BLOCK E SOUTHWESTERN PCB AREA

LEGEND

- GROUNDWATER MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR INTERVAL = 0.5 FEET (MARCH 2012)
- 9.08 GROUNDWATER ELEVATION FEET, NAVD, 1988
- FIRE WATER LINE
- STORM SEWER
- STORMWATER INLET
- ELECTRIC MANHOLE
- MANHOLE SEDIMENT
- SOIL BORING/SAMPLE LOCATION
- AREA OF ELEVATED PCBs IN DEEP SUBSURFACE SOIL (>100-24,000 mg/kg)

PCBs= polychlorinated biphenyls
mg/kg= milligrams per kilogram
NAVD= North American Vertical Datum

Other soil borings/samples are located around the area of elevated PCBs in deep subsurface soil, but the PCB concentrations are not elevated and are therefore not shown. See Tetra Tech (2012c) for details.

Lockheed Martin Middle River Complex
Middle River, Maryland

0 10 20 40 Feet

N

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MARTIN STATE AIRPORT

FIGURE 2-4

DISTRIBUTION OF TCE IN GROUNDWATER, MARCH-APRIL 2012

LEGEND

- GROUNDWATER MONITORING WELL SAMPLED IN 2012
- WELL NOT SAMPLED IN 2012
- ABANDONED WELL BORING
- SURFACE WATER
- TCE ISOCONCENTRATION (UG/L) FOR 2012
- INFERRED
- 13 MAXIMUM CONCENTRATION IN WELL (UG/L)
- UG/L MICROGRAMS PER LITER
- ND NOT DETECTED
- NS NOT SAMPLED

Groundwater standard for TCE is 5 ug/l

TCE= trichloroethene

Lockheed Martin Middle River Complex
Middle River, Maryland

0 125 250 500 Feet

N

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Section 3
Investigation Approach and Methodology

This investigation includes installing, developing, surveying, and sampling four groundwater monitoring wells at the Middle River Complex (MRC). Soil samples will be collected for chemical analyses during drilling of the well boreholes. The objectives of this investigation are presented in Section 2; the activities proposed for this investigation are as follows:

- mobilize/demobilize for sampling staff and equipment
- obtain site and utility clearance
- install and develop two shallow groundwater monitoring wells (approximately 16 to 20 feet deep), south and southeast of existing well MRC-MW43A, to evaluate the presence/absence of polychlorinated biphenyls (PCBs) in groundwater directly downgradient of an area in the southwestern portion of Block E with elevated polychlorinated biphenyl (PCB) concentrations in deep soil
- install and develop two groundwater monitoring wells (approximately 30 to 40 feet deep) in Block I between existing wells MRC-MW94B and MRC-MW95B and between wells MRC-MW93A/B and MRC-MW94B, to further delineate the extent of the volatile organic compounds (VOCs) downgradient of well MRC-MW88A, and in an area north of the vertical launch system (VLS) building where new building construction is proposed
- collect soil samples from the four new well boreholes (five samples per borehole) for laboratory chemical analyses
- measure static groundwater levels for the four new groundwater monitoring wells
- collect groundwater samples from the four new groundwater monitoring wells for laboratory chemical analyses
- survey the soil boring locations and monitoring well locations using a Maryland-licensed surveyor
- perform laboratory chemical analyses and chemical data validation of groundwater and soil samples

- collect, store, and characterize investigation-derived waste (IDW) and dispose of the waste at an off-site, Lockheed Martin Corporation (Lockheed Martin)-approved treatment or disposal facility
- evaluate environmental sampling data
- report results

3.1 MOBILIZATION/DEMOBILIZATION

Following approval of this work plan, the Tetra Tech, Inc. (Tetra Tech) field operations leader will coordinate mobilization activities, which include procuring the required subcontractors and mobilizing personnel and materials to the field. Mobilization also includes locating the appropriate equipment required for the field tasks, purchasing and leasing necessary equipment as required, and staging equipment for efficient loading and transportation to the site. Mobilization will likely begin in the summer 2013, and includes the following:

- coordinate with Lockheed Martin to obtain digging/excavation permits and locate and mark utilities using both Miss Utility and a private utility locating firm
- mobilize subcontractors, equipment, and materials to the site
- implement the following:
    - site-specific health and safety plan (HASP)-attached as Appendix A
    - emergency response plan
    - sampling and analysis plan
    - waste management plan conforming to Lockheed Martin's *Energy, Environment, Safety, and Health (EESH) Remediation Waste Management Procedure No: EROP-03, Revision 4* (effective April 17, 2009)-attached as Appendix B
    - quality assurance/quality control (QA/QC) plan-attached as Appendix C
    - data management plan
- arrange a decontamination area

Demobilization activities will include the following:

- demobilize equipment and materials from the site (at work completion)
- perform general site cleanup and remove trash (at work completion)

- perform surface restoration/landscaping repair as necessary (at work completion)
- manage IDW

Before beginning field operations and after obtaining excavation/digging permits, appropriate Tetra Tech personnel will review the site–specific HASP and the respective Safe Work permits included therein. Tetra Tech will conduct a daily mandatory health and safety tailgate meeting before all fieldwork. All Tetra Tech and subcontractor personnel will sign work permits as specified in the HASP. Subcontractors present for the day's field activities will be included in these meetings. The Tetra Tech field operations leader will document the topics covered, personnel in attendance, and conduct the safety audit, in accordance with the Lockheed Martin contractor's handbook (Lockheed Martin, 2009). Safety requirements are addressed in detail in the site-specific Tetra Tech HASP included as Appendix A.

3.2 SITE ACCESS AND UTILITY CLEARANCE

Field activities planned for this investigation will be coordinated with Lockheed Martin. Utility clearance work and documentation will conform to the provisions of the Lockheed Martin remediation contractor's handbook, (Lockheed Martin, 2009) or the latest update. All required utility clearance activities will be completed, including screening for and identifying possible subsurface utilities. Before beginning any intrusive field activities related to the investigation, Tetra Tech will obtain required clearances and permits, which include performing the following steps:

- notifying the underground utility-location center Miss Utility (1-800-257-7777; www.missutility.net)
- reviewing facility and site utility maps
- following Enterprise Operation-28 (Lockheed Martin, 2009) and Lockheed Martin *Minimum Requirements for Intrusive Fieldwork Work Plans* (Appendix A of Lockheed Martin, 2009), completing the digging authorization form, and obtaining all required signatures

In addition to calling in a Miss Utility ticket, a private utility locating service (Enviroscan, Inc.) will be used to screen for and identify subsurface or underwater utilities and obstructions. The private utility locating firm will use typical utility-locating equipment representing the best available technology, including a Fisher TW-6 electromagnetic pipe and cable locator/tracer, a

RadioDetection C.A.T. and genny pipe and cable locator/tracer, a RadioDetection model RD4000 multi-frequency pipe and cable tracer, and a GSSI SIR-2000 ground penetrating radar system.

Copies of permits, Miss Utility tickets and the report prepared by the private utility-locating company will be submitted as part of the final project report. Tetra Tech will arrange for the meeting with LMC Properties, Inc. (LMCPI) to arrange site access and obtain the signed permit, and will communicate with the LMCPI and tenants to ensure the facility personnel are kept informed of the project scope and schedule.

3.3 MONITORING WELL INSTALLATION AND SOIL SAMPLING

As discussed in Section 2.3, two groundwater monitoring wells will be installed in Block E and two wells will be installed in Block I. The two Block E wells will be used to evaluate the presence or absence of PCBs in groundwater, downgradient of a high- PCB concentration area in deep subsurface soil, whereas the Block I wells will be installed to further characterize VOCs in groundwater east of Building C. Table 3-1 provides summaries of the well installation and soil sampling program. Figures 3-1 through 3-3 show the locations of the proposed wells. Wells MRC-MW113A and MRC-MW114A (in Block E) will be completed to a depth of no more than 20 feet, and wells MRC-MW115A and MRC-MW116A (in Block I) will be installed to an expected depth of 30 to 40 feet.

3.3.1 Monitoring Well Installation

3.3.1.1 Borehole Drilling

Boring for the monitoring well will be advanced using a low-profile mini-sonic rig (Rotasonic method), operated by a Maryland-licensed driller. The Rotasonic method will use a six-inch by eight-inch drill rod/override-casing setup (with temporary casing) to install the wells.

Soil will be continuously sampled during drilling using a 10-foot core barrel. Soil samples will be collected for soil screening, including lithologic characterization, visual observations (e.g., staining, discolorations, etc.), and odor detection. Soil samples will be screened for VOCs using a portable photoionization detector (PID) and a consistent headspace-screening methodology (e.g., sealable plastic bag technique). Headspace sampling in the field consists of cutting the soil core along its long axis, instantly placing one side of the core sample into a sealable plastic bag,

and immediately closing the top of the bag. The other portion of the sample will be placed into a VOC sample container or covered with foil to prevent VOC dissipation during screening. The soil in the bag will be gently disturbed to allow VOCs to be released from the soil matrix; this is particularly important for fine-grained samples containing clay. The samples will be allowed to stand for 5-10 minutes prior to obtaining a PID reading. If the ambient temperature is cool (i.e., below 60 degrees Fahrenheit), the screening sample will be placed in a warm environment such as a heated vehicle or building. After 5-10 minutes, the tip of the PID will be inserted into the plastic bag to obtain a reading. The PID readings will be monitored until a peak (i.e., maximum) total VOC concentration is reached. The peak VOC concentration will then be recorded on the soil boring form and in the field notebook. The soil in the bag used for PID screening will not be used as the laboratory VOC sample aliquot. An empty bag will be screened for total VOCs to determine VOC readings that may be due to the plastic bag because hydrocarbons can partition from the plastic to the air and result in PID responses and readings (United States Environmental Protection Agency [USEPA], 1997). Collected soil samples will be analyzed by the laboratory chemical methods listed in Section 3.5 and Table 3-2.

A qualified Tetra Tech field geologist will perform lithologic logging. All pertinent information, including boring location, soil/lithology descriptions, and PID readings will be recorded on a soil boring log form. Details of soil sampling methods and analyses are in Section 3.3.2 and in Tables 3-1 and 3-2. However, additional soil samples for laboratory analyses may be collected if evidence of contamination (such as sheens, PID readings above background, black oil-like staining, or free product, etc.) are observed.

3.3.1.2 Well Construction

Groundwater monitoring wells will be constructed of two-inch diameter, flush threaded, Schedule-40 polyvinyl chloride (PVC) well casing with a manufactured PVC well-screen. Based on previous wells installed throughout the MRC, the well screen will be 10 feet long with 0.010-inch wire-wrapped openings. The screen length may be adjusted in the field to address the depth to groundwater, thickness of the permeable formation material, or installation of a surface seal; however, the well screen will be at least five feet in length. A sand filter-pack of washed #1 filter sand will be placed around the well screen up to at least two feet above the top of the well screen.

Following placement of the sand pack, the well will be pre-developed using a combination of surging and air lifting via the drill rig to settle the sand pack around the well screen. The depth to sand will be measured using a weighted tape. If settlement of the sand pack is noted, additional sand will be used to bring the sand pack back up to the desired depth.

A two-foot thick bentonite seal will be installed above the sand pack using bentonite pellets, and will be allowed to hydrate during installation. Project-approved water will be used to hydrate the bentonite if it is installed above the water table. Instead of tamping the benonite before placing the grout, it will be vibrated in place using the sonic drill stem to promote pellet hydration and to settlement. Grout, consisting of Type II Portland cement and powdered bentonite, will be placed above the bentonite seal to approximately two feet below grade. Grout will be made by mixing a 94-pound bag of Type II Portland cement, nine pounds of powdered sodium bentonite, and no more than eight gallons of water per bag of cement. The relative thicknesses of the bentonite seal and surface seal and grout may be adjusted to accommodate the well depth relative to ground surface.

A protective, locking, flush-mounted well cover will be secured over the well casing to protect each well. The PVC well casing will be cut below grade and made watertight by installing a locking, expandable, sanitary seal in the well casing top. Concrete will be installed above the grout in the annular space between the well borehole and outer well casing, up to approximately six-inches below grade, to provide a surface seal for the well, and to provide support for the flush-mounted cover. The flush-mount cover will be set in a two square-foot concrete pad.

The highest point on the top of the PVC well casing will be marked using a file (i.e., filing a small groove in the casing) or an indelible marker. The land surveyor will survey the marked location of the well; this information will be used to measure the depth to groundwater at the well. Well construction details will be recorded in the field logbook and on a well construction form.

3.3.1.3 Well Development

The wells will be developed following installation to remove fines from the well filter pack and casing, and to ensure a hydraulic connection between the well and the geologic formation. Well development will be scheduled as soon as possible following installation, and once a minimum of 24-hours has elapsed following well construction, to allow the grout to set up. The well will be

developed by hand bailing to remove heavy sediments, then by gentle surging and purging with a submersible pump and/or air lifting to remove fines and sediment from the sand pack and well screen.

Development will begin at the bottom of the well screen, work up incrementally to the top of the screened interval, and then back down to the bottom of the well. During well development, water level drawdown measurements and groundwater parameters (including pH, temperature, specific conductance, dissolved oxygen [DO], oxidation reduction potential [ORP], and turbidity) will be collected every five minutes until pumping is complete and recorded in the appropriate site-specific logbook and on a well development record. Water quality parameters will be measured using a water quality meter. Turbidity readings will be collected using a separate turbidity meter (due to the instability of turbidity meters on multi-meters) and recorded in the field logbook and on a well development record. Development will continue until groundwater runs clear and/or field parameters such as pH, conductivity, and turbidity have stabilized. Stabilization will be considered achieved when three consecutive readings are within ±0.1 standard units for pH, ±3% for conductivity, and ± 10% for turbidity. Each well will be developed for no longer than three hours. All development water will be collected in United States Department of Transportation (USDOT)-approved, properly labeled 55-gallon steel drums in a facility-approved location.

3.3.2 Soil Sampling

Soil cores will be collected using a 10-foot core-barrel. Soil samples will be collected for laboratory analyses at the following depth intervals: (0)-0.5 feet; 1-2 feet; 3-4 feet; and two deeper samples that will be selected based on field observation and screening, with at least one sample from the screened interval within the most permeable material (i.e., sand and gravel zone). The soil samples will be screened with a PID using a consistent headspace screening methodology (the sealable plastic-bag headspace method described in Section 3.3.1.1), and soil descriptions will be recorded on a lithologic log by the field geologist. Up to five soil samples will be collected for laboratory analyses from each of the four monitoring well borings, for a total of up to 20 soil samples. Soil samples will be submitted to an offsite laboratory to be analyzed for the parameters listed in Section 3.5 and Table 3-2.

3.4 WELL PURGING AND SAMPLING

Before sampling, water levels in the new monitoring wells will be measured after each well has been allowed to equilibrate (following development) with the aquifer for at least one week. The static water level will be determined by lowering the electronic water level meter's probe into the well until the liquid level indicator emits an audible tone, indicating the air/water interface. The water level will be read from the probe cable and recorded to the nearest 0.01 foot as the depth to water from the top of the PVC well casing. Water level measurements will be recorded in the appropriate site-specific field logbook and on a groundwater level measurement field form. The well depths will also be recorded when water level measurements are collected.

One round of groundwater samples will be collected from the new monitoring wells after the groundwater levels have been allowed to equilibrate with the aquifer for at least one week following development, and after a water level measurement is taken. The wells will be sampled using the low flow purging/sampling method (USEPA, 1996 and 2010), whereby water is pumped from the well at a low flow rate and water quality parameters are monitored and recorded during the purging. The wells will be purged using a peristaltic pump and disposable polyethylene tubing. The pumping rate will range between 100 and 300 milliliters per minute. The final adjustment of the purge rate will depend on water stabilization, and how fast the well recharges without drawdown below the initial static water level.

During groundwater purging, water level drawdown measurements and groundwater parameters, including pH, temperature, specific conductance, DO, ORP, and turbidity will be collected every five minutes, or after each purge volume, whichever is quicker, until purging is complete, and recorded in the appropriate site-specific logbook, as well as on Low Flow Purge Data Sheets. Water quality parameters will be measured using an in-line water quality meter. Turbidity readings will be collected using a separate turbidity meter (due to the instability of turbidity readings from multi-meters), and will be recorded in the field logbook and on Low Flow Purge Data Sheets.

Purging will be considered complete when the monitored water quality parameters have stabilized, the well is purged dry, or the well has been purged for two hours. Stabilization will be considered achieved when three consecutive readings, taken at five-minute intervals are within ±0.1 standard units for pH, ±3% for specific conductance, and ±10% for ORP and turbidity, or after a maximum of two hours has elapsed. If the monitoring well is purged dry, the water level in the well will be

allowed to recover to a minimum of 80% of its initial static water level before groundwater sampling occurs.

3.5 SOIL AND GROUNDWATER SAMPLE ANALYSES

Table 3-2 contains analytical requirements, including analytical methods, for soil and groundwater samples collected as part of this investigation. Tetra Tech will use a laboratory accredited in the State of Maryland (e.g., TestAmerica) for the sample analyses. Soil samples collected as part of the well soil boring drilling will be analyzed for the following parameters using the listed methods:

- VOCs by SW846 Method 8260C
- semivolatile organic compounds (SVOCs) by SW846 Method 8270D
- total petroleum hydrocarbons (TPH) gasoline–range organics (GRO) and diesel–range organics (DRO) by SW846 Method 8015D
- total metals by SW846 Method 6020A (including mercury by Method 7471B)
- hexavalent chromium by SW846 Method 7196A
- PCBs by SW846 Method 8082A (Block E samples only).

Groundwater samples collected from the newly installed wells will be analyzed for the following parameters:

- VOCs by SW846 Method 8260C
- SVOCs and 1,4-dioxane by SW846 Method 8270D
- total and dissolved metals by SW846 Method 6020A (including mercury by Method 7470A)
- hexavalent chromium by USEPA Method 218.6
- perchlorate by SW846 Method 6850
- PCBs by SW846 Method 8082A (Block E samples only).

Groundwater samples for VOCs and TPH-GRO will be collected first, followed by samples to be analyzed for SVOCs/1,4-dioxane, TPH-DRO, perchlorate, and metals. Samples for each analytical parameter will be placed in a cooler containing ice immediately upon collection (for example,

VOC containers will be placed in a cooler containing ice immediately after the VOC containers are filled and closed). For coolers used to store and ship VOC samples, aqueous trip blanks will be placed in the cooler at the beginning of each sampling day. Prior to sampling each day, a trip blank will be placed in each cooler that will contain VOC samples for that sampling day; the trip blank will accompany the VOC samples throughout the day and will be sent along with the samples to the laboratory. Trip blanks will be analyzed for VOCs by SW846 Method 8260C. No other QA/QC samples will be collected. Duplicate samples for matrix spike purposes will be collected and analyzed at a rate of one matrix spike/matrix duplicate samples for every 20 environmental samples (or a 1:20 or 5% incidence). Samples will be analyzed on a standard turnaround of 21 calendar days.

3.6 SAMPLE NOMENCLATURE AND HANDLING

A master site logbook will be maintained at the site as an overall record of field activities. Each sample will receive a unique sample identification tag. The sample identification tag will consist of the block designation, followed by "SB" (indicating soil boring) and the well boring number. Samples from each depth interval will carry a two-digit label indicating the top and bottom depths of the boring. For example, I-SB-MW115-0-0.5 designates that the soil sample was collected for Block I at well soil boring MRC-MW115 from the ground surface (i.e., 0 foot) to 0.5 foot below grade.

Each monitoring well sample will be designated by "MRC-MW" followed by the location number and a six-digit collection date. For example, MRC-MW115A-070913 is a groundwater sample collected from monitoring well MRC-MW115A on July 9, 2013. The designation for a shallow well is A. Trip blanks (TB) will be labeled with a TB prefix followed by a six-digit submittal date (e.g., TB-070913).

Sample handling includes field-related considerations concerning the selection of sample containers, preservatives, allowable holding times, and analyses requested. Proper custody procedures will be followed throughout all phases of sample collection and handling. Chain of custody protocols will be used throughout sample handling to establish the evidentiary integrity of sample containers. These protocols will be used to demonstrate that the samples were handled and transferred in a manner that would eliminate (or detect) possible tampering.

Sample custody, handling, and shipping will be conducted in accordance with applicable sections of *Sampler's Guide, Contract Laboratory Program Guidance for Field Samplers* (USEPA, 2011). These requirements require sample containers to be released under signature from the laboratory and accepted under signature by the sampler(s) or responsible individual that will maintain custody until the sample containers are transferred to the sampler(s). Transport containers returning to the laboratory will be sealed with strapping tape and a tamper proof custody seal. The custody seal will contain the signature of the individual releasing the transport container, along with the date and time (USEPA, 2011).

3.7 SURVEYING

A professional Maryland-licensed field surveyor will survey the site to provide the horizontal and vertical coordinates for each new well. A qualified, state-licensed, land-surveying firm will perform the surveying. Surveyed locations will be accurate to the nearest 0.01 foot for vertical elevations in the North American Vertical Datum 1988 and to the nearest 0.1 foot horizontal coordinates in the North American Datum 1983 at the top of the well casings. Ground elevations at the wells will be surveyed within a vertical accuracy of 0.1 foot. Final survey locations will be used for data reporting at the end of field sampling. This information will also update the MRC environmental geographic information system (EGIS).

3.8 EQUIPMENT DECONTAMINATION

A decontamination area and a clean zone will be established at the perimeter of the restricted work zone to prepare and break down sampling equipment. The decontamination area will be established to contain decontamination rinsate solution for subsequent disposal. Reusable equipment (e.g., scoops) will be decontaminated before and after each use. Decontamination of reusable small equipment will consist of the following:

- laboratory grade, phosphate free, ionic/anionic surfactant (Alconox®, Liquinox®, or equivalent) and potable water wash
- potable water rinse
- equipment will be rinsed and wetted thoroughly with reagent grade isopropanol
- analyte free water rinse
- air drying

- decontamination solutions will be collected in USDOT-approved appropriately-labeled 55-gallon drums for waste characterization and disposal

All downhole drilling equipment, including the rear of the rig, will be steam cleaned before arriving on-site, before beginning work, between drilling locations, any time the rig leaves and returns to a hole before completing a boring, any time the drill rig leaves the site, and at the conclusion of the drilling program.

3.9 WASTE MANAGEMENT

A waste management plan conforming to Lockheed Martin's *Enterprise Operation-03* (Lockheed Martin, 2009b) is included as Appendix B. This plan will be followed during this investigation to store, manage, test, and dispose of IDW. IDW (consisting of all drill cuttings and soil cuttings decontamination rinsate water, excess soil from sampling, well purge water, and personal protective equipment [PPE]) will be generated during characterization sampling. PPE IDW will be placed in trash bags and placed in a facility trash receptacle to be disposed of as general refuse. Soil cuttings and decontamination water will be collected and stored in USDOT-approved 55-gallon drums.

All drums will be appropriately labeled and logged on a drum inventory form. Wastes will be characterized and disposed of in accordance with applicable state and federal regulations and the *MRC Waste Management Plan* (see Appendix B). After generation, the drums will be relocated to a drum staging area as identified by Lockheed Martin personnel. Personal protective equipment IDW will be brushed off, placed in trash bags, and disposed of in a facility trash receptacle. Samples of IDW will be collected and submitted for toxicity characteristic leaching procedure organic and inorganic analyses, corrosivity, ignitability, and reactive sulfide and reactive cyanide. Upon receipt of the IDW analytical data, the generated IDW will be removed from the facility and properly disposed in accordance with federal, state, and local regulations.

3.10 DATA MANAGEMENT

Data handling procedures to be followed by the laboratory will meet the requirements in the laboratory subcontract. All analytical and field data will be maintained in Tetra Tech project files and will include copies of the chain of custody forms, sample log forms, sample location maps, and QA/QC documentation.

3.10.1 Data Tracking and Control

A cradle-to-grave sample tracking system will be used from the beginning to the end of the sampling event. Before field mobilization, the field operations leader will coordinate and initiate the sample tracking process. Sample labels will be handwritten in the field or preprinted before entering the field. Labels will be reviewed for accuracy and to ensure that they adhere to the work plan. The project manager (PM) will coordinate with the analytical laboratory to ensure that they are aware of the number and type of samples and analyses.

When field sampling is underway, the field operations leader will forward chain of custody forms to the PM (or designee) and the laboratory for each day that samples are collected; the PM (or designee) will confirm that the chain of custody forms that accompany the samples provide the information required by the work plan. This data tracking system will ensure early detection of field errors so that adjustments can be made while the field team is still mobilized. After completion of all requested analyses, the laboratory will submit an electronic deliverable for every sample delivery group. When all electronic deliverables have been received from the laboratory, the PM (or designee) will ensure that the laboratory has performed all requested analyses, noting discrepancies early enough so that all samples can be analyzed within the prescribed holding times.

3.10.2 Sample Information

Data from field measurements will be recorded on appropriate log sheets. Reduction of field data entails the summarization and presentation of these data in tabular form. The reduction of laboratory data entails manipulation of raw data instrument output into reportable results. Field data such as temperature readings will be verified daily by the field operations leader. Laboratory data will be verified by the group supervisor and then by the laboratory's QC/documentation department.

3.10.3 Project Data Compilation

The analytical laboratory will generate an Adobe® portable document format (PDF) file for the analytical data packages, as well as electronic database deliverables. The electronic database will be checked against the PDF file provided by the laboratory and updated as required, based on data qualifier flags applied during data validation. Data generated during this investigation will be

incorporated into the MRC EGIS. All data, such as units of measure and chemical nomenclature, will be organized to assure consistency across the project database.

3.10.4 Environmental Geographic Information System

Data pertaining to MRC sites are managed to relate environmental information with an EGIS. This relational database stores chemical, geological, hydrogeologic, and other environmental data collected during environmental investigations. The EGIS is derived from the relational database and contains subsets of the larger data pool. Using the EGIS, environmental data can be posted on base maps to provide a graphical representation of information. Sample, chemical, and positional data are compiled and incorporated into the EGIS, which can be used to generate a variety of maps depicting site locations, sample locations, and contaminant tags, as needed.

3.10.5 Data Quality Objective and Data Review

The overall data-quality objective of this project is to obtain reliable data meeting or exceeding project requirements. This objective can be further expressed in terms of data precision, accuracy, representativeness, comparability, and completeness (PARCC). For this project, data quality objectives will be addressed as follows:

- *Precision* is the ability to reproduce analytical results within an established acceptable range when performing analyses. Testing facilities will use standard methods that have been documented in the form of standard operating procedures (SOPs), so that the same methodology is consistently applied to all analyses performed during this project. Laboratory duplicate samples will be analyzed to confirm that data precision is within the established limits for a specific analysis.

- *Accuracy* is a measure of how close the results agree with the "true" value (i.e., an accepted reference value). For this project, accuracy will be assessed by evaluating matrix-spike and laboratory-control samples.

- *Representativeness* is the measure of how well the sample represents the system being measured.

- *Comparability* is the confidence with which one data set can be compared to another. Comparability will be established through the use of SOPs and by comparing data to previous studies.

- *Completeness* is the amount of valid data obtained from a measurement system as compared to the expected amount of data. This factor is of limited relevance to this project, but a goal of 85% will be used based on the completeness of data generated for similar projects.

Definitive data from this investigation will consist of chemical data for soil and groundwater samples. These data will further delineate the nature and extent of soil and groundwater contamination, and will be used to evaluate potential treatment technologies. These data may also be used in human health and ecological screening. Upon receipt of chemical data from the laboratory, it will be entered into a sample database and evaluated against risk-based criteria or standards.

Data validation consisting of assessing data completeness, holding times, calibrations, laboratory and field blank contamination, and detection limits will be completed concurrent with the data evaluation. Data validation will be according to USEPA Region 3 *Modifications to the National Functional Guidelines for Data Review* (USEPA, 1993 and 1994), and the specifics of the analytical method used.

Project samples will be analyzed by a state-accredited laboratory for the compounds prescribed in Table 3–2, according to the methodologies listed in the sampling and analysis plan and the QA plan. All analytical results will be thoroughly checked for quality and usability by qualified chemists. Data usability reviews (data validation) results will be transmitted to the project personnel as they are received. All data provided by the laboratory will be validated for PARCC in accordance with USEPA Region 3 Level M2 protocols. In addition, oversight of laboratory QA/QC will be as proactive as possible to ensure valid data are produced during the sampling event. Methodology and method compliance will also be evaluated, and any corrective actions needed will be performed. Results of data usability reviews will be provided to Lockheed Martin and Remediation Technical Operations (RTO) as they are received.

Table 3-1

Monitoring Well Installation and Soil Sampling—Block E and Block I, 2013
Lockheed Martin Middle River Complex
Middle River, Maryland

Monitoring well number	Monitoring well location	Approximate bottom depth (feet)	Soil Sampling	Rationale/purpose
MRC-MW113A and MRC-MW114A	Southwestern portion of Block E, south and southeast of existing well MRC-MW43A, in a grassy area just south of former Building D basement concrete slab.	16 to 20 feet	Five soil samples from each well boring (10 samples total). From each well soil boring: 0-0.5 feet; 1-2 feet; 3-4 feet; and two deeper samples that will be based on field observation and screening, with at least one sample obtained from the screened interval within the most permeable material (i.e., sand and gravel zone).	Two new wells are required to evaluate the presence/absence of polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs) in shallow groundwater directly downgradient of the former Building D nuclear laboratory and former electrical transformer room. Elevated levels of PCBs and VOCs have been detected in subsurface soil of the upper surficial aquifer at eight to 16 feet below grade in this area. Soil samples collected during well installation will be used to chemically characterize soil quality, delineate potential source areas, and assess risk. Wells will provide long-term groundwater monitoring locations to evaluate the presence/absence of PCBs and VOCs in groundwater; wells can be used for seasonal sampling over several years.
MRC-MW115 and MRC-MW116A	East of Building C in the asphalt lot between wells MRC-MW94B and MRC-MW95B and wells MRC-MW93A/B and MRC-MW94B.	30 to 40 feet based on lithology (i.e., presence of permeable sands and/or silt), field VOC readings, odors, or visual evidence of potential VOCs	Five soil samples from each well boring (10 samples total) at 0-0.5 feet; 1-2 feet; 3-4 feet; and two deeper samples that will be based on field observation and screening, with at least one sample obtained from the screened interval within the most permeable material (i.e., sand and gravel zone).	Groundwater results will further characterize the extent of VOCs in an area east of Building C in Block I, and help to delineate the southeastern trichloroethene (TCE) plume boundary located hydraulically downgradient of well MRC-MW88A (MRC-MW-115A), and in an area of a proposed new building (MRC-MW-116A). MRC-MW88A is screened from 20-30 feet below grade. TCE has been detected at MRC-MW88A at concentrations ranging from 440-1,500 micrograms per liter (µg/L). Four of five historical TCE concentrations at MRC-MW88A have exceeded the Maryland groundwater standard (5 µg/L) by more than 100 times. Soil samples collected will help to chemically characterize soil quality, delineate a possible VOC source area, and assess potential human health risk.

Table 3-2

Soil and Groundwater Sampling Analytical Requirements—Blocks E and I, 2013
Lockheed Martin Middle River Complex
Middle River, Maryland

Location	Analyses-Soil	Methods-Soil	Analyses-Groundwater	Methods-Groundwater
MRC-MW113A and MRC-MW114A	VOCs SVOCs TPH-GRO TPH-DRO total metals total mercury hexavalent chromium PCBs	SW 846 Method 8260C SW 846 Method 8270 D SW 846 Method 8015D SW 846 Method 8015D SW 846 Method 6020A SW 846 Method 7471B SW 846 Method 7196A SW 846 Method 8082A	VOCs SVOCs, 1,4-dioxane total and dissolved[1] metals total and dissolved[1] mercury hexavalent chromium perchlorate PCBs	SW 846 Method 8260C SW 846 Method 8270 D SW 846 Method 6020A SW 846 Method 7470A USEPA Method 218.6 SW 846 Method 6850 SW 846 Method 8082A
MRC-MW115A and MRC-MW116A	VOCs SVOCs TPH-GRO TPH-DRO total metals total mercury hexavalent chromium	SW 846 Method 8260C SW 846 Method 8270 D SW 846 Method 8015D SW 846 Method 8015D SW 846 Method 6020A SW 846 Method 7471B SW 846 Method 7196A	VOCs SVOCs, 1,4-dioxane total and dissolved[1] metals total and dissolved[1] mercury hexavalent chromium perchlorate	SW 846 Method 8260C SW 846 Method 8270 D SW 846 Method 6020A SW 846 Method 7470A USEPA Method 218.6 SW 846 Method 6850

1- Dissolved metals samples are filtered in the field using a 0.45 micron disposable filter prior to sample preservation.

Aqueous trip blanks (one per cooler containing soil and/or groundwater samples) will be analyzed for VOCs using SW 846 Method 8260C
Matrix spike/matrix spike duplicates: one for every 20 environmental samples (5%) for all analyses for both soil and groundwater using the methods listed above

Samples analyzed by SW 846 use *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, Final Update IV of the Third Edition, USEPA, Washington, D.C., http://www.epa.gov/osw/hazard/testmethods/sw846/index.htm

DRO=diesel-range organics
GRO=gasoline-range organics
MRC=Middle River Complex
PCBs=polychlorinated biphenyls
SVOCs=semivolatile organic compounds
TPH=total petroleum hydrocarbons
USEPA=United State Environmental Protection Agency
VOCs=volatile organic compounds

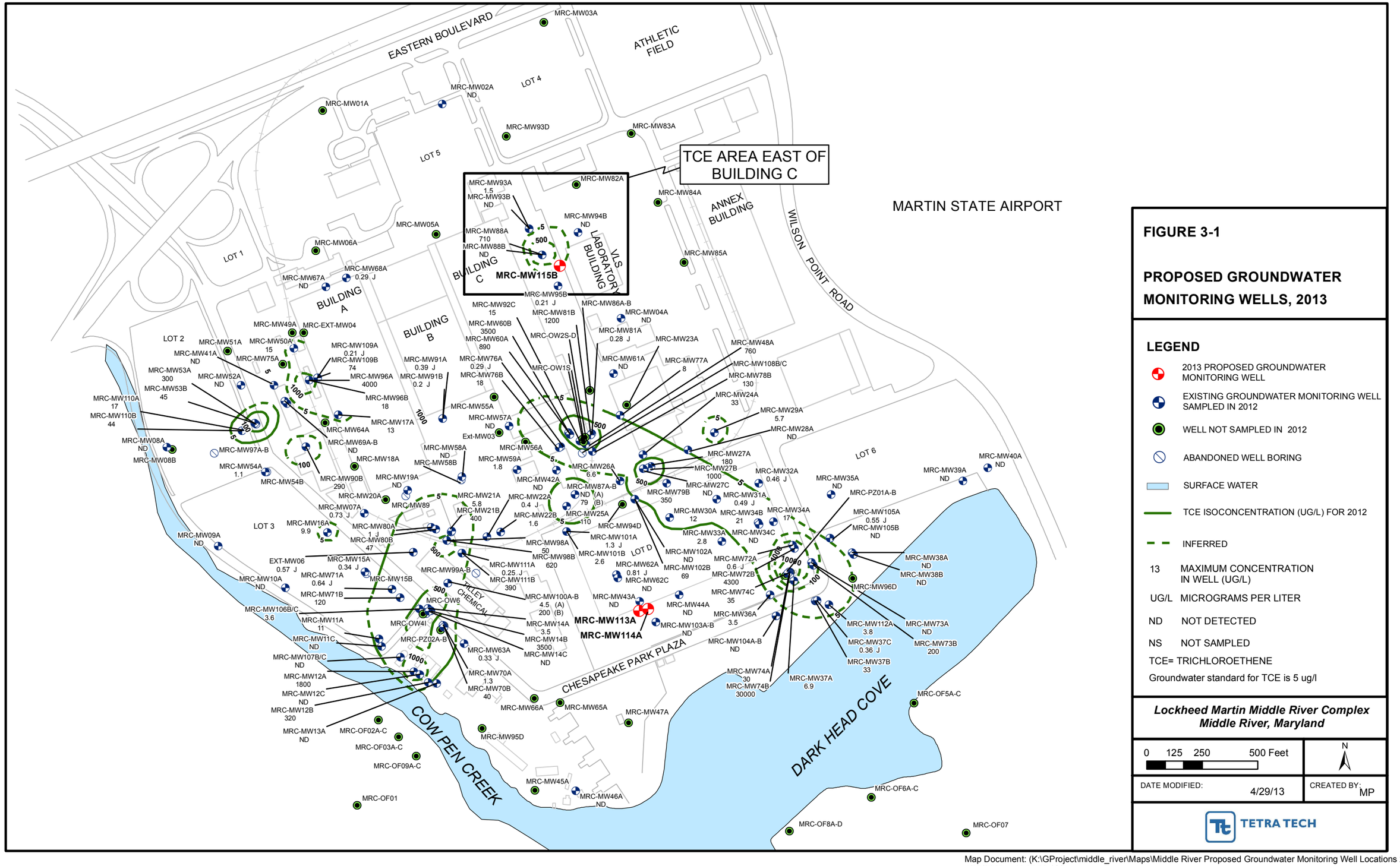

FIGURE 3-1

PROPOSED GROUNDWATER MONITORING WELLS, 2013

LEGEND

- 2013 PROPOSED GROUNDWATER MONITORING WELL
- EXISTING GROUNDWATER MONITORING WELL SAMPLED IN 2012
- WELL NOT SAMPLED IN 2012
- ABANDONED WELL BORING
- SURFACE WATER
- TCE ISOCONCENTRATION (UG/L) FOR 2012
- INFERRED
- 13 MAXIMUM CONCENTRATION IN WELL (UG/L)
- UG/L MICROGRAMS PER LITER
- ND NOT DETECTED
- NS NOT SAMPLED
- TCE= TRICHLOROETHENE
- Groundwater standard for TCE is 5 ug/l

Lockheed Martin Middle River Complex
Middle River, Maryland

0 125 250 500 Feet

N

DATE MODIFIED: 4/29/13

CREATED BY: MP

TETRA TECH

Map Document: (K:\GProject\middle_river\Maps\Middle River Proposed Groundwater Monitoring Well Locations 2013.mxd)
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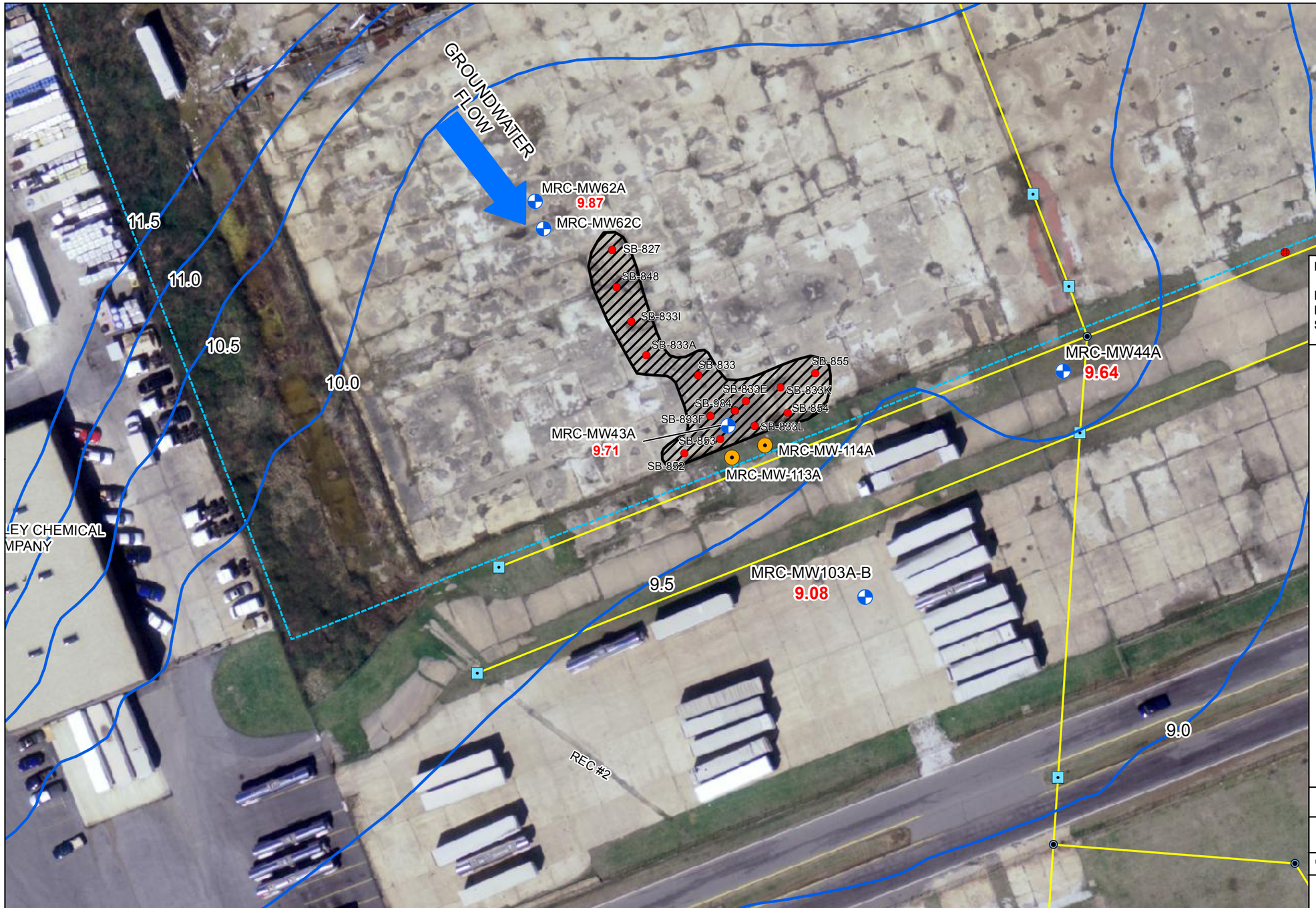

FIGURE 3-2

PROPOSED GROUNDWATER MONITORING WELLS, BLOCK E SOUTHWESTERN PCB AREA

LEGEND

- PROPOSED MONITORING WELL
- GROUNDWATER MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR INTERVAL = 0.5 FEET (MARCH 2012)
- 9.08 GROUNDWATER ELEVATION FEET, NAVD, 1988
- FIRE WATER LINE
- STORM SEWER
- STORMWATER INLET
- ELECTRIC MANHOLE
- MANHOLE SEDIMENT
- SOIL BORING/SAMPLE LOCATION
- AREA OF ELEVATED PCBs IN DEEP SUBSURFACE SOIL (>100-24,000 mg/kg)

PCBs= polychlorinated biphenyls
mg/kg= milligrams per kilogram
NAVD= North American Vertical Datum

Other soil borings/samples are located around the area of elevated PCBs in deep subsurface soil, but the PCB concentrations are not elevated and are therefore not shown. See Tetra Tech (2012c) for details.

Lockheed Martin Middle River Complex
Middle River, Maryland

0 10 20 40 Feet

N

DATE MODIFIED: 3/18/13

CREATED BY: MP

TETRA TECH

Map Document: (K:\GProject\middle_river\Maps\Proposed GW monitoring wells Block E Southwestern PCB area.mxd)
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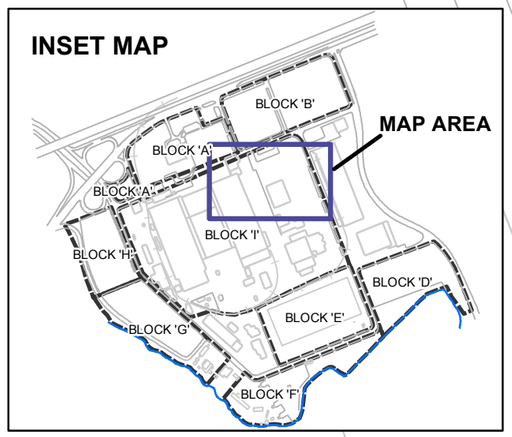

MRC-MW82A

MRC-MW84A

MRC-MW93A
1.5

MRC-MW93B
ND

MRC-MW94B
ND

MRC-MW05A

5

MRC-MW88A
710

500

MRC-MW88B
ND

MRC-MW115B

VLS
LABORATORY
BUILDING

BUILDING
C

MRC-MW95B
0.21 J

MRC-MW86A-B

FIGURE 3-3

PROPOSED GROUNDWATER MONITORING WELL, BLOCK I TCE AREA EAST OF BUILDING C

LEGEND

- 2013 PROPOSED GROUNDWATER MONITORING WELL
- EXISTING GROUNDWATER MONITORING WELL SAMPLED IN 2012
- WELL NOT SAMPLED IN 2012
- TCE ISOCONCENTRATION (UG/L), 2012
- INFERRED
- 13 MAXIMUM CONCENTRATION IN WELL (UG/L)
- UG/L MICROGRAMS PER LITER
- ND NOT DETECTED
- TCE= TRICHLOROETHENE
- Groundwater standard for TCE is 5 ug/l

Lockheed Martin Middle River Complex
Middle River, Maryland

0 25 50 100 Feet

N

DATE MODIFIED: 4/29/13

CREATED BY: MP

TETRA TECH

Map Document: (K:\GProject\middle_river\Maps\Middle River Proposed Groundwater Monitoring Well Locations 2013_TCE area east of building c.mxd) 4/29/2013 -- 2:45:52 PM

Section 4
Project Deliverables

Tetra Tech, Inc. (Tetra Tech) will prepare two reports for this investigation. The reports will be prepared in a format and at a sufficient level of detail to achieve final approval from all project stakeholders, including the Maryland Department of the Environment (MDE). The first report will be a brief technical memorandum that summarizes groundwater-monitoring results from the newly installed well in Block I. The second report will be more comprehensive, and will include a description of field work activities conducted in Blocks E and I, analytical summary tables, figures depicting monitoring well locations, boring logs, certificates of analysis, well completion reports, interpretation and findings, and conclusions.

Summary tables for analytical results will include detectable concentrations and detection limits. Results will be compared to potential screening and regulatory criteria that will also be noted in the tables and text. Analytical data will be entered and maintained in the Middle River Complex (MRC) environmental geographic information system (EGIS). Each report will be submitted to Lockheed Martin Corporation (Lockheed Martin) and its representatives for review and comment. Comments will be incorporated as appropriate to meet project needs.

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Section 5
References

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APPENDIX A—HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
FOR
LOCKHEED MARTIN CORPORATION

MULTIMEDIA CHARACTERIZATION

LOCKHEED MARTIN MIDDLE RIVER COMPLEX

MIDDLE RIVER, MARYLAND

TETRA TECH, INC.
20251 Century Boulevard Suite 200
Germantown, Maryland 20874-7114

Revision 4
April 2013

HEALTH AND SAFETY PLAN
FOR
MULTIMEDIA CHARACTERIZATION
AT
LOCKHEED MARTIN CORPORATION
LOCKHEED MARTIN MIDDLE RIVER COMPLEX

2323 EASTERN BOULEVARD
MIDDLE RIVER, MARYLAND

Submitted to:
Lockheed Martin Corporation
Lockheed Martin Middle River Complex

Submitted by:
Tetra Tech
20251 Century Boulevard, Suite 200
Germantown, Maryland 20874

REVISION 4
April 2013

PREPARED UNDER THE SUPERVISION OF:

MICHAEL W. MARTIN, PG
REGIONAL MANAGER
TETRA TECH
GERMANTOWN, MARYLAND

APPROVED FOR SUBMITTAL BY:

CLYDE SNYDER, MEP, CESCO
PROJECT HEALTH AND SAFETY OFFICER
TETRA TECH
PITTSBURGH, PENNSYLVANIA

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to provide the minimum practices and procedures for Tetra Tech, Inc. (Tetra Tech) and subcontractor personnel engaged in Multimedia Characterization activities at the Lockheed Martin Middle River Complex (LMC MRC) in Middle River, Maryland.

This HASP must be used in conjunction with the Tetra Tech Health and Safety Guidance Manual (HSGM). The HSGM contains Tetra Tech Health and Safety Standard Operating Procedures (SOPs), as well as detailed reference information on a variety of topics referenced in this HASP. This HASP and the contents of the Guidance Manual were developed to comply with the requirements stipulated in 29 CFR 1910.120 (OSHA's Hazardous Waste Operations and Emergency Response Standard) and applicable sections of 29 CFR 1926 (Safety and Health Regulations for Construction).

All contractor responsibilities stipulated in Section 1.0 of the Lockheed Martin Remediation Contractor's ESH Handbook (LM Handbook) will be adhered to. The LM Handbook can be found in Attachment I of this HASP.

Copies of all pertinent environmental, safety and health (ESH) records must be maintained at the job site. This includes, but is not limited to, this site-specific HASP, the Tetra Tech Health and Safety Guidance Manual, personnel training documentation, evidence of enrollment in a medical surveillance program, accident/injury reporting, work area inspections, periodic safety meetings, MSDS's, air monitoring data, waste container inspections, etc. These records must also be provided electronically to the Lockheed Martin Project Lead.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work and site. The HASP will be modified if the scope of work changes or if new information regarding site conditions, hazards, or contaminants of concern becomes available. If deviations are encountered from the field work plan, the contractor shall A) notify to the Lockheed Martin Project Lead and B) suspend work to assess changes to the work plan(s) and the HASP. Changes to the work plan(s) and the HASP shall be reviewed by the Project Lead. Procedures addressing changes to this HASP as described in Section 6 of the LM Handbook (Attachment I) will be followed.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibilities for site safety and health for Tetra Tech employees conducting field activities under this field effort. All personnel assigned to participate in the field work have the primary responsibility for performing all of their work tasks in a manner that is consistent with the Tetra Tech Health and Safety Policy, the health and safety training that they have received, the contents of this HASP, and in an overall manner that protects their personal safety and health and that of their co-workers. The following persons are the primary point of contact and have the primary responsibility for observing and implementing this HASP and for overall on-site health and safety.

- The Tetra Tech Project Manager (PM) is responsible for the overall direction and implementation of this HASP.

- The Field Operations Manager (FOL) manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.

- The Project Health and Safety Officer (PHSO) is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:
  - Providing information regarding site contaminants and physical hazards.
  - Establishing air monitoring and decontamination procedures.
  - Assigning personal protective equipment based on task and potential hazards.
  - Determining emergency action procedures.
  - Identifying appropriate emergency contacts.
  - Stipulating training and medical surveillance requirements.
  - Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste site work.
  - Modify this HASP, where and when necessary.

- The Site Safety Officer (SSO) supports site activities by advising the PM on the aspects of health and safety on site. These duties may include the following:
  - Coordinate health and safety activities with the FOL.
  - Select, inspect, implement, and maintain personal protective equipment.
  - Establish work zones and control points.
  - Implements air-monitoring program for onsite activities.
  - Verify training and medical status of onsite personnel status in relation to site activities.
  - Implements hazard communication, respiratory protection, and other associated safety and health programs as necessary.

- Coordinates emergency services.
- Provides site specific training for onsite personnel.
- Investigates accidents and injuries (see Attachment II Incident Report Form)
- Provides input to the PHSO regarding the need to modify, this HASP, or other applicable health and safety associated documents as per site-specific requirements.

- The Project Health Physicist (PHP) supports site activities by advising the PM on the aspects of health and safety on site. These duties may include the following:
  - Coordinate radiological activities with the FOL.
  - Select, implement, and survey personal protective equipment.
  - Establish radiological areas.
  - Provides site specific training for onsite personnel.
  - Provides input to the PHSO regarding the need to modify, this HASP, or other applicable health and safety associated documents as per site-specific requirements.

- Compliance with the requirements of this HASP are monitored by the SSO and coordinated through the Tetra Tech Health and Safety Manager (HSM).

Note: In some cases one person may be designated responsibilities for more than one position. For example, the FOL may also be responsible for the SSO duties. This action will be performed only as credentials, experience, and availability permits.

1.2 STOP WORK

All employees are empowered, authorized, and responsible to stop work at any time when an imminent and uncontrolled safety or health hazard is perceived. In a Stop Work event (immediately after the involved task has been shut down and the work area has been secured in a safe manner) the employee shall contact the Project Manager and the Corporate Health and Safety Manager. Through observations and communication, all parties involved shall then develop, communicate, and implement corrective actions necessary and appropriate to modify the task and to resume work. If worked was stopped for radiological reasons, Project Manager and Corporate Health and Safety Officer will consult with PHP prior to resuming work.

1.3 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Lockheed Martin Middle River Complex **Address:** Middle River, Maryland

LMC Contact: Tom Blackman **Phone Number:** (240) 460-7508
Scott Lapp (410) 682-0365 office
(410) 967-8745 cell
John Morgan (410) 682-1382 office
(410) 215-4530 cell

Purpose of Site Visit: Multimedia Characterization activities

Proposed Dates of Work: April 2013 until completion

Project Team:

Tetra Tech Management Personnel:	Discipline/Tasks Assigned:	Telephone
Mike Martin	Regional Manager	(301) 528-3022 office (410) 707-5259 cell
Tony Apanavage	Project Manager (PM)	(301) 528-3021 (301) 233-8230 cell
TBD	Field Operations Leader (FOL)	
TBD	Site Safety Officer (SSO)	
Matthew M. Soltis, CIH, CSP	Health and Safety Manager	(412) 921-8912
Clyde Snyder	Project Health and Safety Officer (PHSO)	(412) 921-8904
Amy Stanford	Project Health Physicist (PHP)	(706) 832-7394

Non-Tetra Tech Personnel	Affiliation/Discipline/Tasks Assigned	Telephone
John Morgan	Facilities Manager	(410) 682-1328
Mike Musheno	Environment Safety & Health/Projects	(610) 656-4012
Tom Ambrose	Facilities Supervisor	(410) 682-1308
Chief Philip Johnston	LMC Security Office Site Security	(410) 682-1050
Tom Blackman	Project Lead	(240) 460-7508

Hazard Assessment (for purposes of 29 CFR 1910.132) for HASP preparation has been conducted by:

Prepared by: Clyde Snyder

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. In the event of an emergency, the field team will primarily evacuate and assemble to an area unaffected by the emergency and notify the appropriate local emergency response personnel/agencies. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time.

Tetra Tech personnel may participate in minor event response and emergency prevention activities such as:

- Initial fire-fighting support and prevention
- Initial spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provision of initial medical support for injury/illness requiring only first-aid level support
- Provision of site control and security measures as necessary

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from chemical, physical, or fire hazards are the types of emergencies which could be encountered during site activities. To minimize or eliminate the potential for these emergency situations, pre-emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with Lockheed Martin Middle River and/or local emergency response personnel to ensure that Tetra Tech emergency action activities are compatible with existing emergency response procedures.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:

  - Chemical Inventory (of chemicals used onsite), with Material Safety Data Sheets.

- Onsite personnel medical records (Medical Data Sheets).
- A log book identifying personnel onsite each day.
- Hospital route maps with directions (these should also be placed in each site vehicle).
- Emergency Notification - phone numbers.

The Tetra Tech FOL will be responsible for the following tasks:

- Identifying a chain of command for emergency action.

- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

- Periodically performing practice drills to ensure site workers are familiar with incidental response measures.

- Providing the necessary equipment to safely accomplish identified tasks.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Through the hazard assessment, it has been determined that the following potential hazards that could be encountered:

Physical Injury resulting from:

Struck By: High-pressure lines could become disconnected and whip resulting in possible injury. Prevention methods include having locking/ or pinned hose connections and whip checks to prevent disconnection.

Entanglement: Entanglement hazards exist with the conveyor auger and rotating pump components. To minimize these hazards equipment will be inspected to ensure guarding is in place. If the auger conveyor is not equipped with a safety interlock on the lid to the auger, then administration controls will be put in place to control persons accessing an unguarded rotating auger. See Section of the HSGM for additional direction.

Chemical Exposure: The scope of this work involves possible exposure to chemical contaminants site personnel will:

- Review site MSDSs and have ready any emergency response measures necessary for response. This includes an eyewash station and safety shower or drench hose if required.

- Locate a hospital that has decontamination capabilities and can provide care to chemical exposed personnel.

Foreseeable emergency situations that may be encountered during site activities will generally be recognizable by visual observation. A clear knowledge of the signs and symptoms of overexposure to contaminants of concern may alert personnel of the potential hazards concerning themselves or their fellow workers.

Tetra Tech will minimize or eliminate exposure to recognized hazardous substances covered by OSHA. OSHA requires that exposure to hazardous materials that are not directly covered be monitored and maintained below the limits set forth by the American Conference of Governmental Industrial Hygiene (ACGIH), National Institute for Occupational Safety and Health (NIOSH), and manufacturers' recommended limits. OSHA and the ACGIH have established required or suggested exposure limits for various chemicals in use today. For materials that have more than one established exposure limit, the most stringent exposure limit will apply when determining exposure limits, monitoring requirements, effective control technologies, employee training, and reporting.

In determining the substances that are in use and the areas of exposure, the SSO will develop a program to monitor the operation. The PHSO will determine the potential for exposure and will monitor appropriately for the determination of hazard levels. In addition, the SSO will make any recommendations deemed necessary for the protection of worker health and safety. When hazards are identified, they will be addressed in accordance with the following prevention measures to eliminate the workplace hazards:

- Whenever possible, engineering controls will be implemented to eliminate or control hazards,
- Followed by administrative controls
- As a last resort, the use of personal protective equipment.

These potential hazards, are discussed in detail in Sections 5.0 and 6.0. Additionally, early recognition will be supported by periodic site surveys to eliminate any conditions that may predispose site personnel or properties to an emergency. These surveys will consist of ensuring:

- Approach paths to monitoring wells are maintained (cleared, mowed, etc.)
- Monitoring well protective casings are cleared of spider and insect nests.
- All equipment is inspected and ready for use looking for items such as guards, connections are pinned or whip checked control potential flailing in the event the connect disconnects.
- Ensure emergency equipment is staged, inspected, and is ready for immediate response.
- Ensure personnel are employing protective equipment as described in this HASP.

The FOL and the SSO will constitute the site evaluation committee responsible for these periodic surveys. Site surveys will be conducted at least once a week during the initiation of this effort. These surveys will be documented in the Project Logbook.

2.3.2 Prevention

Tetra Tech and subcontractor personnel will minimize the potential for emergencies by following the Health and Safety Guidance Manual and ensuring compliance with the HASP and applicable OSHA regulations. Daily site surveys of work areas, prior to the commencement of that day's activities, by the FOL and/or the SSO will also assist in prevention of illness/injuries when hazards are recognized early and control measures initiated.

2.3.3 Fire Prevention / Flammable Liquids

Tetra Tech and subcontractor personnel are responsible for fire prevention and protection in all of their work areas at all times during the duration of this field effort (24 hours per day/seven days per week). Since fuels will be maintained on site approved ABC fire-fighting extinguishers must be provided. Tt personnel and subcontractor personnel will only fight fires in the incipent stage (small fires) when there is no danger of injury to personnel. Fire beyond the incipant stage requires immediate site evacuation and notification of the Fire Department.

The Lockheed Martin Project Lead will be notified as soon as possible of any fire, if Tetra Tech or subcontractor personnel use a Lockheed Martin fire extinguisher, and of any and all fires that are extinguished. In case of fire, Tetra Tech and subcontractor personnel will call 9-1-1.

All flammable and combustible liquids must be stored, dispensed and used in accordance with OSHA regulations and the Uniform Fire Code. Bonding and grounding of containers containing flammable liquids will be required.

All fire prevention/flammable liquids safety procedures and requirements stipulated in Section 3.15 of the LM Handbook (Attachment I) will also be adhered to.

2.4 EVACUATION ROUTES, PROCEDURES, AND PLACES OF REFUGE

An evacuation will be initiated whenever recommended hazard controls are insufficient to protect the health, safety or welfare of site workers. Specific examples of conditions that may initiate an evacuation include, but are not limited to the following: severe weather conditions; fire or explosion; monitoring instrumentation readings which indicate levels of contamination are greater than instituted action levels; and evidence of personnel overexposure to potential site contaminants.

In the event of an emergency requiring evacuation, personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the primary place of refuge is not possible, personnel will proceed to a designated alternate location and remain until further notification from the Tetra Tech FOL. Safe places of refuge will be identified prior to the commencement of site activities by the SSO and will be conveyed to personnel as part of the pre-activities training session. This information will be reiterated during daily safety meetings. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the Tetra Tech FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will perform a head count at this location to account for and to confirm the location of site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel. The SSO will document the names of personnel onsite (on a daily basis) in the site Health and Safety Logbook. This information will be utilized to perform the head count in the event of an emergency.

Evacuation procedures will be discussed during the pre-activities training session, prior to the initiation of project tasks. Evacuation routes from the site and safe places of refuge are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) may dictate evacuation routes. As a result, assembly points will be selected and communicated to the workers

relative to the site location where work is being performed. Evacuation should always take place in an upwind direction from the site.

2.5 EMERGENCY CONTACTS

Prior to initiating field activities, personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 2-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted where it is readily available to site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets filed onsite (see Attachment III). If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel**.**

The Lockheed Martin Project Lead shall be contacted immediately in the event of a fatal or serious injury, and unpermitted environmental release, or any ESH incident that is likely to generate significant publicity or an adverse situation for Lockheed Martin. Detailed requirements are describe in Section 1.15 of the LM Handbook (Attachment I).

In the event of an emergency not requiring 9-1-1, LMC facility personnel should be contacted in the order presented on Table 2-1.

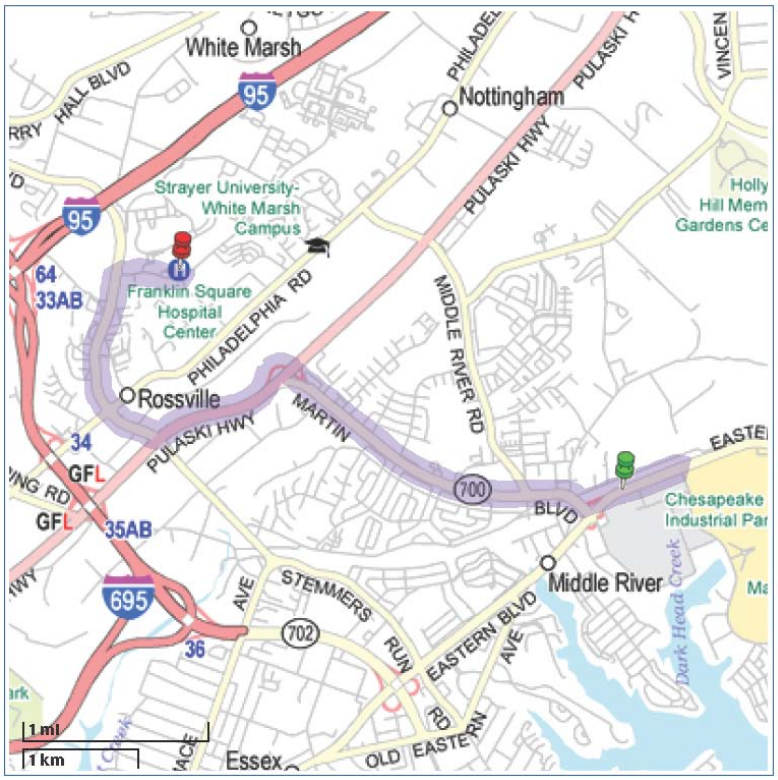
TABLE 2-1

EMERGENCY CONTACTS
LOCKHEED MARTIN MIDDLE RIVER COMPLEX, MARYLAND

AGENCY	TELEPHONE
EMERGENCY (Police, Fire, and Ambulance)	**911**
Franklin Square Hospital	(410) 682-7000
State of Maryland Emergency Response Center	(410) 974-3551
Local Emergency Planning Coordinator's office	(410) 887-2919
Chemtrec	(800) 424-9300
National Response Center	(800) 424-8802
Poison Control Center	(800) 222-1222
Mike Martin, Regional Manager	(301) 528-3022 office (410) 707-5259 cell
PM, Tony Apanavage	(301) 528-3021 office (301) 233-8230 cell
HSM, Matthew M. Soltis, CIH, CSP	(412) 921-8912
PHSO, Clyde Snyder	(412) 921-8904 (724) 516-0907 cell
Amy Stanford (PHP)	(706) 832-7394
Tom Blackman, Project Lead	(240) 460-7508
Mike Musheno, ESH/ Projects	(410) 682-1315 office (610) 656-4012 cell
Scott Lapp	(410) 682-0365 office (410) 967-8745 cell
John Morgan, Facilities Manager	(410) 682-1382 office (410) 215-4530 cell
Tom Ambrose, Facilities Supervisor	(856) 842-2590 cell
Chief Philip Johnston, LMC Security	(410) 682-1050

2.6 EMERGENCY ROUTE TO HOSPITAL

FIGURE 2-1
ROUTE TO HOSPITAL



From: **2323 Eastern Boulevard, Middle River 21220, Maryland**
To: **Franklin Square Hospital Center(Baltimore), MD**
Total Distance: **5.0 miles (8.0km)**
Total Estimated Time: **0 hrs., 13mins.**

Directions

2323 Eastern Boulevard, Middle River 21220, Maryland to Franklin Square Hospital Center(Baltimore), MD
Distance: 5.0 miles (8.0km) Time: 0 hrs., 13mins.

1. Start out heading EAST on EASTERN BOULEVARD. Drive for 0.3 miles.
2. Make a U-turn at MD-150 E. Drive for 0.3 miles.
3. Take exit on your RIGHT towards MD-700 / MARTIN BLVD / US-40. Drive for 0.2 miles.
4. Go STRAIGHT on MD-700 W. Drive for 1.6 miles.
5. Take US-40 W on your LEFT. Drive for 1 mile.
6. Turn RIGHT onto ROSSVILLE BOULEVARD. Drive for 1 mile.
7. Turn RIGHT onto FRANKLIN SQUARE DRIVE. Drive for 0.3 miles.
8. Turn LEFT onto HOSPITAL DRIVE. Drive for a short distance.
9. You have reached Franklin Square Hospital Center(Baltimore), MD

2.7 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

Tetra Tech personnel will be working in close proximity to each other at LMC MRC. As a result, hand signals, voice commands, and line of site communication will be sufficient to alert site personnel of an emergency.

If an emergency warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via hand signals, voice commands, or line of site communication
- Report to the designated refuge point where the FOL will account for all personnel
- Once non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.
- If personnel have been evacuated from a radiological area, contact the PHP.
- Describe to the FOL (FOL will serve as the Incident Coordinator) pertinent incident details.

In the event that site personnel cannot mitigate the hazardous situation, the FOL and SSO will enact emergency notification procedures to secure additional assistance in the following manner:

Dial 911 and call other pertinent emergency contacts listed in Table 2-1 and report the incident. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of the incident. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.8 PERSONAL PROTECTIVE EQUIPMENT (PPE) AND EMERGENCY EQUIPMENT

A first-aid kit, eye wash units (or bottles of disposable eyewash solution) and fire extinguishers (strategically placed) will be maintained onsite and shall be immediately available for use in the event of an emergency. This equipment will be located in the field office as well as in each site vehicle. At least one first aid kit supplied with equipment to protect against bloodborne pathogens will also be available on site. Personnel identified within the field crew with bloodborne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance.

Safety eyewear meeting American National Standards Institute (ANSI) Z87.1 is required in areas designated as “Eye Projection Required” and is also required on all jobs where a potential injury to the eye is possible whether or not the area is posted.

Safety shoes and boots which meet the ANSI Z41 Standard shall be provided when impact and/or compression hazards exist.

Appropriate NIOSH-approved respiratory protective devices must be worn when applicable state and/or federal action levels or OSHA permissible exposure levels are exceeded. For Block E ½ face Air Purifying Respirators will be provided for the grass cutting activity.
Hearing protection must be worn in all areas posted to indicate high noise level or where employees are exposed to noise levels in excess of the OSHA action level (85 dBA over an 8-hour time-weighted average or a dose of fifty percent).

Protective clothing such as suits, aprons, boots or gloves shall be worn where there is a hazard to the body through dermal contact with chemicals, dusts, heat or other harmful agents or conditions.

Hard hats meeting the ANSI Z89.1 Standard will be worn in all areas where there is danger of impact to the head or hazard from falling or moving objects.

All personal protective clothing and equipment will be used and approved as detailed in Section 3.1 of the LM Handbook (Attachment I).

Protective clothing for radiological work, if applicable, will be worn in accordance with Tetra Tech Radiologicial Protection Operating Procedures (Tt RPOP), found in the project work plan.

2.9 HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE

Tetra Tech and subcontractor personnel conducting work at Lockheed Martin will adhere to Title 29, Code of Federal Regulations, Section 1910.120 – Hazardous Waste Operations and Emergency Response or the applicable state OSHA standards.

Tetra Tech and/or subcontractor personnel will to perform periodic work area inspections to determine the effectiveness of the site safety and health plan and to identify and correct unsafe conditions in the work area. These inspections shall be documented and available to Lockheed Martin upon request for review.

The requirements and regulations described in Section 3.20 of the LM Handbook (Attachment I) will be adhered to.

2.10 DECONTAMINATION PROCEDURES / EMERGENCY MEDICAL TREATMENT

During any site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will be postponed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

Tetra Tech personnel will perform rescue operations from emergency situations and may provide initial medical support for injury/illnesses requiring only "Basic First-Aid" level support, and only within the limits of training obtained by site personnel. Basic First-Aid is considered treatment that can be rendered by a trained first aid provider at the injury location and not requiring follow-up treatment or examination by a physician (for example; minor cuts, bruises, stings, scrapes, and burns). Personnel providing medical assistance are required to be trained in First-Aid and in the requirements of OSHA's Bloodborne Pathogen Standard (29 CFR 1910.1030). Medical attention above First-Aid level support will require assistance from the designated emergency response agencies. Attachment II provides the procedure to follow when reporting an injury/illness, and the form to be used for this purpose.

2.11 INJURY/ILLNESS REPORTING

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets filed onsite (see Attachment III). If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxicological properties of the subject chemical(s) to medical service personnel.

If any Tetra Tech personnel are injured or develop an illness as a result of working on site, the Tetra Tech “Injury/Illness Procedure” (Attachment II) must be followed. Following this procedure is necessary for documenting of the information obtained at the time of the incident.

Tetra Tech personnel will contact the LMC personnel in the order presented in Table 2-1 in the event of a fatality injury, environmental release (spill), near-miss incident, or an ESH incident that is likely to generate significant publicity. A written report of the incident/injury/spill and corrective action(s) must be submitted to LMC personnel within one (1) day of the incident.

Section 8.1 of the LM Handbook (Attachment I) describing the requirements of accident, injury, illness and incident reporting will be addressed.

2.11.1 TOTAL Incident Reporting System

TOTAL is Tetra Tech’s online incident reporting system. Use TOTAL to directly report health and safety incidents, notify key personnel, and initiate the process for properly investigating and addressing the causes of incidents, including near-miss events. An incident is considered any unplanned event. It may include several types of near misses, events where no loss was incurred, or incidents that resulted in injuries or illness, property or equipment damage, chemical spills, fires, or damage to motor vehicles.

A copy of the TOTAL incident reporting form is included in Attachment II. TOTAL is an intuitive system that will guide you through the necessary steps to report an incident within 24 hours of its occurrence. TOTAL is a that helps Tetra Tech to better track incidents, analyze root causes, implement corrective action plans, and share lessons learned.

TOTAL is maintained on the Tetra Tech Intranet site at https://my.tetratech.com/

Once on the "My Tetratech" site, TOTAL can be found under the Health and Safety tab, Incident Reporting section, select "Report an Incident (TOTAL)". This will connect you directly to TOTAL. TOTAL can also be accessed directly from the internet using the following web address: http://totalhs.tetratech.com/

Note: When using the system outside the Tetra Tech intranet system or when operating in a wireless mode, a VPN connection will be required. The speed of the application may be affected dependent upon outside factors such as connection, signal strength, etc. Enter the system using your network user name and password. The user name should be in the following format - TT\nickname.lastname.

2.12 DRILL/INCIDENT AFTER ACTION CRITIQUE

The FOL will conduct a drill or exercise to test the Emergency Action Plan. A critique with the site personnel after each drill or incident will be conducted. This critique provides a mechanism to review the incidents and exercises or drills to determine where improvements can be made. For incidents recorded in TOTAL, the FOL will utilize the Lessons Learned component for the critique.

3.0 SITE BACKGROUND

3.1 SITE HISTORY

The LMC MRC is located at 2323 Eastern Boulevard in Middle River, Maryland. The site consists of approximately 180 acres of land and twelve main buildings. The subject property also includes perimeter parking lots, an athletic field, Lot D (presently a vacant lot with a concrete foundation for former Building D), a trailer and parts storage lot, and a vacant waterfront lot. The site is bounded by Eastern Boulevard (Route 150) to the north, Dark Head Creek to the south, Cow Pen Creek to the west, and Martin State Airport to the east.

Currently, LMC MRC activities at the site are limited to facility and building management and maintenance. There are two main tenants at the site, Middle River Aircraft Systems (MRAS) and Naval Electronics & Surveillance Systems (NE&SS), also referred to as Vertical Launch Systems. MRAS conducts design, manufacturing, fabrication, testing, overhaul, and repair and maintenance of aeronautical structures, parts, and components for military and commercial applications. NE&SS conducts fabrication, assembly, testing and support of vertical launch systems. Historically, the property has been used for aircraft and missile launching systems design, development, and sales.

The purpose of these investigations are to characterize soil (surface/subsurface), surface water, groundwater, sediment, and indoor air quality in areas of the facility. Based on review of available facility information during the Phase I Environmental Site Assessment, no indication of current or historical site activities, within these areas, potentially resulting in a release of any hazardous substances or petroleum products was identified.

The facility is divided into blocks for the purpose of site investigations. The blocks included for investigation in this HASP are the following:

- Block D
- Block E
- Block F
- Block G
- Block H
- Block I*

*Work in Block I will not be conducted at this time information in this HASP is placed only for reference purposes at this time.

3.2 BLOCK E BUILDING D RAD INVESTIGATION

Recognized environmental condition (REC) #1 (Former Building D) is the only one of the three RECs located in Block E that were identified in the Phase I environmental site assessment that has a radiological concern. This investigation takes place in Tax Block E in former Building D. Former Building D, which was built in the early 1940s for final assembly of aircraft frames, was demolished in 1972. The building had an assembly floor (first floor), and a basement (current concrete slab), and occupied approximately 400,000 square feet.

The former basement areas were used for welding, extrusion milling, engine preparation, and assembly. The northwestern and southwestern portions of the basement housed several offices and laboratories used for radiological operations. Cleaning, plating, and finishing work areas were located along the southern interior wall near the building's center.

Since the building was demolished it had been used for storage, including the storage of airplane carcasses from the Martin State Airport air museum.

A radiological survey of REC #1 (Former Building D) was performed in April 2004 to determine if radiological activities possibly conducted in Building D had affected the underlying environmental media. The survey focused on the remaining Former Building D foundation slab where suspected radiological activities may have occurred. A cobalt-60 source was also located in the wet lab. The radiological survey covered two areas where isotopes were known to have been used, based on information obtained from MRC personnel who had been present when such operations occurred during the late 1950s–1960s. The primary area was in the southwestern portion of the building, along the southern exterior wall; the secondary area was immediately north of the first area, along the western exterior wall of Former Building D.

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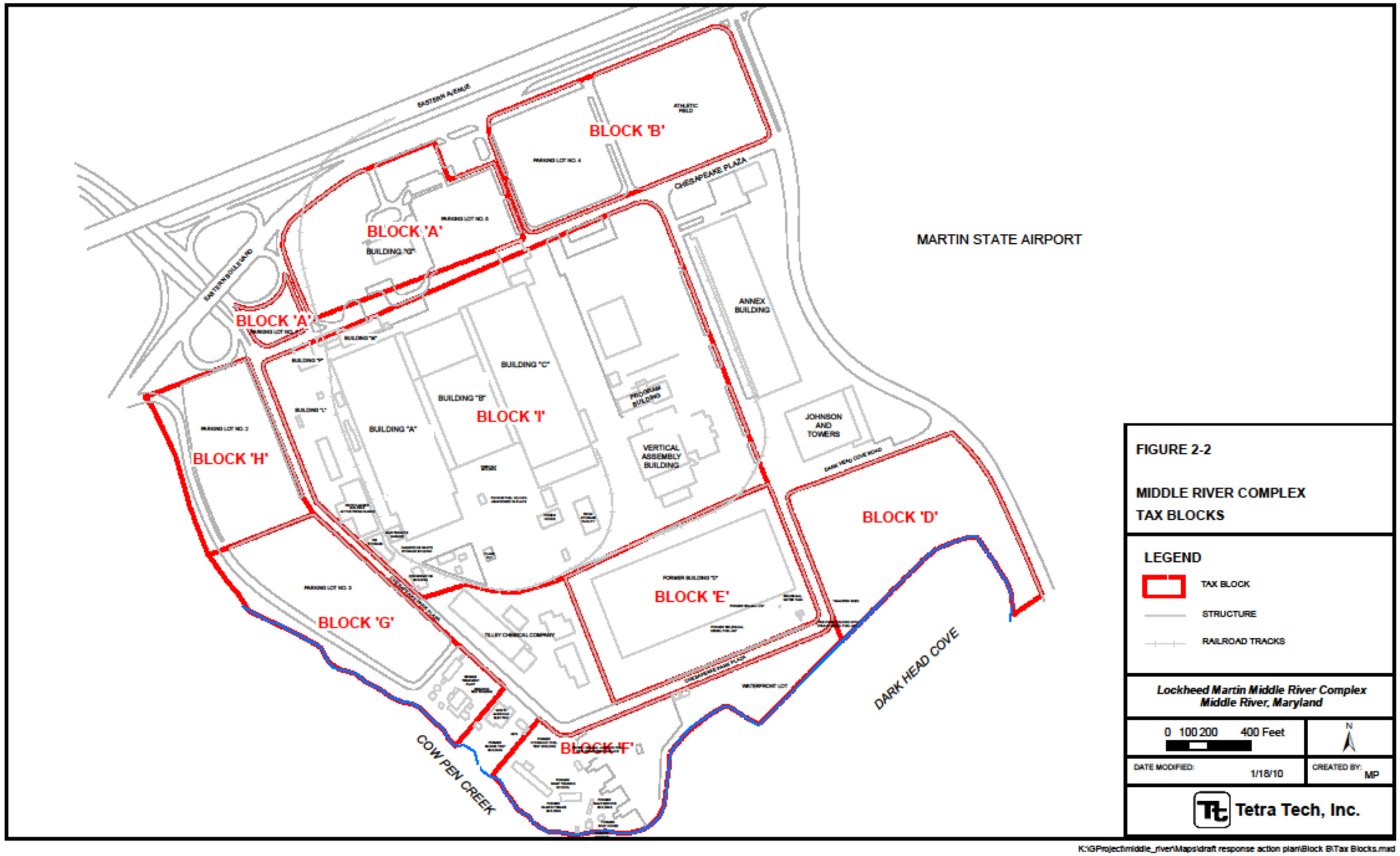
The radiological survey uses alpha and beta monitors and a gamma radiation survey instrument; see the Work Plan for more detailed explanation. See Figure 3-1 for the specific location of each block.

FIGURE 3-1

SITE MAP



4.0 SCOPE OF WORK

This section discusses the specific tasks that are to be conducted as part of this scope of work. These tasks are the only ones addressed by this HASP. Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. The PM or a designated representative will submit the requested modifications to this document to the HSM.

Specific tasks to be conducted include the following:

- Mobilization/demobilization Activities
- Vegetation Management
  - Including grass cutting in Block E
- Indoor Air Quality Sampling using Summa Canisters
- Soil borings via Direct Push Technology (DPT)
- Soil Excavation, Removal and Replacement Blocks E, G and I
- Institu Remediation Blocks E and G including:
  - Soil Excavation
  - Pipe Installation
  - Extraction Well installation
  - Pre Contructed Pump Station Installation
  - Pre Constructed Pump Station Removal From Flatbed Truck And Placement
- Test Pits, Excavations
- Membrane Interface Probe via DPT
- Concrete Coring
  - Installation Of Permanent Soil Gas Vapor Monitoring Points
- Monitoring Well Installation
  - Installation and Development using DPT
  - Soil Vapor Points Installation
- Multimedia sampling including
  - Surface Water and Sediment Sampling from a Barge
  - Groundwater
  - Soil Vapor Points Sampling
  - Surface and Subsurface soil
  - Storm Water Sampling
  - Sediment Sampling
- Decontamination
  - Decontamination of grass cutting equipment at Block E

- Geophysical Survey
- Geographical Survey
- IDW Management
- Building D Rad Investigation
- Block E Additional Media Characterization:
  - Work Area Exposure Surveys
  - Collection of Background Samples
  - Collection of Soil, Concrete, and Perch Water Samples
  - Perform Surface Scans and Removable Contamination Surveys for Personnel Protection During Sampling and Imaging Operations.

For more detailed description of the planned tasks associated with LMC MRC, refer to the Work Plan (WP). Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. All requested modifications to this document will be submitted to the HSM by the PM or a designated representative.

No other activities are anticipated to be necessary. If it becomes apparent that additional or modified tasks must be performed beyond those listed above, the work is not to proceed until the FOL or SSO notifies the Project Manager and the HSM, so that any appropriate modifications to this HASP can first be developed and communicated to the intended task participants.

5.0 IDENTIFYING AND COMMUNICATING TASK-SPECIFIC HAZARDS AND SAFE WORK PRACTICES

The purpose of this section is to identify the anticipated hazards and appropriate hazard prevention/hazard control measures that are to be observed for each planned task or operation. These topics have been summarized for each planned task through the use of task-specific Safe Work Permits (SWPs), which are to be reviewed in the field by the SSO with all task participants prior to initiating any task. Additionally, potential hazard and hazard control matters that are relevant but are not necessarily task-specific are addressed it the following portions of this section.

Section 6.0 presents additional information on hazard anticipation, recognition, and control relevant to the planned field activities.

In the event of an emergency, not requiring calling 9-1-1, LMC facility personnel should be contacted in the order presented on Table 2-1.

5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices and restrictions identified in the SWPs (Attachment IV) the following general safe work practices are to be followed when conducting work on-site.

- Eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists is prohibited.

- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area.

- If a source of potable water is not available at the work site that can be used for hands-washing, the use of waterless hands cleaning products will be used, followed by actual hands-washing as soon as practicable upon exiting the site.

- Avoid contact with potentially contaminated substances including puddles, pools, mud, or other such areas.

- Avoid, kneeling on the ground or leaning or sitting on equipment.

- Keep monitoring equipment away from potentially contaminated surfaces.

- Plan and mark entrance, exit, and emergency evacuation routes.

- Rehearse unfamiliar operations prior to implementation.

- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity to assist each other in case of emergency.

- Establish appropriate safety zones including support, contamination reduction, and exclusion zones.

- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Non-essential vehicles and equipment should remain within the support zone.

- Establish appropriate decontamination procedures for leaving the site.

- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO.

- Observe co-workers for signs of toxic exposure and heat or cold stress.

- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.2 VEGETATION MANAGEMENT

Grass Cutting Safety

Chemical hazards are possible at Block E in the form of particulates (PCB's) during grass cutting operations. No chemical hazards are anticipated at the other Middle River Sites as part of this activity.

Block E Grass Cutting Personal Protective Equipment

During grass cutting operations at Block E the tractor/mower will not be removed from the site without being decontaminated for PCB's. The tractor/mower will be stored in a storage shed on site. The building will be locked when not in use. Grass cutting personnel will wear the following PPE.

- Tyvek Suit either blue or green in color (disposed of and changed after each round of grass cutting)
- Work Gloves (disposed of and changed after each round of grass cutting)i

- **Grass Cutting personnel will be prepared to wear a Half-Face tight fitting respirator with a hepa or dust filter following the tenants of the Respiratory Protection Program. (See Respiratory Protection Program in Attachment XII of this HASP). This will only be required if significant dust is generated that would cause exposure to PCB's. PCB's will attach to dust and could cause exposure if dust that obscures vision is produced.**
- Rubber Boots
- Cool Vests if required due to heat conditions
- Safety Glasses colored the UV Ray Protection
- Ball Cap for UV Ray Protection

All Block Physical hazards:

All vegetation removal equipment will be:

- Inspected in accordance with Federal safety and transportation guidelines, OSHA and manufacturers design and documented as such using Equipment Inspection Checklist provided in Attachment V.
- Only manufacturer approved parts may be used in repair of site equipment.
- Operated by knowledgeable ground crew.
- Restrictions at the operation (All personnel not directly supporting this clearance activity will remain at least 50-100 feet from the point of this operation).
- Hand signals will be established by both the chipper operator and backhoe operator prior to the commencement of clearing activities.
- All personnel will be instructed in the location and operations of the emergency shut off device(s). This device will be tested initially (and then periodically) to insure its operational status.
- Work areas will be kept clear of clutter to permit escape, if necessary.

All Block Weed Trimmer Safety

Practicing proper weed trimmer safety is important to your well being, and to the safety of those around you as you work. Emergency departments report thousands of injuries being treated each year that are related to weed eater use. A majority of these injuries were to the eyes.

One of the first and best places to start with lawn trimming safety is to read the operator's manual. It's full of personal protection recommendations, trouble shooting help, and basis maintenance routines that need to be followed. Practicing proper weed trimming safety can help prevent injuries, save time and money on repairs to both the equipment and to your property.

- Dress Properly
  - wear steel toed approved work boots

  - wear long pants
  - wear safety goggles to protect eyes
  - wear ear muffs to counteract trimmer noise
- Prep The Site
  - walk the area to be trimmed before you start
  - remove any debris, sticks, stones, children's toys etc
  - clear the area of people and pets, and be aware of them as you work
- Prep The Trimmer
  - check that guards and shields are in place
  - ensure there is enough nylon line on the spool
  - fill the gas tank when the engine is cold
  - let the engine cool down first when refilling is necessary
  - don't spill gas or light a match or smoke around gasoline
- Weed Trimmer Safety While Operating
  - start trimmer by laying it down in a clear area
  - hold the trimmer down firmly as you pull the engine start cord when the unit is harnessed to you, or held above ground level
  - keep the muffler side away from you to avoid burning your arms
  - be aware of keeping your balance and good footing, especially on slopes
  - lower the throttle speed when trimming near people or cars to reduce the speed of projected objects
  - never raise the cutting head above knee height
  - hold the trimmer so the debris is directed away from you
  - if the machine starts to shake or vibrate, shut it down immediately

Following these weed trimmer safety practices, along with routine service and maintenance, will keep your trimmer in top shape for seasons to come and more importantly, keep you safe and protected.

TIP: Always disconnect the spark plug before working on any power tool. Keep this in mind when you're cleaning out the grass guard at the end of your work.

Chipper Operations

Recommended Safety Practices:

- All safety devices and controls will be tested prior to the start of work, and checked periodically to insure equipment is safe for operation.

- Buddy system - At least two persons will be in close contact with one another when operating the chipper. One to engage safety controls to assist the other worker should the need arise.
- Work gloves, long hair, loose fitting clothing will be secured to avoid snagging and entanglement in brush or moving chipper components.
- Personnel will not place hands or feet past the entry plane of the feed hopper.
- Brush and limbs will be fed butt first, to allow these materials to sweep past the worker to avoid any hooking or dragging actions.
- Feed the brush and limbs from the side of the feed hopper.
- Once the blades takes hold of brush or limbs, step back, to avoid entanglement.
- Lay short materials on top of longer materials then feed materials by pushing the longer materials into the chipper.

Chainsaw Operations

Recommended Safe Work Practices:

- Inspect the chainsaw prior to each use. Insure the blade is adjusted and sharp, and all parts are lubricated per the manufacturer's instruction.
- Test all safety devices initially and then periodically to insure a safe operational status.
- When starting the chainsaw, place it on a firm surface. Place your foot in the hand guard at the rear of the saw, grip the top handle, pull the start cord with the free hand. Never attempt to start the saw free hand, or by placing it on your knee.
- Never cut with tip of the chain saw blade.
- Plan the cut. Know where the tree will fall. Have a clear escape plan when dropping trees greater than 2 inches in girth.
- Preview the tree to be dropped looking for insect nests bees and hornets that may be nesting in hollowed out trunks and tree tops.
- Do not stand between falling trees, branches, equipment or other trees.
- Never cut above your head.
- Cut only wood with the chain saw.
- Where prescribed safety equipment as described in the Safe Work Permit.
- Monitor, the condition of the saw during use, make adjustments, as necessary.
- When cutting a limb, cut from the opposite side of the trunk, the trunk will act as a shield to protect the worker.
- Be attentive as to how the trunk may move when removing limbs, keep yourself out of the pathway of falling limbs or branches.
- Keep the work area free from clutter to avoid potential slip, trip, and fall hazards.

Hand Tools

If hand tools (brush hooks, machetes, etc.) are used to clear brush and small trees the following precautions should be followed:

- Inspect handles are they in good condition (no cracks, splinters, loose heads/cutting apparatus.
- Check cutting tools edges all blades should be sharp without knicks or gouges in the blade.
- All hand tools (brush hooks, machetes, etc.) should be kept in a sheath when not in use.
- A 10-foot perimeter will be established around areas where brush clearing is being conducted.

Note: Excessive noise levels (raising your voice to speak to someone within two feet) will be require the use of hearing protection.

General Safety Requirements for Clearing and Grubbing

- Avoid insect nesting areas, employ repellents. Report potential hazards to the SSO.
- A backhoe or hand tools (rakes, pitch forks, etc.) will be used to pull brush away from piles to avoid nesting areas. Do not use hands or feet for this purpose.
- Traffic considerations:
  - Establish safe zones and routes of approach to the operation.
  - All personnel working among equipment traffic are required to wear reflective vests.
  - Secure all loose clothing articles to avoid possible entanglement.
  - Boundaries will be established based on the size of trees give sufficient space to keep personnel away from hazards (noise, flying projectiles, etc.)

5.3 DRILLING (HSA/DPT/HANDCART MOUNTED DPT UNIT/ROTOSONIC) SAFE WORK PRACTICES

The following Safe Work Practices are to be followed when working near operating drilling equipment.

5.3.1 Before Drilling

- Identify underground utilities, buried structures, and aboveground utility lines before drilling. Tetra Tech personnel will use the Utility Locating and Excavation Clearance Standard Operating Procedure provided in the Tetra Tech Health and Safety Guidance Manual.

- Drill rigs will be inspected by the SSO or designee, prior to the acceptance of the equipment at the site and prior to the use of the equipment. Needed repairs or identified deficiencies will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist provided in Attachment V. Additional inspections will be performed at least once every 10-day shift or following repairs.

- Check operation of the Emergency Stop/Kill Switch and/or the "Dead Man's" operational controls. These operational checks are required initially as part of the equipment pre-use inspection, and then periodically thereafter. Periodic checks are required at least weekly, or more frequently if recommended by the rig manufacturer.

- Ensure that machine guarding is in place and properly adjusted.

- Block drill rig and use out riggers/levelers to prevent movement of the rig during operations.

- The work area around the point of operation will be graded to the extent possible to remove any trip hazards near or surrounding operating equipment.

- The driller's helper will establish an equipment staging and lay down plan. The purpose of this is to keep the work area clear of clutter and slips, trips, and fall hazards. Mechanisms to secure heavy objects such as drill flights will be provided to avoid the collapse of stacked equipment.

- Potentially contaminated tooling will be wrapped in polyethylene sheeting for storage and transport to the centrally located equipment decontamination unit.

- Prior to each instance of engaging the HSA drill rig, the Driller will look to ensure that the drilling area is clear of personnel and obstructions, and verbally alert everyone in the area that the rig is about to be engaged.

- Prior to the start of boring operations, one individual will be designated at the person responsible for immediate activation of the emergency stop device (if applicable) in the event of an emergency. This individual will be made known to the field crew and will be responsible for visually checking the work area and verbally alerting everyone of boring operations prior to engaging the equipment.

5.3.2 During Drilling

- The Driller will ensure that an individual is constantly stationed at a location were the drill rig emergency stop switch can be immediately engaged.

- Minimize contact to the extent possible with contaminated tooling and environmental media.

- Support functions (sampling and screening stations) will be maintained a minimum distance from the drill rig of the height of the mast plus five feet or 35-feet for Rotosonic/HSA, 25-feet for DPT operations whichever is greater to remove these activities from within physical hazard boundaries.

- Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the drill rig.

- During maintenance, use only manufacturer provided/approved equipment (i.e. auger flight connectors, etc.)

- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move auger flights and other heavy tooling.

- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone.

5.3.3 After Drilling

- Equipment used within the exclusion zone will undergo a complete decontamination and evaluation by the SSO to determine cleanliness prior to moving to the next location, exiting the site, or prior to down time for maintenance.

- Motorized equipment will be fueled prior to the commencement of the day's activities. During fueling operations equipment will be shutdown and bonded to the fuel source.

- When not in use drill rigs will be shutdown, and emergency brakes set and wheels will be chocked to prevent movement.

- The mast will be completely lowered and outrigger completely retracted during movement to decontamination or the next location.

- Areas subjected to subsurface investigative methods will be restored to equal or better than original condition. Any contamination that was brought to the surface by drilling or DPT operations will be removed and containerized. Physical hazards (debris, uneven surfaces, ruts, etc.) will be removed, repaired or otherwise corrected. In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews working in the area.

5.3.4 Concrete Coring Operations

The following safe work practices will be employed during concrete coring operations:

- Identify underground utilities before commencing any concrete operations.
- Use wetting techniques to minimize dust and friction.
- When applying water to the core bit the operator should apply water until the slurry begins to look like heavily creamed coffee.
- Wear the well-fitting nitrile gloves (rather than cotton or leather gloves) when in coring.
- Wash and dry hands before putting on gloves and every time that you remove your gloves.
- Replace grossly contaminated or worn-out gloves.
- Make sure the coring machine is properly anchored.
- Standing on the machine may cause the bit to bind up in the hole
- Use the manufacturers recommended speed (revolutions per minute) for the diameter of the bit used.
- The coring machine will be inspected to ensure housings; plugs; guards are intact, and the coring machine is in good operating order.
- If the power source to be employed is not through a Ground Fault Circuit Interrupter (GFCI) then a temporary GFCI plug extension shall be put in place.

- A shop vac or similar device also connected to the GFCI will be used to collect the water employed during the coring process. All water in the coring area will be cleaned to reduce the potential for slip, trip and falls. Place floor wet signs as necessary from all approach venues.

- The preferred method is to bolt the coring machine to the floor during coring operations. It is however acceptable to utilize sand bags or similar weighted devices to control movement during this activity.

- No open core holes will be permitted after the termination of the shift. All cores will be placed back in the holes or the holes will be fitted for their permanent casings for the sub-slab soil gas vapor monitoring points.

- All core holes finished with protective casings or finished using concrete will be finished to grade again to prevent slip, trips, and/or falls.

5.4 TREATMENT SYSTEM INSTALLATION

JRW Bioremediation L.L.C. provides substrates and nutrients for anaerobic bioremediation. The substrates provided is a highly soluble material lactoil® soy microemulsion. This system adds a carbon substrate to the system to establish and maintain an anaerobic environment capable of promoting reductive dechlorination for a period of time sufficient to completely dechlorinate the contaminants of concern.

5.4.1 Excavation for Pipline Installation

- Utility clearances must be in place prior to the beginning of excavation (in accordance with the Tetra Tech Utility Locating SOP and complete Utility Locate/Excavation Clearance Permit Request).
- Excavation boundaries must be demarcated with appropriate warning signs (e.g., construction activities in progress).
- Traffic patterns for equipment and the loading of trucks must be established. This pattern should form a loop to minimize backing, an activity which causes many accidents.
- Traffic patterns for foot and small vehicular traffic must keep workers away from heavy equipment.
- Traffic patterns for heavy equipment must be constructed to maintain traffic flow a minimum of 10 feet from unsupported walls or excavation boundaries.
- Excavation along thoroughfares will require the use of warning signs, barricades and flag-persons for alteration of traffic patterns, as necessary.
- Ground personnel should be provided with reflective vests to increase visibility and air horns to signal loud trucks and heavy equipment.
- Ground activities with heavy equipment must be supported with a ground spotter.

- The operators should be instructed that they are to follow the instructions provided by the ground spotter unless another party is otherwise authorized.
- Surface encumbrances within the intended work area of the excavation will be removed or supported, as necessary, in accordance with OSHA 1926.651(a).
- Prior to being put into service at the site, the excavator will be inspected by the SSO, and this inspection will be documented using the applicable equipment inspection forms.
- Heavy equipment will be positioned and operated so that it never approaches closer than 4 feet from the edge of an open excavation (other than the boom and bucket portion of the excavator).
- A decontamination station should be established at the loading and off-loading areas to flush mud and dirt from the wheels and tires as well as any areas of the vehicle impacted during the loading operation.

Note: Tetra Tech personnel WILL NOT enter a trench past 4 feet deep

5.4.2 Positioning Pump Building and Equipment

Site personnel will assist each other when positioning the pumping unit. The following procedures will be followed when placing the pre-built pumping units:

- Wear leather gloves. lift heavy objects using the legs and not the back.
- Use wheeled transport equipment for heavy loads.
- Keep hands away from potential pinch points during handling.
- Wear steel toe shoes/boots.
- Ensure that influent supply and discharge hoses and electrical outlet are within reaching distance.

5.4.3 Critical Lift

A non-routine lift requires additional detailed planning and additional or more than normal safety precautions. Critical lifts include lifts made when the load weight is 75% or more of the rated capacity of the lifting equipment at a specific configuration (boom angle, lift radius, swing, etc.); lifts which require the load to be lifted, swung, or placed out of the operator's view; lifts made with more than one piece of lifting equipment; lifts involving non-routine or technically difficult rigging arrangement(s); hoisting of personnel with a crane or derrick; or any lift which the lifting equipment operator believes should be considered critical. Any lift of 30,000 pounds or more should be considered a critical lift, regardless of the crane capacity. The 30,000 pound criteria should be evaluated by the Project Manager and the Site Safety Officer (SSO) for the advisability of lowering the criteria based on project-specific factors such as:

- Capacity of the lifting equipment to be employed on the project, frequency
- Nature of the lifting activities, and availability of experienced personnel.

- Establishment of project-specific criteria for determination of critical lifts should be documented by the Project Manager.

5.4.4 Critical Lift Plan

A plan will prepared by the crane operator, lift supervisor, project engineer (or designee), and rigger, as applicable, prior to making a critical lift. The critical lift plan will be documented, and reviewed by and signed by all personnel involved with the lift.

5.4.5 Failure Mode

There are two generally recognized modes of failure of cranes when the rated capacity is exceeded, depending on the crane configuration: a structural failure occurs when the boom, jib, or other component of the crane suddenly fails (there is usually no advance warning of an impending structural failure); an overturning failure occurs when the crane is pulled over by the weight of the load (there may be advance warning of an impending overturning failure as weight is transferred from the outboard tires, crawler track, or outriggers, causing these to rise as the back side of the crane becomes “light”).

5.4.6 Lift Personnel

Lift supervisor:

- A competent person who has extensive knowledge and experience in lifting operations.

Qualified Operator

- An operator who is qualified to operate the crane in accordance with the standards promulgated in OSHA 29 CFR 1926.1427, who is licensed or certified to operate the crane, or who:
  - Has extensive knowledge and experience, and who has successfully demonstrated the ability to operate the equipment and to solve or resolve problems related to operation of the equipment.
  - One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project. OSHA 29 CFR 1926 Subpart CC – cranes and derricks in construction.

Note: Critical Lifts will be in compliance with the Tetra Tech Safe Work Procedure DCN5-37 Critical Lift Safe Practices and and Critical Lift Plan Master Checklist in Attachment X.

5.4.7 Safe Load Securing Guidelines

Loads are secure and do not exceed manufacturer's specifications and legal limits for the vehicle. Vehicles will be equipped with only necessary equipment, laid out or positioned in the safest configuration. Loads, equipment and other items shall be tied down or secured before commencing motion, and total weight shall never exceed the weight limitations of the vehicle.

- Loads, equipment and other items transported external to the driving compartment or on a trailer shall be:
  - Secured in such a manner to prevent against the loss of the load via leaking, spilling, blowing off or falling from the motor vehicle.
  - Contained, immobilized or secured in such a manner to prevent shifting.
  - If likely to roll, restrained by chocks, wedges, a cradle or other equivalent means to prevent rolling.
  - If considered top heavy and capable of tipping, secured in such a manner to prevent tipping.
  - If placed beside each other and secured by transverse tie-downs, either placed in direct contact with each other or prevented from shifting towards each other while in transit.
  - Securing devices and systems shall be capable of withstanding the following three forces, applied separately:
    - 0 Deceleration in the forward direction.
    - 0 Acceleration in the reverse direction.
    - 0 Acceleration in a lateral direction.
- The manufacturer shall apply any tie-down points added to a vehicle, or the tie-down points shall
- meet manufacturer's specifications.
- Loads, equipment and other items transported under a pickup truck bed-covering device shall be
- considered secured.
- The driver shall verify that loads, equipment and other items transported inside a vehicle's driving
- compartment are secure and/or positioned to eliminate or minimize safety risks to the occupants.
- When loading these items, the driver shall consider:
  - Transporting them in the trunk of a car (e.g., a suitcase or computer bag).
  - Stowing them under or behind a seat, glove box or armrest console.
  - Covering them with netting or holding them in the seats with seatbelts or similar devices.

Note: Loading will be accomplished using theTetra Tech Safe Work Procedure SWP 5-38 Safe Load Securing Guidelines in Attachment XI.

5.4.8 Handling Procedures for Lactoil

- Store unopened under dry conditions at temperatures between 50°F and 85°F.
- Diluted product should be used within 3 days to avoid microbial growth and activity which may cause gas buildups in containers and visible growth which may foul equipment.
- Following injection of material, wells should be flushed with clean water to prevent microbial growth.

5.5 SAFE BOATING PRACTICES (I.E., WORKING FROM WATER VESSELS/BARGES)

Offshore soil boring activities will require site personnel to work from barges in tidal bodies of water. To avoid potential hazards associated with working on water (drowning), the field team shall employ lifelines (tie-off procedure), safety harnesses, when on the barge. U.S. Coast Guard (USCG) approved personal flotation devices (PFD) will be on hand for all participants and will be used. Due to the obvious hazards associated with working on water during inclement weather, field activities may be temporarily suspended or terminated at the discretion and direction of the FOL or SSO. Tetra Tech personnel will also follow the Tetra Tech procedures for working over water outlined in Standard Opering Procedure SWP 5-6 found in Attachment VI.

Refer to the Tetra Tech Boat Safety Checklist in Attachment VII of this HASP.

5.5.1 U.S.C.G. Flotation Device Types

Use the following information to determine the proper type of U.S.C.G. PFD.

Off Shore Life Jacket (Type I, 22lbs buoyancy)

Type I life jacket is the best choice for rough or open waters. This type will float you the best and is favorable if rescue may be long in coming. This type will turn an unconscious person upright in the water. Though is bulky it does have a highly visible color for easier detection.

Near Shore Buoyant Vest (Type II, 15.5lbs buoyancy)

Type II is a good choice for calmer waters. It will turn most unconscious persons face-up in the water. Though it is less bulky than Type I, it is not intended for long hours in calm or rough water.

Flotation Aid (Type III, 15.5lbs buoyancy)

Type III is probably the most comfortable device offering more freedom of movement, such as water skiing or fishing, but is not intended for rough water. Also, an unconscious person may end up face-down in the water.

Throwable Devices (Type IV)

Throwable devices are intended for calm waters with heavy boat traffic where help is always close. It is not intended for unconscious persons or non-swimmers or long hours in the water. They are good backups for the other devices.

Site personnel shall wear Type III personal flotation devices in the event someone falls overboard, boats sinks or capsizes. Type IIIs were selected as they offer the most flexibility for working while still meeting minimum requirements for buoyancy. In situations where personal flotation devices cannot be worn due to the task to be conducted, the flotation devices shall be immediately available/accessible. It is recommended that personal flotation devices be continually worn during colder months due to the potential for hypothermia to restrict muscle movement and therefore, self rescue and maintaining buoyancy. In addition, a single Type IV Throwable Flotation Device shall be maintained on board the boat with at least 90 feet of 3/8 polypropylene line.

When work activities take personnel within four feet of navigable waters edge personnel will have immediately accessible a lifeline with a throwing bag or Type IV flotation device facilitate extraction from the water. Personnel working on water's edge will do so using the buddy system to assist in rescue efforts, if needed.

Device	Type	Description
Off Shore Life Jacket	Type I 22lbs buoyancy	Best in rough or open waters. Floats best especially in long time rescue. Will turn unconscious upright. Bulky but highly visible.
Near Shore Buoyant Vest	Type II, 15.5lbs buoyancy	Good in calmer waters. Will turn most unconscious face-up. Less bulky. Not for long time rescue.
Flotation Aid	Type III 15.5lbs buoyancy	Most comfortable device offering more freedom of movement. Not intended for rough water. Unconscious may end up face-down
Throwable Devices	Type IV	Throwable devices for calm waters with heavy boat traffic where help is always close. Not for unconscious, non-swimmers or long hours. Good backups for the other devices.

5.5.2 U.S.C.G Boat Regulations

No person born on or after April 1, 1986 shall operate a vessel that is fitted with propulsion machinery of more than ten (10) horsepower on waterways unless the person has successfully completed a boating safety education program as approved by the director of the Department of Environmental Management. Certain bodies of water in some states may also have local restrictions as to type and size of watercraft or motor horsepower, restricted use areas, boat speed, and times for use. The FOL is responsible for checking with appropriate local authorities to identify and address any additional requirements/restrictions.

The U.S.C.G. requires boats to have the following equipment on board:

- One personal flotation device per person
- A sound producing device such as an air horn or whistle which can be heard one half mile.

Speed Limits

Any motorboat or vessel operated within a harbor or inlet or any pond of other confined body of water shall not exceed 45 mph from sunrise to sunset and 25 mph during periods of darkness or restricted visibility. Lower speed limits may be regulated in certain areas.

Reckless and Negligent Operation

Negligent or grossly negligent operation of a vessel which endangers lives and/or property is prohibited by law. A civil penalty may be imposed by the Coast Guard for this offense under federal laws. An operator may be subjected to a fine of up to $5,000 and or imprisonment for up to one year, or both. The Maryland penalty is a fine of up to $500 for the first offense.

Some examples of actions that may constitute negligent or grossly negligent operation include but are not limited to:

- Operating in a swimming area
- Operating under the influence of alcohol or drugs.
- Excessive speed in the vicinity of other boats or in dangerous waters.
- Hazardous water skiing practices
- Bow riding, also riding on seatback, gunwale or transom.

Termination of Use

A Maryland Natural Resources Police Officer who observes a boat being operated in an unsafe condition and who determines that an especially hazardous condition exists may direct the operator to take immediate steps to correct the condition, including returning to port. Termination for unsafe use may be imposed for, but is not limited to:

- Insufficient number of USCG approved Personal Flotation Devices.
- Insufficient fire extinguishers.
- Overloading beyond manufacturer's recommended safe loading capacity.
- Improper navigation light display.
- Ventilation requirements for tank and engine spaces not met.
- Fuel leakage.
- Fuel in bilges.
- Improper backfire flame control.

Boating Accident Reports

The operator of any boat involved in an accident must stop, render assistance, and offer identification. An accident report must be made to the Department within 48 hours if:

- A person dies within 24 hours;
- A person loses consciousness or receives medical treatment beyond first aid or is disabled more than 24 hours;
- A person disappears from the vessel under circumstances that indicate death or injury.

Accidents must be reported within 10 days if damage to all vessels and other property totals more than $500.00 or an earlier report is not required. Running aground or hitting a fixed or floating object is considered a boating accident. Boating accident report forms (DNR-149) are obtainable from the Natural Resources Police. They must be submitted to the Natural Resources Police by the operator of the vessel or vessels involved. Accident reports are required by federal law and furnish information for use in accident prevention. Information from individual reports will not be publicly disclosed nor may the information be used in court.

Rendering Assistance

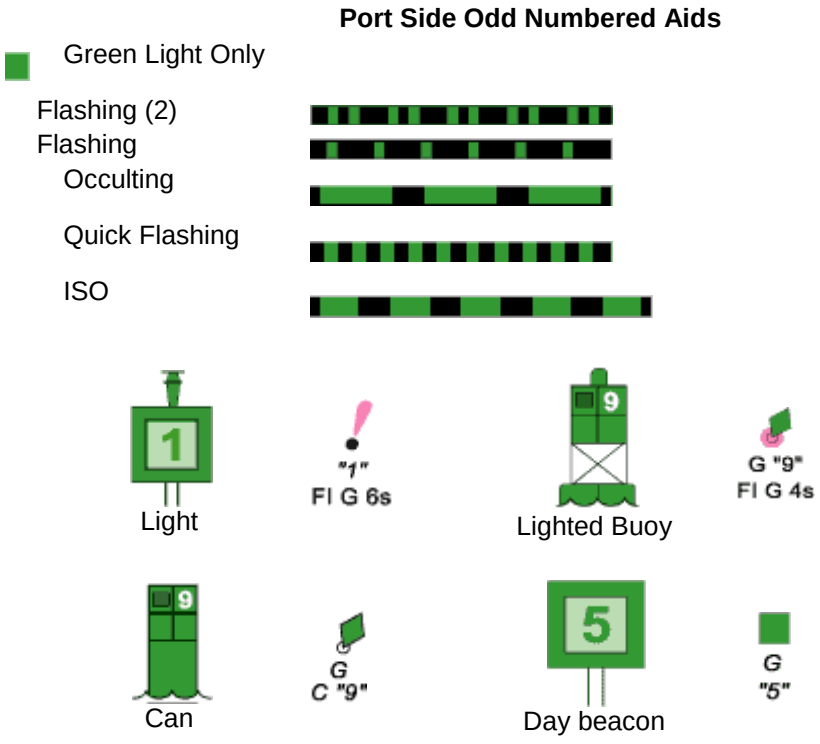
Federal law requires the operator of a vessel to provide assistance that can be safely provided to any individual in danger on the water. Persons who fail to provide assistance may be subject to fine or imprisonment.

Vessels Required to be Registered in Maryland

All vessels, whether commercial or recreational, must be registered in Maryland if it is equipped with any kind of primary or auxiliary mechanical propulsion; if it is not currently documented with the U. S. Coast Guard; and if it is being used principally in Maryland. An owner of a federally documented vessel, though exempt from state numbering requirements, shall apply to the Maryland Department of Natural Resources for documented use decals, and is subject to the state excise tax requirements.

5.5.3 Uniform State Waterway Marking System (USWMS)

Lateral System (As Seen Entering From Seaward)

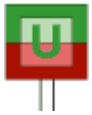


Preferred Channel No Numbers-May Be Lettered
Preferred Channel To Starboard Topmost Band Green

Green Light Only

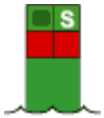
Composite Group Flashing (2+1)

GR "A"
Fl (2+1) G 6s



Day beacon

GR
"U"



Can

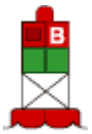
GR
C "S"

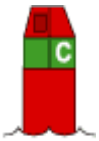
Preferred Channel No Numbers-May Be Lettered
Preferred Channel To Port Topmost Band Red

Red Light Only

Composite Group Flashing (2+1)

RG "B"
Fl (2+1) R 6s





Nun

RG
N "C"

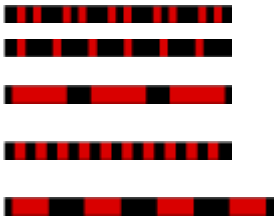
Day beacon

RG
"G"

Starboard Side Even Numbered Aids

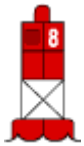
Red Light Only

Flashing (2)
Flashing
Occulting
Quick Flashing
ISO



Light

"2"
FIR 6s



Lighted Buoy

R "8"
Fl R 4s

Nun

R
N"6"

Day beacon

R
"2"

Lateral Aids to Navigation generally indicates which side of an aid to navigation a vessel should pass when channels are entered from seaward. In the absence of a route leading from seaward, the conventional direction of buoyage, generally follows a clockwise direction around landmasses. The most important characteristic of an aid is its color. The "3R" rule "Red Right Returning" is the essential rule of thumb for using the lateral system. This means that when entering one body of water from a larger body of water (i.e. returning to a harbor from a bay or sound), keep the red aids to starboard (right) side and green aids to port (left) side. In addition, each aid is numbered, and these numbers increase as entering from seaward.

Preferred Channel Marks are found at junctions of navigable channels and often mark wrecks or obstructions. A vessel may normally pass this aid on either side, but the top color band indicates the preferred channel. If the top band of the aid is red, it is treated as a red mark and kept to starboard as the vessel passes it while returning from sea. Caution: It may not always be possible to pass on either side of preferred channel aids to navigation. The appropriate nautical chart should always be consulted.

Lateral System

May show green reflector or light

Port Side

Solid Black Buoy
(Being replaced by Green Can Buoy)

Usually found in pairs pass between these buoys

_ Looking upstream _

May show red reflector or light

Starboard Side

Solid Red Buoy
(Being replaced by Red Nun Buoy)

Cardinal System

May show white reflector or light

Red striped white buoy

Do not pass between buoy and nearest shore

Black topped white buoy

Pass to north or east of buoy

Red topped white buoy

Pass to south or west of buoy

5.6 PERMANENT SOIL GAS VAPOR MONITORING POINTS WITHIN BUILDINGS SAFE WORK PRACTICES

Installation of permanent soil gas vapor monitoring points (VMP) will be conducted within buildings on site. Soil gas monitoring points will be installed at various locations using electric powered concrete coring machine will be used to push through the concrete floor.

Prior to installation of the VMPs, appropriate procedures will be followed to address the potential presence of asbestos-containing materials (ACM) at all proposed VMP locations. An outside contractor licensed by the State of Maryland to manage all aspects of asbestos will perform inspections and sampling if necessary to determine the absence or presence of ACM prior to any work being performed. If necessary, ACM such as floor tile will be removed to facilitate installation of the new VMPs. All removed materials will be replaced to prevent any potential tripping hazards. After final locations have been established, Tetra Tech will initiate subsurface utility clearance. Tetra Tech will place a call to Miss Utility and, in addition, will use a private utility locating service (Enviroscan) to identify and mark subsurface utilities and anomalies. All utilities within a 15-foot radius of each designated drilling location will be located using the appropriate technology and marked with paint. Standard utility locating methods may not be effective based on the presence of subsurface metal (rebar) or the presence of metal-stored materials. In the case that standard methods are not effective, alternative methods such as line tracing will be utilized to effectively identify and mark any utilities. Proposed VMP boring locations may be offset based on the results of the asbestos or subsurface utility survey.

Operation of electric powered equipment within enclosed areas such as buildings presents the hazard of dusts generated during concrete coring. Additional hazards that may be present during these operations include, increased noise levels, contact with utilities, electrocution hazards (particularly if water is

present). Use wetting methods to suppress airborne dusts generated during concrete coring within a building.

5.7 EXCAVATION SAFE WORK PRACTICES

Soil excavation activities will be performed through the use of a track or wheel mounted excavator that is outfitted with a boom and excavator bucket that is adequate to complete the entire excavation task in a manner that will not involve or require any entry into the open excavation by any person or by any part of the excavator except for the boom/bucket. The process for performing the excavation and the visual inspections will involve the following:

- First, any surface encumbrances within the intended work area of the excavation will be removed or supported, as necessary, in accordance with OSHA 29 CFR 1926.651(a).

- The FOL will assure that the intended excavation area is cleared of any utility installations that may reasonably be expected to be encountered during excavation work (in accordance with the Tetra Tech Utility Locating SOP and with OSHA 29 CFR 1926.651 [b]).

- Prior to being put into service at the site, the excavator will be inspected by the SSO, and this inspection will be documented.

- The excavator will be positioned and operated so that it never approaches closer than 4 feet from the edge of an open excavation (other than the boom and bucket portion of the excavator).

- At no time during the active operation of the excavator will any person (other than the operator) be permitted to approach the vehicle closer than a distance of the length of the excavator boom and bucket (fully-extended) plus 5 feet, but not less than 25 feet, whichever is greater.

- After a test pit has been created, and after the excavator has been either removed or completely neutralized or shut down, Tetra Tech personnel may approach to perform the visual inspection activities. Tetra Tech personnel will not be permitted to enter any open excavation or approach closer than 2 feet from the edge of an open excavation.

Hazards associated with these activities may include:

- Being struck by the excavator or being trapped between an immovable object and the excavator.
- Being struck by truck traffic being loaded out.

- Slips, trips, and falls associated with movement over uneven terrain or over the sidewall of the excavation
- Contact with contaminants of concern.

Control measures will include:

- The Tetra Tech Site Safety Officer will serve as the Excavation Competent Person (as defined in OSHA 29 CFR 1926.651 [b], as "*one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them".*

- Assuring that all personnel remain clear of the operating excavator at all times during its operation (a minimum "no approach" zone of 25 feet from the excavator or the length of the fully extended excavator boom/bucket length plus 5 feet, whichever is greater).

- ***All work tasks will be performed in a manner that does not require any entry into an open excavation***. In fact all persons are to be restricted form approaching within 2 feet of the edge of any open excavation.

- The FOL and the Excavator Operator will establish and maintain clear communications at all times. Also, the FOL is responsible for assuring that all persons are aware that it is their responsibility to remain outside of the "No Approach" Zone and out of the operator's blind spots.

- Hard hat, hearing protection and a high visibility vest will be required by all persons working near the excavation work area. Also, all personnel will be required to wear steel toe safety footwear, preferably with sole designs that include an aggressive lug to enhance traction

- Personnel will be made aware that they are to never place him/herself between the excavator and an immovable object.

- The assignment of an Excavation Competent Person is also an important part of hazard recognition, evaluation, and control to protect personnel during excavation activities.

Excavation Competent Person (ECP)

The ECP is responsible for addressing responsibilities as defined in OSHA 29 CFR 1926 Subpart P. For this project, the SSO will serve as the ECP. Specific ECP responsibilities include the following:

- Assuring that surface encumbrances are avoided, removed, or supported in accordance with (IAW) OSHA 29 CFR 1926.651 (a)

- Assuring that the FOL has accomplished the utility locating/avoidance processes prior to beginning any excavation (IAW OSHA 29 CFR 1926.651 [b])

- Assuring that no load (e.g., excavator boom or bucket) passes over the head of any person (IAW OSHA 29 CFR 1926.651[e])

- Assuring that adjacent structures, sidewalks, etc. are not undermined by excavation activities.

- Assuring that stockpiled material is placed in a location, at a height, and in a manner that does not represent the hazard of employees being struck by loose or falling materials.

- Because it is anticipated that excavations will be backfilled to grade the same day that they are created, the need to perform visual inspections (such as daily and after rain events, as specified in OSHA 29 CFR 1926.651[k][1]) should not be necessary. However, if such a need is encountered due to inclement weather or other reason, the ECP will be responsible for performing and documenting these excavation inspections. The inspection checklists in Attachment V are provided for this purpose.

- Assuring that stockpiled material will be placed no closer than 4 feet from the edge of an open excavation.

5.8 HAND AND POWER TOOL SAFE WORK PRACTICES

The following safe work practices will be employed during hand and power tool usage:

- All hand and power tools will be maintained in a safe condition.
- Electrical power tools shall be grounded or double insulated with proper assured equipment grounding inspections or Ground Fault Interrupter (GFI) circuit protection provided.
- Pneumatic power tools shall be secured to the hose or whip by some positive means.
- Only properly trained Contractor employees shall operate power-actuated tools.
- All grinding machines shall conform to OSHA and ANSI requirements.

Hand and power tool use procedures are detailed in Section 3.16 of the LM handbook and will be followed.

5.9 HOUSEKEEPING / CLEANUP SAFE WORK PRACTICES

Housekeeping procedures described in Section 5.0 of the LM Handbook (Attachment I) will be addressed and the following housekeeping practices will be employed during this field effort:

- Ensure discharge permits and/or Stormwater Pollution Prevention Plans (if applicable) are available at the project job site.

- Tetra Tech and/or subcontractor personnel will clean up its respective work area(s) and maintain work areas free from all slip, trip, and fall hazards at all times.

- Debris shall be kept cleared from work areas, passageways, stairs, and in and around buildings or other structures. The work area must be left free from accumulation of waste and rubbish at the end of each work shift.

- Combustible scrap and debris shall be removed at regular intervals during the course of work. Safe means shall be provided to facilitate such removal.

- At the end of each working day and/or the conclusion of work being performed, the work area will be restored to the same degree of neatness as when work commenced.

- Tetra Tech and/or subcontractor will furnish necessary equipment and/or receptacles to remove waste and rubbish from the job site unless otherwise specified by Lockheed Martin.

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6.0 HAZARD ASSESSMENT AND CONTROLS

This section provides reference information regarding the chemical and physical hazards which may be associated with activities that are to be conducted as part of the scope of work.

6.1 CHEMICAL HAZARDS

The areas in this investigation have been characterized. Based on historical data from past use and previous sampling events the following contaminants were found to exist at the site:

- VOCs
- SVOCs
- Metals
- PCBs

Although the above chemicals are identified as site contaminants, the latest sampling data indicates that the chemicals in Table 6-1 are the primary contaminants of concern to site personnel performing intrusive work. Although all the chemical contaminants listed above may be present, not all are approaching levels of concern from a human health aspect. The chemicals of concern (COCs) listed below could approach airborne concentrations reaching current occupational exposure limits (OEL). Table 6-1 below shows these and/or common types of these constituents, and a comparison of potential worst case air concentrations (when available) with current Occupational Exposure Limits (OELs).

TABLE 6-1
COMPARISON OF COPCs, AVAILABLE WORST-CASE AIR CONCENTRATIONS, AND CURRENT OCCUPATIONAL EXPOSURE LIMITS

Contaminant of Concern (in soil)	Maximum Concentration In Soil	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Block D			
Acetone	3.1 mg/kg in soil	500 ppm	OSHA: 1000 ppm ACGIH: 500 ppm, TWA_8
Benzene	0.22 mg/kg in soil	13.78 ppm	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
Carbon Disulfide	0.035 mg/kg in soil	5.85 ppm	OSHA: 4 ppm
Methylene Chloride	1.4 mg/kg in soil	367.4 ppm	OSHA: 25 ppm

TABLE 6-1
COMPARISON OF COPCs, AVAILABLE WORST-CASE AIR CONCENTRATIONS, AND CURRENT OCCUPATIONAL EXPOSURE LIMITS

Contaminant of Concern (in soil)	Maximum Concentration In Groundwater	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Acetone	34 ug/l	.02 ppm	OSHA: 1000 ppm ACGIH: 500 ppm, TWA_8
Benzene	.23 ug/l	.02 ppm	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
1,2-Dichloroethene	6.3 ug/l	.27 ppm	OSHA: 200 ppm ACGIH: 200 ppm, TWA_8
Trichloroethylene	38 ug/l in water	2.85 ppm	OSHA: 100 ppm ACGIH: 10 ppm, TWA_8

Block E

Contaminant of Concern (in soil)	Maximum Concentration In Soil	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Acetone	800 mg/kg in soil	115,888.42 ppm	OSHA: 1000 ppm ACGIH: 500 ppm, TWA_8
Benzene	31 mg/kg in soil	5,179.61 ppm	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
Carbon Tetrachloride	16 mg/kg in soil	517.85 ppm	OSHA: 10 ppm ACGIH: 5 ppm TWA_8
Chlorobenzene	16 mg/kg in soil	94.46 ppm	OSHA: 75 ppm ACGIH: 10 ppm, TWA_8
1,2-Dichloroethene	18 mg/kg in soil	1,275.31 ppm	OSHA: 200 ppm ACGIH: 200 ppm, TWA_8
Ethyl Benzene	14 mg/kg in soil	89.71 ppm	OSHA: 100 ppm ACGIH: 20 ppm, TWA_8
Methylene Chloride	360 mg/kg in soil	94,473.69 ppm	OSHA: 25 ppm ACGIH: 50 ppm, TWA_8
Naphthalene	140 mg/kg in soil	32.24 ppm	OSHA: 10 ppm ACGIH: 10 ppm TWA_8
PCB's	1800 mg/kg in soil	1800 ppm	OSHA: 1 mg/m3 ACGIH: 0.5 mg/m3
Styrene	14 mg/kg in soil	50.58 ppm	OSHA: 100 ppm ACGIH: 20 ppm TWA_8
Tetrachloroethylene	31 mg/kg in soil	160.64 ppm	OSHA: 100 ppm ACGIH: 25 ppm TWA_8

Block E			
Contaminant of Concern (in soil)	**Maximum Concentration In Soil**	**Worst-Case Air Concentration That Could Be Encountered**	**Current OSHA PEL or ACGIH TLV**
Toluene	44 mg/kg in soil	703.65 ppm	OSHA: 200 ppm ACGIH: 20 ppm TWA_8
1,1,1-Trichloroethane	21 mg/kg in soil	1,068.43 ppm	OSHA: 10 ppm ACGIH: 10 ppm TWA_8
Trichloroethylene	25 mg/kg in soil	868.96 ppm	OSHA: 100 ppm ACGIH: 10 ppm, TWA_8
Xylenes	46 mg/kg	232.12 ppm	OSHA: 350 ppm TWA_8 ACGIH: 350 ppm, TWA_8
Contaminant of Concern (in water)	**Maximum Concentration In Water**	**Worst-Case Air Concentration That Could Be Encountered**	**Current OSHA PEL or ACGIH TLV**
Benzene	18 ug/l	1.25 ppm	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
1,1-Dichloroethene	300 ug/l in water	80.77 ppm	OSHA: NA ACGIH: 5 ppm, TWA_8
Trichloroethylene	30,000 ug/l in water	2,249.03 ppm	OSHA: 100 ppm ACGIH: 10 ppm, TWA_8
Vinyl Chloride (VOC)	27 ug/l in water	12.01 ppm	OSHA: 1 ppm, TWA_8 5 ppm Ceiling

Block F			
Contaminant of Concern (in soil)	**Maximum Concentration In Soil**	**Worst-Case Air Concentration That Could Be Encountered**	**Current OSHA PEL or ACGIH TLV**
Carbon Disulfide	.007 mg/kg in soil	1.19 ppm	OSHA: 4 ppm
Napthalene	159 mg/kg in soil	36.62 ppm	OSHA: 10 ppm ACGIH: 10 ppm TWA_8
Contaminant of Concern (in water)	**Maximum Concentration In Water**	**Worst-Case Air Concentration That Could Be Encountered**	**Current OSHA PEL or ACGIH TLV**
Carbon Disulfide	25 ug/l in water	4.73 ppm	OSHA: 4 ppm

Block G			
Contaminant of Concern (in soil)	**Maximum Concentration In Soil**	**Worst-Case Air Concentration That Could Be Encountered**	**Current OSHA PEL or ACGIH TLV**
1,1-Dichloroethene	0.007 mg/kg in soil	1.8 ppm	OSHA: NA ACGIH: 5 ppm, TWA_8

Block G

Contaminant of Concern (in soil)	Maximum Concentration In Soil	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Benzene	50 ug/l	3.46 ppm	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
1,1-Dichloroethene	670 ug/l in water	180.39 ppm	OSHA: NA ACGIH: 5 ppm, TWA_8
1,2-Dichloroethene	180 ug/l in water	7.85 ppm	OSHA: 200 ppm ACGIH: 200 ppm, TWA_8
Trichloroethylene	3500 ug/l in water	262.39 ppm	OSHA: 100 ppm ACGIH: 10 ppm, TWA_8
Vinyl Chloride (VOC)	37 ug/l in water	16.46 ppm	OSHA: 1 ppm, TWA_8 5 ppm Ceiling

Block H

Contaminant of Concern (in soil)	Maximum Concentration In Soil	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Carbon Disulfide	3 mg/kg in soil	501.25 ppm	OSHA: 4 ppm
Methylene Chloride	4.9 mg/kg in soil	1,285.89 ppm	OSHA: 25 ppm
Napthalene	180 mg/kg in soil	41.46 ppm	OSHA: 10 ppm ACGIH: 10 ppm TWA_8

Block I
Note: At this time work will not be conducted in Block I but this info is placed here for future investigations.

Contaminant of Concern (in soil)	Maximum Concentration In Soil	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Benzene	0.45 mg/kg	28.19 ppm	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
Carbon Disulfide	.091 mg/kg in soil	4 ppm	OSHA: 4 ppm
1,1-Dichloroethane	4.3 mg/kg	482.98 ppm	OSHA: 100 ppm TWA_8 ACGIH: 100 ppm, TWA_8
Methylene Chloride	.11 mg/kg in soil	28.87 ppm	OSHA: 25 ppm
1,1,1-Trichloroethane	22 mg/kg	1,119.31 ppm	OSHA: 350 ppm TWA_8 ACGIH: 350 ppm, TWA_8
Lead	2,600 mg/kg	4.81 mg/m3	OSHA: 0.05 mg/m3 TWA_8 ACGIH: 0.05 mg/m3, TWA_8

Table Notes:

TWA_8: Average air concentration over an 8-hour work period that is not to be exceeded
OSHA Ceiling: Concentration in air that is not to be exceed

Note: All sites contain various metals, however none above occupational exposure limits if visible dust is observed. Area wetting methods will be used to suppress dust at all locations.

As indicated in Table 6-1, are from a worst-case scenario, COC concentrations immediately above a captured air phase above contaminated soil or water (such as in the head space during soil drilling or excavation activities) could potentially reach concentrations that exceed the OELs. However, in regarding the results of this data evaluation, it is important to recognize the following:

- The planned work area is outdoors with ample natural ventilation that will reduce any airborne VOCs through dilution and dispersion
- The soil value used in this evaluation was the ***highest*** concentration detected during the most recent soil sampling events

As a result of these factors, it is possible that workers participating in site activities may encounter airborne concentrations of COCs that could represent an occupational exposure concern, however it is unlikely. To monitor this route, real-time direct reading monitoring instruments will be used (as described in Section 7.0). This will be performed during the intrusive tasks in soil and IDW management activities, as these tasks are the most likely to involve encountering/releasing any VOCs into the airphase.

Potential exposure concerns to the COCs may also occur through ingestion, or coming into direct skin contact with contaminated groundwater. The likelihood of worker exposure concerns through these two routes are considered unlikely, provided that workers follow good personal hygiene and standard good sample collection/sample handling practices, and wear appropriate PPE as specified in this HASP. Examples of onsite practices that are to be observed that will protect workers from exposure via ingestion or skin contact include the following:

- No hand-to-mouth activities on site (eating, drinking, smoking, etc.)
- Washing hands upon leaving the work area and prior to performing any hand to mouth activities
- Wearing surgeon's-style gloves whenever handling potentially-contaminated media, including groundwater and any potential free product, sampling equipment, and sample containers.

6.1.1 Volatile Organic Compounds (VOCs)

The majority of VOCs are often related to chlorinated solvents and associated degradation products, paint thinners, dry cleaning solvents, constituents of petroleum fuels (e.g. gasoline and natural gas), and crude oil tanking. Symptoms of exposure to VOCs can include abdominal pain, irritation of the skin, eyes, nose, and throat, dizziness, tremors, vomiting, GI bleeding, enlarged liver, pallor of the extremities, and frostbite like-symptoms.

Short-term exposure to VOCs, such as TCE and VC, can cause irritation of the nose and throat and central nervous system (CNS) depression, with symptoms such as drowsiness, dizziness, giddiness, headache, loss of coordination. High concentrations have caused numbness and facial pain, reduced eyesight, unconsciousness, irregular heartbeat and death. Very high concentrations have produced death due to CNS effects, and, in rare cases, irregular heart beat. Permanent nervous system damage and/or liver injury have resulted from severe overexposure.

6.1.2 Metals

The physical effects of poisoning from the heavy metals tend to be a very slow process and occur over a long period of continued exposure to the source of the toxic metal. The physical symptoms which are typically induced by the presence of toxic metals in the body tend to be very vague and can include symptoms such as persistent fatigue, the appearance of splitting and blinding headaches, the presence of an upset stomach, disorders such as colic and even anemia in some cases. The central nervous system is the main part of the human body likely to be affected by the presence of toxic metals. Symptoms of a disrupted central nervous system include the appearance of muscular tremors, the development of spells of dizziness, the presence of insomnia, the poor concentration abilities in the person and a sudden lack of muscular coordination in the body.

6.1.3 Polychlorinated Biphenyl

PCBs were widely used as dielectric and coolant fluids, for example in transformers, capacitors, and electric motors. Due to PCBs' environmental toxicity and classification as a persistent organic pollutant, PCB production was banned by the United States Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.[1] According to the U.S. Environmental Protection Agency (EPA), PCBs have been shown to cause cancer in animals, and there is also evidence that they can cause cancer in humans.[3] A number of peer-reviewed health studies have shown a causal link between exposure to PCBs and non-Hodgkin Lymphoma, a frequently fatal form of cancer. Concerns about the toxicity of PCBs are largely based on compounds within this group that share a structural similarity and toxic mode of action with dioxin. Toxic effects such as endocrine disruption and neurotoxicity are also

associated with other compounds within the group. The maximum allowable contaminant level in drinking water is set at zero, but due to water treatment technologies a level of 0.5 parts per billion is the defacto level. The most commonly observed health effects in people exposed to extremely high levels of PCBs are skin conditions, such as chloracne and rashes, but these were known to be symptoms of acute systemic poisoning dating back to 1922. Studies in workers exposed to PCBs have shown changes in blood and urine that may indicate liver damage. Other symptoms included fatigue, headaches, coughs, and unusual skin sores.

6.2 EXHAUST GASES/FUMES CREATED DURING INDOOR ACTIVITIES

Short-term (acute) effects of workers exposed to high concentrations of exhaust gasses/fumes may include irritation of the eyes, nose, and throat; lightheadedness; heartburn; headache; weakness, numbness and tingling in the extremities; chest tightness; wheezing; and vomiting. Some studies have suggested that workers exposed to diesel/gasoline exhaust are more likely to have chronic respiratory symptoms such as persistent cough and mucous, bronchitis, and reduced lung capacity than unexposed workers. Of particular concern is the potential for exposure to carbon monoxide which is present in diesel and more predominately, in gasoline engine exhaust. Upon entering the bloodstream, carbon monoxide combines with hemoglobin over 200 times more tightly than oxygen. Hemoglobin, then, is unable to carry oxygen in the blood. Carbon monoxide may also combine with myoglobin which may cause muscle metabolism disturbances, especially in the heart. The degree of toxicity depends primarily on carbon monoxide concentrations, exposure time, individual susceptibility, and exertion level.

To prevent or minimize potential exposures to carbon monoxide and other exhaust gas constituents, safe work practices identified in Section 5.4 and air monitoring measures listed Section 7.1.2 will be used.

6.3 RADIOLOGICAL HAZARDS

Based on historical information, and the results of previous screening and sampling events, alpha, beta and gamma radiation may exist at Former Building D. Unstable radioactive elements can be found in a wide range of concentrations in all rocks, soil, and water. The most common radioactive elements, uranium and thorium, decay slowly and produce other radioactive elements, such as radium, which in turn undergo still further radioactive decay. These radioactive product elements have different chemical properties, decay at different rates, and emit different levels of radiation energy than either uranium or thorium. The two most common isotopes of radium (Ra) are Ra-226 and Ra-228. Ra-226 has a long half-life (1,600 years) compared to that of Ra-228 (5.75 years). A half-life is the time required for half of the initial amount of a radionuclide to decay. Ra-226 decays by emitting the nucleus of a helium atom (alpha particle), whereas Ra-228 emits an electron (beta particle). Radiological survey and soil sampling

activities will be performed to determine if remedial actions have removed radiological contamination to acceptable levels.

Of particular concern are exposures that occur as a result of inhalation of radium dusts or radium contaminated particles. However, site activities are unlikely to generate airborne dusts that can be inhaled. Rather the greatest potential for exposure is anticipated to be via ingestion of contaminated soils as a result of hand to mouth activities (eating, drinking, smoking, etc.). As a result, minimizing contact with potentially contaminated soils through the use of avoidance and ppe use as well as the implementation of sound decontamination procedures and personal hygiene practices will be used to prevent exposures to radium. Safe work permits contained in Attachment IV provide specific control methods that will be used to minimize potential exposures to site personnel.

6.4 SUB SLAB AND IAQ SAMPLING BUILDINGS A,B,C

Previous sampling data indicates the presence of VOC'S, within Block I (see Table 6-1) for concentrations.

6.5 PHYSICAL HAZARDS

The following is a list of physical hazards that may be encountered at the site or may be present during the performance of site activities.

- Slips, trips, and falls
- Cuts (or other injuries associated with hand tool use)
- Lifting (strain/muscle pulls)
- Ambient temperature extremes (heat stress)
- Pinches and compressions
- Vehicular and foot traffic
- Noise in excess of 85 dBA
- Flying projectiles
- Contact with underground or overhead utilities/electrical safety
- Heavy equipment hazards (rotating equipment, hydraulic lines, etc.)
- Compressed gas cylinders

Specific hazards are discussed further below, and are presented relative to each task in the task-specific Safe Work Permits.

6.5.1 Slips, Trips, and Falls

During various site activities there is a potential for slip, trip, and fall hazards associated with wet, steep, or unstable work surfaces. To minimize hazards of this nature, personnel required to work in and along areas prone to these types of hazards will be required to exercise caution, and use appropriate precautions (restrict access, guardrails, life lines and/or safety harnesses) and other means suitable for the task at hand. Site activities will be performed using the buddy system.

6.5.2 Strain/Muscle Pulls from Heavy Lifting

During execution of planned activities there is some potential for strains, sprains, and/or muscle pulls due to the physical demands and nature of this site work. To avoid injury during lifting tasks personnel are to lift with the force of the load carried by their legs and not their backs. When lifting or handling heavy material or equipment use an appropriate number of personnel. Keep the work area free from ground clutter to avoid unnecessary twisting or sudden movements while handling loads.

6.5.3 Heat/Cold Stress

Because of the length of planned project activities, the likely seasonal weather conditions that will exist during the planned schedule, and the physical exertion that can be anticipated with some of the planned tasks, it will be necessary for the field team to be aware of the signs and symptoms and the measures appropriate to prevent cold stress. This is addressed in detail in Section 4.0 of the Tetra Tech Health and Safety Guidance Manual, which the SSO is responsible for reviewing and implementing as appropriate on this project. Tetra Tech personnel will also follow the guidance for Heat Stress and prevention of Sun Exposure found in Tetra Tech Safe Work Procedures SWP 5-15 and 5-26 found in Attachment VIII.

6.5.4 Pinch/Compression Points

Handling of tools, machinery, and other equipment on site may expose personnel to pinch/compression point hazards during normal work activities. Where applicable, equipment will have intact and functional guarding to prevent personnel contact with hazards. Personnel will exercise caution when working around pinch/compression points, using additional tools or devices (e.g., pinch bars) to assist in completing activities.

6.5.5 Natural Hazards

Natural hazards such as poisonous plants, bites from poisonous or disease carrying animals or insects (e.g., snakes, ticks, mosquitoes) are often prevalent at sites that are being investigated as part of

hazardous waste site operations. To minimize the potential for site personnel to encounter these hazards, nesting areas in and about work areas will be avoided to the greatest extent possible. Work areas will be inspected to look for any evidence that dangerous animals may be present. Based on the planned location for the work covered by this HASP, encountering wild animals is not a likely probability.

During warm months (spring through early fall), tick-borne Lyme disease may pose a potential health hazard. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots and taped) will prevent initial tick attachment, while performing frequent body checks will help prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures and symptoms of exposure, consult Section 4.0 of the Health and Safety Guidance Manual.

Contact with poisonous plants and bites or stings from poisonous insects are other potential natural hazards. Long sleeved shirts and long pants (tucked into boots), and avoiding potential nesting areas, will minimize the potential for exposure. Additionally, insect repellents may be used by site personnel. Personnel who are allergic to stinging insects (such as bees, wasps and hornets) must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet (see Attachment III of this HASP), and the FOL or SSO notified.

6.5.6 Vehicular and Equipment Traffic

Vehicle and equipment traffic hazards are present for both indoor and outdoor work. While conducting work inside Buildings A, B and C workers should be aware of various vehicles and equipment including but not limited to forklifts, golf carts, maintenance carts and bicycles. All indoor means of vehicular transport are either manual or propane powered as to avoid producing toxic fumes in an indoor environment. Caution should be taken while walking, riding or conducting work in these buildings. Pedestrian traffic should walk in painted aisles marked on the ground whenever possible and should take caution when approaching intersections in the buildings. Mirrors and motion alarms notify of pedestrian and vehicular traffic as they approach major intersections throughout the buildings, however, every intersection does not possess these same warning methods. Each worker must receive cart training provided by either the onsite maintenance contractor or a qualified person who has already received the training. Cart traffic shall always yield to pedestrian traffic. Each cart is also equipped with a horn that can be used when approaching an intersection or a blind corner to notify any oncoming traffic.

If working in or near streets or roadways, hazards associated with vehicular and equipment traffic are likely to exist during various site activities and whenever site personnel performed work on or near

roadways. Site personnel will be instructed to maintain awareness of traffic and moving equipment when performing site activities. When working near roadways, site personnel will wear high visibility vests. Also, when conducting work other methods of traffic safety will be utilized such as strategically positioning the worker's truck, the use of traffic cones, traffic signs and caution tape to quarantine off each work site. Workers shall also be aware of the potential for train traffic through the site. The train runs in a northern direction from Tilley Chemical (neighboring chemical packaging and distribution company) along the western side of Building A out to a railway located north of Eastern Boulevard. All personnel should be cautious of the train running thru work areas. At this time all work areas are not within the railroad right of way but site personnel should be cautious when working in the vicinity of the train tracks.

6.5.7 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors. As a result, inclement weather may be encountered. In the event that adverse weather (electrical storms, snow, ice, tornadoes, etc.) conditions arise, the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

6.5.8 Contact with Underground or Overhead Utilities/Electrical Safety

Contact with energized sources can result in severe injury and even death. There are two areas of concern with this potential hazard: contact with energized processing equipment and contact with energized utilities including underground utilities (i.e., electrical transmission lines, gas lines, water lines, etc.) and overhead utilities (i.e., power lines, etc.).

- Use and application of the Tetra Tech Standard Operating Procedure (SOP) for Utility Locating and Excavation Clearance found in the Tetra Tech Health and Safety Guidance Manual will be employed. This procedure provides step-by-step instructions for clearance of underground utilities, as well as avoidance techniques, and required documentation.

- Establishment of a suitable clearance distance (20-feet) from overhead utilities will be the primary method to control hazards conveyed through contact with these power sources.

- Identify underground utilities and buried structures before commencing any DPT operations. Follow the Tetra Tech Utility Locating and Excavation Clearance Standard Operating Procedure.

In addition, the electrical safety procedures stipulated in Section 3.9 of the LM Handbook and the overhead power line safety procedures in Section 3.14 of the LM Handbook will also be followed.

No hazardous energy work is being conducted as part of this field effort. However, should activities associated with lockout/tagout be required, the requirements stipulated in Section 3.5 of the LM Handbook (Attachment I) will also be adhered to.

6.5.9 Heavy Equipment Hazards

Ensure that workers are thoroughly trained and competent to perform their assigned task with the equipment used in investigation. Ensure that back-up alarms are functional on equipment. Heavy equipment will be subjected to an equipment inspection, upon arrival on-site and prior to leaving. This inspection will be recorded on the Equipment Inspection Checklist provided in Attachment V of this HASP. The equipment operators and on-site Supervisors responsible for the equipment are to ensure that the Equipment Inspection Checklist has been reviewed and completed, and that all moving parts are guarded if such parts are exposed. Check/test all emergency stop controls. Use escort vehicles with flashing lights to ward and control local traffic when moving large equipment to support area.

Only trained and authorized workers may operate heavy equipment, industrial vehicles and/or cranes. All manufacturer's specifications and limitations will be adhered to.

In addition, the heavy equipment, industrial vehicle, and crane operation safety procedures stipulated in Section 3.13 of the LM Handbook and will be followed.

6.5.10 Compressed Gas Cylinders

Work utilizing compressed gas cylinders is not anticipated as part of this field effort. However, if work utilizing compressed gas cylinders is required, this HASP will be updated/amended as necessary and the procedures in Section 3.17 of the LM Handbook (Attachment I) will be followed.

7.0 AIR AND RADIATION MONITORING

The COCs outlined in Section 6 have the potential to be present in concentrations that could present an inhalation hazard during planned site activities at the individual blocks. To assure that such exposures are avoided and documented, a direct reading instrument will be used to monitor worker exposures to chemical hazards present at the various blocks. A Photoionization Detector (PID) using a lamp energy of 11.7 eV will be used to monitor the air when conducting site activities. For Block I only a Flame Ionization Detector (FID) will be used to detect the presence of 1,1 Dichloroethane which is not detected by the PID. A Draeger Tube 0.5/a will be used when the presence of VOCs is confirmed. The PID will be used for most onsite activities to screen source areas (sample locations, monitoring wells, etc.) and worker breathing zones for volatile and detectable site contaminants. The presence of elevated airborne concentrations of volatile organic compounds will suggest an increased exposure threat to site personnel and will require site activities to be suspended until readings return to background levels. The use of personal protective equipment and the observance of the other control requirements presented in this HASP have been selected to minimize potential for personnel exposures to hazardous concentrations (known or unknown) of site contaminants.

Some COCs (PAHs, PCB, metals) are not volatile and are unable to be detected with traditional field instrumentation (photoionization detectors). For metals visible dust will require area wetting to control the dust since the level of the contaminants are above the visible spectrum. Generation of dusts should be minimized. If airborne dusts are observed, use area wetting methods. Site contaminants may adhere to or be part of airborne dusts or particulates. Although unlikely to be present, the generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates.

Instruments will be used primarily to monitor source points and worker breathing zone (BZ) areas, while observing instrument action levels. The SSO shall obtain and document the daily background reading at an upwind, unaffected area and observe for readings above that background level. The SSO shall monitor source areas (e.g., above collected samples and confined areas, etc.) for the presence of any reading above the daily-established background level. If elevated readings are observed above the PEL, the SSO shall monitor the workers' BZ areas. If elevated readings are observed, the following process will be followed:

- The SSO shall order site personnel to stop work and retreat upwind to a safe, unaffected area, where they will remain until further directed by the SSO.

- The SSO shall begin wetting procedures to control dust and then re-approach the work area while continuously monitoring the BZ areas.

- Only when levels are below the PEL standard in BZ areas will work be permitted to resume.

- If background levels are not regained, the SSO will contact the HSM for additional direction.

There is a sampling task where the use of DRIs will not be required that is for the marine operations (surface water and sediment sampling tasks from a small water vessel/boat and drilling soil borings from a barge). An evaluation of available data from previous investigations at the intended sampling areas did not identify any volatile substances (only low concentrations of metals, PCBs, and PAHs. Furthermore, these types of substances only represent an inhalation concern if they are either present in inhalable air as suspended solid particulates in sizes that can be inspired into to the body, or if they are heated to very high temperatures and are present as fumes. Neither of these types of situations is plausible for the marine operations. Therefore, DRI usage will not be required for those tasks only.

Tetra Tech will issue or cause to be issue all necessary personal protective equipment and air monitoring equipment prior to commencing the job to all its agents and personnel, including full instructions and training on the use of the equipment. The requirements included in Section 3.1 of the LM Handbook (Attachment I) addressing monitor equipment will be followed.

Radiological contaminants of concern are alpha, beta and possibly gamma sources. Past actions have likely removed much of the site contamination; however this effort is to determine if contamination exists and to determine background levels. For this reason, a radiological field survey and sampling will be performed to identify any areas of elevated radioactivity. Radiological work will be monitored by the PHP in accordance with Tt RPOP. Action levels are established in the project work plan.

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. The SSO shall obtain and document the daily background (BG) reading at an upwind, unaffected area and observe for readings above that BG level. The SSO shall monitor source areas (e.g., monitoring wells) for the presence of any reading above the daily-established BG level. If elevated readings are observed, the SSO shall monitor the workers breathing zone (BZ) areas with the PID. If the appropriate instrument Action Level is exceeded (see below), the following process will be followed:

- The SSO shall order all personnel to stop work and retreat upwind to a safe, unaffected area, where they will remain until further directed by the SSO.

- The SSO shall allow at least 5 minutes to pass so that the work area can ventilate, and will then re-approach the work area while continuously monitoring the BZ areas.

- Only when BG levels are regained in BZ areas will work be permitted to resume.

- If BG levels are not regained, the SSO will contact the HSM for additional direction.

I**nstrument Action Levels**: Monitoring instruments use will follow the action levels specified below:

- A Draeger Tube 0.5/a will be used when the presence of VOCs is confirmed:
  - If the readings are Benzene, the action level is 5 ppm/sustained 10 minutes/4 times/day
  - If readings are not Benzene, the action levels are as follows:

Instrument Action Levels:

The use of either a PID will be acceptable at all sites, provided that the following action levels are observed:

ACTION LEVELS			
Location	**Instrument**	**Action Level**	**Exposure Time**
Block D	PID with 11.7 eV lamp	1 ppm	4 exposures of 5 minutes one day
Block E	PID with 11.7 eV lamp	7 ppm	4 exposures of 5 minutes one day
Block F	PID with 11.7 eV lamp	1000 ppm	4 exposures of 5 minutes one day
Block G	PID with 11.7 eV lamp	7 ppm	4 exposures of 5 minutes one day
Block H	PID with 11.7 eV lamp Precautionary use	10 ppm	4 exposures of 5 minutes one day
Block I*	PID with 11.7 eV lamp	1 ppm	4 exposures of 5 minutes one day
Block I* (1,1 Dichloroethane only)	FID	1,900 ppm	4 exposures of 5 minutes one day

***Reference only at this time**

7.1.1 Carbon Monoxide Detector and Colorimetric Tubes for Nitrogen Dioxide

A direct-read carbon monoxide detector such as a Draeger PAC III Single Gas Monitor, an Industrial Scientific T82 Single Gas Monitor (or equivalent) will be used during all soil boring and concrete coring operations performed in Building B146 to evaluate airborne concentrations of carbon monoxide. Although other exhaust gases may be present, carbon monoxide has been selected as the primary indicator

compound to determine potential exposure concerns. Conservative action levels for carbon monoxide have been established to prevent potential exposures to other exhaust gas compounds including oxides nitrogen and sulfur.

As a precautionary measure, colorimetric tubes for nitrogen dioxide (NO_2) will also be available for use and will be required whenever elevated CO readings are observed. To evaluate NO2 concentrations a Nitrogen Dioxide Draeger tube (0.5/c) will be used. These tubes detected NO2 at concentrations ranging from 0.5 to 10 ppm or 5 to 25 ppm depending on the number of pump strokes that are used. For the purpose of determining exposure concerns, the lower range will be used which will require 5 strokes of the hand pump. A color change from pale grey to blue grey indicates the presence of NO_2.

7.1.2 Radiation Survey Instrument

Radiological instruments will be used for field survey and sampling as described below. Radiological surveys will be performed in accordance with the guidance provided in the Tt RPOP.

Instrument	Detector	Type of Activity Detected	Survey Type
Ludlum Model 2350 Digital Data Logger	Phoswhich Probe	Alpha/Beta	Contamination Surveys (counts per minute [cpm])
Ludlum Model 2241 Scaler/Ratemeter	2” x 2” Ludlum Model 44-10 NaI Scintillation Probe	Gamma	Dose Rate Surveys (cpm)
Ludlum Model 19 Survey Meter	1” x 1” Sodium Iodide (NaI)Tl scintillator	Low-Level Gamma	Dose Rate (micro Röntgen per hour [µR/hr])

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the equipment provider (i.e., rental agency used). Operational checks and field calibration will be performed on site instruments each day prior to their use. Field calibration will be performed on instruments according to manufacturer’s recommendations. These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer standard operating procedure (which the SSO must assure are included with the instrument upon its receipt onsite). Field calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks

Radiological instruments will be calibrated with known source before field use. Pre-operational checks will be performed on the instruments each day before use in accordance with the guidance provided in the Tt RPOP.

7.3 DOCUMENTING INSTRUMENT READINGS

The SHSO is responsible for ensuring that air monitoring instruments are used in accordance with the specifications of this HASP and with manufacturer's specifications/recommendations. In addition, the SHSO is also responsible for ensuring that all instrument use is documented. This requirement can be satisfied either by recording instrument readings on pre-printed sampling log sheets or in a field log book. **This includes the requirement for documenting instrument readings that indicate no elevated readings above noted daily background levels (i.e., no-exposure readings)**. At a minimum, the SHSO must document the following information for each use of an air monitoring device:

- Date, time, and duration of the reading
- Site location where the reading was obtained
- Instrument used (e.g., PID, etc.)
- Personnel present at the area where the reading was noted
- Other conditions that are considered relevant to the SHSO (such as weather conditions, possible instrument interferences, etc.)

Radiological surveys and instrument pre-operational checks will be documented in accordance with the Tt RPOP.

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: _____ **PROJECT NO.:** _____

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section is included to specify health and safety training and medical surveillance requirements for Tetra Tech personnel participating in on site activities. Tetra Tech personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the LMC MRC. Tetra Tech personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel. Tetra Tech and subcontractor personnel working on site who are potentially exposed to hazardous substances shall receive initial and annual refresher training in accordance with 29 CFR 1910.120(e) – Hazardous Waste Operations and Emergency Response or the applicable state OSHA standard. Lockheed Martin shall be provided with electronic copies of the training certificates.

Documentation of Tetra Tech introductory, supervisory, and refresher training as well as site-specific training will be maintained at the site. Copies of certificates or other official documentation will be used to fulfill this requirement.

The requirements described in Section 3.20.3 of the LM Handbook (Attachment I) addressing training will be followed.

8.2 SITE-SPECIFIC TRAINING

Tetra Tech SSO will provide site-specific training to Tetra Tech employees who will perform work on this project. Figure 8-1 will be used to document the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities. This training documentation will be employed to identify personnel who through record review and attendance of the site-specific training are cleared for participation in site activities. This document shall be maintained at the site to identify and maintain an active list of trained and cleared site personnel.

The Tetra Tech SSO will also conduct a pre-activities training session prior to initiating site work. This will consist of a brief meeting at the beginning of each day to discuss operations planned for that day, and a review of the appropriate Safe Work Permits with the planned task participants. A short meeting may also be held at the end of the day to discuss the operations completed and any problems encountered.

8.3 MEDICAL SURVEILLANCE

Tetra Tech personnel participating in project field activities will have had a physical examination meeting the requirements of Tetra Tech's medical surveillance program. Documentation for medical clearances will be maintained in the Tetra Tech Pittsburgh office and made available, as necessary, and will be documented using Figure 8-1 for every employee participating in onsite work activities at this site. Tetra Tech shall provide evidence of employee enrollment in a medical surveillance program. Lockheed Martin does not provide medical surveillance examinations to contractor employees.

The medical surveillance requirements described in Section 3.20.4 of the LM Handbook (Attachment I) will be followed.

Each field team member, including visitors, entering the exclusion zone(s) shall be required to complete and submit a copy of the Medical Data Sheet (see Attachment III of this HASP). This shall be provided to the SSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by Tetra Tech
- Regulatory personnel (i.e. EPA, MDEP, OSHA)
- Property Owners
- Authorized Personnel
- Other authorized visitors

Non Tetra Tech personnel working on this project are required to gain initial access to the facility by coordinating with the Tetra Tech FOL or designee and following established facility access procedures.

Once access to the base is obtained, personnel who require site access into areas of ongoing operations will be required to obtain permission from the PM. In addition, site visitors wishing to observe operations in progress will be escorted by a Tetra Tech representative and shall be required to meet the minimum requirements discussed below:

- Site visitors will be directed to the FOL/SSO, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity which they represent, and the purpose of the visit.

- Site visitors must be escorted and restricted from approaching any work areas where they could be exposed to hazards from Tetra Tech operations. If a visitor has authorization from the client and from the Tetra Tech Project Manager to approach our work areas, the FOL must assure that the visitor first provides documentation indicating successfull completion of the necessary OSHA introductory training, receive site-specific training from the SSO, and that they have been physically cleared to work on hazardous waste sites. Site visitors wishing to enter the exclusion zone will be required to produce the necessary information supporting clearance to the site. This shall include information attesting to applicable training and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP. All jobsite visitors must have a safety orientation prior to commencing work or touring the site. A visitor log will be kept to document the orientation.

- Once the site visitors have completed the above items, they will be permitted to enter the operational zone. Visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. Visitors entering the exclusion zones during ongoing operations will be accompanied by a Tetra Tech representative. Visitors not meeting the requirements, as stipulated in this plan, for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause the termination of on site activities until the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from local law enforcement personnel.

FIGURE 8-1

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing field activities at LCM MRC and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Emergency response procedures (evacuation and assembly points)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits
- Stop Work Procedures

I have been given the opportunity to ask questions and all of my questions have been answered to my satisfaction. The dates of my training and medical surveillance requirements indicated below are accurate.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam

9.0 SITE CONTROL

This section outlines the means by which Tetra Tech will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site. This approach will be comprised of an exclusion zone, a contamination reduction zone, and a support zone. It is also anticipated that this approach will control access to site work areas, restricting access by the general public, minimizing the potential for the spread of contaminants, and protecting individuals who are not cleared to enter work areas.

Radiological areas, if applicable, will be posted independently of work zones in accordance with the Tt RPOP.

9.1 EXCLUSION ZONE

The exclusion zone will be considered the areas of the site of known or suspected contamination. It is anticipated that the areas around active/intrusive activates will have the potential for contaminants brought to the surface. These areas will be marked and personnel will maintain safe distances. Once active/intrusive activities have been completed and any surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the contamination reduction zone. The exclusion zones for this project are those areas of the site where active work (DPT work areas, drilling, installation, and sample collection, etc.) is being performed plus a designated area of at least 25 feet surrounding the work area. Exclusion zones will be delineated as deemed appropriate by the FOL, through means such as erecting visibility fencing, barrier tape, cones, and/or postings to inform and direct personnel.

9.1.1 Exclusion Zone Clearance

An Exclusion Zone (EZ) will be established at each well installation/sampling location. The purpose of establishing and maintaining these localized exclusion zones is to define areas where more rigorous safety and health protection measures will be required and to designate areas restricted to non-essential and unauthorized personnel. The size and dimensions of these EZs will vary based on the nature of the planned activities, and may be subject to change at the SSO's discretion based on factors such as visual observations, nearby concurrent operations, and other factors. However, the following dimensions represent basic considerations for establishing EZs:

- DPT and associated concurrent sampling activities. The EZ for this activity will be set at the height of the mast, plus five feet surrounding the point of operation, with a minimum of 25-feet. This distance will also apply when surface and subsurface soil sampling from behind these type rigs.

- Monitoring well development, purging, construction and use, and collecting groundwater soil, sediment samples, water level readings and indoor air sampling. The EZ for these activities will be set to encompass an area of at least 10-feet surrounding the well head.

- Decontamination operations. The EZ for this activity will be set at 25 feet surrounding the gross contamination wash and rinse as well as 25-feet surrounding the heavy equipment decontamination area. Sample equipment decontamination boundaries will be set at 10-feet surrounding hand wash and rinse areas.

- Investigative Derived Waste (IDW) area will be constructed and barricaded. Only authorized personnel will be allowed access.

EZs will be marked using barrier tape, traffic cones and/or drive pole, or other readily-visible devices. Signs may also be posted at the SSO's discretion to inform and direct site personnel and site visitors. EZs shall remain marked until the SSO has evaluated the restoration effort and has authorized changing the zone status.

A pre-startup site visit will be conducted by members of the identified field team in an effort to identify proposed subsurface investigation locations, conduct utility clearances, and provide upfront notices concerning scheduled activities within the facility.

Subsurface activities will proceed only when utility clearance has been obtained. In the event that a utility is struck during a subsurface investigative activity, the emergency numbers provided in Section 2.0, Table 2-1, will be notified.

9.2 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. This area will also serve as a focal point in supporting exclusion zone activities. This area will be delineated using barrier tape, cones, and postings to inform and direct facility personnel. Decontamination will be conducted at a central location. Equipment potentially contaminated will be bagged and taken to that location for decontamination.

9.3 SUPPORT ZONE

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. The support zones will be established at areas of the site where away from potential exposure to site contaminants during normal working conditions or foreseeable emergencies.

9.4 SAFE WORK PERMITS

Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits (SWPs) to guide and direct field crews on a task by task basis. An example of the SWP to be used is provided in Figure 9-1. Partially completed SWPs for the work to be performed are attached (Attachment IV) to this HASP. These permits were completed to the extent possible as part of the development of this HASP. It is the SSO's responsibility to finalize and complete all blank portions of the SWPs based on current, existing conditions the day the task is to be performed, and then review that completed permit with all task participants as part of a pre-task tail gate briefing session. This will ensure that site-specific considerations and changing conditions are appropriately incorporated into the SWP, provide the SSO with a structured format for conducting the tail gate sessions, as well will also give personnel an opportunity to ask questions and make suggestions. All SWPs require the signature of the FOL or SSO.

9.5 SITE SECURITY

As this activity will take place at an active facility, the first line of security will be provided by the facility entrance/gate restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL and LMC Contact.

Security at the work areas will be accomplished using field personnel. This is a multiple person operation, involving multiple operational zones. Tetra Tech personnel will retain complete control over active operational zones.

The site contact will serve as the focal point for facility personnel and interested parties and will serve as the primary enforcement contact.

9.6 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by Tetra Tech
- Regulatory personnel (i.e. EPA, MDEP, OSHA)
- Property Owners
- Authorized Personnel
- Other authorized visitors

Non Tetra Tech personnel working on this project are required to gain initial access to the facility by coordinating with the Tetra Tech FOL or designee and following established facility access procedures.

Once access to the base is obtained, personnel who require site access into areas of ongoing operations will be required to obtain permission from the PM. In addition, site visitors wishing to observe operations in progress will be escorted by a Tetra Tech representative and shall be required to meet the minimum requirements discussed below:

- Site visitors will be directed to the FOL/SSO, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity which they represent, and the purpose of the visit.

- Site visitors must be escorted and restricted from approaching any work areas where they could be exposed to hazards from Tetra Tech operations. If a visitor has authorization from the client and from the Tetra Tech Project Manager to approach our work areas, the FOL must assure that the visitor first provides documentation indicating that he/she/they have successfully completed the necessary OSHA introductory training, receive site-specific training from the SSO, and that they have been physically cleared to work on hazardous waste sites. Site visitors wishing to enter the exclusion zone will be required to produce the necessary information supporting clearance to the site. This shall include information attesting to applicable training and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP. All jobsite visitors must have a safety orientation prior to commencing work or touring the site. A visitor log will be kept to document the orientation.

- Once the site visitors have completed the above items, they will be permitted to enter the operational zone. Visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. Visitors entering the exclusion zones during ongoing operations will be accompanied by a Tetra Tech representative. Visitors not meeting the requirements, as stipulated in this plan, for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause the termination of on site activities until the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from local law enforcement personnel.

9.7 SITE MAP

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. These maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

9.8 BUDDY SYSTEM

Personnel engaged in on site activities will practice the "buddy system" to ensure the safety of personnel involved in this operation.

9.9 COMMUNICATION

As personnel will be working in proximity to one another during field activities, a supported means of communication between field crew members will not be necessary.

External communication will be accomplished by using the cell phones/telephones at predetermined and approved locations. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities at the LCM MRC, the FOL will determine and arrange for telephone communications.

9.10 SELF-AUDITS

The procedures outlined in Section 7 of the LM Handbook (Attachment I) addressing self-audits will be adhered to.

Tetra Tech and/or subcontractor personnel will perform periodic work area/project field inspections to monitor compliance with project environmental, safety and health requirements. The name of Tetra Tech’s jobsite health and safety (H&S) representative will be provided to Lockheed Martin prior to starting work at the jobsite.

For jobs that are ongoing, an annual H&S audit shall be conducted and for jobs with a duration of less than one year at least one audit shall occur. A competent H&S representative designated by the Tetra Tech shall perform the audit. Unsafe acts and/or non-compliance conditions noted during inspections shall be corrected immediately.

The documentation related to the audits and inspections shall be submitted electronically to the Lockheed Martin Project Lead.

FIGURE 9-1
SAFE WORK PERMIT

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): _____

II. Primary Hazards: Potential hazards associated with this task: _____

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required

Level D ☐ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required

Yes ☐ Specify on the reverse
No ☐

Modifications/Exceptions: _____

VI.

Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☐ No
Chemical/splash goggles	☐ Yes ☐ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☐ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type –)	☐ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☐ No
Steel toe Work shoes or boots	☐ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: _____

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____

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10.0 SPILL CONTAINMENT PROGRAM AND WASTE MANAGEMENT PLAN

10.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55-gallons) will be generated or handled at any given time as part of this scope of work. It is also not anticipated that such spillage would constitute a danger to human health or the environment. However, as the job progresses, some potential may exist for accumulating Investigative Derived Wastes (IDW) such as decontamination fluids, soil cuttings, disposable sampling equipment and PPE.

10.2 POTENTIAL SPILL AREAS

Potential spill areas will be periodically monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, limited areas are vulnerable to this hazard including:

- Resource deployment
- Waste transfer
- Central staging

It is anticipated that the IDW generated as a result of this scope of work will be containerized, labeled, and staged to await further analyses. The results of these analyses will determine the method of disposal.

10.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-Dry, vermiculite, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. This used material, too, will be containerized for disposal pending analysis. Inspections will be documented in the project logbook.

In case of a spill or release of hazardous chemicals, Tetra Tech shall immediately notify the Lockheed Martin Project Lead, and/or if the severity of the spill warrants, the local fire department by calling 9-1-1. Tetra Tech shall take all necessary steps to control the spread of the release and to provide site control to prevent unauthorized personnel from entering the affected area.

Section 8.2 of the LM Handbook (Attachment I) pertaining to spill reporting will be addresses.

10.4 PERSONNEL TRAINING AND SPILL PREVENTION

Personnel will be instructed in the procedures for incipient spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and the SSO will serve as the Spill Response Coordinators for this operation, should the need arise.

10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the types of equipment that should be maintained at the staging areas for the purpose of supporting this Spill Prevention/Containment Program.

- Absorbent materials such as: Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Drums (55-gallon U.S. DOT 1A1 or 1A2)
- Shovels, rakes, and brooms
- Hand pump
- Container labels

Hazardous materials shall be stored in designated areas and all containers effectively closed. Spill equipment/supplied shall be readily available to contain and/or mitigate accidental spills of hazardous materials.

10.6 SPILL CONTROL PLAN

This section describes the procedures the Tetra Tech field crew members will employ upon the detection of a spill or leak.

- Notify the SSO or FOL immediately upon detection of a leak or spill. Activate emergency alerting procedures for that area to remove non-essential personnel.

- Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.

- Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.

- Re-containerize spills, including 2-inch of top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures discussed in Section 2.0 of this HASP.

As mentioned above, in the event of a spill or release of hazardous chemicals, Tetra Tech will immediately notify the LMC personnel in the order presented in Table 2-1, and/or if the severity of the spill warrants, the local fire department by calling 9-1-1.

10.7 WASTE MANAGEMENT PLAN

Tetra Tech personnel will adhere to the decontamination and waste management procedures laid out the Tetra Tech HSGM and the Tetra Tech Decontamination of Field Equipment and Waste Handling Standard Operating Procedure (Attachment IX).

In addition, all requirements described in Sections 4.1 and 4.2 of the LM Handbook (Attachment I) will be addressed.

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11.0 CONFINED-SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. **Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces**. A confined space is defined as an area which has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, manholes, sewers, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

Additionally, a Permit-Required Confined Space must also have one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly caving walls or by a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed and this HASP will be updated/amended as necessary to address the confined space entry requirements detailed in Section 3.3 of the LM Handbook (Attachment I).

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12.0 HOT WORK

No hot work activities are being conducted as part of this field effort. Should hot work be required, this HASP will be amended/updated as necessary to include the requirements stipulated in Section 3.4 of the LM Handbook (Attachment I).

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13.0 USE OF LOCKHEED MARTIN MATERIALS AND EQUIPMENT

No Lockheed Martin materials, tools, equipment, PPE shall be used until authorized by Lockheed Martin.

No Tetra Tech personnel will start, stop, relocate, or adjust any Lockheed Martin process or production equipment without approval of the Lockheed Martin Project Lead. Details of these requirements are described in Section 3.6 of the LM Handbook.

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14.0 ELEVATED LOCATIONS / LADDERS / SCAFFOLDS

No elevated location work, ladder work, or scaffolding activities are being conducted as part of this field effort. Should any of these activities be required, this HASP will be amended/updated as necessary to include the requirements stipulated in Sections 3.10, 3.11, and 3.12 of the LM Handbook (Attachment I).

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16.0 EXCAVATIONS, TRENCHES, AND EARTHWORK

Excavation, trench work, or earthwork is being conducted as part of this field effort. The excavation, test pit work, required, in this HASP will include the requirements stipulated in Section 3.8 of the LM Handbook (Attachment I) and a trained, competent person will be designated to oversee the activities. Excavation safe work practices are outlined in Section 5.5 of this HASP

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17.0 ASBESTOS

Asbestos abatement work may be conducted as part of this field effort. This HASP includes the requirements stipulated in Section 3.19 of the LM Handbook (Attachment I) and can be found in Section 5.4 of this HASP.

Asbestos containing material (ACM) or presumed asbestos containing material (PACM) if it is to be disrupted, Tetra Tech and/or subcontractor personnel shall immediately report to the Lockheed Martin Project Lead and to other employers of employees working at the job site any anticipated work that could lead to the discovery, disturbance, and/or spill of ACM and/or PACM. All operations will cease and the Asbestos contractor called in to remove or investigate the suspected ACM. The approval of the Lockheed Martin Project Lead is required before resuming operations.

Tetra Tech and/or subcontractor personnel shall not disturb any pipe insulation, boiler insulation, or any other material reasonably suspected of containing asbestos until the Lockheed Martin is notified and approval is obtained.

Abatement of asbestos can be performed only by persons properly trained and licensed to perform such activities.

All requirements addressed in Section 3.18 of the LM Handbook pertaining to incidental asbestos exposure will be followed.

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18.0 NANOTECHNOLOGY

No nanotechnology work is being conducted as part of this field effort. Should it be required, this HASP will be amended/updated as necessary to include the requirements stipulated in Section 3.21 of the LM Handbook (Attachment I).

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19.0 WORK INVOLVING AIR EMISSIONS

No work involving air emissions is being conducted as part of this field effort. Should it be required, this HASP will be amended/updated as necessary to include the requirements stipulated in Section 4.3 of the LM Handbook (Attachment I).

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20.0 WORK INVOLVING WATER DISCHARGES

No work involving water discharges is being conducted as part of this field effort. Should it be required, this HASP will be amended/updated as necessary to include the requirements stipulated in Section 4.4 of the LM Handbook (Attachment I).

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21.0 MATERIALS AND DOCUMENTATION

The Tetra Tech Field Operations Leader (FOL) shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for chemicals brought on site, including decontamination solutions, fuels, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (posted in the site trailer)
- Training/Medical Surveillance Documentation Form (Blank)
- First-Aid Supply Usage Form
- Emergency Reference Form (Section 2.0, extra copy for posting)
- Directions to the Hospital

21.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted or maintained at the site for quick reference purposes. In situations where posting these documents is not feasible (such as no office trailer), these documents should be separated and be immediately accessible.

- **Chemical Inventory Listing (posted)** - This list represents all chemicals brought on-site, including decontamination solutions, sample preservations, fuel, etc. This list should be posted in a central area.

- **MSDSs (maintained)** - The MSDSs should also be in a central area accessible to all site personnel. These documents should match all the listings on the chemical inventory list for all substances employed on-site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

- **The OSHA Job Safety & Health Protection Poster (posted – Attachment XIII)** - This poster should be conspicuously posted in places where notices to employees are normally posted, as directed by 29 CFR 1903.2 (a)(1). Each FOL shall ensure that this poster is not defaced, altered, or covered by other material. The law also states that reproductions or facsimiles of the poster shall be at least 8 1/2 by 14 inches with 10 point type.

- **Site Clearance (maintained)** - This list is found within the training section of the HASP (Figure 8-1). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance. The list indicates not only clearance, but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

- **Emergency Phone Numbers and Directions to the Hospital(s) (posted)** - This list of numbers and directions will be maintained at all phone communications points and in each site vehicle.

- **Medical Data Sheets/Cards (maintained)** - Medical Data Sheets will be filled out by on-site personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

- **Personnel Monitoring (maintained)** - All results generated through personnel sampling (levels of airborne toxins, noise levels, etc.) will be posted to inform individuals of the results of that effort.

- **Placards and Labels (maintained)** - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using DOT placards and acceptable [Hazard Communication 29 CFR 1910.1200(f)] labels.

The purpose of maintaining or posting this information, as stated above, is to allow site personnel quick access. Variations concerning location and methods of presentation are acceptable providing the objective is accomplished.

21.2 HAZARD COMMUNICATION – USE OF HAZARDOUS MATERIALS

All hazardous substance (as defined by OSHA) brought onto Lockheed Martin remediation sites must be accompanied by a MSDS and the containers labeled in accordance with the Red OSHA Hazard Communication Standard, 29 CFR 1910.1200 or applicable state OSHA standard. Tetra Tech and subcontractor personnel will provide MSDSs for chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of the chemicals used on site will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

The Lockheed Martin Project Lead shall be notified prior to bringing any quantity of hazardous materials onto Lockheed Martin remediation sites. Hazardous materials shall be stored in designated areas and all

containers effectively closed. Spill equipment/supplied shall be readily available to contain and/or mitigate accidental spills of hazardous materials.

All other hazard communication requirements are detailed in Section 3.2 and Section 4.1 of the LM Handbook (Attachment I) and will be adhered to.

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22.0 ACRONYMS / ABBREVIATIONS

CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CSP	Certified Safety Professional
DPT	Direct Push Technology
DRI	Direct Reading Instrument
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IDW	Investigation Derived Waste
MDEP	Maryland Department of Environmental Protection
N/A	Not Available
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PHP	Project Health Physicist
PHSO	Project Health and Safety Officer
PID	Photoionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
SSO	Site Safety Officer
TBD	To be determined
TCE	Trichloroethene
Tt RPOP	Tetra Tech Radiological Protection Operating Procedures
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds

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ATTACHMENT I

LOCKHEED MARTIN'S

REMEDIATION CONTRACTOR'S ESH

HANDBOOK

LOCKHEED MARTIN

REMEDIATION CONTRACTOR'S ESH HANDBOOK

June 10, 2009

Revision 1

Lockheed Martin Corporation
Energy, Environment, Safety & Health

A COPY OF THE JOB SPECIFIC HASP SHALL BE AVAILABE AT THE JOB SITE FOR THE DURATION OF THE PROJECT

REVISION STATUS

REVISION	DATE	COMMENTS
1	06/10/2009	

TABLE OF CONTENTS

Table of Contents

CONTRACTOR'S ESH HANDBOOK

GENERAL

Lockheed Martin Corporation management at all levels is committed to conducting operations and activities in a manner that provides and maintains safe and healthful working conditions, protects the environment, and conserves natural resources.

This *Contractor's ESH Handbook* has been prepared to assist each project jobsite employer/contractor in satisfying its' contractual and legal accident prevention responsibilities, in such a manner that a safe, efficient operation is assured. All applicable requirements outlined in this handbook shall be incorporated into the contractor's site specific Safety and Health Plan The site specific Safety and Health plan shall be submitted to the Lockheed Martin Project Lead at least two weeks prior to starting work on any Lockheed Martin remediation projects.

This material must not be considered to be all inclusive as to the hazards that might be encountered, safe practices that should be performed, or safe conditions that should be maintained during the course of any project. Moreover, this handbook does not replace the contractor's legal obligation to its employees under all relevant environmental, safety and health requirements and laws. All legal standards not specifically referenced in this handbook shall apply when applicable.

1 CONTRACT RESPONSIBILITIES

The Contractor agrees to comply with all rules and procedures contained in this document, known as the *Remediation Contractor's ESH Handbook*, unless Lockheed Martin specifically agrees, in writing, to a modification or exemption. In addition, the Contractor and subcontractors, at any tier, shall:

1.1 Lockheed Martin is a drug free-work workplace. This requirement extends to contractors working on Lockheed Martin remediation projects. Additionally, the use of tobacco is not permitted on Lockheed Martin owned property.

1.2 Take all prudent and proper environmental, safety and health (ESH) precautions to protect Lockheed Martin employees, all other workers, and the public from ESH hazards associated with contractor activities.

1.3 Comply with all applicable Federal, State, municipal, local, and any other applicable occupational safety and health statutes, rules, ordinances, regulations, and requirements issued or imposed by any governmental authority (including, but not limited to *Title 29, Code of Federal Regulations Parts 1903, 1904, 1910* and *1926*).

1.4 Comply with all applicable Federal, State, municipal, local, and any other applicable air pollution statutes, rules, ordinances, regulations, and requirements issued or imposed by any governmental authority.

1.5 Comply with all Federal, State, municipal, local and Lockheed Martin hazardous materials, hazardous waste, and non-hazardous waste statutes, rules, ordinances, regulations, and requirements (including, but not limited to *Title 40, Code of Federal Regulations*).

1.6 Obtain the applicable ESH permits to conduct the work in compliance with local, state, federal ESH regulations and site requirements (including, but not limiting to *Title 29, Code of Federal Regulations, 1910 and 1926*).

1.7 Ensure that all employees and subcontractors have received the appropriate level of ESH training in accordance with applicable ESH regulations necessary for the performance of the work requested by Lockheed Martin.

1.8 To instruct, prior to commencement of operations, all employees on the jobsite about relevant governmental laws and regulations, specific hazards expected to be encountered and proper safety precautions to be observed. In addition, jobsite employees shall read and certify that they have read and understand the job specific health and safety plan (HASP). The certification forms provided by the contractor within the HASP shall be electronically sent to the Lockheed Martin Project Lead.

1.9 Provide all jobsite visitors with a safety orientation prior to commencing work or touring the site. A visitor log shall be kept to document the orientation.

1.10 To ensure Contractor's job specific health and safety plan (HASP) encompasses Federal, State, municipal, local and the Lockheed Martin requirements found within this document the HASP should contain a section on crisis management / emergency response. A copy of the job specific HASP shall be maintained at the job site where jobsite employees have access to a copy. All Contractor Project Managers shall be provided a copy of the *Contractor's ESH Handbook* found within the Lockheed Martin Request for Proposal or as an appendix of the Key National Contractor Agreement. Contractors shall flow these requirements down to their subcontractors.

1.11 Contractor understands that Lockheed Martin may immediately stop Contractor's work if Contractor violates any applicable Federal, State, municipal, local, or any other rules, regulations, and requirements, *Remediation Contractor's ESH Handbook* provisions, or other contract terms and conditions regarding environmental, safety and health compliance. Lockheed Martin shall not incur work stoppage charges unless the contractor demonstrates that the work stoppage was unwarranted for any of the reasons stated above. Any dispute regarding work stoppage charges must be resolved through binding arbitration.

1.12 Contractor is advised that the Project may be inspected from time to time by Lockheed Martin or a representative of Lockheed Martin. Periodic Lockheed Martin inspections in no way relieve the Contractor of their obligation to maintain its own inspection program to identify unsafe conditions or acts. ESH violations will be considered in evaluation of Contractor's performance.

1.13 Lockheed Martin is not responsible for training or supervising Contractor employees or abating workplace hazards created by the Contractor or to which the Contractor's employees are exposed.

1.14 Contractor agrees to maintain copies of all pertinent ESH records at the job site. Pertinent records include, but is not limited to, personnel training documentation, evidence of enrollment in a medical surveillance program, accident/injury reporting, work area inspections, periodic safety meetings, MSDS's, air monitoring data, waste container inspections, etc. These records shall also be provided electronically to the Lockheed Martin Project Lead.

1.15 Contractor shall contact the Lockheed Martin Project Lead immediately in the event of a fatal or serious injury, an unpermitted environmental release, or any ESH incident that is likely to generate significant publicity or an adverse situation for Lockheed Martin (e.g., alleged releases of contaminants beyond property boundaries, purported fish or wildlife impacts, allegations of adverse community health or property impacts, etc.)

2 DEFINITION

2.1 Contractor: any agent/agency engaged by Lockheed Martin through written contract (or other written agreement) to perform work on Lockheed Martin Remediation Sites. For the purposes of this *Remediation Contractor's ESH Handbook*, "Contractor" shall also include Contractor's subcontractors at any tier.

2.2 EPA: the Environmental Protection Agency.

2.3 Fed/OSHA: the Federal Occupational Safety and Health Administration

2.4 Hazard Communication Program: a written program meeting the requirements of Title 29, Code of Federal Regulations, Section 1910.1200 - Hazard Communication.

2.5 Lockheed Martin: Lockheed Martin Corporation, Corporate Energy, Environment, Safety & Health

2.6 Lockheed Martin Project Lead: the Lockheed Martin Corporate Environment, Safety & Health individual that has been designated to manage a specific project.

2.7 Lockheed Martin Contract Representative: the Lockheed Martin Corporate Environment, Safety & Health contract representative (Contract Administrator/Buyer) for the project.

2.8 RCRA: the Federal Resource Conservation and Recovery Act and all amendments or revisions.

3 SAFETY & HEALTH

Contractor shall comply with applicable provisions of Federal, State, municipal, local, and any other applicable occupational safety and health statutes, rules, ordinances, regulations and requirements. Contractor shall take all precautions for the protection of the safety and health of Contractor employees, subcontractor employees, and Lockheed Martin employees to prevent accidents or injury to them or to other persons on, about, or adjacent to site of work performance. Notwithstanding this handbook, Contractor will hold harmless Lockheed Martin for any incident, violation, regulatory agency inspection resulting in a finding, or any other ESH issue that occurs to a Contractor employee.

Within Section 3.0, Lockheed Martin is identifying specific requirements within the Federal regulations that need extra attention. These are not all encompassing and adherence to the all rules and regulations must be followed.

3.1 PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

1926 Subpart E or 1910 Subpart I
1910.139 / 1926.103
ANSI Z87.1
ANSI Z41 Standard
ANSI Z89.1 Standard

3.1.1 Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

- Eye Protection. Safety eyewear meeting ANSI Z87.1 shall be worn in areas designated as "Eye Protection Required" and on all jobs where a potential injury to the eyes is possible whether or not the area is posted.
- Foot Protection. Affected employee(s) shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards. Safety shoes and boots which meet the ANSI Z41 Standard shall be provided when impact and/or compression hazards exist. Soft-shoes, including but not limited to, tennis shoes, athletic shoes, moccasins, sandals, and open-toed or open-heeled shoes shall not be worn.
- Respiratory Protection Devices. Appropriate, MSHA/NIOSH-approved respiratory protective devices must be worn when applicable state and/or federal action levels or OSHA permissible exposure levels (PELs) are exceeded. Contractor must have fully implemented a respiratory protection program meeting the requirements of *Title 29, Code of Federal Regulations, Section 1910.139 / 1926.103* or applicable state OSHA regulations prior to issuing and using respiratory equipment. Contractor shall supply and maintain

appropriate air monitoring and respiratory protection equipment if inhalation hazards are anticipated.

- Protective Clothing such as suits, aprons, boots, or gloves shall be worn where there is a hazard to the body through dermal contact with chemicals, dusts, heat or other harmful agents or conditions.
- Hearing Protection (muffs and/or plugs) must be worn in all areas posted to indicate high noise level or where Contractor employees are exposed to noise levels in excess of the OSHA action level (85 dBA over a 8-hour time-weighted average or a dose of fifty percent).
- Hard Hats will be worn in all areas where there is a danger of impact to the head or hazard from falling or moving objects. Hard hats must meet the ANSI Z89.1 Standard.

3.1.2 Contractor will issue or cause to be issued prior to commencing the job all necessary personal protective equipment and air monitoring equipment to all its agents and employees, together with full instructions and training on the use of said equipment.

3.1.3 Contractor will meet all applicable Federal, Sate, municipal, local, and Lockheed Martin requirements for protective clothing and equipment. Contractor will properly supervise all its agents and employees to ensure protective clothing and equipment are used in conformance with applicable rules and regulations.

3.2 HAZARD COMMUNICATION - USE OF HAZARDOUS MATERIALS

Title 29, Code of Federal Regulations, Section 1926.59 Hazard Communication
Title 29, Code of Federal Regulations, Section 1910.1200 Hazard Communication

3.2.1 Contractor personnel shall not bring any hazardous substances (as defined by OSHA) onto Lockheed Martin remediation sites unless accompanied by a Material Safety Data Sheet (MSDS) and the containers are appropriately labeled. MSDS's must be maintained at the job site.

3.2.2 Contractor shall notify the Lockheed Martin Project Lead prior to bringing onto Lockheed Martin remediation sites any quantity of hazardous materials.

3.2.3 Contractor shall ensure all containers of hazardous materials are labeled in accordance with the Fed OSHA Hazard Communication Standard, 29 CFR 1910.1200 or applicable state OSHA standard.

3.2.4 Do not handle or use any hazardous material that does not have adequate safety warning labels.

3.2.5 Do not dump, drain or discharge any hazardous materials or wastes into any sink, drain or sewer.

3.2.6 The Lockheed Martin Project Lead shall inform the Contractor(s) of the identity of hazardous chemicals to which Contractor's employees may be exposed from

Lockheed Martin operations, if applicable. The Lockheed Martin Project Lead shall provide the following information:

- Where to obtain information concerning any hazardous substances used in Lockheed Martin operations that the Contractor's employees may come in contact with while performing their work;
- If Lockheed Martin owns or uses chemicals on a remediation site for any process where contractors could be exposed, Lockheed Martin shall make available to the Contractor Material Safety Data Sheets (MSDS) and sufficient information to permit the Contractor to train its employees on the hazards of the chemical Appropriate protective measure Contractor employees may take to protect themselves from exposure to known hazards from Lockheed Martin operations; and
- Appropriate work practice procedures (safety rules) for the location where work is to be performed.

3.2.7 Contractor shall ensure its employees are trained in the safe handling and use of hazardous materials in accordance with *29 CFR 1910.1200 - Hazard Communication* or the applicable state-OSHA hazard communication standard.

3.2.8 Contractor shall ensure that all applicable employees are medically qualified (as defined by OSHA) to perform the work assigned.

3.2.9 Hazardous materials shall be stored in designated areas and all containers effectively closed. Spill equipment/supplies shall be readily available to contain and/or mitigate accidental spills of hazardous materials.

3.3 CONFINED SPACE ENTRY

Title 29, Code of Federal Regulations, Section 1910.146 Permit-Required Confined Spaces

3.3.1 If Contractor or any other employee must enter a confined space (tank, vat, pit, sewer, etc.), the entry must be performed in accordance with the applicable state OSHA or federal OSHA regulations.

3.3.2 Before Contractor's employees are permitted entry into any confined space, the internal atmosphere shall be tested with a calibrated direct-reading instrument for the following conditions in the order given: 1) Oxygen content, 2) Flammable gases & vapors, and 3) Potential toxic air contaminants. Contractor shall furnish the air testing equipment and a person competent in the use of the testing equipment.

3.3.3 When possible, the Contractor shall notify the Lockheed Martin Project Lead prior to entering a permit required confined space. A permit shall be issued by the contractor prior to entry and electronically submit a copy to the Lockheed Martin Project Lead.

3.3.4 To ensure the safety of Contractor personnel during entry into confined spaces, the Contractor shall have a written confined space entry program.

3.4 HOT WORK REQUIREMENTS (i.e., welding, torch cutting, brazing, etc.)

Title 29, Code of Federal Regulations, Section 1910 Subpart Q
Title 29, Code of Federal Regulations, Section 1926 Subpart J

3.4.1 All hot work activities shall be conducted in accordance with the hot work permit requirements outlined in the site specific HASP (i.e., fire suppression equipment availability, removal of combustibles, fire watch, etc.).

3.4.2 Contractor personnel must secure all oxygen and acetylene cylinders in a manner that will prevent them from falling or tipping over. Oxygen and acetylene cylinders must be stored separately. Oxygen cylinders in storage must be separated from fuel gas cylinders a distance of 20 feet or by a noncombustible barrier 5 feet high. Acetylene cylinders shall not be stored horizontally, lying on their side.

3.4.3 When welding, Contractor personnel shall use welding curtains and/or suitable protective devices to protect persons from indirect exposure to welding flashes.

3.5 LOCKOUT / TAGOUT - Control of Hazardous Energy

Title 29, Code of Federal Regulations, Section 1910.147

3.5.1 Contractors are required to establish a written program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employee.

3.5.2 Contractor shall not service and/or maintain machines and equipment in which the unexpected energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. Servicing and/or maintaining such equipment shall not be conducted until appropriate energy control methods have been initiated.

The Contractor shall provide training to ensure that the purpose and function of the energy control program are understood by their employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by the employees.

3.5.3 If Contractor needs to service or maintain Lockheed Martin equipment, Contractor(s) shall notify the Lockheed Martin Project Lead and/or on-site facility operator (if applicable) of the intended equipment service for any unscheduled maintenance.

3.5.4 Upon completion of the job, Contractor is to notify the Lockheed Martin Project

Lead and/or on-site facility operator (if applicable) so power can be resumed to the equipment after the lock-outs and tags have been removed.

3.6 USE OF LOCKHEED MARTIN MATERIALS AND EQUIPMENT

3.6.1 Contractor's employees shall not use Lockheed Martin tools, equipment, materials, or personal protective equipment unless otherwise authorized by Lockheed Martin.

3.6.2 Contractor shall not start or stop any production equipment without the approval of the Lockheed Martin Project Lead.

3.6.3 Contractor shall not adjust or relocate any Lockheed Martin process equipment without the approval of the Lockheed Martin Project Lead.

3.7 DANGEROUS OPERATIONS - WARNINGS AND BARRICADES

Title 29, Code of Federal Regulations, Section 1926, Subpart G-Signs, signals and barricades

3.7.1 Contractor shall isolate their work areas from Lockheed Martin operations, employees, and the public by using barricades or other effective means of isolation. Signs, signals and barricades shall be visible at all times where a hazard exists.

3.7.2 Contractor personnel shall erect and properly maintain, at all times, all necessary safeguards for the protection of Contractor personnel, Lockheed Martin employees and the public. This includes:

- If doing any overhead work, Contractor must utilize warning signs and barricades, or station someone on the ground to prevent passers-by from entering the area below the overhead work;
- Contractor must effectively barricade excavations, floor openings, etc., as required by OSHA regulations;
- Contractor must construct and maintain all scaffolds and working platforms in accordance with OSHA regulations; and
- If Contractor's equipment, barricades or other safeguards restrict fire lanes or fire equipment access, the Contractor shall notify the Lockheed Martin Project Lead about its notification to the local fire department.

3.7.3 Prior to commencing work, Contractor must inform Lockheed Martin Project Lead of any work posing a potential danger to personnel.

3.8 EXCAVATIONS, TRENCHES, EARTHWORK

Title 29, Code of Federal Regulations, Section 1926 Subpart P

3.8.1 Review the Lockheed Martin intrusive fieldwork requirements in Appendix A.

3.8.2 If workers are to enter excavations, a competent person must be designated and trained in soil classification and the recognition of trenching and excavation hazards.

3.8.3 Excavations and trenches shall be inspected by a competent person daily and after every rainstorm, earthquake, or other hazard-increasing occurrence.

3.8.4 Inspect the face, banks, and top daily when workers are exposed to falling or rolling materials.

3.8.5 Shore, bench, slope, or use equivalent methods to protect workers in excavations four feet deep or more.

3.8.6 Locate soil at least two feet from the edge of the excavation, or one foot from the edge when the excavation is less than five feet deep.

3.8.7 Ladders or steps shall be provided and secured in all trenches four feet or more in depth. Ladders shall be located to require no more than twenty-five feet of lateral travel before having access or egress and shall extend three feet above the top of the trench bank.

3.8.8 Install crossings with standard guardrails and toeboards when the excavation is more than 7½ feet deep.

3.8.9 All open trenches and other excavations shall be provided with suitable barriers, signs, and lights to the extent that adequate protection is provided to the public.

3.8.10 Do not excavate beneath the level of adjacent foundations, retaining walls, or other structures until a qualified person has determined that the work will not be hazardous. Support undermined sidewalks.

3.9 ELECTRICAL SAFETY

Title 29, Code of Federal Regulations, Section 1926 Subpart K-Electrical
Title 29, Code of Federal Regulations, Section 1910.269 Electrical Power Generation, Transmission and Distribution

3.9.1 Only qualified persons are permitted to work on electrical systems, as defined by *Title 29, Code of Federal Regulations Section 1910.269(a)(2).* Qualified persons shall be trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electrical equipment;
- The skills and techniques necessary to determine the nominal voltage of exposed live parts;
- The minimum approach distances specified by OSHA corresponding to the voltages to which the qualified employee will be exposed; and

- The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.

3.9.2 Contractor personnel shall properly ground all electrical tools, mechanical digging or concrete breaking equipment and all other electrical equipment while in use.

3.9.3 All electrical work, installation and wire capacities shall be in accordance with the pertinent provisions of the National Electrical Code, ANSI and OSHA.

3.9.4 Covers or barriers must be installed on boxes, fittings, and enclosures to prevent accidental contact with live parts.

3.9.5 Temporary wiring installations must be grounded.

3.9.6 Electrical systems shall be de-energized utilizing appropriate lockout/tagout procedures prior to conducting work.

3.10 ELEVATED LOCATIONS / FALL PROTECT

Cal/OSHA General Industry Safety Orders, 8 CCR 3210
Title 29, Code of Federal Regulations, Section 1926 Subpart M – Fall Protection

3.10.1 California employers: Guardrails shall be provided on all open sides of unenclosed room openings, open and glazed sides of landings, balconies or porches, platforms, runways, ramps, or working levels more than 30 inches above the floor, ground, or other working areas. The railing must be provided with a toeboard where the platform, runway, or ramp is 6 feet or more above places where employees normally work or pass and the lack of a toeboard could create a hazard from falling tools, material, or equipment.

3.10.2 Contractor must provide fall protection systems whenever a worker is exposed to a fall of four feet or more (in construction the threshold is six feet). Guardrails are the most common forms of fall protection systems. If guardrail systems are not feasible, safety nets, personal fall arrest systems, positioning device systems, warning line systems, or some other demonstrated, effective means of fall protection shall be used. Fall protection systems and devices shall be inspected prior to each use Title 29, Code of Federal Regulations, Section 1926 Subpart M.

3.11 LADDERS

Title 29, Code of Federal Regulations, Section 1910 Subpart D – Walking and Working Surfaces
Title 29, Code of Federal Regulations, Section 1926 Subpart X - Ladders

3.11.1 The use of ladders with broken or missing rungs or steps, broken or split rails or other defective construction is prohibited.

3.11.2 Ladders shall extend no less than 36 inches above landing and be secured to

prevent displacement.

3.11.3 Portable ladders must be equipped with safety shoes.

3.11.4 Wooden ladders shall not be painted.

3.11.5 Do not use metal ladders for electrical work or near live electrical parts.

3.12 SCAFFOLDS

Title 29, Code of Federal Regulations, Section 1910.28 – Safety Requirements for Scaffolding
Title 29, Code of Federal Regulations, Section 1926 Subpart L - Scaffolds

3.12.1 Scaffolds must be provided for all work that cannot be done safely by employees standing on solid construction at least 20 inches wide, except where such work can be safely done from ladders.

3.12.2 Erection and dismantling of scaffolds shall be performed in accordance with good engineering practice.

3.12.3 Footings or anchorage for any scaffold shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement.

3.12.4 No unstable objects such as concrete blocks shall be used to support scaffolds or planks.

3.12.5 Any part of a scaffold weakened or damaged shall be repaired or replaced immediately.

3.12.6 All scaffold planking shall be free of knots and cracks (Class A number) and shall completely cover the work platform.

3.12.7 Scaffold planks shall be laid tight, cleated at both ends or overlapped a minimum of 12 inches and nailed or bolted to prevent movement. Overlaps to occur directly above scaffold supports.

3.12.8 A safe and unobstructed means of access, such as a walkway, stair, or ladder shall be provided to all scaffold platforms.

3.13 HEAVY EQUIPMENT, INDUSTRIAL VEHICLES, AND CRANES

Title 29, Code of Federal Regulations, Section 1926 Subparts N, O and W

3.13.1 Only trained and authorized workers may operate heavy equipment, industrial vehicles, and/or cranes.

3.13.2 The Contractor shall designate a competent person who shall inspect all machinery and equipment prior to each use to make sure it is in safe operating condition.

3.13.3 The Contractor shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all heavy equipment, industrial vehicles, and cranes.

3.13.4 Seatbelts are required to be worn if the vehicle has Roll-Over Protection Structures (ROPS).

3.13.5 The swing radius of cranes shall be barricaded.

3.13.6 Equipment shall not be lubricated while in use.

3.13.7 Rated load capabilities, recommended operating speeds, special hazard warning, specific hand signal diagrams and special instructions shall be visible to the operator while he is at the control station.

3.13.8 Contractor's employees shall not be allowed to work under the load of cranes. Tag lines shall be used on all loads.

3.14 OVERHEAD POWER LINES

Title 29, Code of Federal Regulations, Section 1926.550 (a) (15)

3.14.1 If work is to be performed near overhead power lines, the lines must be de-energized and grounded by the owner or operator of the lines, or other protective measures must be provided before work is started. Protective measures (such as guarding or insulating the lines) must be designed to prevent employees from contacting the lines.

3.14.2 Unqualified employees and mechanical equipment must stay at least 10 feet away from overhead power lines. If the voltage is over 50,000 volts, the clearance should be increased by four inches for each additional 10,000 volts.

3.14.3 When mechanical equipment is being operated near overhead lines, employees standing on the ground may not contact the equipment unless it is located so that the required clearance cannot be violated even at the maximum reach of the equipment.

3.14.4 A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

3.14.5 Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicates that it is not energized.

3.15 FIRE PREVENTION / FLAMMABLE LIQUIDS

Title 29, Code of Federal Regulations, Section 1926 Subpart F or 1910 Subpart E

3.15.1 Contractor shall be responsible for fire protection in its work and operational areas,

including offices, tool rooms, and storage areas 24 hours per day, seven days per week through the duration of this Contract. Approved fire-fighting equipment, in adequate quantities, must be provided.

3.15.2 Contractor shall familiarize Contractor's employees with the locations of fire extinguishers in their respective work areas and ensure they are prepared to use them safely if necessary. In certain remote field locations or within abandoned (discontinued) facilities where fire extinguishers may not exist in the immediate work area, contractor shall provide and locate fire extinguisher(s) in close proximity to the active work area(s).

3.15.3 In case of fire, Contractor shall call 9-1-1. Contractor shall also inform all Contractor and Lockheed Martin employees in the area to evacuate to a safe place and direct arriving fire response personnel to the fire. Notify the Lockheed Martin Project Lead as soon as reasonably possible.

3.15.4 Contractor employees shall only attempt to put out a fire when such action can be performed safely.

3.15.5 If a Contractor employee uses a Lockheed Martin fire extinguisher, Contractor shall report its use to the Lockheed Martin Project Lead.

3.15.6 Contractor shall report all fires extinguished by the Contractor to the Lockheed Martin Project Lead.

3.15.7 Contractors are to store, dispense, and use flammable and combustible liquids in accordance with OSHA regulations and the Uniform Fire Code. Bonding and grounding of containers containing flammable liquids will be required.

3.15.8 Open flames and smoking shall not be permitted in flammable or combustible liquid storage areas.

3.15.9 Contractor shall provide sufficient fire extinguishers necessary for their work activities.

3.16 HAND AND POWER TOOLS

Title 29, Code of Federal Regulations, Section 1910 Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment
Title 29, Code of Federal Regulations, section 1926 Subpart I – Tools Hand and Power

3.16.1 All hand and power tools, whether furnished by Contractor, or by Contractor’s employee, shall be maintained in a safe condition.

3.16.2 Electrical power tools shall be grounded or double insulated with proper assured equipment grounding inspections or Ground Fault Interrupter (GFI) circuit protection provided.

3.16.3 Pneumatic power tools shall be secured to the hose or whip by some positive means.

3.16.4 Only properly trained Contractor employees shall operate power-actuated tools.

3.16.5 All grinding machines shall conform to OSHA and ANSI requirements.

3.17 COMPRESSED GAS CYLINDERS

Title 29, Code of Federal Regulations, Section 1910.101 – Compressed Gases
Title 29, Code of Federal Regulations, Section 1926.350 – Gas Welding and Cutting

3.17.1 Compressed gas cylinders shall be secured in an upright position at all times.

3.17.2 When transporting, moving and storing cylinders, valve protection caps shall be in place and secured.

3.17.3 Compressed gas cylinders shall be kept away from excessive heat, shall not be stored where they might be damaged or knocked over by passing or falling objects, and shall be stored at least 20 feet away from highly combustible materials.

3.17.4 Cylinders shall be labeled as to the nature of their contents.

3.17.5 Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials a minimum of 20 feet or by a noncombustible barrier at least five feet high having a fire-resistant rating of at least one-half hour.

3.17.6 Acetylene cylinders shall be stored and used in a vertical, valve-end-up position only.

3.17.7 Anti-flashback arrestors shall be installed on all oxygen and acetylene cylinders.

3.18 INCIDENTAL CONTACT WITH ASBESTOS

3.18.1 This section applies to all contractors who incidentally disrupt the matrix of asbestos containing material (ACM) or presumed asbestos containing material (PACM); i.e., contractors who have not been specifically hired to perform ACM abatement.

3.18.2 Contractor shall immediately report to the Lockheed Martin Project Lead and to other employers of employees working at the job site any discovery, disturbance, and/or spill of ACM and/or PACM. Contractor(s) is to cease all operations in the immediate area of the suspect ACM and/or PACM and demarcate the area. The approval of the Lockheed Martin Project Lead is required before resuming operations.

3.18.3 Contractor shall not disturb any pipe insulation, boiler insulation, or any other material reasonably suspected of containing asbestos until the Contractor notifies the Lockheed Martin Project Lead. Lockheed Martin approval is required before operations may commence.

3.18.4 Abatement of asbestos can be performed only by persons properly trained and licensed to perform such activities

3.19 ASBESTOS ABATEMENT CONTRACTORS

3.19.1 This section applies to Contractors performing maintenance, construction, repair, renovation, demolition, salvage, or any other operation in which any material containing more than 1% asbestos is sanded, abrasive blasted, sawed, shoveled, removed, or otherwise handled in a manner that would generate airborne asbestos fibers. These requirements are in addition to any requirements contained in Contractor's scope of work.

3.19.2 All Contractors working with asbestos shall comply with applicable federal and state OSHA, EPA, local air district, and other applicable Federal, State, municipal, and local statutes, regulations, rules, and ordinances; and specific contract terms and conditions regarding the handling of, use of, and work involving asbestos.

3.19.3 The contractor shall ensure that a competent person, as defined by OSHA supervises all asbestos work performed within regulated areas.

3.19.4 Before commencing work, all asbestos abatement contractors shall supply to Lockheed Martin proof of:

- Asbestos abatement contractor certification by the state Contractor's License Board
- Liability insurance for Contractor employees engaged in asbestos work operations
- Copies of asbestos work notification letters to state OSHA
- Local air district Asbestos Demolition/Renovation Notification

3.19.5 Contractors shall minimize the creation and spread of airborne asbestos fibers by using appropriate work practices, engineering controls, and established procedures (i.e., wet methods, HEPA filter vacuums, negative pressure enclosure, local exhaust ventilation equipped with HEPA filter dust collection system, etc.).

3.19.6 All Class I, II and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area. Signs shall be provided and displayed at each location where a regulated area is required to be established. Signs shall be posted at such a distance from such a location that an employee may read the signs

and take necessary protective steps before entering the area marked by the signs. Warning signs shall bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

3.19.7 On multiple employer worksites requiring the establishment of a regulated area, the asbestos Contractor shall inform other employers on the site of the nature of the work with asbestos and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other employers are not exposed to asbestos.

3.19.8 Contractors shall package and label asbestos waste in accordance with federal and or applicable state OSHA requirements and federal or applicable state hazardous waste regulations. Labels shall be affixed to all products containing asbestos and to all containers containing such products, including waste containers. Labels shall be printed in large, bold letters on a contrasting background and shall contain the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

3.19.9 Contractors shall properly dispose of all asbestos waste. Proper disposal includes the use of hazardous waste manifests and Lockheed Martin approved and licensed waste haulers, and disposal facilities according to federal RCRA law and applicable state hazardous waste regulations. Contractor shall contact the Lockheed Martin Project Lead before transporting or disposing of any hazardous waste. Lockheed Martin must review all hazardous waste manifests prior to shipment.

3.19.10 Contractors shall ensure that employee exposure air monitoring is conducted as required by federal or applicable state OSHA regulations. All other air monitoring (i.e. clearance sampling) shall be conducted by a third-party contracted air monitoring firm not affiliated with the Contractor.

3.19.11 Contractor shall, at no cost to the employee, institute a training program for and ensure the participation of all employees engaged in asbestos-related work who may reasonably be expected to be exposed to asbestos fibers from asbestos containing construction materials.

3.19.12 Contractor shall institute a medical surveillance program for all employees who are or will be exposed to airborne concentrations of fibers of asbestos at or above the TWA and/or excursion limit.

3.20 HAZARDOUS WASTE OPERATIONS and EMERGENCY RESPONSE (HAZWOPER)

Title 29, Code of Federal Regulations, Section 1910.120 - Hazardous Waste Operations and Emergency Response

Title 29, Code of Federal Regulations, Section 1926.65 – Hazardous Waste Operations and Emergency Response

This section applies to Contractors performing hazardous waste-type activities. This includes operations that pose a potential or reasonable possibility for employee exposure to hazardous waste/chemical contaminants during site investigations, clean-up operations, abatement, or hazardous substance removal work (remedial actions). These requirements are in addition to any requirements contained in Contractor's scope of work.

3.20.1 Contractor shall provide a **site-specific safety and health plan** at least two (2) weeks prior to field mobilization to the Lockheed Martin Project Lead (global statement – move to the beginning).

Contractor shall provide a **safety and health plan** in accordance with *Title 29, Code of Federal Regulations, Section 1910.120 - Hazardous Waste Operations and Emergency Response* or the applicable state OSHA standard and, at a minimum, shall contain the following elements:

- Safety and health risk or hazard analysis for each anticipated site task
- Employee training requirements
- Personal protective equipment to be used by employees for each of the site tasks and operations
- Medical surveillance requirements
- Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment to be used
- Site control measures
- Decontamination requirements and procedures
- Emergency response plan
- Confined space procedures (if applicable)
- Emergency response plan
- Confined space procedures (if applicable)
- Spill containment program
- Periodic documented safety meetings
- Periodic documented work area safety inspections and corrective actions

3.20.2 Contractors performing hazardous waste-type operations shall adhere to the requirements specified in *29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response* or the applicable state OSHA standard.

3.20.3 Training: All Contractor and subcontractor employees working on site who are potentially exposed to hazardous substances shall receive initial and annual

refresher training in accordance with *29 CFR 1910.120(e) – Hazardous Waste Operations and Emergency Response* or the applicable state OSHA standard. Lockheed Martin shall be provided with electronic copies of the training certificates.

3.20.4 Medical Surveillance: Contractor employees must be enrolled in a medical surveillance program prior to performing hazardous waste operations. Upon Lockheed Martin request, Contractor shall provide evidence of employee enrollment in a medical surveillance program. Lockheed Martin does not provide medical surveillance examinations to Contractor employees.

3.20.5 Periodic work area inspections: Contractor agrees to perform periodic work area inspections to determine the effectiveness of the site safety and health plan and to identify and correct unsafe conditions in contractor's responsible work area. These inspections shall be documented and available to Lockheed Martin upon request for review.

3.21 MANAGEMENT OF NANOTECHNOLOGY

3.21.1 The Lockheed Martin Project Lead shall work with the designated contractor responsible for nanotechnology to implement this procedure and ensure areas where nanomaterials (materials incorporating engineered nanoparticles or nanoscale features that exhibit unique physical and chemical properties as a result of the nanoparticles or nanoscale features) will be used meet engineering control requirements of this procedure.

3.21.2 The contractor shall ensure that the safety and environmental hazards of nanomaterials are managed as described in the requirements of this section.

3.21.3 A plan must be developed and executed that addresses the following requirements:

3.21.3.1 **Hazard Analysis:** Identify potential adverse health effects and environmental impacts that could result from the chemical and physical properties exhibited by the nanomaterials and/or nanoparticles in use, to be used, under development, or to be developed at the site.

3.21.3.2 **Exposure Assessment**: Evaluate all tasks involving nanomaterials and identify where exposures could occur. The evaluation must include at a minimum, an evaluation of materials; chemical intermediates; by-products; end-products; waste products; processes; process equipment; the amount of material used; material form; degree of containment; duration of use; and work space including laboratory and manufacturing space.

3.21.3.3 **Exposure Control**

- Implement appropriate controls to mitigate worker exposure and environmental emissions identified in sections 3.21.2.1 and 3.21.2.2 of this procedure.

- Implement Control Bands as indicated on the Control Band Matrix below.

Exposure Duration	Bound Materials	Potential Release	Free / Unbound
Hazard Group A (Known to be inert)			
Short	1	1	2
Medium	1	1	2
Long	1	2	2
Hazard Group B (Understand reactivity/function)			
Short	1	2	2
Medium	1	2	3
Long	1	3	3
Hazard Group C (Unknown Properties)			
Short	2	2	3
Medium	2	3	4
Long	2	4	4

Duration Key:
Short - Less than 4 hrs/day; 2 days/week
Medium - Between 4 to 6 hrs/day; 3 to 5 days/week
Long - 6 to > 8 hrs/day; 3 to 5 days/week

Release Key:
Bound Materials: Nanoparticles in a solid matix e.g. polycarbonate
Potential Release: Nanoparticles in friable or solgel matrix
Free / Unbound: Nanoparticles unbound, not aggregated

Control Band:
1. General Ventilation and PPE
2. Engineering Controls and/or Respirators and additional PPE
3. Containment e.g. glove box
4. Specialist Advise

- Establish designated areas for Control Banding. The designated area shall, at a minimum, include warning signs informing employees that they are entering a nanomaterial work area as well as signs specifying administrative controls and personal protective equipment (PPE) required for entry.
- Identify appropriate administrative controls (e.g. good housekeeping methods, HEPA vacuums, wet wipe methods, employee training, safe work practices), engineering controls (e.g. containment, exhaust ventilation) and Personal Protective Equipment (e.g. respiratory protection, protective coveralls, gloves, goggles) based on Control Band and best industry practices.
- Develop and execute procedures for housekeeping, including clean-as-you-go practices that do not re-suspend particles.
- Develop and execute procedures for management of nanomaterial-associated waste.

4 ENVIRONMENTAL

Contractors shall comply with all applicable provisions of Federal, State, municipal, local, and other environmental statutes, rules, and regulations. Contractor shall take all necessary precautions to protect the environment. Contractor shall also store, transport, dispose, or otherwise handle hazardous wastes and non-hazardous wastes to prevent discharges of materials into the environment except in accordance with applicable governmental regulations.

4.1 HAZARD COMMUNICATION - USE OF HAZARDOUS MATERIALS

4.1.1 Contractor shall develop a Waste Management Plan in accordance with the requirements outlined in the LMC Remediation Waste Management Procedure in

Appendix B. Lockheed Martin shall approve the Waste Management Plan prior to work commencement.

4.1.2 Contractor must segregate hazardous from non-hazardous waste; all hazardous waste generated by its operations must be labeled in accordance with all governmental regulations.

4.1.3 Contractor shall dispose of all hazardous waste within the time frame stipulated by local, state, or federal regulations. Contractor shall not leave behind on Lockheed Martin remediation sites any containers of hazardous materials or waste (including drums, roll-offs, maintenance chemicals, etc.), empty or not, after the termination of operations.

4.1.4 In case of a spill or release of hazardous materials or waste, Contractor shall immediately notify the Lockheed Martin Project Lead and if the severity of the spill warrants, notify the local fire department (Call 9-1-1). The Contractor shall be liable for the costs of any spill resulting from Contractor's actions, including, but not limited to, costs of containment, cleanup, and disposal.

4.2 NON-HAZARDOUS WASTE DISPOSAL

4.2.1 Contractor shall develop a Waste Management Plan in accordance with the requirements outlined in the LMC Remediation Waste Management Procedure in Appendix B. This plan must be approved by the Lockheed Martin Project Lead.

4.3 WORK INVOLVING AIR EMISSIONS

4.3.1 Contractor shall work with the Lockheed Martin Project Lead to identify applicable Federal, state, and/or local permit application requirements for air emission sources (i.e., stationary point source, fugitive emissions, etc.) associated with the anticipated project.

4.3.2 Contractor shall submit permit applications and/or notifications to the Lockheed Martin Project Lead for review prior to submittal to the applicable regulatory agency.

4.3.3 Contractor shall abide by the requirements of the permit(s) and gather emissions data (as applicable) to document compliance. This data shall be electronically submitted to the Lockheed Martin Project Lead.

4.3.4 Contractor shall immediately contact the Lockheed Martin Project Lead in the event permit conditions are not met.

4.3.5 Ensure permits are posted on permitted equipment (or in close proximity) as required by the respective permit.

4.4 WORK INVOLVING WATER DISCHARGES

4.4.1 At no time is an unauthorized, unpermitted release allowed. Contractor shall notify the Lockheed Martin Project Lead in the event of a release and obtain the approval of Lockheed Martin before discharging any material into storm drains or sewers.

4.4.2 Contractor shall work with the Lockheed Martin Project Lead to identify applicable National Pollutant Discharge Elimination System (NPDES), Stormwater Pollution Prevention Plans (SWPPP), and POTW requirements associated with the anticipated project.

4.4.3 Contractor shall submit permit applications and/or Notice of Intent forms to the Lockheed Martin Project Lead for review prior to submittal to the applicable regulatory agency.

4.4.4 Contractor shall abide by the requirements of the discharge permit(s) and maintain discharge monitoring information and inspection data to document compliance. This documentation shall be electronically provided to the Lockheed Martin Project Lead.

4.4.5 Contractor shall immediately contact the Lockheed Martin Project Lead in the event permit conditions are not met.

5 HOUSEKEEPING / CLEANUP

5.1 Ensure discharge permits and/or SWPPP plans (as applicable) are available at the project job site.

5.2 Contractor shall continuously clean up its respective work area(s). Contractor shall maintain its work areas free from all slip, trip, and fall hazards at all times.

5.3 Debris shall be kept cleared from work areas, passageways, stairs, and in and around buildings or other structures. The work area must be left free from accumulation of waste and rubbish at the end of each work shift.

5.4 Combustible scrap and debris shall be removed at regular intervals during the course of work performed by Contractor. Safe means shall be provided to facilitate such removal.

5.5 At the end of each working day and/or the conclusion of work being performed, Contractor shall restore the work area to the same degree of neatness as when work commenced.

5.6 Contractor shall furnish necessary equipment and/or receptacles to remove waste and rubbish from the job site unless otherwise specified by the Lockheed Martin.

6 CHANGE MANAGEMENT

If deviations are encountered from the field work plan, the contractor shall A) notify to the Lockheed Martin Project Lead and B) suspend work to assess changes to the work plan(s) and the HASP. Changes to the work plan(s) and the HASP shall be reviewed by the PL.

7 REQUIREMENT TO PERFORM & DOCUMENT SELF-AUDITS

7.1 Contractor agrees to perform periodic work area/project field inspections to monitor compliance with project environmental, safety and health (ESH) requirements. The name of Contractor's jobsite ESH representative will be provided to Lockheed Martin prior to the Contractor starting work at the jobsite.

7.2 For jobs that are ongoing, an annual ESH audit shall be conducted and for jobs with a duration of less than one year at least one audit shall occur. A competent ESH representative designated by the Contractor shall perform the audit. Unsafe acts and/or non-compliance conditions noted during inspections shall be corrected immediately.

7.3 The documentation related to the audits and inspections shall be submitted electronically to the Lockheed Martin Project Lead.

8 ACCIDENT, INJURY, ILLNESS, INCIDENT and SPILL REPORTING

8.1 Contractor shall immediately contact the Lockheed Martin Project Lead and/or Lockheed Martin Safety & Health Manager in the event of a fatality, injury, environmental release (spill), near-miss incident, or any ESH incident that is likely to generate significant publicity. A written report of the incident/injury/spill and corrective action(s) taken shall be submitted to the Lockheed Martin Project Lead within one (1) day of the incident. Representatives from Lockheed Martin may conduct joint investigations with the contractor if deemed necessary.

8.2 In case of a spill or release of hazardous chemicals, Contractor shall immediately notify the Lockheed Martin Project Lead, and/or if the severity of the spill warrants, the local fire department by calling 9-1-1. Contractor shall take all necessary steps to control the spread of the release and to provide site control to prevent unauthorized personnel from entering the affected area. The Contractor shall be liable for the costs of any spill resulting from Contractor's actions, including, but not limited to, costs of containment, cleanup, and disposal.

9 FINES, PENALTIES AND COSTS

9.1 Contractor shall indemnify and hold Lockheed Martin harmless from any and all liability (including but not limited to fines and penalties), loss, cost, damage, or expense (including attorney's fees) suffered or incurred by Lockheed Martin by reason of Contractor's failure to comply with Federal, State, municipal, local or other laws, rules, regulations, ordinances and requirements, or failure to comply with generally accepted environmental safety and health practices.

10 LOCKHEED MARTIN ESH MANAGER

10.1 The Lockheed Martin ESH Manager is Jimmy Yeager. Contact Jimmy regarding any questions or concerns at (301) 873-1444 or via email at james.l.yeager@lmco.com.

Appendix A – LMC Requirements for Invasive Fieldwork

LMC Minimum
Requirements for Inv

Appendix B – LMC Waste Management Procedure

LMC Waste Mgmt
Procedure Rev 4

LOCKHEED MARTIN

CONTRACTOR'S ESH HANDBOOK

COMPLIANCE AGREEMENT

The Key National Contractor Program Manager has read and understands the contents of the *Contractor's ESH Handbook*. Contractor agrees while performing work on Lockheed Martin-owned or Lockheed Martin-controlled premises, that the Contractor shall require its employees and subcontractors at any tier to comply with the contents of this *Contractor's ESH Handbook* and the job specific HASP. A copy of the HASP shall be maintained at the job site and made readily available to contractor and subcontractor employees for their information. All contractor employees and subcontractors shall read and certify that they have read and understand the job specific health and safety plan (HASP). The certification forms shall be electronically sent to the Lockheed Martin Project Lead.

I further understand that this handbook and the rules and regulations it contains do not in any way relieve the Contractor (employer) of its responsibility to comply with the applicable environmental safety and health (ESH) regulations and its obligation to implement and enforce its own written ESH programs while working on this project.

Company: _____

Name: _____

Signature: _____

Title: _____

Date: _____

COMPLETE, SIGN AND RETURN THIS CERTIFICATE TO THE LOCKHEED MARTIN ESH MANAGER.

ATTACHMENT II

INCIDENT REPORT FORM

TETRA TECH, INC.
Safety Excellence

Tetra Tech, Inc.
Incident Report

Report Date	Report Prepared By	Incident Report Number

INSTRUCTIONS:

All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.

Complete any additional parts to this form as indicated below for the type of incident selected.

TYPE OF INCIDENT (Check all that apply)		Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	☐	Complete IR Form Only
Injury or Illness	☐	Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	☐	Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	☐	Complete Form IR-C; Motor Vehicle

INFORMATION ABOUT THE INCIDENT

Description of Incident

_____

_____

_____

Date of Incident	Time of Incident
	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐
Weather conditions at the time of the incident	**Was there adequate lighting?**
_____	_____ Yes ☐ No ☐

Location of Incident

_____ Was location of incident within the employer's work environment? Yes ☐ No ☐

Street Address	City, State, Zip Code and Country
Project Name	**Client:**
Tt Supervisor or Project Manager	**Was supervisor on the scene?**
	Yes ☐ No ☐

WITNESS INFORMATION (attach additional sheets if necessary)

Name	Company
Street Address	**City, State and Zip Code**
Telephone Number(s)	

CORRECTIVE ACTIONS

Corrective action(s) immediately taken by unit reporting the incident:

_____

_____

_____

Corrective action(s) still to be taken (by whom and when):

_____

_____

_____

ROOT CAUSE ANALYSIS LEVEL REQUIRED

Root Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐

Root Cause Analysis Level Definitions

Level - 1	**Definition:** A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office. The following events may trigger a Level 1 RCA: ▪ Work related fatality ▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability ▪ Property damage in excess of $75,000 ▪ When requested by senior management
Level - 2	**Definition:** A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided. The following events will require a Level 2 RCA: ▪ OSHA recordable lost time incident ▪ Near miss incident that could have triggered a Level 1 RCA ▪ When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

_____

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Safety Excellence

TETRA TECH, INC.
INCIDENT FORM IR-A

INSTRUCTIONS:

Complete all sections below for incidents involving injury or illness.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)

EMPLOYEE INFORMATION

Company Affiliation

Tetra Tech Employee? ☐ TetraTech subcontractor employee (directly supervised by Tt personnel)? ☐

Full Name	**Company (if not Tt employee)**

Street Address, City, State and Zip Code	**Address Type**
_____	Home address (for Tt employees) ☐
_____	Business address (for subcontractors) ☐

Telephone Numbers

Work: _____	Home: _____	Cell: _____

Occupation (regular job title)	**Department**

Was the individual performing regular job duties?	**Time individual began work**
Yes ☐ No ☐	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐

Safety equipment

Provided? Yes ☐ No ☐

Used? Yes ☐ No ☐ If no, explain why

_____

_____

_____

Type(s) provided:
- ☐ Hard hat
- ☐ Protective clothing
- ☐ Gloves
- ☐ High visibility vest
- ☐ Eye protection
- ☐ Fall protection
- ☐ Safety shoes
- ☐ Machine guarding
- ☐ Respirator
- ☐ Other (list)

_____

NOTIFICATIONS

Name of Tt employee to whom the injury or illness was first reported	**Was H&S notified within one hour of injury or illness?**
	Yes ☐ No ☐
Date of report	**H&S Personnel Notified**
Time of report	**Time of Report**

If subcontractor injury, did subcontractor's firm perform their own incident investigation?

Yes ☐ No ☐ If yes, request a copy of their completed investigation form/report and attach it to this report.

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INCIDENT FORM IR-A

INJURY / ILLNESS DETAILS

What was the individual doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry"

_____

_____

_____

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; Worker developed soreness in wrist over time"

_____

_____

_____

_____

Describe the object or substance that directly harmed the individual: Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

_____

_____

MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes ☐ No ☐ If yes, describe the type of first aid administered and by whom?

_____

Was treatment provided away from the site: Yes ☐ No ☐ If yes, provide the information below.

Name of physician or health care professional	**Facility Name**
Street Address, City State and Zip Code	**Type of Care?**
_____ _____	Was individual treated in emergency room? Yes ☐ No ☐ Was individual hospitalized overnight as an in-patient? Yes ☐ No ☐ Did the individual die? Yes ☐ No ☐ If yes, date: _____ Will a worker's compensation claim be filed? Yes ☐ No ☐
Telephone Number	

NOTE: Attach any police reports or related diagrams to this report.

SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	**Affected individual (signature)**	**Telephone Number**	**Date**

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

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INCIDENT FORM IR-B

INSTRUCTIONS:

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)

TYPE OF INCIDENT (Check all that apply)

Property Damage ☐ Equipment Damage ☐ Fire or Explosion ☐ Spill or Release ☐

INCIDENT DETAILS

Results of Incident: Fully describe damages, losses, etc.

Response Actions Taken:

Responding Agency(s) (i.e. police, fire department, etc.)	Agency(s) Contact Name(s)

DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)

Item:	Extent of damage:	Estimated repair cost

SPILLS / RELEASES (Provide information for spilled/released materials)

Substance	Estimated quantity and duration	Specify Reportable Quantity (RQ)
		_____ Exceeded? Yes ☐ No ☐ NA ☐

FIRES / EXPLOSIONS (Provide information related to fires/explosions)

Fire fighting equipment used? Yes ☐ No ☐ If yes, type of equipment: _____

NOTIFICATIONS

Required notifications	Name of person notified	By whom	Date / Time
Client: _____ Yes ☐ No ☐			
Agency: _____ Yes ☐ No ☐			
Other: _____ Yes ☐ No ☐			

Who is responsible for reporting incident to outside agency(s)? Tt ☐ Client ☐ Other ☐ Name: _____

Was an additional written report on this incident generated? Yes ☐ No ☐ If yes, place in project file.

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TETRA TECH, INC.
INCIDENT FORM IR-C

INSTRUCTIONS:

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

INCIDENT DETAILS

Name of road, street, highway or location where accident occurred	**Name of intersecting road, street or highway if applicable**

County	**City**	**State**

Did police respond to the accident?	**Did ambulance respond to the accident?**
Yes ☐ No ☐	Yes ☐ No ☐
Name and location of responding police department	**Ambulance company name and location**
Officer's name/badge #	

Did police complete an incident report? Yes ☐ No ☐ If yes, police report number: _____
Request a copy of completed investigation report and attach to this form.

VEHICLE INFORMATION

How many vehicles were involved in the accident? _____ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		**Vehicle Number 2 – Other Vehicle**	
Vehicle Owner / Contact Information		**Vehicle Owner / Contact Information**	
Color		**Color**	
Make		**Make**	
Model		**Model**	
Year		**Year**	
License Plate #		**License Plate #**	
Identification #		**Identification #**	
Describe damage to vehicle number 1		**Describe damage to vehicle number 2**	
Insurance Company Name and Address		**Insurance Company Name and Address**	
Agent Name **Agent Phone No.**		**Agent Name** **Agent Phone No.**	
Policy Number		**Policy Number**	

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INCIDENT FORM IR-C

DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		**Driver's Name**	
Driver's Address		**Driver's Address**	
Phone Number		**Phone Number**	
Date of Birth		**Date of Birth**	
Driver's License #		**Driver's License #**	
Licensing State		**Licensing State**	
Gender	Male ☐ Female ☐	**Gender**	Male ☐ Female ☐
Was traffic citation issued to Tetra Tech driver? Yes ☐ No ☐		Was traffic citation issued to driver of other vehicle? Yes ☐ No ☐	
Citation #		**Citation #**	
Citation Description		**Citation Description**	

PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.
Driver information is captured in the preceding section.
Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.
Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? ____		How many passengers (excluding driver) in the vehicle? ____	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	

INJURIES TO NON-TETRATECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐
Name of injured person 2				**Address of injured person 2**		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐

OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	**Property Owner's Address**

COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

ATTACHMENT III

MEDICAL DATA SHEET

MEDICAL DATA SHEET

This Medical Data Sheet must be completed by on-site personnel and kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Person to notify in the event of an emergency: Name: _____

Phone: _____

Drug or other Allergies: _____

Particular Sensitivities : _____

Do You Wear Contacts? _____

What medications are you presently using? _____

_____

Name, Address, and Phone Number of personal physician: _____

_____

_____

Note: Health Insurance Portability and Accountability Act (HIPAA) Requirements

HIPAA took effect April 14, 2003. Loosely interpreted, HIPAA regulates the disclosure of Protected Health Information (PHI) by the entity collecting that information. PHI is any information about health status (such as that you may report on this Medical Data Sheet), provision of health care, or other information. HIPAA also requires Tetra Tech to ensure the confidentiality of PHI. This Act can affect the ability of the Medical Data Sheet to contain and convey information you would want a Doctor to know if you were incapacitated. So before you complete the Medical Data Sheet understand that this form will not be maintained in a secure location. It will be maintained in a file box or binder accessible to other members of the field crew so that they can accompany an injured party to the hospital.

DO NOT include information that you do not wish others to know, only information that may be pertinent in an emergency situation or treatment.

_____ _____ _____

Name (Print clearly) Signature Date

ATTACHMENT IV

SAFE WORK PERMITS

SAFE WORK PERMIT
SITE MOBILIZATION AND DEMOBILIZATION ACTIVITIES
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Mobilization and demobilization activities

II. Primary Hazards: Lifting; slips, trips and falls; vehicular and foot traffic; insect/animal bites and stings; poisonous plants; inclement weather.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, or coveralls, safety, glasses and safety footwear. Hard hats and hearing protection will be worn when working near operating equipment.

VI. Chemicals of Concern None anticipated

Hazard Monitoring / Action Level(s) None

Response Measures None

Primary Route(s) of Exposure/Hazard: NA

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☒ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type – Work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☒ No
Steel toe work shoes/boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Tyvek coverall to protect against natural hazards (e.g., ticks) if working/walking through areas of high grass. Use insect repellants containing at least 10% DEET and tape up in such areas. Follow manufacturer's recommendations for proper application and reapplication. Hard hat when overhead hazards exist. Safety glasses when near eye hazards. Hearing protection when in high noise areas.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc)	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Review PPE needs based on activities being performed and the associated hazards. Use safe lifting procedures and obtain assistance when handling heavy or awkward objects. Suspend site activities in the event of inclement weather. Observe site workers for signs and symptoms of heat/cold stress. Use sun block (SPF > 15) to prevent sunburn if necessary.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SITE CONCRETE CORING OPERATIONS
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Concrete coring will take place in some areas of the complex. This activity uses an electrical coring machine with water supplied cooling and dust suppression. This activity will also include: Installation of soil gas monitoring points, coring borehole restoration and protective casing installation.

II. Primary Hazards: Potential hazards associated with this task: heavy equipment hazards; elevated noise; energized systems/utilities; electrical shock; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; flying projectiles.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
Dust (Concrete)	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Airborne concentrations of VOCs are not anticipated during this activity. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☒ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – nitrile/work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☒ No
Steel toe work shoes or boots	☒Yes ☐ No	Chemical resistant boot covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☒ No
First Aid Kit	☒Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Coveralls if the potential for soiling work clothing exists. Other PPE may be specified by the SSO based on conditions (rain gear, rubber boots, etc.)

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 (Excavation/Penetration Permit is Required)

X. Special instructions, precautions: Ensure all equipment is powered through a GFCI to prevent possible electrocution hazards. Ensure the coring unit is stable and secured to prevent movement during operation. Keep water collected using a shop vac or similar device for wet applications. This device should also be routed through the GFCI. Inspect the unit before use Ensure wiring, casing, and guards are not damaged and the unit is suitable for use. As this activity may occur at night Ensure lighting within the work area is adequate. Use barricades, signs, temporary diking to control water spread during coring operations. Place signs and barricades to warn foot traffic of potential wet areas. Do not leave any core holes open and unattended. Ensure all protective casings that are installed are flat and level with existing grade. Heavy Equipment Inspection Checklist must be completed prior to beginning work.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SITE GEOPHYSICAL/GEOGRAPHIC LAND SURVEYING
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Surveying activities both geophysical and geographical.

II. Primary Hazards: Potential hazards associated with this task: slip, trip and fall; vehicular and foot traffic; temperature extremes; inclement weather; insect /animal bites or stings, poisonous plants, etc.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: _____

VI.

Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
None expected during this task	NA	NA	NA

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☒ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – Work)	☐ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☒ No
Safety Shower/Eyewash	☐ Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Tape up, use insect repellents. Follow manufacturer's label directions for application and re-application of these products. Wear snake chaps in any high grass or brush areas.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Suspend activities in the event of inclement weather.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
VEGETATION MANAGEMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Vegetative clearing

II. Primary Hazards: heavy equipment hazards; energized systems; noise; vehicular and equipment traffic; strain from heavy lifting; slips, trips and falls; cuts, abrasions and lacerations; loading trucks; and inclement weather,

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☐

Modifications/Exceptions: _____

VI. Chemicals of Concern	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**
None expected during this task	NA	NA	NA

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes	☐ No	Hearing protection (plugs/muffs)	☒ Yes	☐ No
Safety glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☒ No	Radio/cellular phone	☐ Yes	☐ No
Splash shield	☐ Yes	☒ No	Barricades	☐ Yes	☐ No
Coveralls	☒ Yes	☐ No	Gloves (type – cotton/leather)	☒ Yes	☐ No
Impermeable apron	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☐ No
Steel toe work shoes/boots	☒ Yes	☐ No	Chemical resistant boot covers	☐ Yes	☐ No
High visibility vest	☒ Yes	☐ No	Tape up/use insect repellent	☐ Yes	☐ No
First aid kit	☐ Yes	☐ No	Fire extinguisher	☐ Yes	☐ No
Safety shower/eyewash	☐ Yes	☐ No	Other	☐ Yes	☐ No

Modifications/Exceptions: Tyvek coverall and boot covers if there is a potential for soiling work clothes or contacting potentially contaminated media (soils, shed debris, etc.). PVC or PE coated Tyvek if saturation of work clothes may occur

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Use dust suppression (area wetting) methods as needed. This will reduce dust emissions when handling dry materials which have a tendency to become airborne much more easily than wet or moist materials. Suspend site activities in the event of inclement weather. Employ proper lifting techniques..

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
BLOCK E GRASS CUTTING AND VEGETATION MANAGEMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Vegetative clearing and grass cutting Block E only.

II. Primary Hazards: heavy equipment hazards; energized systems; noise; vehicular and equipment traffic; strain from heavy lifting; slips, trips and falls; cuts, abrasions and lacerations; loading trucks; and inclement weather

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☐

Modifications/Exceptions: _____

VI. Chemicals of Concern	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**
Possible PCB exposure	Visual	Visible dust	Area wetting

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☒ No	Hearing protection (plugs/muffs)	☒ Yes ☐ No
Safety glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☐ No
Chemical/splash goggles	☒ Yes ☐ No	Radio/cellular phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Coveralls	☒ Yes ☐ No	Gloves (type – cotton/leather)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes/boots	☒ Yes ☐ No	Chemical resistant boot covers	☒ Yes ☐ No
High visibility vest	☒ Yes ☐ No	Tape up/use insect repellent	☒ Yes ☐ No
First aid kit	☐ Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety shower/eyewash	☐ Yes ☐ No	Other (Cool Vests)	☒ Yes ☐ No

Modifications/Exceptions: Blue or Green colored Tyvek coverall and boot covers. If significant dust is generated that obscures vision a ½ face Air Puifying Respirator will be used in accordiance with the Respiratory Protection Program in Attachment XII of this HASP.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Use dust suppression (area wetting) methods as needed. This will reduce dust emissions when handling dry materials which have a tendency to become airborne much more easily than wet or moist materials. Suspend site activities in the event of inclement weather. Employ proper lifting techniques

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
BLOCK D SOIL BORING AND MONITORING/DEEP WELL INSTALLATION
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ **Date:** _____ **Time: From** _____ **to** _____

I. Work limited to the following (description, area, equipment used): Soil boring and monitoring well installation. Soil boring will generally be performed using DPT and HSA Rigs, while the monitoring wells will be installed via HSA. This task includes well development and the installation of vapor monitoring points and installation of membrane interface probes.

II. Primary Hazards: Contact and transfer of site contaminants; heavy equipment hazards; elevated noise; energized systems/utilities; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; flying projectiles; insect/animal bites and stings, poisonous plants, inclement weather, drowning.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>1.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – nitrile/work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒Yes ☐ No	Chemical resistant boot covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Coveralls if the potential for soiling work clothing exists. Other PPE is possible based on conditions (rain gear, rubber boots, etc.)

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 (Excavation Permit is Required)

X. Special instructions, precautions: Any sustained VOC readings in worker BZs indicate an unanticipated condition requiring that site activities be suspended. Use safe lifting/carrying techniques. Inspect equipment prior to use. Ensure emergency stop devices are functional and test daily. Minimize contact with potentially contaminated media and assume soils/groundwater are contaminated. Use waterless hand cleaner products or disinfecting wipes on boat after sampling until access to proper hands washing facilities on shore can be reached. Heavy Equipment Inspection Checklist must be completed prior to beginning work.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
BLOCK E AND G SOIL BORING AND MONITORING/DEEP WELL INSTALLATION
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. Date: Time: From to

I. Work limited to the following (description, area, equipment used): Soil boring and monitoring well installation. Soil boring will generally be performed using DPT and HSA Rigs, while the monitoring wells will be installed via HSA. This task includes well development and the installation of vapor monitoring points and installation of membrane interface probes.

II. Primary Hazards: Contact and transfer of site contaminants; heavy equipment hazards; elevated noise; energized systems/utilities; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; flying projectiles; insect/animal bites and stings, poisonous plants, inclement weather, drowning.

III. Field Crew:

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions:

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>7.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – nitrile/work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒Yes ☐ No	Chemical resistant boot covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Coveralls if the potential for soiling work clothing exists. Other PPE is possible based on conditions (rain gear, rubber boots, etc.)

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 (Excavation Permit is Required)

X. Special instructions, precautions: Any sustained VOC readings in worker BZs indicate an unanticipated condition requiring that site activities be suspended. Use safe lifting/carrying techniques. Inspect equipment prior to use. Ensure emergency stop devices are functional and test daily. Minimize contact with potentially contaminated media and assume soils/groundwater are contaminated. Use waterless hand cleaner products or disinfecting wipes on boat after sampling until access to proper hands washing facilities on shore can be reached. Heavy Equipment Inspection Checklist must be completed prior to beginning work.

Permit Issued by: Permit Accepted by:

SAFE WORK PERMIT
BLOCK E, G AND I LACTOIL INSITU TREATMENT SYSTEM INSTALLATION
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Soil boring and injection well installation. Soil boring will generally be performed using DPT and HSA Rigs. This task includes well development and the excavation of trenches for pipeline installation.

II. Primary Hazards: Contact and transfer of site contaminants; heavy equipment hazards; elevated noise; energized systems/utilities; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; flying projectiles; insect/animal bites and stings, poisonous plants, inclement weather, drowning.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>7.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☒ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☒ Yes ☐ No	Gloves (Type – nitrile/work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒Yes ☐ No	Chemical resistant boot covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Coveralls if the potential for soiling work clothing exists. Other PPE is possible based on conditions (rain gear, rubber boots, etc.)

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 (Excavation Permit is Required)

X. Special instructions, precautions: Any sustained VOC readings in worker BZs indicate an unanticipated condition requiring that site activities be suspended. Use safe lifting/carrying techniques. Inspect equipment prior to use. Ensure emergency stop devices are functional and test daily. Minimize contact with lactoil by wearing splash shield, apron and nitrile gloves to avoid contact with lactoil solution. Also assume soils/groundwater are contaminated and avoid contact with contaminated media. Use waterless hand cleaner products or disinfecting wipes after sampling until access to proper hands washing facilities can be reached. Heavy Equipment Inspection Checklist must be completed prior to beginning work.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SOIL EXCAVATION TRANSPORTATION AND PUMP STATION PLACEMENT ACTIVITIES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): This activity includes the excavation and removal of contaminated soils; Direct loading and dewatering and loading will be conducted. Back filling, compaction; site restoration will be included in this activity. This activity includes: initial site surveys including identifying, eliminating or barricading hazards in the work area; establishing traffic patterns for the site including truck staging, loading position as well as hauling in back fill. Removal, lift and placement of preconstructed pump stations. Heavy equipment includes tracked excavator, loader and back-hoe and crane.

II. Primary Hazards: Physical/natural hazards - Lifting; slips, trips and falls; vehicular and foot traffic; struck by; inclement weather.

III. Field Crew: _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☒ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, or coveralls, safety, glasses and safety footwear. Hard hats, hearing protection, and High Visibility Vests will be worn when working near operating equipment. Chemical resistant over boots will be worn during muddy conditions.

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>7.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, and dizziness); extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☒ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☒ Yes ☐ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type – Work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☒ No
Steel toe work shoes/boots	☒Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒Yes ☐ No	Fire Extinguisher	☒ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Hard hat, safety glasses, steel toed work booted will be worn in all cases as minimum PPE. Equipment operators and truck drivers are not required to wear hard hats as long as they remain in the cab. Hearing protection (>25dB NRR) for activities generating high noise levels. High Visibility Vests when working along traffic patterns or near operating equipment.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.).☒ Yes ☐ No

If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 – Utility locating Excavation Clearance Permit and Ticket will be applied for from the Local One-Call

X. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Suspend site activities in the event of inclement weather. Establish Site Control boundaries as well as Free Space of Travel along vehicle patterns. For this activity the clearance exists around the excavator and crane (fully extended boom length + 5-feet and maintain at least 4-feet from

excavation edge and pump station removal. Cut excavation in shallow intervals. Ground personnel will use passive methods to evaluate the next cut depth (6-inch intervals). The excavator should be equipped with a sand bar to avoid snagging subsurface utilities. Ground personnel will also direct truck movement and loading activities. Confirm utility clearance status. Call those who have not responded to One Call request, confirm utility absence. Utilities within 5-feet of the subsurface investigation point will be potholed (hand dug) to confirm location. Excavation activities will be conducted in accordance with 29 CFR 1926.650-.652. concerning sloping, shoring, storage, and movement on or over excavations. Equipment, personnel, and machinery will be kept away from the edges of open excavations (> 3 feet). Personnel will not be permitted to enter an excavation greater than 4 feet deep with out the use of shoring, benching or trench boxes. Excavations which cross sidewalks or streets will provide crossovers of adequate construction for anticipated traffic loads. Flag persons and traffic control barricades and signs will be used where excavation encroaches streets and passageways. Excavation activities will be supported by a "Competent Person". Do not overload transport vehicles. Calculate weight based on bucket capacity and the number of buckets loaded into each truck or roll off. Typical weight for wet earthen soils is 100lbs per cubic foot or 2700 lbs per cubic yard. The use of a spotter/ground man during excavation activities and motor vehicle/heavy equipment use will be employed.

Permit Issued by:_____ Permit Accepted by:_____

SAFE WORK PERMIT
BLOCK F SOIL BORING AND MONITORING/DEEP WELL INSTALLATION
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. Date: Time: From to

I. Work limited to the following (description, area, equipment used): Soil boring and monitoring well installation. Soil boring will generally be performed using DPT and HSA Rigs, while the monitoring wells will be installed via HSA. This task includes well development and the installation of vapor monitoring points and installation of membrane interface probes.

II. Primary Hazards: Contact and transfer of site contaminants; heavy equipment hazards; elevated noise; energized systems/utilities; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; flying projectiles; insect/animal bites and stings, poisonous plants, inclement weather, drowning.

III. Field Crew:

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions:

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>1,000 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – nitrile/work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒Yes ☐ No	Chemical resistant boot covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Coveralls if the potential for soiling work clothing exists. Other PPE is possible based on conditions (rain gear, rubber boots, etc.)

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No

If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 (Excavation Permit is Required)

X. Special instructions, precautions: Any sustained VOC readings in worker BZs indicate an unanticipated condition requiring that site activities be suspended. Use safe lifting/carrying techniques. Inspect equipment prior to use. Ensure emergency stop devices are functional and test daily. Minimize contact with potentially contaminated media and assume soils/groundwater are contaminated. Use waterless hand cleaner products or disinfecting wipes on boat after sampling until access to proper hands washing facilities on shore can be reached. Heavy Equipment Inspection Checklist must be completed prior to beginning work.

Permit Issued by: Permit Accepted by:

SAFE WORK PERMIT
Block H SOIL BORING AND MONITORING/DEEP WELL INSTALLATION
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Soil boring and monitoring well installation. Soil boring will generally be performed using DPT and HSA Rigs, while the monitoring wells will be installed via HSA. This task includes well development and the installation of vapor monitoring points and installation of membrane interface probes.

II. Primary Hazards: Contact and transfer of site contaminants; heavy equipment hazards; elevated noise; energized systems/utilities; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; flying projectiles; insect/animal bites and stings, poisonous plants, inclement weather, drowning.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>10.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – nitrile/work)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒Yes ☐ No	Chemical resistant boot covers	☐ Yes ☐ No
High visibility vest	☐Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐Yes ☐ No	Fire extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Coveralls if the potential for soiling work clothing exists. Other PPE is possible based on conditions (rain gear, rubber boots, etc.)

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090 (Excavation Permit is Required)

X. Special instructions, precautions: Any sustained VOC readings in worker BZs indicate an unanticipated condition requiring that site activities be suspended. Use safe lifting/carrying techniques. Inspect equipment prior to use. Ensure emergency stop devices are functional and test daily. Minimize contact with potentially contaminated media and assume soils/groundwater are contaminated. Use waterless hand cleaner products or disinfecting wipes on boat after sampling until access to proper hands washing facilities on shore can be reached. Heavy Equipment Inspection Checklist must be completed prior to beginning work.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
Block E, G AND I SOIL REMOVAL AND REPLACEMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Excavation activities using heavy equipment to remove contaminated soil and replace with clean soil. Excavations will be limited to 2 foot depths.

II. Primary Hazards: Potential hazards associated with this task include: heavy equipment hazards, heavy lifting, pinches and compressions, slip, trips and falls, vehicular and foot traffic, insect/animal bites and stings, poisonous plants, inclement weather and limited contact with potential contaminants of concern.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, or coveralls, safety, glasses hard hats, hearing protection and safety footwear. Nitrile gloves will be worn whenever the potential for coming into direct contact with potentially contaminated groundwater or soil exists or whenever handling grout mixtures.

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>7.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☒ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☒ No
Splash Shield	☐ Yes ☒ No	Barricades	☒ Yes ☒ No
Splash suits/coveralls	☒ Yes ☐ No	Gloves (Type – Work and nitrile)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☒ No
Steel toe Work shoes or boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility vest	☒ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Tyvek coverall to protect against soil contact and natrual hazards (e.g., ticks) if working/walking through areas of high grass. Use insect repellants containing at least 10% DEET. Follow manufacturer's recommendations for proper application and reapplication. If working in areas where snakes are a threat, wear snake chaps to protect against bites.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required. Utility Clearance/Dig Permit ☒ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Stay clear of operating equipment (minimum of 30 feet) and stay in the field of vision of the operator. Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Review PPE needs based on activities being performed and the associated hazards. Use safe lifting procedures and obtain assistance when handling heavy or awkward objects. Suspend site activities in the event of inclement weather. Observe site workers for signs and symptoms of heat stress. Use sun block (SPF > 15) to prevent sunburn.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
MARINE OPERATIONS (FROM WATER VESSEL)
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Collection of surface water and sediment samples. These sampling activities will be conducted from a small boat. Deep well installation via Rotosonic drill rig from a barge will be part of this activity.

II. Primary Hazards: Drowning. Suspend activities in the event of inclement weather (i.e., high winds, heavy rains, or electrical storms). Other hazards could include, small cuts/abrasions, and injury form slip, trip and fall events

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: Coast Guard approved personal floatation device (pfd).

VI. VI. Chemicals of Concern (COCs) and Actions

COC's	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>1.75 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Stop site activity until background levels return to normal.

Primary Route(s) of Exposure/Hazard: incidental ingestion, direct contact with contaminated media.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐	☒	Hearing Protection (Plugs/Muffs)	☐	☒
Safety Glasses	☒	☐	Safety belt/harness	☐	☐
Chemical/splash goggles	☐	☒	Radio/Cellular Phone	☐	☐
Splash Shield	☐	☒	Barricades	☐	☒
Splash suits/coveralls	☐	☒	Gloves (Type – Work/nitrile)	☒	☐
Impermeable apron	☐	☒	Work/rest regimen	☐	☐
Steel toe work shoes or boots	☐	☒	Chemical Resistant Boot Covers	☐	☒
High Visibility vest	☐	☒	Tape up/use insect repellent	☐	☒
First Aid Kit	☒	☐	Fire Extinguisher	☒	☐
Safety Shower/Eyewash	☐	☒	Other	☒	☐

(Yes / No)

Modifications/Exceptions: Each person on the boat must be wearing a USCG-approved pfd, and the boat must be equipped with a tethered, throwable life saver device. Footwear equipped with slip-resistant soles. Hats and sunscreen for protection from UV rays.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☒
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Minimize contact with potentially contaminated media and sampling devices. Wash hands before performing any hand-to-mouth activities. Use waterless hand cleaner products or disinfecting wipes on boat after sampling until access to proper hands washing facilities on shore can be reached. Fire extinguisher and first aid kit to be maintained on boat at all times. The boat employed will meet the minimum safe vessel requirements including PFDs, fire extinguishers, and visual distress signals. Complete Boating Safety Checklist prior to beginning work. See Attachment VI for Tetra Tech Procedure for Working over or near Water.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
Block D MULTI MEDIA SAMPLING AND WELL DEVELOPMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Multimedia sampling including surface and subsurface soils, groundwater, storm water, IDW. This task also includes soil vapor sampling and indoor air quality sampling.

II. Primary Hazards: Contact with site contaminants; transfer of contamination; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; insect/animal bites and stings, poisonous plants, inclement weather.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>1.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Dust components may include metals, PCBs, PAHs, sand, grout. Encountering airborne concentrations above background levels in the breathing zone (BZ) during this activity is not anticipated based on historical source concentrations. SSO to take and record background levels at least daily.

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety Belt/Harness	☐ Yes ☒ No
Chemical/Splash Goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash Suits/Coveralls	☐ Yes ☐ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable Apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel Toe Work Shoes or Boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility Vest	☐ Yes ☐ No	Tape/Insect Repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: _____

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: VOCs are most likely to be present at REC 1, 11, and 12. Any sustained readings in worker breathing zones will suggest an unanticipated condition that will require that site activities be suspended until the source of elevated readings is determined. Use safe lifting/carrying techniques. Assume media is contaminated and avoid contact through the use of safe work practices, PPE and decontamination. As this activity may occur at night Ensure lighting within the work area are at least 5 foot candles. Prior to placing Summa Canisters ventilate indoor area if elevated readings (>10 ppm) are encountered upon entering building to achieve readings less than 10 ppm.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
BLOCK E AND G MULTI MEDIA SAMPLING AND WELL DEVELOPMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Multimedia sampling including surface and subsurface soils, groundwater, storm water, IDW. This task also includes soil vapor sampling and indoor air quality sampling.

II. Primary Hazards: Contact with site contaminants; transfer of contamination; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; insect/animal bites and stings, poisonous plants, inclement weather.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>7.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes
Benzene	Draeger Tube 0.5/a	Up to 5 ppm/sustained 10 minutes/4 times/day	Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Dust components may include metals, PCBs, PAHs, sand, grout. Encountering airborne concentrations above background levels in the breathing zone (BZ) during this activity is not anticipated based on historical source concentrations. SSO to take and record background levels at least daily.

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety Belt/Harness	☐ Yes ☒ No
Chemical/Splash Goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash Suits/Coveralls	☐ Yes ☐ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable Apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel Toe Work Shoes or Boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility Vest	☐ Yes ☐ No	Tape/Insect Repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions:

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: VOCs are most likely to be present at REC 1, 11, and 12. Any sustained readings in worker breathing zones will suggest an unanticipated condition that will require that site activities be suspended until the source of elevated readings is determined. Use safe lifting/carrying techniques. Assume media is contaminated and avoid contact through the use of safe work practices, PPE and decontamination. As this activity may occur at night Ensure lighting within the work area are at least 5 foot candles. Prior to placing Summa Canisters ventilate indoor area if elevated readings (>10 ppm) are encountered upon entering building to achieve readings less than 10 ppm.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
BLOCK F MULTI MEDIA SAMPLING AND WELL DEVELOPMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Multimedia sampling including surface and subsurface soils, groundwater, storm water, IDW. This task also includes soil vapor sampling and indoor air quality sampling.

II. Primary Hazards: Contact with site contaminants; transfer of contamination; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; insect/animal bites and stings, poisonous plants, inclement weather.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern (COCs) and Actions

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>1,000 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Dust components may include metals, PCBs, PAHs, sand, grout. Encountering airborne concentrations above background levels in the breathing zone (BZ) during this activity is not anticipated based on historical source concentrations. SSO to take and record background levels at least daily.

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety Belt/Harness	☐ Yes ☒ No
Chemical/Splash Goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash Suits/Coveralls	☐ Yes ☐ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable Apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel Toe Work Shoes or Boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility Vest	☐ Yes ☐ No	Tape/Insect Repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: _____

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: VOCs are most likely to be present at REC 1, 11, and 12. Any sustained readings in worker breathing zones will suggest an unanticipated condition that will require that site activities be suspended until the source of elevated readings is determined. Use safe lifting/carrying techniques. Assume media is contaminated and avoid contact through the use of safe work practices, PPE and decontamination. As this activity may occur at night Ensure lighting within the work area are at least 5 foot candles. Prior to placing Summa Canisters ventilate indoor area if elevated readings (>10 ppm) are encountered upon entering building to achieve readings less than 10 ppm.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
BLOCK H MULTI MEDIA SAMPLING AND WELL DEVELOPMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. **Work limited to the following (description, area, equipment used):** Multimedia sampling including surface and subsurface soils, groundwater, storm water, IDW. This task also includes soil vapor sampling and indoor air quality sampling.

II. **Primary Hazards:** Contact with site contaminants; transfer of contamination; heavy lifting; slip, trip and fall; cuts and lacerations; vehicular and foot traffic; ambient temperature extremes; insect/animal bites and stings, poisonous plants, inclement weather.

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

V. **Protective equipment required**
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Modifications/Exceptions: _____

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

VI. **Chemicals of Concern (COCs) and Actions**

COCs	Hazard Monitoring	Action Level(s)	Response Measures
VOCs	PID (except on boat/barge)	>10.00 ppm in BZ sustained 4 exp of 5 minutes	Screen BZ with Draeger tubes Evacuate site till background levels return
Dust	Visual –Visible dust	>2 mg/m3	Employ dust suppression –Wet it down

Dust components may include metals, PCBs, PAHs, sand, grout. Encountering airborne concentrations above background levels in the breathing zone (BZ) during this activity is not anticipated based on historical source concentrations. SSO to take and record background levels at least daily.

Primary Route(s) of Exposure/Hazard: Inhalation, ingestion and skin contact. Controls include monitoring instrument use, dust control, use of PPE, and following safe work practices. VOCs – irritating at all points of contact; CNS effects (blurred vision, narcotic effects, dizziness); Extremely high concentrations may result in Irregular heartbeats, possible cardiac arrest. Sand, bentonite, grout may cause mechanical irritation (eyes) as well as potential alkali burns; respiratory, eye, and mucous membrane irritation.

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety Belt/Harness	☐ Yes ☒ No
Chemical/Splash Goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash Suits/Coveralls	☐ Yes ☐ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable Apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel Toe Work Shoes or Boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility Vest	☐ Yes ☐ No	Tape/Insect Repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: _____

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) ☒ Yes ☐ No
If yes, SSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. **Special instructions, precautions:** VOCs are most likely to be present at REC 1, 11, and 12. Any sustained readings in worker breathing zones will suggest an unanticipated condition that will require that site activities be suspended until the source of elevated readings is determined. Use safe lifting/carrying techniques. Assume media is contaminated and avoid contact through the use of safe work practices, PPE and decontamination. As this activity may occur at night Ensure lighting within the work area are at least 5 foot candles. Prior to placing Summa Canisters ventilate indoor area if elevated readings (>10 ppm) are encountered upon entering building to achieve readings less than 10 ppm.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SITE IDW MANAGEMENT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. **Work limited to the following (description, area, equipment used):** IDW management activities includes containerization, staging, monitoring for leaks of IDW accumulated wastes. Wastes types include soil cutting, purge and decontamination wash waters.

II. **Primary Hazards:** Lifting, pinches and compressions; flying projectiles; slips, trips, and falls and chemical contamination.

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☒ No Initials of Inspector _____Tetra Tech

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. **Protective equipment required**
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ See Reverse
No ☒

Modifications/Exceptions: None anticipated

VI. **Chemicals of Concern**: None anticipated
Hazard Monitoring /Action Level(s): N/A
Response Measures: N/A

Primary Route of Exposure/Hazard: inhalation, dermal, ingestion

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☒ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type – Leather/Cotton)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☒ No
Steel toe work shoes/boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☒ No	Other	☐ Yes ☐ No

Modifications/Exceptions: If using pneumatic/electric power to open drums – Safety glasses are required. If power equipment is used to move drums or you are working near operating equipment hard hats will be worn. Tyvek coverall to protect against natural hazards (e.g., ticks) if working/walking through areas of high grass. Use insect repellants containing at least 10% DEET if necessary. Follow manufacturer's recommendations for proper application and reapplication. If working in areas where snakes are a threat, wear snake chaps to protect against bites. High visibility vest if near active traffic areas.

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques. When/where possible use heavy equipment to move and place containers. When placing drums – Place the label and retention ring nut on the outside where it is readily visible. Place 4-drums to a pallet. Maintain a minimum distance of 4-feet between pallet rows. An IDW inventory shall be generated to provide the number of drums, contents, and volumes. This inventory should be provided to the facility contact. Inspect equipment prior to use.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SITE DECONTAMINATION ACTIVITIES
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Decontamination of sampling equipment (i.e., reusable stainless steel trowels, etc.). Brushes and spray bottles will be used to decontaminate small sampling equipment.

II. Primary Hazards: Chemical exposure, transfer of contamination, inclement weather, noise.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ Tetra Tech

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety glasses, safety footwear, and nitrile gloves. Impermeable aprons are preferred protection against soiling work clothes when lifting auger flights because of the need to carry close to the body. If it (impermeable apron) does not offer adequate protection, PVC rain suits or PE or PVC coated Tyvek should be employed. Chemical resistant boot covers if excessive liquids are generated or to protected footwear. PID with 10.6eV lamp [Note: This instrument will be used to determine if any volatile contaminants have been removed. It will not be used for purposes of monitoring exposure.

VI.

Chemicals of Concern	Hazard Monitoring / Action Level(s)	Response Measures
Decontamination Fluids	Refer to MSDS	refer to MSDS

Primary Route(s) of Exposure/Hazard: Inhalation and direct contact and ingestion

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☒ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☒ No
Splash Shield	☒ Yes ☐ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☒ No
Steel toe Work shoes or boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☐ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☐ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Chemical resistant boot covers if excessive liquids are generated or to protect footwear.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Suspend site activities in the event of inclement weather. Employ proper lifting techniques. When/where possible use heavy equipment to move and place containers.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT FOR
BLOCK E FORMER BUILDING D MULTI-MEDIA SAMPLING / RADIOLOGICAL SURVEYING
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Radiological survey activities and soil sampling at Sites 10 and 14.

II. Required Monitoring Instrument(s): beta/gamma detectors (Micro R meter and frisker such as the Ludlum Model 19)

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____Tetra Tech
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____Tetra Tech

SECTION II: General Safety Requirements (To be filled in by permit issuer)

V. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
PAPR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: None anticipated

VI. Chemicals of Concern / Action Level(s) / Response Measures

Chemicals of Concern	Action Level(s)	Response Measures
Alpha, Beta, Gamma Radiation	Dose rates above 50 μR/hr	Exit work area and evaluate control measures

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type – Surgical Style)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Gloves required during sampling activities or whenever contact with potentially contaminated media exists.

VIII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☐	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☐
Emergency Equipment Staged	☐	☐	☐

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, Complete Permit Required or Contact Health Sciences, Pittsburgh Office (412)921-7090

XI. Special Instructions, Precautions: It is anticipated that remedial action activities have resulted in the removal of contaminated soils. This sampling effort is being conducted to evaluate the effectiveness of the remediation effort. However, contact with potentially contaminated media will be minimized through the use of avoidance practices and the use of ppe. Site workers must wash hands and face before performing any hand to mouth activities. Avoid inhalation of any airborne dusts, however, soil sampling activities are unlikely to generate dusts. First aid kits will be available at all remote sampling locations. Avoid insect/animal nesting areas. Sampling areas may be tick, gnat, wasp, and mosquito infested. Maintain a means to contact emergency services (cell phone) and verify they are functional.

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT V
EQUIPMENT INSPECTION CHECKLIST
FOR DRILL/DPT RIGS

Equipment Inspection Checklist for Drill/DPT Rigs

Company: _____ **Unit/Serial No#:** _____

Inspection Date: ____/____/____ **Time:** _____:_____ **Equipment Type:** _____
(e.g., Drill Rigs Hollow Stem, Mud Rotary, Direct Push, HDD)

Project Name: _____ **Project No#:** _____

Yes	No	NA	Requirement	Comments
			Emergency Stop Devices	
☐	☐	☐	• Emergency Stop Devices (At points of operation)	
☐	☐	☐	• Have all emergency shut offs identified been communicated to the field crew?	
☐	☐	☐	• Has a person been designated as the Emergency Stop Device Operator?	
			Highway Use	
☐	☐	☐	• Cab, mirrors, safety glass?	
☐	☐	☐	• Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	
☐	☐	☐	• Seat Belts?	
☐	☐	☐	• Is the equipment equipped with audible back-up alarms and back-up lights?	
☐	☐	☐	• Horn and gauges	
☐	☐	☐	• Brake condition (dynamic, park, etc.)	
☐	☐	☐	• Tires (Tread) or tracks	
☐	☐	☐	• Windshield wipers	
☐	☐	☐	• Exhaust system	
☐	☐	☐	• Steering (standard and emergency)	
☐	☐	☐	• Wheel Chocks?	
☐	☐	☐	• Are tools and material secured to prevent movement during transport? Especially those within the cab?	
☐	☐	☐	• Are there flammables or solvents or other prohibited substances stored within the cab?	
☐	☐	☐	• Are tools or debris in the cab that may adversely influence operation of the vehicle (in and around brakes, clutch, gas pedals)	

Unit/Serial No#:_____ **Inspection Date:** ____/____/____

Yes	No	NA	Requirement	Comments
			Fluid Levels:	
☐	☐	☐	• Engine oil	
☐	☐	☐	• Transmission fluid	
☐	☐	☐	• Brake fluid	
☐	☐	☐	• Cooling system fluid	
☐	☐	☐	• Hoses and belts	
☐	☐	☐	• Hydraulic oil	
			High Pressure Hydraulic Lines	
☐	☐	☐	• Obvious damage	
☐	☐	☐	• Operator protected from accidental release	
☐	☐	☐	• Coupling devices, connectors, retention cables/pins are in good condition and in place	
			Mast Condition	
☐	☐	☐	• Structural components/tubing	
☐	☐	☐	• Connection points	
☐	☐	☐	• Pins	
☐	☐	☐	• Welds	
☐	☐	☐	• Outriggers	
☐	☐	☐	• Operational	
☐	☐	☐	• Plumb (when raised)	
			Hooks	
☐	☐	☐	• Are the hooks equipped with Safety Latches?	
☐	☐	☐	• Does it appear that the hook is showing signs of wear in excess of 10% original dimension?	
☐	☐	☐	• Is there a bend or twist exceeding 10% from the plane of an unbent hook?	
☐	☐	☐	• Increase in throat opening exceeding 15% from new condition	
☐	☐	☐	• Excessive nicks and/or gouges	
☐	☐	☐	• Clips	
☐	☐	☐	• Number of U-Type (Crosby) Clips (cable size 5/16 – 5/8 = 3 clips minimum) (cable size 3/4 – 1 inch = 4 clips minimum) (cable size 1 1/8 – 1 3/8 inch = 5 clips minimum)	

Unit/Serial No#:_____ **Inspection Date:** ____/____/____

Yes	No	NA	Requirement	Comments
☐	☐	☐	Power cable and/or hoist cable • Reduction in Rope diameter π (5/16 wire rope>1/64 reduction nominal size -replace) (3/8 to 1/2 wire rope>1/32 reduction nominal size-replace) (9/16 to 3/4 wire rope>3/64 reduction nominal size-replace)	
☐	☐	☐	• Number of broken wires (6 randomly broken wires in one rope lay) (3 broken wires in one strand)	
☐	☐	☐	• Number of wire rope wraps left on the Running Drum at nominal use (≥3 required)	
☐	☐	☐	- Lead (primary) sheave is centered on the running drum	
☐	☐	☐	• Lubrication of wire rope (adequate?)	
☐	☐	☐	• Kinks, bends – Flattened to > 50% diameter	
☐	☐	☐	Hemp/Fiber rope (Cathead/Split Spoon Hammer) • Minimum ¾; maximum 1 inch rope diameter (Inspect for physical damage)	
☐	☐	☐	• Rope to hammer is securely fastened	
☐	☐	☐	Safety Guards – • Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?	
☐	☐	☐	• Hot pipes and surfaces exposed to accidental contact?	
☐	☐	☐	• High pressure lines	
☐	☐	☐	• Nip/pinch points	
☐	☐	☐	Operator Qualifications • Does the operator have proper licensing where applicable, (e.g., CDL)?	
☐	☐	☐	• Does the operator, understand the equipment's operating instructions?	
☐	☐	☐	• Is the operator experienced with this equipment?	
☐	☐	☐	• Is the operator 21 years of age or more?	

Unit/Serial No#:_____ **Inspection Date:** ____/____/____

Yes	No	NA	Requirement	Comments
☐	☐	☐	PPE Required for Drill Rig Exclusion Zone • Hardhat	
☐	☐	☐	• Safety glasses	
☐	☐	☐	• Work gloves	
☐	☐	☐	• Chemical resistant gloves_____	
☐	☐	☐	• Steel toed Work Boots	
☐	☐	☐	• Chemical resistant Boot Covers	
☐	☐	☐	• Apron	
☐	☐	☐	• Coveralls Tyvek, Saranex, cotton)_____	
☐	☐	☐	Other Hazards • Excessive Noise Levels? _____dBA	
☐	☐	☐	• Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.)	
☐	☐	☐	- MSDSs available?	
☐	☐	☐	• Will On-site fueling occur	
☐	☐	☐	- Safety cans available?	
☐	☐	☐	- Fire extinguisher (Type/Rating -_____ _)	

Approved for Use ☐ Yes ☐ No ☐ See Comments

_____ _____

Site Health and Safety Officer Operator

ATTACHMENT VI

TETRA TECH SWP 5-6 SAFE WORKING PRACTICES FOR WORKING OVER OR NEAR WATER

The following sections discuss general procedures for working over or near water, underwater work, and cold water procedures.

1.0 SCOPE

This safe work practice (SWP) provides guidelines for all Tetra Tech employees and subcontractors who work over or near bodies of water three (3) or more feet deep or swiftly moving water. This SWP was developed in accordance with the Occupational Safety and Health Administration (OSHA) standard specified in Title 29 of the *Code of Federal Regulations* (CFR), Part 1926.106, "Working Over or Near Water."

2.0 RESPONSIBILITIES

The project manager (PM) is responsible for identifying all health and safety requirements of each project, including all tasks that may involve worker exposure to hazards or working in or near bodies of water. The PM will appoint a site safety coordinator (SSC) to ensure that this SWP is followed in the field. Workers will follow this SWP whenever working near or in any body of water that is over three (3) feet deep or swiftly moving.

3.0 GENERAL PROCEDURES

When working over or near water, the following precautions will be taken:

- All staff and team members must wear a personal flotation device (PFD) when working within 15 feet of a water body. Personnel will be provided with U.S. Coast Guard (USCG)-approved life jackets or work vests. The PFD should be Class III, which will support the head of an unconscious person above water.
- Life jackets and work vests will be inspected before and after each use.
- Ring buoys with at least 90 feet of line shall be provided and readily available for employee rescue operations.
- The distance between ring buoys shall not exceed 200 feet.

- A USCG-approved life-saving skiff will be available.
- Under no circumstances will team members enter water bodies without protective clothing such as rubber boots or waders.
- At least one person will remain on shore as a look-out.

If a team member falls into the water, a ring buoy, branch, paddle, pole, or other floating object should be extended to the person in the water. Resist the impulse to dive in; employees should not attempt a deep water rescue unless they have been trained in water lifesaving skills. When the person in the water grabs the extended item, the worker should be pulled toward the shore or boat. If the person is unconscious, the PFD, clothing, or hair should be hooked to pull the person toward the shore or boat. Once the person has been safely retrieved, necessary emergency medical procedures should be performed by qualified personnel. If none are necessary, the retrieved team member should change into dry clothing as soon as possible after any necessary personal decontamination.

4.0 UNDERWATER WORK

Underwater work should be performed in accordance with the procedures and guidelines of the Diving Safety Program (Document Control No. 2-15).

5.0 COLD WATER PROCEDURES

When the water temperature is below 45 °F, hypothermia is a serious risk. A person can loose feeling in the extremities within 5 minutes. Additional protective equipment such as cold water immersion suits may be required. All field staff members should be familiar with cold water survival techniques or should receive training from an American Red Cross-certified swimming instructor in cold water survival techniques when site conditions warrant such knowledge. Cold water safe work practices must be addressed in site specific safety documents.

After a person has been rescued from cold water, he or she should change into dry clothes as soon as possible. If the person who has fallen into the water displays hypothermia symptoms, he or she should be treated immediately and taken to a medical facility. Under no circumstances should the hypothermia victim be given hot liquids because this could

accelerate shock. Drinks no warmer than normal body temperature are acceptable. If symptoms are severe and evacuation to a medical facility cannot be quickly conducted, any wet clothing should be removed, the victim should be placed in blankets or sleeping bags in a sheltered location, and the rescuer should climb into the blankets or sleeping bag with victim to provide additional warmth. The victim should also be treated continuously for shock, elevating feet and monitoring the victim's pulse and breathing rate.

If a team member falls into cold water, he or she should not remove any clothing while in the water because clothing provides additional insulation. Although clothing creates an added drag while swimming, the insulation outweighs the disadvantage of the additional drag. Each team member should carry a wool hat to place on his or her head in case he or she falls into the water. A wool hat, even when wet, provides good insulation for the head, where a large amount of body heat is lost.

Revision Date	Document Authorizer	Revision Details
10/1/2008	Chris McClain	Update from 1998 format

ATTACHMENT VII

BOAT SAFETY CHECKLIST

TETRA TECH, INC.

SAFE BOATING CHECKLIST

Owner/Operator Name:_____

Registration Number_____

Location _____ County: _____State: _____HIN:_____

Length of Boat: <16 ❑ 16-25 ❑ 26-39 ❑ 40-65 ❑ > 65 ❑

Area of Operations: Inland ❑ Coastal ❑

Powered by: Gas ❑ Diesel ❑ Sail ❑ Other ❑

Type: PWC ❑ Open ❑ Cabin ❑ Other ❑

VESSEL SAFETY CHECK REQUIREMENTS					**RECOMMENDED AND DISCUSSION ITEMS**			
Item	Yes	No	NA		*Item*	Yes	No	NA
1. Display of Numbers					**(While encouraged, items below are not requirements)**			
2. Registration / Documentation					**I.** Marine Radio			
3. Personal Flotation Devices (PFD)					**II.** Dewatering Device & Backup			
4. Visual Distress Signals (VDS)					**III.** Mounted Fire Extinguishers			
5. Fire Extinguishers					**IV.** Anchor & Line for Area			
6. Ventilation					**V.** First Aid and PIW Kits (**over)			
7. Backfire Flame Control					**VI.** Inland Visual Distress Signals			
8. Sound Producing Devices / Bell					**VII.** Capacity / Cert. of Compliance			
9. Navigation Lights					**VIII.** Discussion Items: (as applies)			
10. Pollution Placard					a. Accident reporting / owner responsibility			
11. MARPOL Trash Placard					b. Offshore operations			
12. Marine Sanitation Devices					c. Nautical charts / navigation aids			
13. Navigation Rules					d. Survival tips / first Aid			
14. State and/ or Local Requirements					e. Fueling / fuel management			
15. Overall Vessel Condition: (as applies)					f. Float plan / weather & sea conditions			
a. Deck free of hazards / clean bilge					g. Insurance considerations			
b. Electrical / fuel systems					h. Boating check list			
c. Galley / heating systems					i. Safe boating classes			

This checklist has been modified for use from the United States Coast Guard Auxiliary Vessel Safety Check (VSC) Program. USCG AUX. Form 204 (7-2000)

Explanation of Required Items

- ❑ **1. NUMBERING:** The boat's registration number must be permanently attached to each side of the forward half of the boat. Characters must be plain, vertical, block style, not less than three (3) inches high, and in a color contrasting with the background. A space or hyphen must separate the letters from the numbers.

- ❑ **2. REGISTRATION / DOCUMENTATION:** Registration or Documentation papers must be on board and available. Documentation numbers must be permanently marked on a visible part of the interior structure. The documented boat's name and hailing port must be displayed on the exterior hull in letters not less than 4 inches in height.

- ❑ **3. PERSONAL FLOTATION DEVICES (PFDs):** Acceptable PFDs (also known as Life Jackets) must be U.S. Coast Guard approved and in good, serviceable condition. A wearable PFD of suitable size is required for the each person on the boat. Wearable PFDs shall be *"readily accessible*." Boats 16 Feet or longer, must also have one Type IV (throwable) device, which shall be " *immediately available*." PFDs shall NOT be stored in unopened plastic packaging.

- ❑ **4. VISUAL DISTRESS SIGNALS:** Boats 16 feet and over are required to carry a minimum of either:
  1) three day and three night pyrotechnic devices
  2) one day non-pyrotechnic device (flag) and one night non-pyrotechnic device (auto SOS light)
  3) a combination of 1) and 2).

  Boats less than 16 feet need only carry night visual distress signals when operating from sunset to sunrise. It is recommended, but not required, that boats operating on inland waters should have some means of making a suitable day and night distress signal. The number and type of signals is best judged by considering conditions under which the boat will be operating.

- ❑ **5. FIRE EXTINGUISHERS:** Fire extinguishers are required if one of the following conditions exists:
  1) Inboard engine(s)
  2) Double bottom hulls not completely sealed or not completely filled with flotation materials
  3) Closed living space
  4) Closed stowage compartments that contain flammable materials or
  5) Permanently installed fuel tanks. Boats less than 26 feet, and propelled by outboard motors are NOT required to have fire extinguishers unless one or more of the conditions (2-5) listed above applies.

Coast Guard Classification of Fire Extinguishers		
Classification (type size)	**B-I**	**B-II**
Foam (minimum gallons)	1.25	2.5
Carbon Dioxide (minimum lbs.)	4	15
Dry Chemical (minimum lbs.)	2	10
Halon (minimum lbs.)	2.5	10

NOTE: Fire extinguishers must be readily accessible and verified as serviceable.

Minimum Number of Extinguishers Required		
Boat Length	*No Fixed System*	*With Fixed System*
Less than 26'	one B-1	0
26' to less than 40'	two B-1 or one B-2	one B-1
40' to 65'	three B-1 or one B-1 & one B-2	two B-1 or one B-2

- ❑ **6. VENTILATION:** Boats with gasoline engines in closed compartments, built after 1 August 1980 must have a powered ventilation system. Those built prior to that date must have natural or powered ventilation. Boats with closed fuel tank compartments built after 1 August 1978 must

meet requirements by displaying a "certificate of compliance." Boats built before that date must have either natural or powered ventilation in the fuel tank compartment.

- ❑ **7. BACKFIRE FLAME ARRESTER:** Gasoline powered inboard/outboard or inboard motor boats must be equipped with an approved backfire flame control device.

- ❑ **8. SOUND PRODUCING DEVICES:** To comply with Navigation Rules and for distress signaling purposes boats must carry a sound producing device (whistle, horn, siren, etc.) capable of a 4-second blast audible for ½ mile. Boats larger than 39.4 ft. are also required to have a bell (see Navigation Rules.)

- ❑ **9. NAVIGATION LIGHTS: B**oats must be able to display navigation lights between sunset and sunrise and in conditions of reduced visibility. Boats 16 feet or more in length must have properly installed, working navigation lights and an all-around anchor light capable of being lit independently from the red/green/white "running" lights.

- ❑ **10. POLLUTION PLACARD:** Boats 26 feet and over with a machinery compartment must display an oily waste "pollution" placard.

- ❑ **11. MARPOL TRASH PLACARD:** Boats 26 feet and over in length, operating in U.S. navigable waters, must display a "MARPOL" trash placard. Oceangoing boats 40 feet and over must also have a written trash disposal plan available onboard.

- ❑ **12. MARINE SANITATION DEVICE:** Any installed toilet must be a Coast Guard approved device. Overboard discharge outlets must be capable of being sealed.

- ❑ **13. NAVIGATION RULES:** Boats 39.4 feet and over must have on board a current copy of the Navigation Rules.

- ❑ **14. STATE AND LOCAL REQUIREMENTS:** A boat must meet the requirements of the state in which it is being examined.

- ❑ **15. OVERALL BOAT CONDITION: As it applies to this Vessel. Including, but not limited to:**

    a. **Deck free of hazards and clean bilge -** The boat must be free from fire hazards, in good overall condition, with bilges reasonably clean and visible hull structure generally sound. The use of automobile parts on boat engines is not acceptable. The engine horsepower must not exceed that shown on the capacity plate.

    b. **Electrical and Fuel Systems:** The electrical system must be protected by fuses or manual reset circuit breakers. Switches and fuse panels must be protected from rain or water spray. Wiring must be in good condition, properly installed and with no exposed areas or deteriorated insulation. Batteries must be secured and terminals covered to prevent accidental arcing. If installed, self-circling or kill switch mechanism must be in proper working order.

    c. **Fuel Systems -** Portable fuel tanks (normally 7 gallon capacity or less) must be constructed of non-breakable material and free of corrosion and leaks. Vents must be capable of being closed. The tank must be secured and have a vapor-tight, leak-proof cap. Each permanent fuel tank must be properly ventilated.

    d. **Galley and Heating Systems -** System and fuel tanks must be properly secured with no flammable materials nearby.

ATTACHMENT VIII

TETRA TECH SWP 5-15 HEAT STRESS AND 5-26 PREVENTION OF SUN EXPOSURE

This safe work practice (SWP) describes situations where heat stress is likely to occur and provides procedures for the prevention and treatment of heat-related injuries and illnesses. Wearing personal protective equipment (PPE), especially during warm weather, puts employees at considerable risk of developing heat-related illness. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress, including PPE, ambient temperature and humidity, workload, and the physical condition of the employee, as well as predisposing medical conditions. However, the primary factors are elevated ambient temperatures in combination with fluid loss. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs, symptoms, and various treatment methods of each form of heat stress. Heat stroke is the most serious heat-related illness—it is a threat to life and has a 20 percent mortality rate. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age directly affect the tendency to heat stroke. Table 1 lists the most serious heat conditions, their causes, signs and symptoms, and treatment.

Training is an important component of heat stress prevention. Employees are instructed to recognize and treat heat-related illnesses during 8-hour health and safety refresher and first aid training courses. When working in hot environments, specific steps should be taken to lessen the chances of heat-related illnesses. These include the following:

- Ensuring that all employees drink plenty of fluids (Gatorade® or its equivalent)
- Ensuring that frequent breaks are scheduled so overheating does not occur
- Revising work schedules, when necessary, to take advantage of the cooler parts of the day (such as working from 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When PPE must be worn (especially Levels A and B), suggested guidelines relating to ambient temperature and maximum wearing time per excursion are as shown in Table 2.

TABLE 1
HEAT STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Heat cramps	Fluid loss and electrolyte imbalance from dehydration	• Painful muscle cramps, especially in legs and abdomen • Faintness • Profuse perspiration	• Move affected worker to cool location • Provide sips of liquid such as Gatorade® • Stretch cramped muscles • Transport affected worker to hospital if condition worsens
Heat Exhaustion	Blood transport to skin to dissipate excessive body heat, resulting in blood pooling in the skin with inadequate return to the heart	• Weak pulse • Rapid and shallow breathing • General weakness • Pale, clammy skin • Profuse perspiration • Dizziness • Unconsciousness	• Move affected worker to cool area • Remove as much clothing as possible • Provide sips of cool liquid or Gatorade® (only if conscious) • Fan the person but do not overcool or chill • Treat for shock • Transport to hospital if condition worsens
Heat Stroke	Life threatening condition from profound disturbance of body's heat-regulating mechanism	• Dry, hot, and flushed skin • Constricted pupils • Early loss of consciousness • Rapid pulse • Deep breathing at first, and then shallow breathing • Muscle twitching leading to convulsions • Body temperature reaching 105 or 106 °F or higher	• Immediately transport victim to medical facility • Move victim to cool area • Remove as much clothing as possible • Reduce body heat promptly by dousing with water or wrapping in wet cloth • Place ice packs under arms, around neck, at ankles, and wherever blood vessels are close to skin surface • Protect patient during convulsions

TABLE 2
SUGGESTED GUIDELINES WHEN WEARING PPE

Ambient Temperature	Maximum PPE Wearing Time per Excursion
Above 90 °F	15 minutes
85 to 90 °F	30 minutes
80 to 85 °F	60 minutes
70 to 80 °F	90 minutes
60 to 70 °F	120 minutes
50 to 60 °F	180 minutes

Source: National Institute for Occupational Safety and Health (NIOSH). 1985. Memorandum Regarding Recommended Personal Protective Equipment Wearing Times at Different Temperatures. From Austin Henschel. To Sheldon Rabinovitz. June 20.

To monitor the level of an employee's heat stress, the following should be measured:

- Heart Rate: Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period; if heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

- Oral Temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 °F (37.6 °C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6 °F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when his or her oral temperature exceeds 100.6 °F (38.1 °C).

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By far, the most common cause of skin cancer is overexposure to the sun. Ninety percent of all skin cancers occur on parts of the body that not usually covered by clothing. People who sunburn easily, and those with fair skin and red or blond hair are more prone to develop skin cancer. The amount of time spent in the sun also affects a person's risk of skin cancer. Premature aging of the skin also occurs with prolonged sun exposure. Tetra Tech encourages personnel to avoid prolonged exposure to the sun, and recommends the following:

- Sunburn can occur during any time of the year. To avoid sunburn, wear hats with wide brims.
- Use sunscreen with a Sun Protective Factor (SPF) rating of 15 or higher.
- To prevent skin cancer:
  - Cover up with a wide brimmed hat and a bandanna for your neck. Wear long-sleeved shirts and pants which the sun cannot penetrate.
  - Use sunscreens to help prevent skin cancer as well as premature aging of your skin. Use a Sun Protective Factor (SPF) rating of 15 or higher.
  - Apply sunscreen at least an hour before going into the sun and again after swimming or perspiring a lot.
  - Do not use indoor sun lamps, tanning salons/parlors, or tanning pills.
- You can still get burned on a cloudy day. Try to stay out of the direct sun at midday, because sun rays are their strongest between 10 a.m. and 3 p.m. Beware of high altitudes - where there is less atmosphere to filter out the ultraviolet rays. Skiers should remember that snow reflects the sun's rays, too.
- Know your skin. Whatever your skin type, do a monthly self-examination of your skin to note any moles, blemishes or birthmarks. Check them once a month and if you notice any changes in size, shape or color, or if a sore does not heal, see your physician without delay.

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10/1/2008	Chris McClain	NEW

ATTACHMENT IX
TETRA TECH DECONTAMINATION OF FIELD EQUIPMENT AND WASTE HANDLING STANDARD OPERATING PROCEDURE

TETRA TECH NUS, INC.	STANDARD OPERATING PROCEDURES	Number SA-7.1	Page 1 of 8
		Effective Date 09/03	Revision 3
		Applicability Tetra Tech NUS, Inc.	
		Prepared Earth Sciences Department	
Subject DECONTAMINATION OF FIELD EQUIPMENT		Approved D. Senovich	

TABLE OF CONTENTS

1.0 PURPOSE

Decontamination is the process of removing and/or neutralizing site contaminants that have contacted and/or accumulated on equipment. The objective/purpose of this SOP is intended to protect site personnel, general public, and the sample integrity through the prevention of cross contamination onto unaffected persons or areas. It is further intended through this procedure to provide guidelines regarding the appropriate procedures to be followed when decontaminating drilling equipment, monitoring well materials, chemical sampling equipment and field analytical equipment.

2.0 SCOPE

This procedure applies to all equipment including drilling equipment, heavy equipment, monitoring well materials, as well as chemical sampling and field analytical equipment decontamination that may be used to provide access/acquire environmental samples. Where technologically and economically feasible, single use sealed disposable equipment will be employed to minimize the potential for cross contamination. This procedure also provides general reference information on the control of contaminated materials.

3.0 GLOSSARY

Acid - For decontamination of equipment when sampling for trace levels of inorganics, a 10% solution of nitric acid in deionized water should be used. Due to the leaching ability of nitric acid, it should not be used on stainless steel.

Alconox/Liquinox - A brand of phosphate-free laboratory-grade detergent.

Decontamination Solution - Is a solution selected/identified within the Health and Safety Plan or Project-Specific Quality Assurance Plan. The solution is selected and employed as directed by the project chemist/health and safety professional.

Deionized Water (DI) - Deionized water is tap water that has been treated by passing through a standard deionizing resin column. This water may also pass through additional filtering media to attain various levels of analyte-free status. The DI water should meet CAP and NCCLS specifications for reagent grade, Type I water.

Potable Water - Tap water used from any municipal water treatment system. Use of an untreated potable water supply is not an acceptable substitute for tap water.

Pressure Washing - Employs high pressure pumps and nozzle configuration to create a high pressure spray of potable water. High pressure spray is employed to remove solids.

Solvent - The solvent of choice is pesticide-grade Isopropanol. Use of other solvents (methanol, acetone, pesticide-grade hexane, or petroleum ether) may be required for particular projects or for a particular purpose (e.g. for the removal of concentrated waste) and must be justified in the project planning documents. As an example, it may be necessary to use hexane when analyzing for trace levels of pesticides, PCBs, or fuels. In addition, because many of these solvents are not miscible in water, the equipment should be air dried prior to use. Solvents should not be used on PVC equipment or well construction materials.

Steam Pressure Washing - This method employs a high pressure spray of heated potable water. This method through the application of heat provides for the removal of various organic/inorganic compounds.

4.0 RESPONSIBILITIES

Project Manager - Responsible for ensuring that all field activities are conducted in accordance with approved project plan(s) requirements.

Field Operations Leader (FOL) - Responsible for the onsite verification that all field activities are performed in compliance with approved Standards Operating Procedures or as otherwise dictated by the approved project plan(s).

Site Health and Safety Officer (SHSO) - The SHSO exercises shared responsibility with the FOL concerning decontamination effectiveness. All equipment arriving on-site (as part of the equipment inspection), leaving the site, moving between locations are required to go through a decontamination evaluation. This is accomplished through visual examination and/or instrument screening to determine the effectiveness of the decontamination process. Failure to meet these objectives are sufficient to restrict equipment from entering the site/exiting the site/ or moving to a new location on the site until the objectives are successfully completed.

5.0 PROCEDURES

The process of decontamination is accomplished through the removal of contaminants, neutralization of contaminants, or the isolation of contaminants. In order to accomplish this activity a level of preparation is required. This includes site preparation, equipment selection, and evaluation of the process. Site contaminant types, concentrations, media types, are primary drivers in the selection of the types of decontamination as well as where it will be conducted. For purposes of this SOP discussion will be provided concerning general environmental investigation procedures.

The decontamination processes are typically employed at:

- Temporary Decontamination Pads/Facilities
- Sample Locations
- Centralized Decontamination Pad/Facilities
- Combination of some or all of the above

The following discussion represents recommended site preparation in support of the decontamination process.

5.1 Decontamination Design/Constructions Considerations

5.1.1 Temporary Decontamination Pads

Temporary decontamination pads are constructed at satellite locations in support of temporary work sites. These structures are generally constructed to support the decontamination of heavy equipment such as drill rigs and earth moving equipment but can be employed for smaller articles.

The purpose of the decontamination pad is to contain wash waters and potentially contaminated soils generated during decontamination procedures. Therefore, construction of these pads should take into account the following considerations

- Site Location – The site selected should be within a reasonable distance from the work site but should avoid:

  - Pedestrian/Vehicle thoroughfares
  - Areas where control/custody cannot be maintained
  - Areas where a potential releases may be compounded through access to storm water transport systems, streams or other potentially sensitive areas.
  - Areas potentially contaminated.

- Pad – The pad should be constructed to provide the following characteristics

  - Size – The size of the pad should be sufficient to accept the equipment to be decontaminated as well as permitting free movement around the equipment by the personnel conducting the decontamination.

  - Slope – An adequate slope will be constructed to permit the collection of the water and potentially contaminated soils within a trough or sump constructed at one end. The collection point for wash waters should be of adequate distance that the decontamination workers do not have to walk through the wash waters while completing their tasks.

  - Sidewalls – The sidewalls should be a minimum of 6-inches in height to provide adequate containment for wash waters and soils. If splash represents a potential problem, splash guards should be constructed to control overspray. Sidewalls maybe constructed of wood, inflatables, sand bags, etc. to permit containment.

  - Liner – Depending on the types of equipment and the decontamination method the liner should be of sufficient thickness to provide a puncture resistant barrier between the decontamination operation and the unprotected environment. Care should be taken to examine the surface area prior to placing the liner to remove sharp articles (sticks, stones, debris) that could puncture the liner. Liners are intended to form an impermeable barrier. The thickness may vary from a minimum recommended thickness of 10 mil to 30 mil. Achieving the desired thickness maybe achieved through layering lighter constructed materials. It should be noted that various materials (rubber, polyethylene sheeting) become slippery when wet. To minimize this potential hazard associated with a sloped liner a light coating of sand maybe applied to provide traction as necessary.

  - Wash/drying Racks – Auger flights, drill/drive rods require racks positioned off of the ground to permit these articles to be washed, drained, and dried while secured from falling during this process. A minimum ground clearance of 2-feet is recommended.

  - Maintenance – The work area should be periodically cleared of standing water, soils, and debris. This action will aid in eliminating slip, trip, and fall hazards. In addition, these articles will reduce potential backsplash and cross contamination. Hoses should be gathered when not in use to eliminate potential tripping hazards.

5.1.2 Decontamination Activities at Drill Rigs/DPT Units

During subsurface sampling activities including drilling and direct push activities decontamination of drive rods, Macro Core Samplers, split spoons, etc. are typically conducted at an area adjacent to the operation. Decontamination is generally accomplished using a soap/water wash and rinse utilizing buckets and brushes. This area requires sufficient preparation to accomplish the decontamination objectives.

Buckets shall be placed within mortar tubs or similar secondary containment tubs to prevent splash and spills from reaching unprotected media. Drying racks will be employed as directed for temporary pads to permit parts to dry and be evaluated prior to use/re-use.

5.1.3 Decontamination Activities at Remote Sample Locations

When sampling at remote locations sampling devices such as trowels, pumps/tubing should be evacuated of potentially contaminated media to the extent possible. This equipment should be wrapped in plastic for transport to the temporary/centralized decontamination location for final cleaning and disposition.

5.2 Equipment Decontamination Procedures

The following represents procedures to be employed for the decontamination of equipment that may have contacted and/or accumulated contamination through site investigation activities.

5.2.1 Monitoring Well Sampling Equipment

5.2.1.1 Groundwater sampling pumps – This includes pumps inserted into the monitoring well such as Bladder pumps, Whale pumps, Redi-Flo, reusable bailers, etc.

1) Evacuate to the extent possible, any purge water within the pump.

2) Scrub using soap and water and/or steam clean the outside of the pump and tubing, where applicable.

3) Insert the pump and tubing into a clean container of soapy water. Pump a sufficient amount of soapy water through the pump to flush any residual purge water. Once flushed, circulate soapy water through the pump to ensure the internal components are thoroughly flushed.

4) Remove the pump and tubing from the container, rinse external components using tap water. Insert the pump and tubing into a clean container of tap water. Pump a sufficient amount of tap water through the pump to evacuate all of the soapy water (until clear).

5) Rinse equipment with pesticide grade isopropanol

6) Repeat item #4 using deionized water through the hose to flush out the tap water and solvent residue as applicable*.

7) Drain residual deionized water to the extent possible, allow components to air dry.

8) Wrap pump in aluminum foil or a clear clean plastic bag for storage.

5.2.1.2 Electronic Water Level Indicators/Sounders/Tapes

During water level measurements, rinsing with the extracted tape and probe with deionized water and wiping the surface of the extracted tape is acceptable. However, periodic full decontamination should be conducted as indicated below.

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* - The solvent should be employed when samples contain oil, grease, PAHs, PCBs, and other hard to remove materials. If these are not of primary concern, the solvent step may be omitted. In addition, do not rinse PE, PVC, and associated tubing with solvents.

1) Wash with soap and water
2) Rinse with tap water
3) Rinse with deionized water

Note: In situations where oil, grease, free product, other hard to remove materials are encountered probes and exposed tapes should be washed in hot soapy water.

5.2.1.3 Miscellaneous Equipment

Miscellaneous equipment including analytical equipment (water quality testing equipment) should be cleaned per manufacturer's instructions. This generally includes wiping down the sensor housing and rinsing with tap and deionized water.

Coolers/Shipping Containers employed to ship samples are received from the lab in a variety of conditions from marginal to extremely poor. Coolers should be evaluated prior to use for

- Structural integrity – Coolers missing handles or having breaks within the outer housing should be removed and not used. Notify the laboratory that the risk of shipping samples will not be attempted and request a replacement unit.

- Cleanliness – As per protocol only volatile organic samples are accompanied by a trip blank. If a cooler's cleanliness is in question (visibly dirty/stained) or associated with noticeable odors it should be decontaminated prior to use.

  1) Wash with soap and water
  2) Rinse with tap water
  3) Dry

If these measures fail to clean the cooler to an acceptable level, remove the unit from use as a shipping container and notify the laboratory to provide a replacement unit.

5.2.2 Down-Hole Drilling Equipment

This includes any portion of the drill rig that is over the borehole including auger flights, drill stems, rods, and associated tooling that would extend over the borehole. This procedure is to be employed prior to initiating the drilling/sampling activity, then between locations.

1) Remove all soils to the extent possible using shovels, scrapers, etc. to remove loose soils.
2) Through a combination of scrubbing using soap and water and/or steam cleaning remove visible dirt/soils.
3) Rinse with tap water.
4) Rinse equipment with pesticide grade isopropanol
5) To the extent possible allow components to air dry.
6) Wrap or cover equipment in clear plastic until it is time to be used.

5.2.3 Soil/Sediment Sampling Equipment

This consists of soil sampling equipment including but not limited to hand augers, stainless steel trowels/spoons, bowls, dredges, scoops, split spoons, Macro Core samplers, etc.

1) Remove all soils to the extent possible.

2) Through a combination of scrubbing using soap and water and/or steam cleaning remove visible dirt/soils.

3) Rinse with tap water.

4) Rinse equipment with pesticide grade isopropanol

5) Rinse with deionized water

6) To the extent possible allow components to air dry.

7) If the device is to be used immediately, screen with a PID/FID to insure all solvents (if they were used) and trace contaminants have been adequately removed.

8) Once these devices have been dried wrap in aluminum foil for storage until it is time to be used.

5.3 Contact Waste/Materials

During the course of field investigations disposable/single use equipment becomes contaminated. These items include tubing, trowels, PPE (gloves, overboots, splash suits, etc.) broken sample containers.

With the exception of the broken glass, single use articles should be cleaned (washed and rinsed) of visible materials and disposed of as normal refuse. The exception to this rule is that extremely soiled materials that cannot be cleaned should be containerized for disposal in accordance with applicable federal state and local regulations.

5.3.1 Decontamination Solutions

All waste decontamination solutions and rinses must be assumed to contain the hazardous chemicals associated with the site unless there are analytical or other data to the contrary. The waste solution volumes could vary from a few gallons to several hundred gallons in cases where large equipment required cleaning.

Containerized waste rinse solutions are best stored in 55-gallon drums (or equivalent containers) that can be sealed until ultimate disposal at an approved facility. These containers must be appropriately labeled.

5.4 Decontamination Evaluation

Determining the effectiveness of the decontamination process will be accomplished in the following manner

- Visual Evaluation – A visual evaluation will be conducted to insure the removal of particulate matter. This will be done to insure that the washing/rinsing process is working as intended.

- Instrument Screening – A PID and/or an FID should be used to evaluate the presence of the contaminants or solvents used in the cleaning process. The air intake of the instrument should be passed over the article to be evaluated. A positive detection requires a repeat the decontamination process. It should be noted that the instrument scan is only viable if the contaminants are detectable within the instruments capabilities.

- Rinsate Blanks – It is recommended that Rinsate samples be collected to

  - Evaluate the decontamination procedure representing different equipment applications (pumps versus drilling equipment) and different decontamination applications.

  - Single use disposable equipment – The number of samples should represent different types of equipment as well as different Lot Numbers of single use articles.

The collection and the frequency of collection of rinsate samples are as follows:

- Per decontamination method
- Per disposable article/Batch number of disposable articles

It is recommended that an initial rinsate sample be collected early in the project to ensure that the decontamination process is functioning properly and in an effort to avoid using a contaminated batch of single use articles. It is recommended that a follow up sample be collected during the execution of the project to insure those conditions do not change. Lastly, rinsate samples collection may be driven by types of and/or contaminant levels. Hard to remove contaminants, oils/greases, some PAHs/PCBs, etc. may also support the collection of additional rinsates due to the obvious challenges to the decontamination process. This is a field consideration to be determined by the FOL.

ATTACHMENT X

TETRA TECH SAFE WORK PROCEDURE

DCN5-37 CRITICAL LIFT SAFE PRACTICES AND CRITICAL LIFT PLAN MASTER CHECKLIST

1.0 PURPOSE

The purpose of this procedure is to identify minimum requirements and provide a means to ensure that critical lift operations are planned, reviewed, and conducted with specific documented instructions that identify appropriate additional, special, and/or unusual precautions, methods, and/or safety requirements that must be accounted for before or during any lifting operation.

2.0 SCOPE

This procedure applies to all Tetra Tech (Tt) projects that include a construction O&M, and/or UXO component, including remediation construction, that involve critical lifts, as defined in Section 3.1, Definitions. This procedure applies to lifting operations performed by Tt's personnel and to lifting operations performed using crane operators provided with rented or leased cranes or other material handling equipment. This procedure may be applicable to work performed by subcontractors; however, the applicability shall be addressed in the subcontract agreement terms and conditions.

3.0 MINIMUM REQUIREMENTS

3.1 Definitions

3.1.1 Competent Person

One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them, OSHA 29 CFR 1926 Subpart CC – Cranes and Derricks in Construction.

3.1.2 Crane and Lifting Equipment

The terms "crane" and "lifting equipment" are used throughout this procedure. It shall be understood that these terms are inclusive of any equipment or tools utilized for lifting operations, including, but not limited to, crawler cranes and truck mounted cranes, including those with lattice booms or telescoping booms; forklifts; backhoes; excavators; loaders; derricks; chain falls; tuggers; and come-alongs. It is the intent that the requirements or guidance set forth in this procedure are to be applied to any device used for lifting activities, with appropriate adjustment to the instructions as required to address the specific situation. (For example, when using a chain fall for a lift or more than 75% of its rated capacity, the Critical Lift Plan checklist entry for "Foundation Support Checked" would require checking the structural integrity for the supporting member to which the chain fall is attached).

3.1.3 Crane Operator Aids

Devices which are used to assist a crane operator in the safe operation of a crane, including: two-block warning devices, two-block prevention devices, load and load moment indicator devices, boom angle and radius indicators, boom and jib stops, boom hoist disengaging devices, limit switches, drum rotation indicators, power line proximity devices, etc.

3.1.4 Critical Lift

A non-routine lift requiring additional detailed planning and additional or more than normal safety precautions. Critical lifts include lifts made when the load weight is 75% or more of the rated capacity of the lifting equipment at a specific configuration (boom angle, lift radius, swing, etc.); lifts which require the load to be lifted, swung, or placed out of the operator's view; lifts made with more than one piece of lifting equipment; lifts involving non-routine or technically difficult rigging arrangement(s); hoisting of personnel with a crane or derrick; or any lift which the lifting equipment operator believes should be considered critical.

Any lift of 30,000 pounds or more should be considered a critical lift, regardless of the crane capacity. The 30,000 pound criteria should be evaluated by the Project Manager and the Site Safety Coordinator (SSC) for the advisability of lowering the criteria based on project-specific factors such as capacity of the lifting equipment to be employed on the project, frequency and nature of the lifting activities, and availability of experienced personnel, among other factors. Establishment of project-specific criteria for determination of critical lifts should be documented by the Project Manager.

3.1.5 Critical Lift Plan

A plan prepared by the Crane Operator, Lift Supervisor, Project Engineer (or designee), and rigger, as applicable, prior to making a critical lift. The Critical Lift Plan shall be documented, and shall be reviewed and signed by all personnel involved with the lift.

3.1.6 Failure Mode

There are two generally recognized modes of failure of cranes when the rated capacity is exceeded, depending on the crane configuration: a structural failure occurs when the boom, jib, or other component of the crane suddenly fails (there is usually no advance warning of an impending structural failure); an overturning failure occurs when the crane is pulled over by the weight of the load (there may be advance warning of an impending overturning failure as weight is transferred from the outboard tires, crawler track, or outriggers, causing these to rise as the back side of the crane becomes "light").

3.1.7 Lift Supervisor

A competent person who has extensive knowledge and experience in lifting operations.

3.1.8 Qualified Operator

An operator who is qualified to operate the crane in accordance with the standards promulgated in 29 CFR 1926.1427, who is licensed or certified to operate the crane, or who has extensive knowledge and experience, and who has successfully demonstrated the ability to operate the equipment and to solve or resolve problems related to operation of the equipment.

3.1.9 Qualified Person

One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project. OSHA 29 CFR 1926 Subpart CC – Cranes and Derricks in Construction.

3.1.10 Tailing Crane Lift

A procedure sometimes used in erecting large vessels or structural elements in which one crane (lead crane) lifts the top of the load and a second crane (tail crane), rigged to the bottom of the load, either secures the bottom of the load from movement or assists in the horizontal positioning of the load. (USACE Safety and Health Requirements Manual, Publication EM 385-1-1).

3.1.11 Tandem Crane Lift

The use of two or more cranes to lift a load. (USACE Safety and Health Requirements Manual, Publication EM 385-1-1).

3.1.12 Terms

The terms "should, may, and might" as used in statements in this procedure are intended to denote a discretionary consideration; the terms "shall and must" are intended to impose a mandatory requirement. The terms "is, are and will" as used in statements in this procedure are intended to denote discretionary or mandatory requirements that are addressed in other department/disciplines' procedures. However, nothing contained herein should be interpreted as to prohibit development and approval of project-specific procedures or plans that take exception to mandatory direction presented in this procedure provided that the appropriate level of approval (Executive Vice President of Construction, Business Line Executive Vice

President, or the Vice President ESQ Services as appropriate) is obtained for deviations from such requirements.

3.1.13 Two-blocking

A condition which occurs when the lower load block or hook assembly comes in contact with the upper load block, or when the load block comes in contact with the boom tip. (USACE Safety and Health Requirements Manual, Publication EM 385-1-1).

3.2 Roles & Responsibilities

3.2.1 Executive Vice President of Construction

The Executive Vice President of Construction is responsible for providing qualified personnel to support the project as requested by the Project Manager.

3.2.2 Project Manager

The Project Manager is responsible for ensuring that a qualified Lift Supervisor and Project Engineer are assigned to the project for the performance of critical lifts. The Project Engineer may delegate authority to perform functions relative to critical lifts to a qualified Field Engineer but should maintain oversight of activities.

The Project Manager is responsible for communicating to the Site Superintendent and the Lift Supervisor that the Lift Supervisor is to be assigned the authority to take any actions, including but not limited to exercising Stop Work Authority, required for the safe execution of this critical lift.

3.2.3 Site Superintendent

The Site Superintendent is responsible for ensuring that no critical lifts are performed without the completion and approval of a Critical Lift Plan in accordance with this procedure, that no critical lifts are scheduled without the knowledge of the Lift Supervisor, and that the Lift Supervisor is assigned the authority discussed in Section 3.2.4 below.

3.2.4 Lift Supervisor

The Lift Supervisor is responsible for the execution of critical lifts, including selection of appropriate equipment of sufficient capacity, selection of qualified operators, and direct supervision of the critical lift operation and all personnel involved in the critical lift, including

the operator, rigger, and signalperson. The Lift Supervisor is responsible for ensuring that all personnel associated with the critical lift are aware of their responsibilities as addressed in this procedure, any applicable project procedure(s), and/or the Critical Lift Plan.

The Lift Supervisor is responsible for the selection of rigging slings, spreaders, shackles, and miscellaneous rigging materials in accordance with the requirements of the Critical Lift Plan. The Lift Supervisor is responsible for the arrangement and configuration of the rigging, and the attachment of the rigging to the load and to the lifting hook in accordance with safe rigging practices and the Critical Lift Plan.

The Lift Supervisor shall be responsible for determining the applicable qualification requirements for the crane operator in accordance with this procedure, state and local licensing agency requirements, OSHA 29 CFR 1926 Subpart CC – Cranes and Derricks in Construction, ANSI/ASME B30 standards, client requirements, or equipment manufacturer's recommendations. The U.S. Army Corps of Engineers (USACE), for example, requires proficiency qualification of operators, which includes a written examination and a physical examination, on USACE projects. Assistance in determining state and local licensing agency requirements may be obtained from a Tt Regulatory Specialist.

3.2.5 Crane Operator

The crane operator is responsible for the performance of the pre-operational inspections prior to each use of a crane, safe operation of the crane, and the performance of the critical lift in accordance with the requirements of the Critical Lift Plan and the instructions of the Lift Supervisor. The crane operator is responsible for ensuring that the following documents are with the crane at all times, and that the documents are completed as required:

- A copy of the operating manual developed by the manufacturer for the specific make and model of crane.
- A copy of the operating manual for any crane operator aids with which the crane is equipped.
- The load rating chart for the crane.
- A copy of the crane log book which records all operating hours as well as all inspections, tests, maintenance, and repair.
- The US Army Corps of Engineers (USACE) Safety and Health Requirements Manual, EM 385-1-1, requires the following information to be included on the load rating chart for lifting equipment to be used on a USACE project:

- The crane make and model, serial number and year of manufacture;
- Load ratings for all crane operating configurations, including optional equipment;
- Wire rope type, size and reeving; line pull, line speed and drum capacity; and
- Operating limits in windy or cold weather conditions.

When circumstances are encountered where all of the required information listed above is not included on the load rating chart for lifting equipment to be used on a USACE project, the USACE's project representative shall be requested to provide direction. For lifting equipment to be used on projects where the requirements of EM 385-1-1 do not apply, the Lifting Supervisor should determine the project's requirements concerning the information listed above.

The crane's log book shall be updated daily as the crane is used and shall be signed by the operator and supervisor. Service mechanics shall sign the log after conducting maintenance and repairs on the crane.

3.2.6 Signalperson

The signalperson is responsible for familiarity with the proper use of hand signals, radio communications, or other signal devices as appropriate for the Critical Lift Plan.

3.2.7 Subcontractors/Vendors

Roles and responsibilities of Tt personnel for lifting activities performed by subcontractors, vendors and suppliers shall be as established in the subcontract agreement terms and conditions and site-specific procedures.

3.3 Qualifications

3.3.1 Lift Supervisor Qualifications

The Lift Supervisor shall have the capability of determining the total weight and center of gravity of the load; selecting the appropriate lifting equipment and rigging materials rated for the load and the particular lifting configuration; evaluating the lifting configuration and conditions affecting the lift; and evaluating the condition of the equipment and rigging.

The Lift Supervisor shall have demonstrated the ability to solve or resolve problems related to lifting operations through experience, certification, or other means to the satisfaction of the Executive Vice President of Construction and the Project Manager.

3.3.2 Crane Operator Qualifications

Individual states and/or municipalities may have licensing requirements for crane operators. Where there are no licensing requirements, a certification of competency is recommended. Requirements for competency certification shall be included in subcontracts or purchase orders if this is to be a requirement of the project. The Project Manager should coordinate with the Tt Labor Relations Representative for the project to ensure inclusion of the competency certification requirement in the Project Labor Agreement as appropriate.

Crane operators shall be physically, mentally, medically, and emotionally qualified for performing the duties required of the position. Some factors to be considered in determining qualifications of crane operators are strength, endurance, agility, coordination, and visual and hearing acuity.

Tetra Tech crane operators shall be required to demonstrate to the satisfaction of the Lift Supervisor their knowledge of the following:

- Responsibilities of the operator, rigger, signalpersons, and lift supervisor;
- Knowledge of crane safety requirements (such as required safety equipment, clearance from power lines, overhead lifts, etc.) and the crane's operator manual;
- Ability to determine the crane configuration, to determine the weight and center of gravity of loads, and to determine the crane's capacity using the load chart;
- Ability to determine whether the crane would be in either the structural and overturning failure mode for the crane's configuration and the lift radius, using the crane's load chart;
- Use and limitations of the crane operator aids;
- Crane inspection, testing and maintenance requirements;
- Determination of ground conditions and outrigger matting requirements;
- Crane set-up, assembly, dismantling, and demobilization procedures;
- Signaling and communication procedures; and
- Factors which reduce rated capacity.

Tetra Tech crane operators shall pass a practical operating examination, conducted by the Lift Supervisor, which demonstrates their ability to perform the following:

- Inspecting the crane (refer to Construction Tools and Equipment, Attachment 2, for a Daily Equipment Inspection checklist);
- Establishing a stable foundation and leveling the crane;
- Raising, lowering, extending, retracting and swinging the boom;
- Raising and lowering the load line;
- Attaching the load, holding the load, and moving the load;
- Reading and understanding the signs, load charts, signals and operating instructions in use; and
- Reading the load, boom angle, and other indicating devices.

During the practical examination the crane operators should demonstrate the ability to operate the crane smoothly, with no sudden starts, stops or impact loading.

Results of crane operators' qualification examinations should be documented by the Lift Supervisor in the cranes' log books and/or other appropriate on-site project file.

3.3.3 Rigger Qualifications

The rigger shall demonstrate, to the satisfaction of the Lift Supervisor, a knowledge of safe rigging practices and the abilities to select the proper rigging hardware, slings and accessories of adequate capacity; to inspect the rigging and determine its condition, acceptability for use and load capacity; and to position the load in the lifting devices, assuring that the load is well secured, stable and balanced.

3.3.4 Signal Person Qualifications

The signalperson shall demonstrate, to the satisfaction of the Lift Supervisor, the ability to communicate, verbally and through the use of standard signals, with the crane operator, other workers, and the Lift Supervisor. The signalperson shall possess the visual and hearing acuity required for the performance of the duties associated with the position. The signalperson shall demonstrate a knowledge of the operation of any radio or other communication devices required for the lifting operation.

3.4 Planning the Lift

3.4.1 Critical Lift Plan Preparation, Review and Approval

Prior to commencing any lift meeting, the requirements of a critical lift, as defined in Section 3.4 of this procedure, the Site Superintendent shall ensure that a Critical Lift Plan is prepared, reviewed and approved. The Critical Lift Plan shall be prepared with appropriate input from the Lift Supervisor, Project Engineer (or designee), crane operator, rigger and the Site Safety Coordinator (SSC). The Critical Lift Plan shall be approved by the Project Manager or designee, and shall be signed by all personnel involved in the lift.

The Project Manager shall ensure that personnel performing calculations for total lift weight, determination of center of gravity, and capacity of the crane at the operating radius, as well as all other calculations required for the critical lift, possess the necessary qualifications. The Project Engineer may establish requirements for the performance of calculation reviews by a checker, and an independent verification of calculations, in accordance with the Tt Engineering Procedures. State and/or federal regulations may require a Professional Engineer to stamp the calculations for the Critical Lift Plan. Assistance in determining specific regulations applicable to a project may be obtained from a Regulatory Specialist.

Attachment 1, Critical Lift Plan Forms, provides a standard form which may be utilized to document the Critical Lift Plan. Other forms or project generated formats may be utilized provided that they address all of the areas required by this procedure.

After completion of the Critical Lift Plan, and immediately before the lift, the Lift Supervisor shall hold a meeting to be attended by all personnel involved in the lift. The purpose of the meeting is to communicate the roles, authorities, and responsibilities of all personnel, in particular the role of the Lift Supervisor as the person with the overall responsibility for the lift and the authority to direct the actions of all personnel involved in the lift; and to review the lift equipment and rigging selection, lift configuration, lift operation sequence, and all hazards involved in the lift. The pre-lift meeting shall be documented in the crane's log book.

For multiple, repetitive lifts with the same basic crane configuration and only minor variations in load weight, lift radius, or other variables, as determined by the Lift Supervisor, the Project Manager or designee may authorize the use of a single Critical Lift Plan to document all of the involved lifts. In those cases, the Lift Supervisor shall analyze the various lifts and ensure that the Critical Lift Plan adequately addresses the worst case combination of all of the variables involved.

For multiple, repetitive lifts utilizing one Critical Lift Plan, and conducted during the same work shift, The Project Manager or designee may determine that only one pre-lift meeting is required. Waiver of the pre-lift meeting should be documented in the crane's log book. Critical

lifts performed on separate shifts or workdays should require additional, documented pre-lift meetings as described above.

3.4.2 Critical Lift Plan Content

The Critical Lift Plan shall:

- Specify the exact size and weight of the load to be lifted as well as all crane and rigging components which add to the weight. Calculations required for determination of total weight, lift radius, % of crane's capacity, and center of gravity shall be included in or attached to the Critical Lift Plan. Documentation of any required calculation checks and independent verifications shall also be attached to the Critical Lift Plan,

- Specify the lift geometry and procedures, including the crane position, height of the lift, the load radius or boom angle, and the boom length, for the entire range of the lift. Sketches may be used when appropriate to adequately describe the layout,

- Designate the Crane Operator, Lift Supervisor, and Rigger. The Lift Supervisor shall be designated as the person in charge of the lift,

- Include a rigging plan which shows the lift points and forces and describes the rigging procedures and the hardware requirements. Sketches may be used when required to adequately describe the configuration and attachment points to the load,

- Include the sequence of the lift operation's activities, including verification of preparation activities (setup, inspections, testing),

- Describe the ground conditions, outrigger or crawler track requirements, and, if necessary, the design of cribbing or mats, necessary to achieve a level, stable foundation of sufficient bearing capacity for the lift for ground based lift equipment and the operating base (platform) condition for floating lift equipment,

- List the environmental conditions (rain, snow, ice, lightning, reduced visibility, etc.) under which the lift operations shall be conducted and/or curtailed or stopped,

- Specify the coordination and communication requirements for and during all lift operations, and

- Specify the make and model of the cranes, the line, boom and swing speeds, and requirements for an equalizer beam for tandem or tailing lift equipment.

3.4.3 Crane Supported Work Platforms (Manbaskets)

Crane supported work platforms shall be used only when the erection, use, and dismantling of conventional means of reaching a work site, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold would be more hazardous or is not possible because of structural design or work site conditions. (See SWP 5-37 Manbasket Form).

3.4.4 Special Considerations for Critical Lifts

When two or more cranes are used to lift a load, the responsibility of the Lift Supervisor as the person in charge of the lift shall be emphasized to all personnel involved in the lift. If the Lift Supervisor delegates any authority to a crane operator, this delegation shall be clearly communicated to all personnel involved in the lift.

When two or more cranes are used in a lift, unless approved otherwise, the capacity of each crane shall be at least equal to or greater than the total weight to be lifted including the load, lifting beams, rigging, hooks and attachments. Particular attention shall be given to the distribution of the load between the cranes to eliminate the overloading of a crane due to unbalanced load distribution and forces. The Lift Supervisor shall consider the rigging configuration to ensure that there is no possibility of an unacceptable load transfer between cranes, Such a load transfer may overload a crane.

Consideration shall be given to the possibility that the load may not be successfully placed in its intended location due to unanticipated occurrences (wind, obstacles, etc.). The Critical Lift Plan shall address contingency plans to return the load to its original or an alternate location. Refer to Section 3.4.4 of this procedure for additional discussion on this subject.

Consideration shall be given to the performance of a test lift to demonstrate the ability to safely perform a lift when, in the judgment of the Project Manager or the Lift Supervisor, there is a significant risk of a loss occurring during the actual lift. In evaluating the need for a test lift, consideration should be given to the complexity of the lifting operation, the value of the component being lifted, the potential impact to other installations, and potential schedule impacts, among other factors.

3.4.5 General Considerations for All Lifts

The Project Engineer or designee shall review and approve the strength and stability of the foundation or supports to receive any load. Cranes should be positioned as near as possible to the load, maintaining a safe operating distance from any foreign objects that might contact the boom and outriggers, and, if possible with a clear line of sight of the complete lift operation with consideration for minimizing the swing and the setting radii. The operator shall verify that

the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.

The immediate area of the lift should be checked for any electrical wires. A minimum safe distance of 10 feet shall be maintained from power lines rated 50 kV or less. The USACE Safety and Health Requirements Manual, Publication EM 385-1-1 shall be consulted for minimum safe distances from electric lines with a higher system voltage. Alternately, the minimum safe distance may be calculated as follows: minimum safe distance = 10 ft + 0.4 in for each 1 kV of lines rated over 50 kV; or twice the length of the line insulator (but never less than 10 feet). Refer to ANSI/ASME B30.5a for specific guidance concerning the operation of cranes in proximity to electrical transmission lines. Special precautions including de-energizing and grounding the lines may be required depending on the proximity and possibility of the crane, the load line, or the load becoming a conductive path.

The required bearing capacity for the ground or foundation supporting the crane should be calculated, and the actual bearing capacity should be verified to be sufficient to support the crane and the load being lifted.

3.4.6 The Lift Supervisor should always ensure that:

- The swing area of the crane is barricaded to protect personnel in the immediate area;
- Loads are not lifted over personnel;
- All loose load objects are secured or removed;
- Tag lines are used to control loads except where their use will create a hazard;
- The crane is not subjected to sudden lifting, stopping or impact loading;
- Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited;
- Rigging attachment points are as specified by the equipment vendor, if applicable, or as specified in the Critical Lift Plan;
- Softeners are used at contact points between rigging and load as necessary to avoid damage to the load or the rigging;
- Environmental conditions under which lifting operations should not be performed, such as wind, precipitation, reduced visibility, etc., have been established and

communicated to project personnel through the Work Plan, Health, and Safety Plan (HASP), and by verbal instructions, and

- Consideration is given towards developing a contingency plan should conditions prohibit the load from being placed in it's intended position. Contingency plans could include placement back in its original position or an alternate temporary location, and should include ensuring that adequate cribbing, dunnage, or tie downs are provided for the alternate location.

The Lift Supervisor shall determine that the foundation or supports to receive any load have been reviewed for stability and strength prior to any lift operation. This may be considered as a risk sensitive item, and if so, calculations performed shall be checked and independently verified prior to use in accordance with CP-11, Field Engineering. Temporary supports such as dunnage, cribbing, tie downs, and false work shall be reviewed with consideration given to the load's weight, center of gravity, and resistance to overturning forces. Stability and bearing capacity of soils to support loads shall be verified. Review and approval of permanent foundations or supports is performed as part of the design, however, there may be instances where a load is to be placed in it's final, designed location prior to completion of all construction associated with support of that load. (Examples: Backfill may not have been placed against foundations, concrete may not have achieved full design strength, or structural steel framing may not be complete.) These instances require review and approval by the Project Engineer prior to any load being placed.

Prior to placement of any load in storage or otherwise temporarily staged prior to placement in its final, designed location, consideration shall be given to any future access requirements, needed maintenance activities, the ability to perform future lifting or handling, and any construction activities expected to be performed in the vicinity of the stored or staged load.

3.4.7 Rigging Requirements

Certification of all lift accessories, including the results of proof tests for custom designed accessories, shall be available at the on-site project offices and maintained in a file as part of the project filing system. Certifications for load testing shall only be required if specified in the contract documents.

The total weight of the load to be lifted must include all lifting beams, rigging, hooks and attachments before any lift can be planned or executed.

The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity whenever and wherever possible. Where the location of attachments is below the center of gravity, extreme care must be taken to ensure

stability of the load and to guard against overturning of the load. Special precautions shall be taken in the selection of sling lengths and attachment configurations to ensure that the load is stable. Rigging of loads in this configuration should only be performed by personnel with extensive experience in rigging and after all plans have been reviewed and approved by competent and qualified personnel.

Consideration shall be given in any lifting operation to the possibility of a load becoming unstable during lifts intended only to reposition a load, such as up righting or turning a load over. The center of gravity shall be calculated for the load in all positions anticipated in order to ensure stability.

The load shall be safely rigged within the rated capacity of all rigging equipment.

Sling capacities shall be determined based on sling configuration (vertical, choker or basket hitch) and sling leg angle.

Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall have been proof-tested prior to use to 125% of their load rating.

3.4.8 Crane Inspections

Inspection Classification: Crane inspections are divided into two classifications by the ANSI/ASME B30 standards:

- Initial Inspection: Prior to initial use, all new and altered cranes shall be inspected by a qualified person to verify compliance with the applicable provisions of the ANSI/ASME B30 standards.

- Regular Inspection: The inspection procedure for cranes in regular service is further divided into two general classifications based on the intervals at which inspections should be performed. The intervals are dependent in turn on the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications of regular inspections are designated as “frequent” and “periodic”, with respective intervals between inspections defined as:

- Frequent Inspection - intervals from one to thirty days, performed by a person designated by the Lift Supervisor; and

- Periodic Inspection - intervals from one to twelve months (or as specifically recommended by the manufacturer or by a qualified person), performed by a qualified person.

Specific guidelines and requirements for all of the above inspections are included in the ANSI/ASME B30 standards.

Implementation of the inspection requirements listed above for Tt projects shall be in accordance with the following:

- Prior to initial use, all new and altered cranes to be used by Tt shall be inspected (initial inspection) by a certified crane inspector to ensure compliance with the applicable portions of the ANSI/ASME B30 standards, or the Power Crane and Shovel Association Standard #4 for draglines.

- Cranes to be used by Tt shall receive pre-operational inspections (frequent inspections) performed by the crane operator daily, prior to every use. Refer to the USACE Safety and Health Requirements Manual, Publication EM 385-1-1, Appendix H, Crane and Derrick Inspection, for a checklist of items to be inspected. Pre-operational inspections of rented or leased cranes, performed by a Tt employee (e.g. either a certified crane inspector, the Lift Supervisor, or the crane operator) should not be documented or used in place of a periodic inspection.

- Cranes to be used by Tt shall receive periodic inspections conducted by a qualified person on an annual basis, or more frequently if recommended by the manufacturer or if subjected to extensive use. Because of liability considerations, the vendor renting or leasing the crane shall be responsible for performing and documenting the periodic inspections.

- Cranes which have been idle for a period of more than one month but less than six months shall be given a pre-operational inspection, conforming to the requirements for frequent crane inspections and frequent wire rope inspections, by a qualified person before being placed into service.

- Cranes which have been idle for a period of more than six months shall be given a complete inspection, conforming to the requirements for frequent and periodic crane inspections and for frequent and periodic wire rope inspections, by a qualified person prior to being placed into service.

3.4.9 Crane Performance Load Tests

Cranes to be used by Tt shall receive performance load tests by a qualified person in accordance with USACE Safety and Health Requirements Manual EM 385-1-1 Appendix I under the following circumstances:

- Prior to initial use of cranes when load sustaining parts have been altered, replaced, or repaired (excluding replacement of load line wire rope);

- Every time it is reconfigured or reassembled after disassembly or is moved and set up in a unsimilar configuration; and

- Every four years.

Under the first 2 bullet statements a selective operational performance test (testing only components that have or may have been affected by the alteration, replacement, repair, reconfiguration, or reassembly) may be performed.

A crane boom stop field test shall be conducted to verify the proper setup of the boom stops and functioning of the boom hoist disengaging device. This test shall be conducted, and deficiencies noted shall be corrected, prior to initiating the load performance test. Refer to the USACE Safety and Health Requirements Manual, Publication EM 385-1-1, Appendix I, for a checklist for the crane boom stop field test.

Performance load tests shall be conducted in accordance with the manufacturer's recommendations. Test loads shall not exceed 100% of the manufacturer's load rating capacity chart for any configuration of the test, except where a specific requirement exists.

Written reports of the load test, showing test procedures and confirming the adequacy of repairs or alterations, shall be maintained in the crane log book and in project equipment records.

3.4.10 Applicability to Subcontractors

Subcontractors performing work on Tt projects shall be required to comply with the minimum requirements of the Tt Safety Plan(s) or to develop and implement a Site Safety Plan of their own which includes Tt requirements in accordance with DCN 2-11 Health and Safety Qualifications for Subcontractors.

This critical lift procedure in and of itself is not directly applicable to subcontractors unless specifically addressed in the subcontract terms and conditions. The Project Manager may provide copies of this procedure to subcontractors for their use in developing their own Critical Lift Plans; however, this should only be done with the understanding and express, written agreement that Tt has no responsibility or liability for the acceptability and/or implementation of this procedure in the subcontractors' plans.

4.0 GUIDANCE

None Required

5.0 REFERENCES

1. American National Standards Institute, ANSI/ASME B30 Standards, B30.1 through B30.25, including the B20.5-1995 Addenda to ASME B30.5-1994
2. OSHA 29 CFR 1926 Subpart CC – Cranes and Derricks in Construction
3. Power Crane and Shovel Association Standard #4
4. USACE Safety & Health Requirements Manual, Publication EM-385-1-1, October 1992 or latest edition

6.0 ATTACHMENTS

1. Attachment 1 - Critical Lift Plan and Attachment "A"
2. Attachment 2 - Personnel Platform (Manbasket) Inspection/Verification Form

ATTACHMENT XI

TETRA TECH SAFE WORK PROCEDURE SWP 5-38 SAFE LOAD SECURING GUIDELINES

1.0 Loads

Loads are secure and do not exceed manufacturer's specifications and legal limits for the vehicle.

Vehicles will be equipped with only necessary equipment, laid out or positioned in the safest configuration. Loads, equipment and other items shall be tied down or secured before commencing motion, and total weight shall never exceed the weight limitations of the vehicle.

2.0 Guidance

Loads, equipment and other items transported external to the driving compartment or on a trailer shall be:

- Secured in such a manner to prevent against the loss of the load via leaking, spilling, blowing off or falling from the motor vehicle.
- Contained, immobilized or secured in such a manner to prevent shifting.
- If likely to roll, restrained by chocks, wedges, a cradle or other equivalent means to prevent rolling.
- If considered top heavy and capable of tipping, secured in such a manner to prevent tipping.
- If placed beside each other and secured by transverse tie-downs, either placed in direct contact with each other or prevented from shifting towards each other while in transit.

Securing devices and systems shall be capable of withstanding the following three forces, applied separately:

- Deceleration in the forward direction.
- Acceleration in the reverse direction.
- Acceleration in a lateral direction.

The manufacturer shall apply any tie-down points added to a vehicle, or the tie-down points shall meet manufacturer's specifications.

Loads, equipment and other items transported under a pickup truck bed-covering device shall be considered secured.

The driver shall verify that loads, equipment and other items transported inside a vehicle's driving compartment are secure and/or positioned to eliminate or minimize safety risks to the occupants. When loading these items, the driver shall consider:

- Transporting them in the trunk of a car (e.g., a suitcase or computer bag).
- Stowing them under or behind a seat, glove box or armrest console.
- Covering them with netting or holding them in the seats with seatbelts or similar devices.

Revision Date	Document Authorizer		Revision Details
	Name	Approval Date	
4/21/2012	Chris McClain		

ATTACHMENT XII

TETRA TECH RESPIRATORY PROTECTION PROGRAM

TETRA TECH INC.
RESPIRATORY PROTECTION PROGRAM
For
Lockheed Martin
Middle River Complex
Block E

April 2013

TABLE OF CONTENTS

Respiratory Protection Program

1.0 INTRODUCTION

1.1 Mission

Tetra Tech ensures the safe and healthful work environment for employees performing field work. To accomplish this mission Tetra Tech evaluates all work sites provides the proper protective equipment to insure that all employees are properly protected.

1.2 Vision

Tetra Tech is committed to being the premier environmental engineering and consultation firm, dedicated to providing our clients with the best possible service to ensure regulatory compliance in all aspects of environmental work.

2.0 PURPOSE

Tetra Tech, Inc has determined that certain employees may be potentially exposed to respiratory hazards during grass cutting operations on Block E of the Middle River Complex from PCB contamination. If significant dust is generated that obscures vision this program and respiratory protective equipment will be used. The purpose of this program is to ensure that all Tetra Tech, Inc. employees are protected from exposure to possible respiratory hazards from PCB exposure.

Engineering controls, such as ventilation and isolation, are not appropriate for grass cutting operations at this site. Since Tetra Tech, Inc. cannot control exposure at this site. Respirators and other protective equipment may be used if dust is generated.

3.0 SCOPE AND APPLICATION

This program applies to employees who may be required to wear respirators during grass cutting operations at Block E.

Any employee who wears a respirator is subject to medical evaluation, cleaning, maintenance, and storage elements of this program, and must be provided with certain information specified in this section of the program.

Employees participating in the respiratory protection program do so at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment will be borne by Tetra Tech, Inc.

4.0 RESPONSIBILITIES

4.1 Program Administrator

The Program Administrator is responsible for administering the respiratory protection program. Duties of the program administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards.
- Selection of respiratory protection options.

- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Arranging for and/or conducting training.
- Ensuring proper storage and maintenance of respiratory protection equipment.
- Conducting qualitative fit testing.
- Administering the medical surveillance program.
- Maintaining records required by the program.
- Evaluating the program.
- Updating written program, as needed.

The Program Administrator is Clyde Snyder Tetra Tech, Inc.

4.2 Supervisors

Supervisors are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees in their charge. Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection program.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

4.3 Employees

Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. Employees must also:

- Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
- Inform their supervisor if the respirator no longer fits well, and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.

5.0 PROGRAM ELEMENTS

5.1 Selection Procedures

The Program Administrator has selected a respirator to be used for Tetra Tech, Inc. personnel. This selection is based on the hazard (PCB's) to which workers are exposed it is also in accordance with

OSHA standards. The Program Administrator conducted a hazard evaluation for the anticipated operation, and the work area (Block E) where the airborne contaminant may be present. The hazard evaluation has limited the exposure potential to particulates which PCB's are attached.

- Particulate contaminants are classified according to physical and chemical characteristics and the physiological effect of the body. The particulates are measured in diameter in microns (1 micron = 1/25,400 of an inch). Particulates below 10 microns have a greater chance to enter the respiratory system, and particles below 5 microns in diameter are more likely to reach the deep lung or alveolar spaces. In healthy lungs, particles from 5 to 10 microns are naturally removed by the human body. With excessive "dust" exposure or someone who has a diseased respiratory system the efficiency of the cleaning action is significantly reduced.

- Prior to performing grass cutting and trimming where there is an atmospheric hazard, Tetra Tech, Inc. personnel must ensure the following:

    - Review the work area and required tasks to be performed.

    - Determine where potential exposures to hazardous substances may occur.

    - This review shall be conducted by surveying the site, reviewing current and historical records, and talking with TETRA TECH, INC management and Health and Safety personnel.

    - Monitoring will not be performed due to Tetra Techs and Lockheed Martins knowledge of site contaminants (PCB's) levels encountered will only occur during dry conditions when dust is created. Based on previous data contaminants levels are within the visible range making monitoring instruments unnecessary.

5.1.1 Updating the Hazard Assessment

The Program Administrator must revise and update the hazard assessment as needed (i.e., any time the work process changes or new information is obtained that could potentially affect exposure). If an employee feels that respiratory protection is needed during a other activities, he/she is to contact his or her supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard, arranging for outside assistance as necessary. The Program Administrator will then communicate the results of that assessment back to the employee. If it is determined that respiratory protection is necessary, all other elements of this program will be in effect for those tasks and this program will be updated accordingly.

5.1.2 NIOSH Certification

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.

5.2 Medical Evaluation

Employees who wear respirators must pass a medical exam before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has

determined that they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

Workcare has been chosen by Tetra Tech to provide this service will provide the medical evaluations. Medical evaluation procedures are as follows:

- The medical evaluation will be conducted using the questionnaire provided in Appendix C of the respiratory protection standard. The Program Administrator will provide a copy of this questionnaire to all employees requiring medical evaluations.

- To the extent feasible, Tetra Tech, Inc. will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee will be sent directly to the physician for medical evaluation.

- Follow-up medical exams will be granted to employees as required by the standard, and/or as deemed necessary by the WorkCare clinic physician.

- All employees will be granted the opportunity to speak with the physician about their medical evaluation, if they so request.

- The Program Administrator has provided the occupational medicine physician (Workcare) with a copy of this program, a copy of the Respiratory Protection Standard, the list of potential hazardous substances, and for each employee requiring evaluation: his or her work area or job title, proposed respirator type and weight, length of time required to wear respirator, expected physical work load (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing required.

- Any employee required for medical reasons to wear a positive pressure air purifying respirator will be provided with a powered air purifying respirator.

- After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations will be provided under the following circumstances:

    - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.

    - The WorkCare clinic physician or supervisor informs the Program Administrator that the employee needs to be reevaluated;

    - Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;

    - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

All examinations are to remain confidential between the employee and the physician.

5.3 Fit Testing

Fit testing is required for employees wearing half-facepiece APRs for exposure to suspended particulates in the atmosphere.

Employees required to wear half-face piece APRs during grass cutting operations will be fit tested:

- Prior to being allowed to wear any respirator with a tight fitting face piece

- Annually
- When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.)

Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several sizes of respirators so that they may find an optimal fit.

The Program Administrator will conduct fit tests following the OSHA approved QNFT Protocol in Appendix B (B4) of the Respiratory Protection standard.

5.4 Respirator Use

Participation in the Respiratory Protection Program at Tetra Tech, Inc. is mandatory. Only individuals who are in the program will be issued respirators. Others will refrain from entering atmospheres where respiratory protection is required.

5.4.1 General Use Procedures

- Employees will use their respirators under conditions specified by this program, and in accordance with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

- All employees shall conduct user seal checks each time that they wear their respirator. Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the Respiratory Protection Standard.

- Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the facepiece-to-face seal.

- Air Purifying filters provides respiratory protection against aerosols by removing dusts, mists, fumes, fibers, and other particles. Filters do not remove gases or vapors, or correct for oxygen deficiency. P100 Particulate Filter provides a 99.97% Minimum Filter Efficiency. Typical applications include but are not limited to asbestos or mold and lead.

- Employees wearing respirators must be clean shaven with no stuble.

- End of service life for filters is normally determined by the increase in breathing resistance sensed by the user. When it becomes difficult to breathe comfortably, the filters should be replaced.

5.4.2 Half Mask Air Purifying Respirator


550030M Half Mask shown with 7580P100 Cartridges

The North 5500 Series is a comfortable and efficiently designed half mask respirator. It was chosen because of its convenience, low maintenance and it is disposable. However, all parts are replaceable, which will extend the useful life of the respirator.

Features and benefits:

- Made of an extremely soft non-allergenic elastomer for comfort and fit. Contoured sealing flange eliminates discomfort caused by pressure points on facial nerves. The design of nose area provides excellent comfort and fit

- Low dead air space improves worker comfort by limiting re-breathing of exhaled air
- Direct cartridge to facepiece seal minimizes replacement parts and simplifies maintenance
- Three overlapping sizes comfortably fit most users
- North 5500 Series half masks are compatible with all North cartridges, filters and accessories

5.4.3 Emergency Procedures

If during grass cutting operations, Tetra Tech, Inc. employees must ensure that a procedure is in place to evacuate the site. If a site alarm sounds, employees must immediately exit the area and report to the designated location.

5.4.4 Respirator Malfunction

For any malfunction of an APR (e.g., such as breakthrough, facepiece leakage, or improperly working valve), the respirator wearer should immediately leave the site and inform his or her supervisor that the respirator no longer functions as intended, and go to the designated safe area to maintain the respirator. The supervisor must ensure that the employee receives the needed parts to repair the respirator, or is provided with a new respirator.

5.4.5 Immediately Dangerous to Life and Health (IDLH) Procedures

Respirators will only be worn in areas declared to be free of IDLH situations.

5.5 Air Quality

This work is being conducted in the open air, air quality should not be an issue. The only air quality issue that could arise is dust generated during grass cutting operations. Prior to commencing grass cutting personnel will determine the site conditions if dry conditions exist conduct area wetting to suppress dust.

5.6 Cleaning, Maintenance, Change Schedules and Storage

5.6.1 Cleaning

Respirators are to be regularly inspected, cleaned and disinfected if necessary.

The following procedure is to be used when cleaning and disinfecting respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the face piece and associated parts in a mild detergent with warm water. Do not use organic solvents.
- Rinse completely in clean warm water.
- Wipe the respirator with disinfectant wipes (70% Isopropyl Alcohol) to kill germs.
- Air dry in a clean area.
- Reassemble the respirator and replace any defective parts.

- Place in a clean, dry plastic bag or other air tight container.

Note: The Program Administrator will ensure an adequate supply of appropriate cleaning and disinfection material. If supplies are low, employees should contact their supervisor, who will inform the Program Administrator.

5.6.2 Maintenance

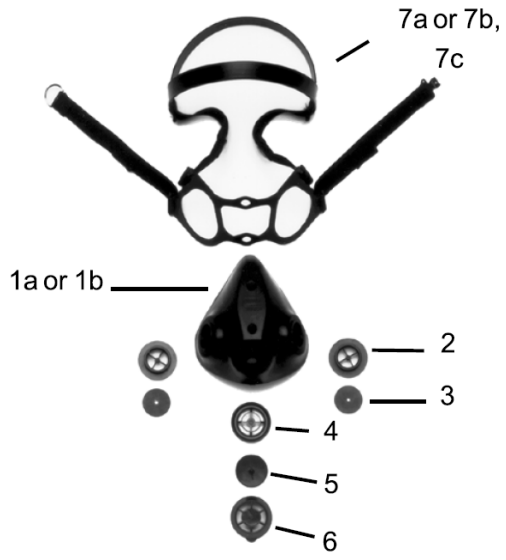
Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer.

The following checklist will be used when inspecting respirators:

- Facepiece: cracks, tears, or holes facemask distortion
- Headstraps: breaks or tears broken clasps
- Valves: residue or dirt, cracks or tears in valve material
- Filters/Cartridges: approval designation on cartridge, gaskets, cracks in housing and proper cartridge for hazard

The following Figure shows the “exploded” view of the North N5500 face piece. Replacement part numbers are also listed.

7700 & 5500 Series Facepiece Replacement Parts



	Cat. #	*Description*
1a	770011 L, M, S	Basic Facepiece for 7700
1b	550011 L, M, S	Basic Facepiece for 5500
2	770016	Cartridge Connector
3	770017	Inhalation Valve
4	770019	Exhalation Valve Seat
5	770018	Exhalation Valve
6	770020	Exhalation Valve Guard
7a	770092	Cradle Suspension System for 7700
7b	550092	Cradle Suspension System for 5500
7c	770092P	Cradle Suspension System with Slides for 7700

5.6.3 Change Schedules

Employees wearing APRs shall change the cartridges on their respirators when they first begin to experience difficulty breathing (i.e., resistance) while wearing their masks.

5.6.4 Storage

Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program and will store their respirator in a plastic bag in their own locker. Each employee will have his/her name on the bag and that bag will only be used to store that employee's respirator.

The Program Administrator will store Tetra Tech, Inc.'s supply of respirators and respirator components in their original manufacturer's packaging in the equipment storage room.

5.6.5 Defective Respirators

Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his or her supervisor. Supervisors will give all defective respirators to the Program Administrator. The Program Administrator will decide whether to:

- Temporarily take the respirator out of service until it can be repaired.
- Perform a simple fix on the spot such as replacing a headstrap.
- Dispose of the respirator due to an irreparable problem or defect.

5.7 Training

The Program Administrator will provide training to respirator users and their supervisors on the contents of the TETRA TECH, INC Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

The training course will cover the following topics:

- TETRA TECH, INC Respiratory Protection Program
- OSHA Respiratory Protection standard
- Respiratory hazards encountered at Lockheed Martin and their health effects
- Proper selection and use of respirators
- Limitations of respirators
- Respirator donning and user seal (fit) checks
- Fit testing
- Emergency use procedures
- Maintenance and storage
- Medical signs and symptoms limiting the effective use of respirators

Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

6.0 PROGRAM EVALUATION

The Program Administrator or designee will conduct periodic evaluations to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to Tetra Tech, Inc. Program Administrator and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

7.0 DOCUMENTATION AND RECORDKEEPING

A written copy of this program and the OSHA standard is kept in the site office and is available to all employees who wish to review it.

Also maintained in the Program Administrator's office are copies of training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The Program Administrator will also maintain copies of the medical records for all employees covered under the respirator program. The completed medical questionnaire and the physician's documented findings are confidential and will remain at WorkCare Clinic. Tetra Tech, Inc. will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

8.0 DEFINITIONS

Approved: Respirators tested and listed as satisfactory by the National Institute for Occupational Safety and Health (NIOSH), or U.S. Department of Labor Mine Safety and Health Administration (MSHA) to provide adequate respiratory protection against a particular hazard for which it is designed.

Aerosol: A suspension of fine solid or liquid particles or fibers in air, such as dust, fog, fume, mist, smoke, or sprays.

Contaminant: A harmful, irritating, or nuisance material in concentrations exceeding those normally found in the ambient air.

Disinfection: The destruction of pathogenic organisms, especially by means of chemical substances.

Dust: Solid particles, mechanically produced, with a size ranging from submicroscopic to microscopic.

Elastomer: Materials with the ability to be stretched to twice their original length and to retract (rapidly) to their original length.

End-Of-Service-Life Indicator (ESLI): A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective.

Fog: A heavy concentration of a mist that can obscure vision.

Fumes: Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, with a size usually less than one micron in diameter.

Gases: Substances that are gaseous at ordinary temperatures and pressures.

High-Efficiency Particulate Air (HEPA) Filter: A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Immediately Dangerous to Life or Health (IDLH): Environmental conditions which contain less than 19.5% oxygen or contaminants of high toxicity which even for short periods of exposure (at the proper concentrations) pose an immediate threat to life or health of employees.

Mists: Suspended liquid droplets generated by condensation or by breaking up of liquid with a size ranging from submicroscopic to microscopic.

Oxygen-Deficient Atmosphere: An atmosphere containing 19.5% or less of oxygen by volume.

Respirator: A device designed to provide the wearer protection against inhalation of airborne contaminants; and, for some devices, protection against oxygen-deficient atmospheres.

Respiratory Protective Equipment (RPE): Approved equipment that provides uncontaminated respirable air to the user.

Sanitize: The process of cleaning and removing potentially harmful bacteria, viruses, etc. by using disinfectant cleaning materials or immersion in hot water or a combination of the two processes.

Smoke: Particles generated by the incomplete combustion of an organic substance. Colors vary (e.g., thick black--hydrocarbon; gray--wood, paper).

Spray: Liquid particles suspended in air. This usually occurs by mechanical means, such as a leaking pipe.

Vapor: The gaseous state of a substance that is a solid or liquid at ordinary temperature and pressure.

ATTACHMENT XIII

OSHA POSTER

Job Safety and Health

It's the law!

OSHA

Occupational Safety and Health Administration
U.S. Department of Labor

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
The Best Resource for Safety and Health

Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA

www.osha.gov

OSHA 3165-12-06R

APPENDIX B—WASTE MANAGEMENT PLAN

Waste Management Plan
Middle River Complex
Middle River, Maryland

Prepared for:

Lockheed Martin Corporation

Prepared by:

Tetra Tech, Inc.

April 2012

Michael Martin, P.G.
Regional Manager

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TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

ACRONYMS

CFR	*Code of Federal Regulations*
COMAR	Code of Maryland Regulation
EESH	Energy, Environment, Safety, and Health
HAZWOPER	hazardous waste operations
IDW	Investigation-derived waste
LMCPI	Lockheed Martin Corporation Properties, Inc.
Lockheed Martin	Lockheed Martin Corporation
MDE	Maryland Department of the Environment
MDOT	Maryland Department of Transportation
MRC	Middle River Complex
OERR	Office of Emergency Remedial Response
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
Tetra Tech	Tetra Tech, Inc.
TSD	treatment, storage, and disposal
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency

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Section 1
Purpose

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc. (Tetra Tech) has prepared this *Waste Management Plan* to address management of the potentially contaminated nature of the waste that will be generated as part of field investigations at the Lockheed Martin Middle River Complex (MRC) (Figure 1-1). Both solid- and liquid-waste will be generated and handled as investigation-derived waste (IDW). Following proper IDW procedures, the IDW generated will be collected in U.S. Department of Transportation- (USDOT)-approved steel drums, stored at a designated on-site location (considered a temporary satellite accumulation area), sampled for waste profiling and characterization and, once characterized, disposed of off-site at a Lockheed Martin-approved facility. The IDW generated during these field investigations will include but is not limited to soil, sediment, and water (surface, groundwater, purge and/or decontamination water).

A Tetra Tech geologist will be on-site for all MRC field activities. All work by any subcontractor will be directed by the Tetra Tech geologist and will fully comply with Maryland Department of Transportation (MDOT) and other local, state, and federal regulations, including the federal Resource Conservation Recovery Act, Toxic Substances Control Act, Occupational Safety and Health Administration (OSHA) regulation 1910.120, and Lockheed Martin's EROP-03 procedure. In addition, IDW will be handled in accordance with the U.S. Environmental Protection Agency (USEPA) guidance *Management of Investigation-Derived Wastes During Site Inspections* [USEPA Office of Emergency Remedial Response (OERR) directive 9345.3-02, May 1991].

This plan is organized as follows:

Section 2—Responsibilities and Training Requirements: Presents the requirements and responsibilities of Tetra Tech and their appointed subcontractor,

Section 3—Hazardous Waste Determinations: Briefly describes how the determination of waste characterization is completed, and

Section 4—Shipping Requirements: Details pre-shipment, shipping, and post-shipping requirements.

Section 5—Reporting Requirements: Details biennial reporting and waste minimization requirements.

Attorney-Client Privileged

EASTERN AVENUE

EASTERN BOULEVARD

BLOCK 'A'

BLOCK 'B' CHESAPEAKE PLAZA

BLOCK 'A'

MIDDLE RIVER COMPLEX

BLOCK 'I'

MARTIN STATE AIRPORT

BLOCK 'H'

DARK HEAD COVE ROAD

BLOCK 'D'

Lot D

BLOCK 'E'

BLOCK 'G'

CHESAPEAKE PARK PLAZA

DARK HEAD COVE

COW PEN CREEK

BLOCK 'F'

FIGURE 1-1

SITE LOCATION MAP
MIDDLE RIVER COMPLEX

LEGEND

TAX BLOCK

STRUCTURE

RAILROAD TRACKS

Lockheed Martin Middle River Complex
Middle River, Maryland

0 125 250 500 Feet

N

DATE MODIFIED: 1/26/10

CREATED BY: MP

Tetra Tech, Inc.

Map Document: (K:\GProject\middle_river\Maps\Tax Blocks_26Jan10.mxd)
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Section 2
Responsibilities and Training Requirements

All Tetra Tech personnel and subcontractors must be trained in accordance with all state and federal protocols. All personnel will complete the appropriate OSHA hazardous waste operations (HAZWOPER) training and annual refresher training, as specified in 29 *Code of Federal Regulations* (CFR) §1910.120. All subcontractor training certifications shall be provided electronically to the Lockheed Martin project lead. Certificates for Tetra Tech personnel are maintained internally and can be provided to Lockheed Martin upon request.

U.S. Department of Transportation HAZMAT Employee training is required for anyone involved in the shipment, preparation, offering for transport, and transportation of hazardous waste, including signing hazardous waste manifests (see 49 CFR 172, Subpart H). The waste management subcontractor will have completed HAZMAT employee training and will renew the training as necessary to meet USDOT requirements for transporting hazardous waste. Facilities that generate more than 1,000 kilograms per month of hazardous waste must comply with the emergency preparedness and personnel training requirements outlined in 40 CFR §265.16 (see 40 CFR §262.34(a)(4)). This training is intended for the waste generator's (i.e., Lockheed Martin) contractors (i.e., Tetra Tech) and includes training by a person qualified in hazardous waste management and emergency response procedures.

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Section 3
Hazardous Waste Determination and Process

Hazardous waste determinations shall be made in accordance with 40 CFR 262.11, combining process knowledge and/or analytical evaluation of waste samples. Hazardous waste determinations shall be reevaluated whenever any of the following occurs:

- the process that produces the waste changes (e.g. a new chemical constituent is discovered, the treatment process changes)
- the treatment media changes (e.g., new media vendor or media type)
- waste was tainted by inadvertent mixing with another waste
- a change occurs in the hazardous waste regulations

Waste generated during field investigations will include, but is not limited to, soil, sediment, water (surface, groundwater, purge, and/or decontamination water), and/or disposable personal protective equipment (PPE). PPE IDW will be brushed off, placed in trash bags, and disposed of in a facility trash receptacle designated by MRC personnel. IDW generated during field activities will be segregated into drums based upon historical data (as applicable), labeled to indicate the wells and/or locations from which the waste was generated, and the generation date. IDW generated during this activity will be further characterized and disposed of in accordance with the state regulations, unless state requirements are less stringent than federal requirements, in which case the federal requirements will apply.

When available, analytical data obtained during the investigations will be provided to the subcontractor for IDW classification (i.e., non-hazardous versus hazardous). IDW materials that will be generated at the MRC during future sampling events are not expected to be characterized as hazardous, since IDW generated during previous sampling events was classified as non-hazardous. All analytical data shall be presented to the IDW subcontractor for them to classify

the IDW generated from the field project. Based on the analytical data, the IDW subcontractor will determine whether additional IDW sampling is required to complete the waste profiles. If additional sampling is required for waste characterization parameters, Tetra Tech will schedule a site visit and oversee the sampling conducted by the IDW subcontractor.

Following receipt of the approved analytical data, the IDW subcontractor shall develop a waste profile. Waste profiles are to be sent to the Tetra Tech project manager for initial review. The Tetra Tech project manager will review them and forward the waste profile forms to the appropriate site contact. All forms related to IDW from the MRC will be signed and approved by Mr. Mike Musheno of Lockheed Martin Corporation Properties, Inc. (LMCPI) at the MRC.

The Waste Listing Assessment form is presented in Appendix A. The Tetra Tech project manager will complete this form as the first step in IDW classification/removal process. This form is the first notification and is presented to the managing contractor for review. The form presents pertinent information such as the project name, waste description, generation date, type, and classification information.

Lockheed Martin may choose to issue a Lockheed Martin Hazardous Waste Manifest Signatory Authorization Form (see Appendix B). This form authorizes a Lockheed Martin subcontractor to sign for the IDW. The authorization certifies that the representative signing on behalf of Lockheed Martin has completed the appropriate USDOT training (as delineated at 49 CFR Part 172, *et seq.*) to sign hazardous waste manifests and is in compliance with all state and federal requirements for hazardous waste manifesting. Lockheed Martin shall remain responsible and liable for the hazardous waste being disposed of, regardless of the signatory authorization on the form.

After Lockheed Martin or an authorized representative signs the waste profile forms, the IDW is scheduled for removal from the site. The Tetra Tech project manager will coordinate the IDW removal with the appropriate Lockheed Martin site contact. The Lockheed Martin site contact (or their authorized representative) shall be on-site to sign bills of lading (for non-hazardous IDW) or hazardous waste manifests (for hazardous IDW). Signed copies of the returned bills of lading and hazardous waste manifests will be kept on file for a minimum of three years. The signed documentation for transporting the waste off-site will be properly filed and available for review upon request.

Before IDW leaves the site, the Lockheed Martin site contact or their authorized representative will complete a waste shipment checklist. The Hazardous Material/Waste Shipment Checklist is presented in Appendix C for reference. Completion of the checklist assures that all protocols, standards, and requirements have been adhered to and the waste can be properly removed from the site. The checklist covers various items to ensure the truck is fitted with the proper waste placards, is properly constructed with double walled containment, and the waste manifests and bills of lading contain the proper information. IDW is removed from the site subsequent to the Lockheed Martin representative completing the checklist. Both the Lockheed Martin representative and the Tetra Tech geologist then receive a copy of the associated paperwork. Tetra Tech will record the drums on a master Drum Inventory form for each site (see Appendix D).

A Site Contact List is presented in Appendix E as a reference in case of an emergency, or if questions arise with regards to IDW disposal. The emergency contingency plan has been incorporated into the on-site health and safety plan and will comply with all current and applicable regulations and requirements including, but not limited, to OSHA 29 CFR 1903, 1904, 1910, and 1926. Lockheed Martin Corporation will be listed as the waste generator on all paperwork, including the waste profile sheets on which the generator was initially listed as “Middle River Complex.” The areas of Lockheed Martin investigations at MRC, including the “Tax Block” sites, are identified for purposes of waste disposal by USEPA ID number MDR000524413.

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Section 4
Shipping Requirements

4.1 PRE-SHIPMENT REQUIREMENTS

Waste generated during the field investigation will include, but is not limited to soil, sediment, and water (groundwater, surface, purge, and/or decontamination water). IDW generated during previous investigations has been characterized as non-hazardous. Pre-shipping requirements were discussed in detail in Section 3.0.

4.1.1 Packing

All waste materials will be collected in new or reconditioned USDOT-approved 55-gallon drums that will be sealed at the end of each day's sampling activities. Special consideration will be given to manage certain wastes (e.g., bentonite grout) separately from other IDW, to avoid increasing the volume of material that may be classified as hazardous due to elevated pH.

4.1.2 Labeling

Drums will be marked with the appropriate "Hazardous" or "Nonhazardous" labels containing the following information:

- **Site** will list the name of the site where waste was generated (i.e., Middle River Complex)
- **Location** will list the location where the waste was generated (i.e., well identification, soil boring, test pit, sediment and surface water location number)
- **Date** will include the date when waste materials accumulation began
- **Drum Number** will list the number of the drum in the series of drums from this sampling event
- **Contents** will list the waste that was generated (i.e., sediment, soil, and water)
- **Volume** will list an estimated volume not to exceed three quarters of the drum capacity and

- **Site Contact and Emergency Contact Information** will list the contact information for the designated authorized Lockheed Martin representative for the site and the telephone number of the local fire department.

4.1.3 Storing

Investigation derived waste storage areas will meet the following specifications to permit access to the drums and conduct spill/leak monitoring, sampling, and extraction (once the disposal route is determined):

- drums will be placed on a hard flat surface designated by the facility
- drum labels will be attached to each drum and will include the information presented in Section 4.1.2
- keep the retaining bolt and label readily visible on the outside of storage containers
- provide at least four feet between each row of pallets/drums to allow access to the containers for sampling, drum removal, and spill response
- maintain on-site a copy of work plans, waste disposal forms, and the IDW inventory list, and provide this information to the project manager at the end of each shift
- maintain spill response equipment at the site in case it is required
- whenever possible, use appropriate equipment for moving containers to avoid injury to the worker or damage to the container, when that is not possible, obtain help to manipulate containers
- Monitor and maintain all storage containers weekly to ensure that the containers remain in their original condition and that no leaks or spills have occurred. Weekly inspections should be documented in a dedicated field notebook and should include photographs of the containers and storage area.

The MRC's IDW drum storage area is on a flat concrete area in Lot D (Figure 4-1), inside the secured facility boundary. An alternate IDW storage area may be used to minimize transportation of drums on site, due to the dispersed nature of sampling locations throughout the MRC. MRC IDW storage areas will be determined by Lockheed Martin personnel at the start of field activities.

If any drums are classified as hazardous based on the waste characterization samples, the following additional measures will be instituted:

- A temporary spill containment system, constructed of polyethylene sheeting and 2-inch × 6-inch boards creating a bermed edge, will be placed under the drums to contain spilled or leaked materials. The dimensions of the temporary spill containment area will

depend on the number of 55-gallon drums at the site. For most jobs, the spill containment area is estimated to be 10-feet × 20-feet. Containment system integrity will be monitored periodically.

- The drums will be placed on self-containing plastic secondary containment pallets with four (or fewer) drums per pallet. Self-containing pallets will be stored on a hard flat surface covered with polyethylene sheeting. These pallets will be capable of containing the entire contents of one 55-gallon drum. All hazardous IDW drums will be stored on secondary containment until they can be removed from the site.
- Caution tape and/or temporary fencing will be placed around the drums to identify and secure the area.
- Signs will be posted in front of the IDW storage area identifying the site, location, collection date, number of drums, drum contents, volume of contents, site and emergency contact information, and the location of spill control materials for the wastes.
- Inform appropriate authorities/organizations of hazardous waste on-site and emergency response procedures. Identify the emergency coordinator and document emergency planning for the site.

Lockheed Martin has 90 days to remove the non-hazardous- and/or hazardous waste drums from the facility. Access for the subcontractor's representative and IDW transport carrier will be coordinated by Tetra Tech.

4.1.4 Material Identification and Classification

All waste materials shall be identified and classified per USDOT requirements.

4.1.5 Waste Shipment

Tetra Tech will subcontract all IDW removal to an approved vendor(s). In the event hazardous waste is encountered, Tetra Tech will ensure the use of Lockheed Martin Corporate Purchasing Agreements and the associated list of Corporate Approved Waste Management Vendors, to ensure that the waste is transported by an approved vendor to a treatment, storage, and disposal (TSD) facility listed on the Lockheed Martin Corporate Hazardous Waste Approved Vendors List. Non-hazardous waste shall be transported to an approved industrial waste disposal facility, but it does not have to be managed by corporate-approved waste management vendors. Attachment D is the Lockheed Martin Hazardous Waste Manifest Signatory Authorization Form, which must be filled out by the Lockheed Martin project lead in coordination with the Tetra Tech project manager if the IDW is hazardous.

4.1.5.1 Hazardous Waste Generator Identification Number

The Lockheed Martin USEPA identification number for hazardous waste generation at MRC is MDR000524413. All IDW will be removed from the site by a subcontractor adhering to the shipping requirements in Section 4.2.

4.2 SHIPPING REQUIREMENTS

United States Department of Transportation HAZMAT Employee training is required for anyone involved in shipment preparation, offering for transport, and transportation of hazardous waste, including signing hazardous waste manifests (see 49 CFR 172, Subpart H).

Certification and accuracy verification of the physical waste shipment against the manifested waste shipment must be provided. Non-hazardous materials do not require the signature of a USDOT HAZMAT trained individual. A bill of lading will be signed for all non-hazardous waste. A hazardous waste manifest will be signed for all hazardous waste.

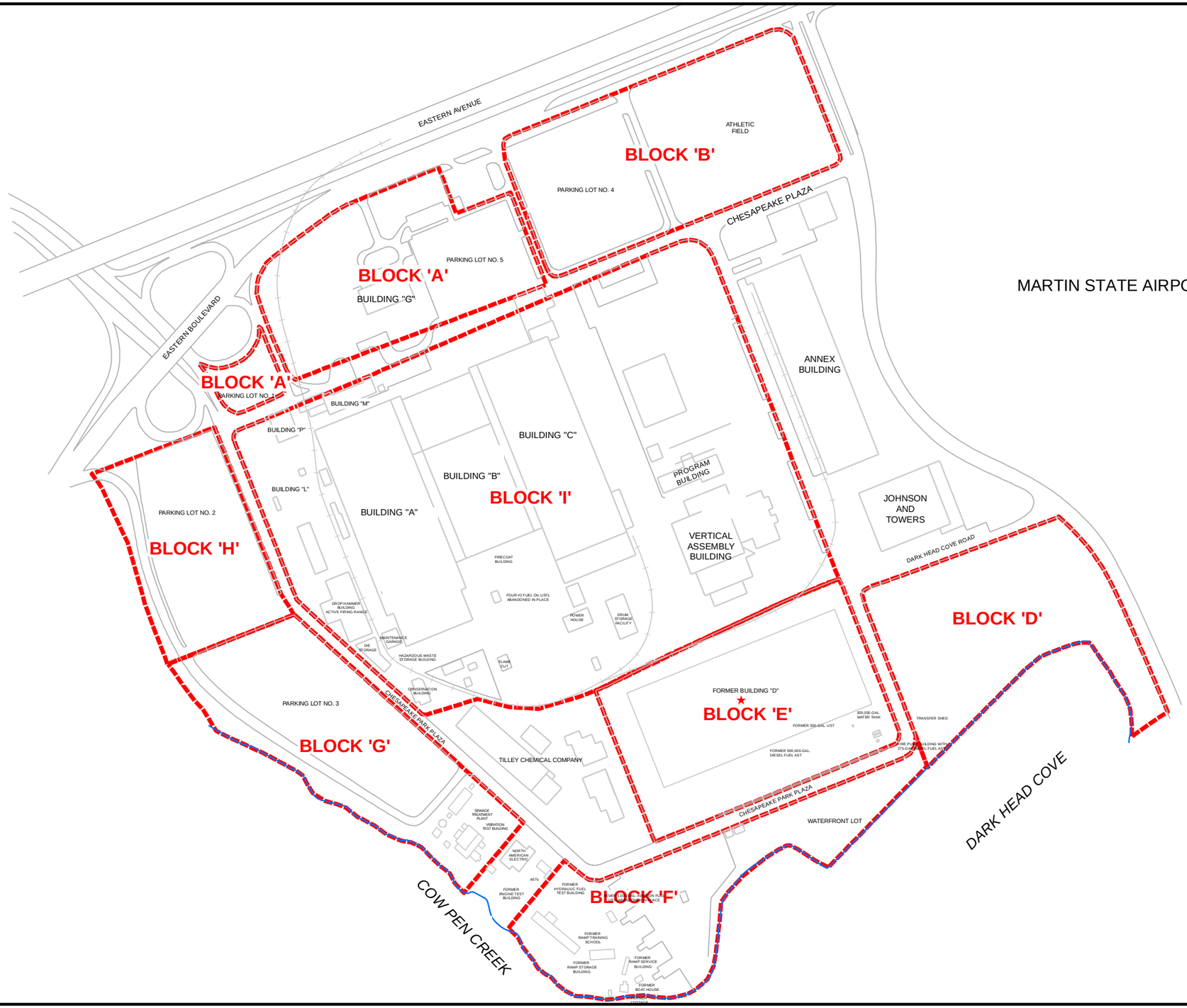
For non-hazardous waste, Tetra Tech will use Lockheed Martin's Hazardous Material/Waste Shipment Checklist (see Appendix B) during the preparation and pre-transport review of waste shipments, and will submit a completed electronic copy to the Lockheed Martin project lead along with the shipping documentation. Detailed records of authorized work will be maintained by the subcontractor including:

- all manifests of waste transported to the approved off-site disposal facility
- receipts that the waste has been accepted by the approved treatment/disposal facility
- certification that the waste has been disposed of at the approved facility
- receipts that waste containers have been received by the approved disposal facility
- certification of the disposal of waste containers by the approved disposal facility
- weigh slips
- any other documentation required by local, state, or federal requirements

4.3 POST-SHIPMENT REQUIREMENTS

Records of waste characterization, chain of custody, transportation, and destruction will be scanned and electronically submitted to the Lockheed Martin project lead for records retention. This includes

profile sheets, the Hazardous Material/Waste Checklist, the generator's copy of the waste manifest, a copy of the signed TSD manifest, Land Disposal Restriction forms, and certificates of waste destruction (where applicable). All records of monitoring events will be submitted for each year's waste generation activities in the first quarter of the following year, or per the project lead's direction. The documentation noted above must be retained for three years. All documents should be properly stored and available for review upon request.



MARTIN STATE AIRPORT

FIGURE 4-1
MIDDLE RIVER COMPLEX
INVESTIGATION DERIVED
WASTE STORAGE AREA

LEGEND

- ★ INVESTIGATION DERIVED WASTE STORAGE AREA
- TAX BLOCK
- STRUCTURE
- RAILROAD TRACKS

Lockheed Martin Middle River Complex
Middle River, Maryland

0 100 200 400 Feet

N

DATE MODIFIED: 02/17/2010

CREATED BY: BJ

Tetra Tech, Inc.

Map Document: (K:\GProject\middle_river\Maps\Draft Response Action Plan\Block B\Tax Blocks_17Feb2010.mxd)
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Section 5
Reporting Requirements

5.1 BIENNIAL REPORTING REQUIREMENTS

The Code of Maryland Regulations (COMAR) 26.13.03.06B requires facilities that manage hazardous waste to file a Biennial Report once every two years which includes hazardous waste activity for the preceding calendar. Facilities are required to submit the Biennial Report, for a given site, if:

1. Either:
    a. They generate hazardous waste and ship it off-site to a facility in the United States; or
    b. They treat, store or dispose of hazardous waste on-site: and
2. They are regulated under Maryland's hazardous waste regulations by:
    a. Generating 220 pounds or more of hazardous waste, or more than 2.2 pounds of acute hazardous waste, in a calendar month; or
    b. Accumulating, art any time, more than 220 pounds of hazardous waste or more than 2.2 pounds of acute hazardous waste.

Guidance for completing the Biennial Report form is available at the Maryland Department of the Environment's (MDE) Biennial Report web page, which is available at http://www.mde.state.md.us/Programs/LandPrograms/Hazardous_Waste/home/index.asp.

The report must be completed and filed, typically by March 1 of even numbered years (e.g. 2010, 2012) with the:

Maryland Department of the Environment
Technical Services and Operations Program
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719

Before each report is filed, the Maryland hazardous waste regulations must be consulted to confirm or update regulatory thresholds.

5.2 WASTE MINIMIZATION

Hazardous waste generators, when preparing a manifest, are required to certify they have taken steps to minimize the volume and toxicity of hazardous waste generated. Waste minimization efforts are required under COMAR 26.13.03.06B(1)(d)(vi) to be reported on the Biennial Report submittal.

Efforts should be taken, to the degree economically practicable, to reduce the volume and toxicity of hazardous waste generated and a reasonable method of treatment, storage, or disposal should be selected which will minimize the present and future threat to human health and the environment.

APPENDIX A — WASTE IDENTIFICATION AND CLASSIFICATION FORM

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Waste Identification and Classification Form

LMC Remediation Project		**State Generated**	
Description of Waste			
Generic Name		**Solid, Liquid, Gas**	
		Additional Info.	
Date of Waste Generation		**Ongoing (Y/N)?**	

Description of Process Generating Waste

Listed Waste ? (Y/N)		**F,K, P or U Codes, if applicable**	

Justification for Waste Classification (attach support documentation)

Completed by	
Company	
Date	

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APPENDIX B — HAZARDOUS WASTE MANIFEST SIGNATURE AUTHORIZATION FORM

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Lockheed Martin Hazardous Waste Manifest Signatory Authorization

This Authorization Agreement, effective for the remediation site and period of performance written below, is entered into by and between:

LOCKHEED MARTIN CORPORATION (hereinafter "Lockheed Martin"), having a business office at 6801 Rockledge Drive, Bethesda, Maryland 20817 USA, and incorporated in the State of Maryland, and

_____

(hereinafter "_____")

having a business office at_____

_____.

WHEREAS, _____ (company representative) of _____ (company) will sign Hazardous Waste Manifests on behalf of Lockheed Martin for the project and hazardous waste, as defined at 40 CFR Pt. 261 *et seq.* indicated below.

Remediation Site: _____
Site Address: _____
Period of Performance: _____
Hazardous Waste Description:
_____
_____
Hazardous Waste Disposal Facility and Location: _____
_____
_____

This Authorization Agreement certifies that the representative signing on behalf of Lockheed Martin has taken the appropriate Department of Transportation training, as delineated at 49 CFR Part 172 *t seq.* to sign Hazardous Waste Manifests and is in compliance with all state and federal requirements for hazardous waste manifesting.

Lockheed Martin shall remain responsible and liable for the hazardous waste being disposed regardless of the Signatory Authorization provided herein.

LOCKHEED MARTIN CORPORATION	_____
By:_____	By:_____
Name:_____	Name:_____
Title:_____	Title:_____
Date:_____	Date:_____

APPENDIX C —
HAZARDOUS MATERIAL/WASTE SHIPMENT CHECKLIST

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Lockheed Martin Hazardous Material/Waste Shipment Checklist

Date:
Project Site Name:
Shipping Document No.:

A. DESCRIPTION

A1._____ UN/NA Identification Number, Proper Shipping Name, Hazard Class/Division Number, Packing Group
A2._____ Subsidiary hazard class(es) or division number(s), if any, in parenthesis
A3._____ Total Quantity of Material
A4._____ 24-Hour Emergency Phone Number and Response Information ERG No.: _____
A5._____ Page of Pages, *for multiple shipping papers/EPA Manifest/Air Decs.*
A6._____ Shipper's Certification, *as applicable*
A7._____ Small Quantity Exception/Dangerous Goods In Excepted Quantities/Diagnostic Specimen/Sample

B. ADDITIONAL DESCRIPTIONS - GENERAL

B1._____ Exemptions "DOT-E-*ex.#"*
B2._____ "Limited Quantity" (*not to exceed 66 lb gross weight*)
B3._____ "X" or "RQ" (if RQ, Hazardous Substance Contact @ 1-800-424-8802)
B4._____ "Waste" for RCRA regulated material
B5._____ "Mixture" or "Solution" - as appropriate.
B6._____ *(technical names), for poisons/mixtures/n.o.s./generic proper shipping names*
B7._____ "Marine Pollutant" and constituent in ( ), *for bulk shipments only*
B8._____ *(hazardous substance names) per 172.101 appendix if not contained in proper shipping name*
B9._____ *(EPA waste identification numbers)- used to identify the hazardous substance*
B10._____ "Poison" - *if not identified in proper shipping name or hazard class*
B11._____ "Poison-Inhalation Hazard" & Zone A, Zone B, Zone C, or Zone D, as appropriate*****
(*******Note Special Provisions 1-6 and 13 in Column 7 of 172.101)*

C. MARKING FOR NON-BULK PACKAGINGS

C1._____ Proper Shipping Name, UN/NA Identification Number
C2._____ (*technical name)*
C3._____ (*EPA waste identification number)*
C4._____ "RQ"
C5._____ Exemption Packagings "DOT-E-*ex.#*"
C6._____ Consignee's Name & Address
C7._____ Net or Gross quantity for non-rad Dangerous Goods (adjacent to PSN & UN#)
C8._____ Ltd. Qty - PSN only *per 172.301(a)(1) or* UN ID# placed in square-on-point border *per 172.315*
C9._____ Package Orientation Arrows, *for liquids in inner packagings*
C10._____ "Inhalation Hazard", unless these words appear on the label prescribed in *172.416* or *172.429*
C11._____ "Overpack" adjacent to proper shipping name marking [*see 173.25(a)(4)*]
C12._____ TSCA PCB Marking (*for actual or source concentration greater than or equal to 50 ppm **)
(* Note Potential Vehicle Marking Requirements in *40 CFR 761.40*)

D. MARKING FOR BULK PACKAGINGS (DUMP TRUCKS OR ROLL-OFFS)

D1._____ UN/NA Identification Number on orange panel or placard or white square-on-point display configuration as prescribed by 172.302 and 172.332

E. LABELING

E1._____ Primary Hazard Label(s): _____
E2._____ Subsidiary Hazard Label(s) with class/division: _____
E3._____ Hazardous Wastes Label(s)

F. PLACARDING

F1. 172.504 Table 1 Materials - Any Amount

F1.1._____ Dangerous When Wet (4.3)
F1.2._____ Poison (6.1, Inhalation Hazard, Zone A or B)***** (Primary or Subsidiary _____

*(******Materials subject to the "Poison-Inhalation Hazard" notation must be placarded with a POISON INHALATION HAZARD or POISON GAS placard , as appropriate, and also placarded for any other hazard class required for that material in 172.504)*

F1.3._____ Radioactive (7, LSA/SCO Exclusive Use Shipments)

F2. 172.504 Table 2 Materials - 1,001 lb:

G. PACKAGING

G1._____ Container Type: (Inner Pkg)_____
G2._____ Container Type: (Outer Pkg)_____
G3._____ Container Type: (Bulk Pkg)_____
G4._____ Loaded and Closed As Required_____

H. PAPERWORK AND MISCELLANEOUS ITEMS

H1._____ Shipping Paper/Hazardous Waste Manifest/Bill of Lading/Airway Bill/Shipper's Declaration
H2._____ Instructions for Maintenance of Exclusive Use Shipments
H3._____ Small Quantity/Excepted Quantity Statement on Package, *for 173.4 shipments* / **DGEQ** statement per *2.7.7.2* noted on Airway Bill
H4._____ Photograph, *if applicable*
H5._____ Vehicle Inspection
H6._____ Check Driver's Qualifications
H7._____ Emergency Telephone Number Notification, if required, see 172.604(b)
H8._____ LMC Notification Instructions

I. ADDITIONAL REQUREMENTS FOR RADIOACTIVE MATERIAL SHIPMENTS

I1. SHIPPING PAPER DESCRIPTIONS
- I1.1.____ Radionuclide Symbol(s), *per 173.435*
- I1.2.____ Physical & Chemical Form, *if not special form*
- I1.3.____ Activity per Package
- I1.4 ____ Radioactive Labels
- I1.5.____ Fissile Excepted, *if applicable*
- I1.6.____ "Exclusive Use Shipment"

I2. MARKING FOR NON-BULK PACKAGINGS
- I2.1.____Gross Weight, *for radioactive material packages in excess of 110 lb*
- I2.2.____ "Radioactive"; "Radioactive – LSA" ; "Radioactive – SCO"
- I2.3.____ Package Certification Number, *for radioactive material packages, as appropriate*
- I2.4.____ IP-1, IP-2, IP-3 markings
- I2.5.____ "USA" on all IP and Type A packagings
- I2.6.____ Packaging manufacturer marking on Type A

I3. LABELING
- I3.1.____ Radioactive Labels
- I3.2.____ "EMPTY" Label
- I3.3.____ "Radioactive Material, Excepted Package" handling label

I4. PLACARDING (172.504 TABLE 1 MATERIALS - ANY AMOUNT)
- I4.1.____ Radioactive (7, LSA/SCO Exclusive Use Shipments)

I5. PAPERWORK AND MISCELLANEOUS ITEMS
- H1._____ Instructions for Maintenance of Exclusive Use Shipments
- H2._____ Radioactive Excepted Package statement per *10.8.8.3.3* on Airway Bill
- H3._____Limited Quantity Radioactive Material *for multiple hazard limited quantity Class 7*.
- H4._____Health Physics Information
- H5._____NRC Manifest #540 for radioactive waste shipment for land disposal.

Completed By: **Company:** **Date:**

APPENDIX D — DRUM INVENTORY FORM

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Tetra Tech NUS, Inc.

DRUM INVENTORY

PROJECT NAME: **PROJECT NUMBER:**

CLIENT: **LOCATION:**

Tt NUS PERSONNEL: **DATE (START):**

IDW CONTRACTOR: **DATE (END):**

DRUM ID	GENERATION LOCATION	DATE GENERATED	AMOUNT (gal.)	STORAGE LOCATION	COMMENTS

COMMENTS: _____

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APPENDIX E— SITE CONTACT SHEET

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Site Contact List

1)	Tom Ambrose: Facilities Supervisor:	Office: 410-682-1308
2)	Steve Thompson: Facilities Manager:	Office: 410-682-1304
3)	Scott Lapp: Maintenance:	Office: 410-682-0365 Cell: 410-967-8745
4)	Mike Musheno: ESH / Projects:	Office: 484-875-2819
5)	John Wells: Lead Facilities Electrician:	Work: 410-682-1307
6)	Tom McVickers: Facilities Electrician:	Office: 410-682-1307
7)	A&A Environmental / Spill Response:	1-800-404-8037
8)	Tony Apanavage: Project Manager:	Office: 1-301-528-3021 Cell: 1-301-233-8230
9)	Michael Martin: Program Manager:	Office: 1-301-528-3022 Cell: 1-410-707-5259

10) Baltimore County Police & Fire Department: 911

11) State of Maryland Emergency Response Center: (410-974-3551)

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APPENDIX F— EESH REMEDIATION OPERATING PROCEDURE NO. EROP-03, EESH REMEDIATION WASTE MANAGEMENT

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Subject: EESH Remediation Waste Management

Ref:
1. Code of Federal Regulations, Title 40, Parts 260, 261, 262, 264, 265, 268, 761, and 763
2. Code Federal Regulations, Title 49, Parts 100 through 180
3. Corporate Functional Procedure No: ESH-06
4. Corporate Functional Procedure No: ESH-08
4. Corporate Policy Statement 527

1.0 Purpose

This procedure establishes practices for management and transportation of solid and hazardous waste (waste in this context also refers to DOT hazardous materials) generated at remediation project sites in a manner that complies with Subtitle C of the. Resource Conservation and Recovery Act (RCRA), Department of Transportation (DOT) regulations, and similar state and/or host country waste regulations. Additionally, this procedure ensures waste disposal is managed in accordance with Corporate Functional Procedure ESH-06 and ESH-08, and records retained in accordance with Corporate Policy Statement 527.

2.0 Applicability

This procedure applies to the Energy, Environment, Safety and Health (EESH) Remediation Organization (the Organization) and to the remediation projects for which the Organization has waste management responsibility. Each member of the Organization, including IWTA, contractor staff and, where applicable, support organizations (e.g. Global Supply Chain Management), is responsible for execution of this procedure.

The materials to which this practice applies are solid wastes generated as a result of remediation project activities, including such things as investigation derived waste, environmental sampling, treatment of contaminated media, and routine operations and maintenance, unless such solid waste is exempt under applicable regulations.

3.0 Key National Agreement

Waste management requirements shall be included within the EESH Key National Agreements (KNA). The KNA establishes the requirements under which Remediation Contractors perform work for Lockheed Martin.

The KNA will stipulate that the Remediation Contractor shall comply with Lockheed Martin waste management, transportation, and disposal requirements and all applicable state, federal, and/or host country laws and regulations.

4.0 Statement of Work Requirements

4.1 Waste Management Plan

All remediation project statements of work that include the generation of solid waste, excluding office trash (e.g. food wastes, consumer packaging) that may be disposed of at a municipal solid waste facility, shall include a requirement for the waste management contractors (i.e. Remediation Contractors and/or Corporate Approved Waste Management Vendors) to submit a waste management plan to Lockheed Martin. A site specific waste management plan shall be prepared that identifies all potential solid waste streams that may reasonably be expected to be generated or discovered during project activities. The plan will address the required elements listed below; however, if the waste is determined to be non-hazardous following completion of Element A, then only the additions of Elements D and E are required.

Element A) Hazardous Waste Determination

i) Listing assessment (See Attachment #1 – Waste Listing Assessment Form)
ii) Characteristic determination

Hazardous waste determinations shall be made in accordance with 40 CFR 262.11 using a combination of process knowledge and/or analytical evaluation of waste sampling. Hazardous waste determinations shall be reevaluated whenever any of the following circumstances occur:

- A change in the process that produces the waste (e.g. a new chemical constituent is discovered, the treatment process changes);
- A change in the treatment media is made (e.g. new media vendor or media type);
- A waste was tainted by inadvertent mixing with another waste; or
- A change occurred to the hazardous waste regulations that apply to that waste.

Characteristic waste determinations based on analytical sampling shall be reevaluated at some reasonable frequency to verify the accuracy of the initial waste determination. The waste determination reevaluation frequency for ongoing remediation or treatment operations should be specified in the waste management plan and be profiled at least once a year.

Element B) Responsibilities and Training Requirements

i) Contractor staff responsibilities with regard to waste management and training requirements necessary to comply with Section 6.0 and all state, federal, and/or host country laws and regulations. Contractor training certifications shall be provided electronically to the Lockheed Martin Project Lead.

Element C) Pre-Shipment Requirements

i) Material identification and classification per DOT requirements
ii) Packaging, storage, segregation, marking, labeling, and accumulation of waste
iii) Waste shipment documentation
(1) Hazardous Waste Generator Identification Number

iv) Hazardous Material Transportation Plan
   (1) Hazardous material transportation risk identification, prioritization, and mitigation plan
   (2) Emergency Response (material information to be provided with shipments, actions to be taken in the event of an incident, staffing the emergency response phone number)
   (3) Hazmat Security Plan (as required based on thresholds outlined in 49 CFR §172.800)
   (4) Transportation and disposal logistics

Lockheed Martin Project Leads shall ensure the use of the Lockheed Martin Corporate Purchasing Agreements and the associated Corporate Approved Waste Management Vendors (WMV) for hazardous waste management and ensure that waste is transported to a treatment, storage, and disposal (TSD) facility on the Lockheed Martin Corporate Hazardous Waste Approved Vendors List as outlined in the ESH-06. Remediation contractors can contract directly with the WMV.

Additionally, hazardous waste manifests shall be signed only by a DOT trained and qualified Lockheed Martin employee or authorized designee (See Attachment #2 – Hazardous Waste Manifest Authorization Form). In addition to completing the Authorization Form, Project Leads shall verify that the designee is DOT trained and qualified to sign manifests and has adequate DOT experience. It is preferable to have contractors designated to sign that are involved in the waste characterization and oversight. For contractor personnel handling hazardous waste, appropriate hazardous waste handling training shall be provided by the contractor as outlined in Section 6.0 and complying with all state, federal, and/or host country laws and regulations.

Non-hazardous waste is not required to be managed by Corporate Approved Waste Management Vendors but shall be transported to an approved industrial waste disposal facility as outlined in ESH-06.

Within the United States, waste shall be characterized and disposed in accordance with the state regulations where it was generated unless the state requirements are less stringent than the federal requirements. For instance, California non-RCRA hazardous waste cannot be disposed of in a non-hazardous waste facility. Within a host country, waste shall be managed in accordance with the host country regulations; however, if the host country standards are less stringent than those of the US Environmental Protection Agency (EPA), than the EPA standards shall apply.

Element D) Shipping Requirements

i) Manifest certification and accuracy verification of physical waste shipment against manifested waste shipment (for non-hazardous waste this may not be applicable)
   (1) For hazardous waste, the contractor responsible for waste shipment shall utilize the Lockheed Martin Hazardous Material/Waste Shipment Checklist (see Attachment #3) during the preparation and pre-transport review of waste shipments and submit a completed electronic copy to the Lockheed Martin Project Lead with the shipping documentation.

ii) For non-specification bulk containers (e.g. dump trucks and roll-offs), the contractor responsible for waste shipment shall adhere to the Lockheed Martin requirements for packing and closing (see Attachment #4). These requirements are meant to supplement the applicable regulations.

Element E) Post Shipment Requirements - Records

i) Waste characterization, chain of custody, transportation, and destruction records shall be scanned and electronically submitted to the Lockheed Martin Project Lead for records retention. This shall include profile sheets, the Hazardous Material/Waste Checklist, the generator copy of the waste manifest, a copy of the TSD signed waste manifest, Land Disposal Restriction forms, and certificates of waste destruction where applicable. For finite-duration remediation projects, waste transportation and disposal records shall be submitted to the project lead at the completion of the project unless submittals are required by regulatory agencies on a more frequent basis. For recurring remediation project activities such as annual groundwater monitoring or groundwater treatment, these records shall be submitted for each year's waste generation activities in the first quarter of the following year or per the Project Lead's direction.

The waste management plan shall be submitted in a phased approach. The first section of the waste management plan will provide the hazardous listing assessment and the characteristic determination methodology (addressing Element A). This section of the plan shall be submitted in a timeframe that allows for Lockheed Martin's review prior to waste generation. Upon approval to proceed, the second section will document the waste profiling results and must be signed off on by a Lockheed Martin Project Lead. Additionally, it shall outline the logistics for waste handling, transportation and disposal (addressing Elements B through E). This section of the plan shall specify a reevaluation frequency for waste generated as a result of ongoing remediation or treatment operations.

Following the approval of the second section by the Lockheed Martin Project Lead, the waste management contractor shall implement the waste management plan. This plan shall be updated when the remedial treatment system process, waste stream, media, or regulations change.

4.2 Health and Safety Plan

For remediation sites managing waste, a section shall be included in the site Safety and Health Plan to address the safety and health requirements for managing the site specific waste.

4.3 Electronics and Scrap Metal Recycling

Where applicable and feasible, electronics and scrap metals shall be recycled or refurbished to the extent possible in accordance with ESH-06.

5.0 Responsibilities

5.1 Project Lead

The Project Lead shall:

- Ensure that all remediation projects for which they have responsibility have a waste management plan as outlined in Section 4.0. Review and ensure updates are completed as necessary. Plans must also be submitted to the Records Manager for upload to the Document Management System (DMS).

- Consult with Corporate EESH Legal as needed to verify the listing determination.

- Ensure that the Contractor has outlined the applicable training requirements and provided a training plan or statement of completion within the waste management plan.

- Verify that the site has a Hazardous Waste Generator Identification Number prior to hazardous waste shipments, where applicable.

- Ensure that all hazardous waste manifests are signed and certified by a Lockheed Martin employee or authorized designee. For non-hazardous waste, there are no signatory requirements for waste manifests.

- Ensure that non-hazardous or hazardous waste is shipped to an approved facility per ESH-06 and that the Corporate Approved Waste Management Vendors are being used for hazardous waste transportation, storage, and/or disposal services.

- Ensure receipt of the waste characterization, chain of custody, transportation, and destruction records, where applicable, and submit them to the Records Manager for upload to the DMS.

- Ensure that the required regulatory and state hazardous waste reports are submitted (e.g. biennial waste reports).

5.2 Remediation Global Supply Chain Management Representative

The Global Supply Chain Representative shall:

- Ensure that the KNA includes the requirements defined in Section 3.0.

- Send the Remediation Contractors an updated version of the approved non-hazardous facility list quarterly.

- Send the Corporate Approved Waste Management Vendors an updated version of the Lockheed Martin Corporate Hazardous Waste Approved Vendors List quarterly.

5.3 Corporate EESH Legal

The Corporate EESH Legal Counsel shall:

- Provide the Project Lead with support when making listed waste determinations.
- Notify the Project Leads of regulation changes that would affect prior listing determinations.

6.0 Training Requirements

The EESH remediation staff training requirements are summarized in Table 1.

6.1 RCRA Hazardous Waste Handling and Emergency Procedures

RCRA Generator Status Facilities
Generators who generate more than 1,000 kg/month of hazardous waste (or more than 1 kg/month of acutely hazardous waste) must comply with the emergency preparedness and personnel training requirements outlined in 40 CFR §265.16 (see 40 CFR §262.34(a)(4)). This training is intended for all facility personnel including the generator's contractors and includes training by a qualified person on hazardous waste management and emergency response procedures. Personnel shall receive an annual refresher. Project Leads are responsible for ensuring this training is provided to contractor staff on remediation projects that meet this generator criterion. Contractor personnel training records must also be maintained by the Project Lead.

"Small quantity generators" who generate greater than 100 kg but less than 1000 kg/month of hazardous waste, must comply with the emergency preparedness and personnel training requirements at 40 CFR §262.34(d)(5). These generators "must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relevant to their responsibilities during normal facility operations and emergencies" (40 CFR §262.34 (d)(5)(iii)). Project Leads shall ensure that all contractor staff has had the appropriate hazardous waste handling and emergency procedure training on remediation projects that meet this generator criterion.

Federal training requirements do not apply to remediation projects that generate less than 100 kg/month of hazardous waste. However, Project Leads shall ensure that the contractor staff is familiar with hazardous waste handling and emergency procedure training appropriate for waste management.

RCRA Permitted or Interim Status Facilities
Permitted or interim status facilities must follow training requirements in accordance with 40 CFR §264.16 and 40 CFR §265.16, respectively (the same requirements apply as outlined in the first paragraph under Section 6.1).

Additional training may be required by state and/or host country hazardous waste regulations. Any such additional training shall be verified and implemented by the Project Lead.

6.2 Department of Transportation Training

Department of Transportation (DOT) Hazmat Employee training is required for a person involved in shipment preparation, offering for transport and transportation of hazardous waste, including signing of hazardous waste manifests (see 49 CFR 172, Subpart H). All Lockheed Martin Remediation representatives, designees, and/or waste management contractors shall complete the hazmat employee training and renew the training as necessary to meet DOT requirements for hazardous waste transportation.

6.3 OSHA HAZWOPER Training

All contractors working on Lockheed Martin remediation sites shall complete the appropriate OSHA hazardous waste operations (HAZWOPER) training and annual refresher training specified in 29 CFR §1910.120. Lockheed Martin employees managing projects where hazardous waste is generated shall complete the 24 hour OSHA HAZWOPER training and annual refresher training.

7.0 Deviations

All deviations from this procedure must have prior approval by the Director of Environmental Remediation. The approval shall be documented and uploaded to the DMS.

Table 1

EESH Remediation Staff Waste Management Training Matrix			
Function	Task	Training Required	Requirements
EESH Remediation Employees (including IWTA and managing contractor staff (where the task description matches responsibilities))	Completing / Approving Waste Determinations	RCRA Generator Training	Refresher every 5 years
	Managing Remediation Sites where Hazardous Waste is Generated	OSHA HAZWOPER 24 HR	8 hr refresher annually
	Managing Hazardous Waste Shipments	DOT HazMat Certification (see Table 2)	Refresher every 3 years

The Lockheed Martin Project Lead shall update the Remediation Waste Management Training Matrix located on the Remediation Process Asset Library once training has occurred. All training and certification documentation will reside on the Remediation DMS under Training Records.

Table 2

EESH Remediation Staff DOT Requirements for Hazmat Employees	
Requirement	**Completion Method**
General Awareness [49 CFR 172.704(a)(1)]	• Vendor (e.g. Lions) provided Hazardous Materials Transportation Workshop • DOT OJT (taught by EESH DOT SME)
Function-Specific [49 CFR 172.704(a)(2)]	• Vendor (e.g. Lions) provided Hazardous Materials Transportation Workshop • DOT OJT (taught by EESH DOT SME)
Safety [49 CFR 172.704(a)(3)]	• Vendor (e.g. Lions) provided Hazardous Materials Transportation Workshop • DOT OJT (taught by EESH DOT SME) • Hazwoper 24 Hour Training • Site specific safety training [NOTE: This element of safety training may be fulfilled through completing any one (1) of the following three (3) options which provides the required site specific safety information: 1) Site Safety Plan Review, 2) Site HazCom/ General Employee Training or 3) Site Visitor Safety Briefing/Training. The source of the training must be entered as part of the information on the test which is administered for site specific safety training.]
Security Awareness [49 CFR 172.704(a)(4)]	• Vendor (e.g. Lions) provided Hazardous Materials Transportation Workshop • DOT OJT (taught by EESH DOT SME) • Site specific security awareness training [NOTE: This element of security awareness training may be fulfilled through completing any one (1) of the following three (3) options which provides the required site specific security information: 1) Site Security Plan Review, 2) Site HazCom/General Employee Training or 3) Site Visitor Security Briefing/Training. The source of the training must be entered as part of the information on the test which is administered for site specific security training.]
In-Depth Security (Hazmat Security Plan) Only applicable when haz material/waste meets certain class and volume thresholds (reference Section 4.1, Element C, iv, 4) [49 CFR 172.704(a)(5)]	• Site Hazmat Transportation Security Plan Training

The EESH DOT SME will certify EESH Remediation staff members as DOT Hazmat Employees on behalf of Lockheed Martin once training and safety and security tests have been completed.

Attachment #1

Waste Listing Assessment Form

Waste Listing
Assessment Form

Attachment #2

Hazardous Waste Manifest Signature Authorization Form

Designee
Authorization Form

Attachment #3

Hazardous Material/Waste Shipment Checklist

Hazardous Material/
Waste Shipment Che

Attachment #4

Non-Specification Bulk Container Packing and Closing Instructions

Non-Specification
Bulk Container Packin

Waste Identification and Classification Form

LMC Remediation Project		**State Generated**	
Description of Waste			
Generic Name		**Solid, Liquid, Gas**	
		Additional Info.	
Date of Waste Generation		**Ongoing (Y/N)?**	

Description of Process Generating Waste

Listed Waste ? (Y/N)		**F,K, P or U Codes, if applicable**	

Justification for Waste Classification (attach support documentation)

Completed by	
Company	
Date	

Lockheed Martin Hazardous Waste Manifest Signatory Authorization

This Authorization Agreement, effective for the remediation site and period of performance written below, is entered into by and between:

LOCKHEED MARTIN CORPORATION (hereinafter "Lockheed Martin"), having a business office at 6801 Rockledge Drive, Bethesda, Maryland 20817 USA, and incorporated in the State of Maryland, and

_____

(hereinafter "_____")

having a business office at_____

_____.

WHEREAS, _____ (company representative) of _____ (company) will sign Hazardous Waste Manifests on behalf of Lockheed Martin for the project and hazardous waste, as defined at 40 CFR Pt. 261 *et seq.* indicated below.

Remediation Site: _____
Site Address: _____
Period of Performance: _____
Hazardous Waste Description:
_____
_____
Hazardous Waste Disposal Facility and Location: _____
_____
_____

This Authorization Agreement certifies that the representative signing on behalf of Lockheed Martin has taken the appropriate Department of Transportation training, as delineated at 49 CFR Part 172 *t seq.* to sign Hazardous Waste Manifests and is in compliance with all state and federal requirements for hazardous waste manifesting.

Lockheed Martin shall remain responsible and liable for the hazardous waste being disposed regardless of the Signatory Authorization provided herein.

LOCKHEED MARTIN CORPORATION	_____
By:_____	By:_____
Name:_____	Name:_____
Title:_____	Title:_____
Date:_____	Date:_____

Lockheed Martin Hazardous Material/Waste Shipment Checklist

Date:
Project Site Name:
Shipping Document No.:

A. DESCRIPTION

A1._____ UN/NA Identification Number, Proper Shipping Name, Hazard Class/Division Number, Packing Group
A2._____ Subsidiary hazard class(es) or division number(s), if any, in parenthesis
A3._____ Total Quantity of Material
A4._____ 24-Hour Emergency Phone Number and Response Information ERG No.: _____
A5._____ Page of Pages, *for multiple shipping papers/EPA Manifest/Air Decs.*
A6._____ Shipper's Certification, *as applicable*
A7._____ Small Quantity Exception/Dangerous Goods In Excepted Quantities/Diagnostic Specimen/Sample

B. ADDITIONAL DESCRIPTIONS - GENERAL

B1._____ Exemptions "DOT-E-*ex.#"*
B2._____ "Limited Quantity" (*not to exceed 66 lb gross weight*)
B3._____ "X" or "RQ" (if RQ, Hazardous Substance Contact @ 1-800-424-8802)
B4._____ "Waste" for RCRA regulated material
B5._____ "Mixture" or "Solution" - as appropriate.
B6._____ *(technical names), for poisons/mixtures/n.o.s./generic proper shipping names*
B7._____ "Marine Pollutant" and constituent in ( ), *for bulk shipments only*
B8._____ *(hazardous substance names) per 172.101 appendix if not contained in proper shipping name*
B9._____ *(EPA waste identification numbers)- used to identify the hazardous substance*
B10._____ "Poison" - *if not identified in proper shipping name or hazard class*
B11._____ "Poison-Inhalation Hazard" & Zone A, Zone B, Zone C, or Zone D, as appropriate*****
(*******Note Special Provisions 1-6 and 13 in Column 7 of 172.101)*

C. MARKING FOR NON-BULK PACKAGINGS

C1._____ Proper Shipping Name, UN/NA Identification Number
C2._____ (*technical name)*
C3._____ (*EPA waste identification number)*
C4._____ "RQ"
C5._____ Exemption Packagings "DOT-E-*ex.#*"
C6._____ Consignee's Name & Address
C7._____ Net or Gross quantity for non-rad Dangerous Goods (adjacent to PSN & UN#)
C8._____ Ltd. Qty - PSN only *per 172.301(a)(1) or* UN ID# placed in square-on-point border *per 172.315*
C9._____ Package Orientation Arrows, *for liquids in inner packagings*
C10._____ "Inhalation Hazard", unless these words appear on the label prescribed in *172.416* or *172.429*
C11._____ "Overpack" adjacent to proper shipping name marking [*see 173.25(a)(4)*]
C12._____ TSCA PCB Marking (*for actual or source concentration greater than or equal to 50 ppm **)
(* Note Potential Vehicle Marking Requirements in *40 CFR 761.40*)

D. MARKING FOR BULK PACKAGINGS (DUMP TRUCKS OR ROLL-OFFS)

D1._____ UN/NA Identification Number on orange panel or placard or white square-on-point display configuration as prescribed by 172.302 and 172.332

E. LABELING

E1._____ Primary Hazard Label(s): _____
E2._____ Subsidiary Hazard Label(s) with class/division: _____
E3._____ Hazardous Wastes Label(s)

F. PLACARDING

F1. 172.504 Table 1 Materials - Any Amount

F1.1._____ Dangerous When Wet (4.3)
F1.2._____ Poison (6.1, Inhalation Hazard, Zone A or B)***** (Primary or Subsidiary _____

*(******Materials subject to the "Poison-Inhalation Hazard" notation must be placarded with a POISON INHALATION HAZARD or POISON GAS placard , as appropriate, and also placarded for any other hazard class required for that material in 172.504)*

F1.3._____ Radioactive (7, LSA/SCO Exclusive Use Shipments)

F2. 172.504 Table 2 Materials - 1,001 lb:

G. PACKAGING

G1._____ Container Type: (Inner Pkg)_____
G2._____ Container Type: (Outer Pkg)_____
G3._____ Container Type: (Bulk Pkg)_____
G4._____ Loaded and Closed As Required_____

H. PAPERWORK AND MISCELLANEOUS ITEMS

H1._____ Shipping Paper/Hazardous Waste Manifest/Bill of Lading/Airway Bill/Shipper's Declaration
H2._____ Instructions for Maintenance of Exclusive Use Shipments
H3._____ Small Quantity/Excepted Quantity Statement on Package, *for 173.4 shipments* / **DGEQ** statement per *2.7.7.2* noted on Airway Bill
H4._____ Photograph, *if applicable*
H5._____ Vehicle Inspection
H6._____ Check Driver's Qualifications
H7._____ Emergency Telephone Number Notification, if required, see 172.604(b)
H8._____ LMC Notification Instructions

I. ADDITIONAL REQUREMENTS FOR RADIOACTIVE MATERIAL SHIPMENTS

I1. SHIPPING PAPER DESCRIPTIONS
- I1.1.____ Radionuclide Symbol(s), *per 173.435*
- I1.2.____ Physical & Chemical Form, *if not special form*
- I1.3.____ Activity per Package
- I1.4 ____ Radioactive Labels
- I1.5.____ Fissile Excepted, *if applicable*
- I1.6.____ "Exclusive Use Shipment"

I2. MARKING FOR NON-BULK PACKAGINGS
- I2.1.____Gross Weight, *for radioactive material packages in excess of 110 lb*
- I2.2.____ "Radioactive"; "Radioactive – LSA" ; "Radioactive – SCO"
- I2.3.____ Package Certification Number, *for radioactive material packages, as appropriate*
- I2.4.____ IP-1, IP-2, IP-3 markings
- I2.5.____ "USA" on all IP and Type A packagings
- I2.6.____ Packaging manufacturer marking on Type A

I3. LABELING
- I3.1.____ Radioactive Labels
- I3.2.____ "EMPTY" Label
- I3.3.____ "Radioactive Material, Excepted Package" handling label

I4. PLACARDING (172.504 TABLE 1 MATERIALS - ANY AMOUNT)
- I4.1.____ Radioactive (7, LSA/SCO Exclusive Use Shipments)

I5. PAPERWORK AND MISCELLANEOUS ITEMS
- H1._____ Instructions for Maintenance of Exclusive Use Shipments
- H2._____ Radioactive Excepted Package statement per *10.8.8.3.3* on Airway Bill
- H3._____Limited Quantity Radioactive Material *for multiple hazard limited quantity Class 7*.
- H4._____Health Physics Information
- H5._____NRC Manifest #540 for radioactive waste shipment for land disposal.

Completed By: **Company:** **Date:**

PACKING AND CLOSING INSTRUCTIONS FOR NON-SPECIFICATION BULK CONTAINERS (DUMP TRUCKS AND ROLL-OFFS) 04/10/2009

PRELIMINARY TASKS

- Select the transport container based on the Department of Transportation hazard classification and the packaging requirements specified in the Hazardous Materials Table.
- Perform moisture evaluation of waste material to be loaded into transport containers to determine the potential for releasing liquid.

PREPARATION OF BULK CONTAINERS FOR LOADING

- Transport containers must be inspected for any condition that may affect their safety or performance prior to each use.
- Dump trucks and roll-offs with doors must have gaskets installed at the tailgate or doors that when the tailgate or doors are closed the gasket is compressed sealing the tailgate or doors to assure package integrity and containment of materials. The gasket must be inspected prior to each use for overall integrity including positioning, damage such as holes or tears or debris which could prevent tight closure. Any deficiencies shall require replacement prior to use.
- An absorption pad shall be placed in the truck or roll-off bed. The pad specification shall be determined utilizing the data determined in the waste material moisture evaluation and must be capable of absorbing the liquid which could be released.
- An absorption log at the rear of the transport container along the bottom of the tailgate or rear doors.
- A minimum 6 mil poly liner shall be placed over the absorption pad and absorption log prior to loading.
- Determine the amount of waste that can be loaded into the transport container. (Subtract the unladen weight of the transport vehicle from the maximum licensed weight of the transport vehicle. NOTE: Do not load the maximum permissible load determined in the mathematical calculation to allow for variance in scales that may be utilized to weigh the loaded vehicle.)

LOADING AND CLOSING BULK CONTAINERS

- Waste material shall be loaded into the transport container in such a manner that does not compromise either the liner or container integrity.
- Do not load material above the height of the sides of the transport container.
- Close the poly liner over of the waste material prior to tarping the load.
- Close the transport container by putting a heavy roll tarp over the top of the transport container and secure the tarp by utilizing tie downs on all four sides.

APPENDIX C — QUALITY ASSURRANCE PROJECT PLAN

Analysis Group Description	Method Description	Method Code
Groundwater	Volatile Organic Compounds (GC/MS)	8260B

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Acetone	67-64-1	5	1.1	ug/L	43	136	%	30	%	33	145	%	30	%			%
Benzene	71-43-2	1	0.13	ug/L	83	112	%	20	%	72	121	%	30	%			%
Bromobenzene	108-86-1	1	0.13	ug/L	76	115	%	30	%	71	116	%	30	%			%
Bromochloromethane	74-97-5	1	0.29	ug/L	77	120	%	30	%	73	121	%	30	%			%
Bromodichloromethane	75-27-4	1	0.15	ug/L	72	121	%	30	%	67	120	%	30	%			%
4-Bromofluorobenzene (Surr)	460-00-4			ug/L			%		%			%		%	66	117	%
Bromoform	75-25-2	1	0.64	ug/L	40	131	%	30	%	32	128	%	30	%			%
Bromomethane	74-83-9	1	0.41	ug/L	11	185	%	30	%	10	186	%	30	%			%
2-Butanone	78-93-3	5	0.57	ug/L	60	126	%	30	%	54	129	%	30	%			%
Carbon disulfide	75-15-0	1	0.13	ug/L	62	142	%	30	%	57	147	%	30	%			%
Carbon tetrachloride	56-23-5	1	0.13	ug/L	66	128	%	30	%	59	129	%	30	%			%
Chlorobenzene	108-90-7	1	0.15	ug/L	85	110	%	30	%	80	110	%	30	%			%
Chloroethane	75-00-3	1	0.29	ug/L	25	153	%	30	%	21	165	%	30	%			%
2-Chloroethyl vinyl ether	110-75-8	10	0.99	ug/L	52	131	%	30	%	10	150	%	30	%			%
Chloroform	67-66-3	1	0.16	ug/L	79	117	%	30	%	76	118	%	30	%			%
Chloromethane	74-87-3	1	0.3	ug/L	44	126	%	30	%	33	132	%	30	%			%
2-Chlorotoluene	95-49-8	1	0.11	ug/L	76	116	%	30	%	69	117	%	30	%			%
4-Chlorotoluene	106-43-4	1	0.18	ug/L	77	115	%	30	%	71	116	%	30	%			%
cis-1,2-Dichloroethene	156-59-2	1	0.17	ug/L	80	113	%	30	%	70	120	%	30	%			%
cis-1,3-Dichloropropene	10061-01-5	1	0.14	ug/L	61	115	%	30	%	51	110	%	30	%			%
Dibromochloromethane	124-48-1	1	0.18	ug/L	64	119	%	30	%	56	118	%	30	%			%
1,2-Dibromo-3-Chloropropane	96-12-8	5	0.67	ug/L	42	136	%	30	%	32	139	%	30	%			%
1,2-Dibromoethane	106-93-4	1	0.24	ug/L	79	113	%	30	%	74	113	%	30	%			%
Dibromofluoromethane (Surr)	1868-53-7			ug/L			%	30	%			%	30	%	75	121	%
Dibromomethane	74-95-3	1	0.28	ug/L	81	120	%	30	%	77	121	%	30	%			%
1,2-Dichlorobenzene	95-50-1	1	0.13	ug/L	81	110	%	30	%	75	111	%	30	%			%
1,3-Dichlorobenzene	541-73-1	1	0.14	ug/L	80	110	%	30	%	73	110	%	30	%			%
1,4-Dichlorobenzene	106-46-7	1	0.13	ug/L	82	110	%	30	%	75	110	%	30	%			%
Dichlorodifluoromethane	75-71-8	1	0.31	ug/L	19	129	%	30	%	17	128	%	30	%			%
1,1-Dichloroethane	75-34-3	1	0.15	ug/L	82	115	%	30	%	79	116	%	30	%			%
1,2-Dichloroethane	107-06-2	1	0.22	ug/L	71	127	%	30	%	68	129	%	30	%			%
1,2-Dichloroethane-d4 (Surr)	17060-07-0			ug/L			%	30	%			%	30	%	63	129	%
1,1-Dichloroethene	75-35-4	1	0.19	ug/L	78	131	%	30	%	74	135	%	30	%			%
1,2-Dichloropropane	78-87-5	1	0.18	ug/L	81	115	%	30	%	78	115	%	30	%			%
1,3-Dichloropropane	142-28-9	1	0.16	ug/L	79	116	%	30	%	74	118	%	30	%			%
2,2-Dichloropropane	594-20-7	1	0.13	ug/L	50	129	%	30	%	38	127	%	30	%			%
1,1-Dichloropropene	563-58-6	1	0.13	ug/L	83	114	%	30	%	80	114	%	30	%			%
Diisopropyl ether	108-20-3	5	1.5	ug/L	77	118	%	30	%	73	118	%	30	%			%
Ethylbenzene	100-41-4	1	0.17	ug/L	83	112	%	30	%	75	116	%	30	%			%
Ethyl-t-butyl ether (ETBE)	637-92-3	5	0.11	ug/L			%	30	%			%	30	%			%
Hexachlorobutadiene	87-68-3	1	0.3	ug/L	36	134	%	30	%	27	132	%	30	%			%
2-Hexanone	591-78-6	5	0.41	ug/L	55	133	%	30	%	47	139	%	30	%			%
Isopropylbenzene	98-82-8	1	0.13	ug/L	75	114	%	30	%	68	116	%	30	%			%
Methylene Chloride	75-09-2	1	0.33	ug/L	66	131	%	30	%	63	128	%	30	%			%
4-Methyl-2-pentanone	108-10-1	5	0.32	ug/L	63	128	%	30	%	56	131	%	30	%			%
Methyl tert-butyl ether	1634-04-4	5	0.17	ug/L	52	144	%	30	%	46	144	%	30	%			%
m-Xylene & p-Xylene	179601-23-1	2	0.24	ug/L	83	113	%	30	%	75	117	%	30	%			%
Naphthalene	91-20-3	1	0.24	ug/L	32	141	%	30	%	15	158	%	30	%			%
n-Butylbenzene	104-51-8	1	0.12	ug/L	66	125	%	30	%	56	127	%	30	%			%
n-Propylbenzene	103-65-1	1	0.14	ug/L	74	121	%	30	%	64	124	%	30	%			%
o-Xylene	95-47-6	1	0.14	ug/L	83	113	%	30	%	76	116	%	30	%			%
p-Isopropyltoluene	99-87-6	1	0.12	ug/L	74	120	%	30	%	64	122	%	30	%			%
sec-Butylbenzene	135-98-8	1	0.13	ug/L	70	117	%	30	%	60	119	%	30	%			%
Styrene	100-42-5	1	0.11	ug/L	79	114	%	30	%	71	117	%	30	%			%
Tert-amyl-methyl ether (TAME)	994-05-8	5	0.067	ug/L			%	30	%			%	30	%			%
tert-Butyl alcohol	75-65-0	20	3.9	ug/L	70	130	%	30	%	70	130	%	30	%			%
tert-Butylbenzene	98-06-6	1	0.13	ug/L	71	115	%	30	%	61	119	%	30	%			%
1,1,1,2-Tetrachloroethane	630-20-6	1	0.23	ug/L	72	116	%	30	%	64	118	%	30	%			%
1,1,2,2-Tetrachloroethane	79-34-5	1	0.18	ug/L	68	118	%	30	%	63	122	%	30	%			%
Tetrachloroethene	127-18-4	1	0.29	ug/L	79	114	%	30	%	70	117	%	30	%			%
Toluene	108-88-3	1	0.13	ug/L	84	111	%	30	%	78	114	%	30	%			%
Toluene-d8 (Surr)	2037-26-5			ug/L			%	30	%			%	30	%	74	115	%
trans-1,2-Dichloroethene	156-60-5	1	0.19	ug/L	83	117	%	30	%	80	119	%	30	%			%
trans-1,3-Dichloropropene	10061-02-6	1	0.19	ug/L	58	117	%	30	%	46	116	%	30	%			%
1,2,3-Trichlorobenzene	87-61-6	1	0.17	ug/L	54	126	%	30	%	45	129	%	30	%			%
1,2,4-Trichlorobenzene	120-82-1	1	0.15	ug/L	48	135	%	30	%	38	138	%	30	%			%
1,1,1-Trichloroethane	71-55-6	1	0.22	ug/L	74	118	%	30	%	68	121	%	30	%			%
Trichloroethene	79-01-6	1	0.17	ug/L	76	117	%	30	%	66	120	%	30	%			%
Trichlorofluoromethane	75-69-4	1	0.21	ug/L	49	157	%	30	%	46	157	%	30	%			%
1,2,3-Trichloropropane	96-18-4	1	0.43	ug/L	73	129	%	30	%	67	132	%	30	%			%
1,1,2-Trichloro-1,2,2-trichfluoroethane	76-13-1	1	0.28	ug/L	74	151	%	30	%	70	152	%	30	%			%
1,2,3-Trimethylbenzene	526-73-8	5	0.0059	ug/L	70	130	%	30	%	70	130	%	30	%			%
1,2,4-Trimethylbenzene	95-63-6	1	0.12	ug/L	76	120	%	30	%	67	124	%	30	%			%
Vinyl acetate	108-05-4	2	0.19	ug/L	46	161	%	30	%	43	157	%	30	%			%
Vinyl chloride	75-01-4	1	0.22	ug/L	53	127	%	30	%	49	130	%	30	%			%
Xylenes, Total	1330-20-7	2	0.28	ug/L	83	112	%	30	%	76	116	%	30	%			%
Tentatively Identified Compound	STL00231	1	1	ug/L			%	30	%			%	30	%			%

Groundwater	Metals (ICP/MS)	6020A

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Antimony	7440-36-0	2	0.13	ug/L	80	120	%	20	%	44	153	%	20	%			
Arsenic	7440-38-2	5	0.4	ug/L	80	120	%	20	%	82	123	%	20	%			
Barium	7440-39-3	5	0.19	ug/L	80	120	%	20	%	45	144	%	20	%			
Beryllium	7440-41-7	1	0.2	ug/L	80	120	%	20	%	77	124	%	20	%			
Cadmium	7440-43-9	1	0.13	ug/L	80	120	%	20	%	78	117	%	20	%			
Cobalt	7440-48-4	1	0.058	ug/L	80	120	%	20	%	67	114	%	20	%			
Chromium	7440-47-3	2	0.71	ug/L	80	120	%	20	%	72	110	%	20	%			
Copper	7440-50-8	2	0.29	ug/L	80	120	%	20	%	60	123	%	20	%			
Molybdenum	7439-98-7	10	4	ug/L	80	120	%	20	%	80	110	%	20	%			
Nickel	7440-02-0	2	0.2	ug/L	80	120	%	20	%	72	111	%	20	%			
Lead	7439-92-1	1	0.18	ug/L	80	120	%	20	%	73	115	%	20	%			
Selenium	7782-49-2	5	0.57	ug/L	80	120	%	20	%	72	148	%	20	%			
Thallium	7440-28-0	2	0.14	ug/L	80	120	%	20	%	69	117	%	20	%			
Vanadium	7440-62-2	20	0.44	ug/L	80	120	%	20	%	70	112	%	20	%			
Zinc	7440-66-6	20	2.3	ug/L	80	120	%	20	%	49	156	%	20	%			
Silver	7440-22-4	1	0.08	ug/L	80	120	%	20	%	10	139	%	20	%			

Groundwater	Mercury (CVAA)	7470A

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Mercury	7439-97-6	0.2	0.12	ug/L	81	123	%	20	%	69	134	%	20	%			

Groundwater	Semivolatile Organic Compounds (GC/MS)	8270D

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
1,4-Dioxane	123-91-1	1	0.49	ug/L	27	110	%	30	%	21	110	%	60	%			%
2-Fluorobiphenyl (Surr)	321-60-8			ug/L			%		%			%		%	20	110	%
2-Fluorophenol (Surr)	367-12-4			ug/L			%		%			%		%	10	110	%
2,4,6-Tribromophenol (Surr)	118-79-6			ug/L			%		%			%		%	21	110	%
Nitrobenzene-d5 (Surr)	4165-60-0			ug/L			%		%			%		%	21	110	%
Phenol-d5 (Surr)	4165-62-2			ug/L			%		%			%		%	21	110	%
Terphenyl-d14 (Surr)	1718-51-0			ug/L			%		%			%		%	24	110	%

Groundwater	Dissolved Gases (GC)	RSK_175

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Ethene	74-85-1	0.5	0.37	ug/L	64	130	%	30	%	51	129	%	34	%			%
Ethane	74-84-0	0.5	0.1	ug/L	77	127	%	30	%	59	133	%	34	%			%
Methane	74-82-8	0.5	0.098	ug/L	79	113	%	30	%	13	173	%	42	%			%
1,1,1-Trifluoroethane	420-46-2			ug/L			%		%			%		%	40	122	%

Groundwater	Nitrogen, Ammonia	350.3

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Ammonia (as N)	7664-41-7	0.2	0.035	mg/L	85	114	%	20	%	75	125	%	20	%			

Groundwater	Alkalinity	310.1

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Alkalinity	STL00171	5	2.7	mg/L	90	127	%	20	%	10	160	%	24	%			

Groundwater	Solids, Total Dissolved (TDS)	160.1_Calcd

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Total Dissolved Solids	STL00242	10	7.4	mg/L	88	110	%	20	%								

Groundwater	Metals (ICP)	6010C

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Calcium	7440-70-2	5000	130	ug/L	80	120	%	20	%	75	125	%	20	%			
Iron	7439-89-6	200	81	ug/L	80	120	%	20	%	75	125	%	20	%			
Potassium	7440-09-7	5000	72	ug/L	80	120	%	20	%	75	125	%	20	%			
Magnesium	7439-95-4	5000	34	ug/L	80	120	%	20	%	75	125	%	20	%			
Manganese	7439-96-5	15	0.41	ug/L	80	120	%	20	%	75	125	%	20	%			
Sodium	7440-23-5	5000	590	ug/L	80	120	%	20	%	75	125	%	20	%			
SiO2, Silica	14808-60-7	1070	14	ug/L	80	120	%	20	%	75	125	%	20	%			

Groundwater	Anions, Ion Chromatography	300

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Nitrite as N	14797-65-0	0.1	0.012	mg/L	90	110	%	20	%	80	120	%	20	%			
Nitrate as N	14797-55-8	0.1	0.023	mg/L	90	110	%	20	%	80	120	%	20	%			
Orthophosphate as P	STL00599	0.5	0.044	mg/L	90	110	%	20	%	80	120	%	20	%			
Chloride	16887-00-6	1	0.1	mg/L	90	110	%	20	%	80	120	%	20	%			
Sulfate	14808-79-8	1	0.12	mg/L	90	110	%	20	%	80	120	%	20	%			

Groundwater	Polychlorinated Biphenyls (PCBs) by Gas C	8082

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Aroclor 1016	12674-11-2	1	0.17	ug/L	66	120	%	30	%	67	120	%	30	%			%
Aroclor 1221	11104-28-2	1	0.13	ug/L			%		%			%		%			%
Aroclor 1232	11141-16-5	1	0.16	ug/L			%		%			%		%			%
Aroclor 1242	53469-21-9	1	0.22	ug/L			%		%			%		%			%
Aroclor 1248	12672-29-6	1	0.1	ug/L			%		%			%		%			%
Aroclor 1254	11097-69-1	1	0.16	ug/L			%		%			%		%			%
Aroclor 1260	11096-82-5	1	0.17	ug/L	55	120	%	30	%	31	120	%	30	%			%
Tetrachloro-m-xylene	877-09-8			ug/L			%		%			%		%	23	136	%
DCB Decachlorobiphenyl	2051-24-3			ug/L			%		%			%		%	10	130	%
PCB-1016 Peak 1	STL00132	1	0.17	ug/L			%		%			%		%			%
PCB-1016 Peak 2	STL00290	1	0.17	ug/L			%		%			%		%			%
PCB-1016 Peak 3	STL00232	1	0.17	ug/L			%		%			%		%			%
PCB-1016 Peak 4	STL00307	1	0.17	ug/L			%		%			%		%			%
PCB-1016 Peak 5	STL00085	1	0.17	ug/L			%		%			%		%			%
PCB-1221 Peak 1	STL00206	1	0.13	ug/L			%		%			%		%			%
PCB-1221 Peak 2	STL00174	1	0.13	ug/L			%		%			%		%			%
PCB-1221 Peak 3	STL00313	1	0.13	ug/L			%		%			%		%			%
PCB-1232 Peak 1	STL00280	1	0.16	ug/L			%		%			%		%			%
PCB-1232 Peak 2	STL00210	1	0.16	ug/L			%		%			%		%			%
PCB-1232 Peak 3	STL00110	1	0.16	ug/L			%		%			%		%			%
PCB-1232 Peak 4	STL00108	1	0.16	ug/L			%		%			%		%			%
PCB-1232 Peak 5	STL00130	1	0.16	ug/L			%		%			%		%			%
PCB-1242 Peak 1	STL00059	1	0.22	ug/L			%		%			%		%			%
PCB-1242 Peak 2	STL00276	1	0.22	ug/L			%		%			%		%			%
PCB-1242 Peak 3	STL00020	1	0.22	ug/L			%		%			%		%			%
PCB-1242 Peak 4	STL00075	1	0.22	ug/L			%		%			%		%			%
PCB-1242 Peak 5	STL00148	1	0.22	ug/L			%		%			%		%			%
PCB-1248 Peak 1	STL00039	1	0.1	ug/L			%		%			%		%			%
PCB-1248 Peak 2	STL00268	1	0.1	ug/L			%		%			%		%			%
PCB-1248 Peak 3	STL00294	1	0.1	ug/L			%		%			%		%			%
PCB-1248 Peak 4	STL00264	1	0.1	ug/L			%		%			%		%			%
PCB-1248 Peak 5	STL00218	1	0.1	ug/L			%		%			%		%			%
PCB-1254 Peak 1	STL00292	1	0.16	ug/L			%		%			%		%			%
PCB-1254 Peak 2	STL00297	1	0.16	ug/L			%		%			%		%			%
PCB-1254 Peak 3	STL00022	1	0.16	ug/L			%		%			%		%			%
PCB-1254 Peak 4	STL00042	1	0.16	ug/L			%		%			%		%			%
PCB-1254 Peak 5	STL00067	1	0.16	ug/L			%		%			%		%			%
PCB-1260 Peak 1	STL00060	1	0.17	ug/L			%		%			%		%			%
PCB-1260 Peak 2	STL00274	1	0.17	ug/L			%		%			%		%			%
PCB-1260 Peak 3	STL00248	1	0.17	ug/L			%		%			%		%			%
PCB-1260 Peak 4	STL00277	1	0.17	ug/L			%		%			%		%			%
PCB-1260 Peak 5	STL00197	1	0.17	ug/L			%		%			%		%			%

Groundwater	Semivolatile Organic Compounds (GC/MS)	8270D

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Acenaphthene	83-32-9	0.2	0.1	ug/L	47	110	%	30	%	35	110	%	30	%			%
Acenaphthylene	208-96-8	0.2	0.1	ug/L	49	110	%	30	%	33	110	%	30	%			%
Acetophenone	98-86-2	1	0.34	ug/L	46	110	%	30	%	10	155	%	31	%			%
Anthracene	120-12-7	0.2	0.1	ug/L	52	110	%	30	%	26	110	%	37	%			%
Atrazine	1912-24-9	1	0.34	ug/L	66	126	%	30	%	40	124	%	30	%			%
Benzaldehyde	100-52-7	1	0.39	ug/L	38	110	%	30	%	24	110	%	34	%			%
Benzo[a]anthracene	56-55-3	0.2	0.1	ug/L	52	110	%	30	%	16	110	%	30	%			%
Benzo[b]fluoranthene	205-99-2	0.2	0.1	ug/L	48	110	%	30	%	10	110	%	45	%			%
Benzo[k]fluoranthene	207-08-9	0.2	0.1	ug/L	49	110	%	30	%	10	110	%	48	%			%
Benzo[g,h,i]perylene	191-24-2	0.2	0.1	ug/L	50	110	%	30	%	10	110	%	60	%			%
Benzo[a]pyrene	50-32-8	0.2	0.1	ug/L	44	110	%	30	%	10	110	%	60	%			%
Butyl benzyl phthalate	85-68-7	1	0.8	ug/L	55	110	%	30	%	31	110	%	37	%			%
1,1'-Biphenyl	92-52-4	1	0.8	ug/L	43	110	%	30	%	34	110	%	31	%			%
Bis(2-chloroethoxy)methane	111-91-1	1	0.32	ug/L	43	110	%	30	%	27	110	%	33	%			%
Bis(2-chloroethyl)ether	111-44-4	1	0.1	ug/L	40	110	%	30	%	24	110	%	42	%			%
Bis(2-ethylhexyl) phthalate	117-81-7	2	0.8	ug/L	39	116	%	30	%	10	112	%	71	%			%
4-Bromophenyl phenyl ether	101-55-3	2	0.8	ug/L	45	110	%	30	%	26	110	%	35	%			%
Caprolactam	105-60-2	5	0.8	ug/L	45	111	%	30	%	10	199	%	99	%			%
Carbazole	86-74-8	1	0.28	ug/L	55	110	%	30	%	28	110	%	30	%			%
4-Chloroaniline	106-47-8	2	0.8	ug/L	44	110	%	30	%	15	110	%	73	%			%
4-Chloro-3-methylphenol	59-50-7	2	0.8	ug/L	52	110	%	30	%	38	110	%	35	%			%
2-Chloronaphthalene	91-58-7	1	0.1	ug/L	43	110	%	30	%	28	110	%	37	%			%
2-Chlorophenol	95-57-8	1	0.29	ug/L	29	110	%	30	%	20	110	%	70	%			%
4-Chlorophenyl phenyl ether	7005-72-3	2	0.3	ug/L	47	110	%	30	%	30	110	%	36	%			%
Chrysene	218-01-9	0.2	0.1	ug/L	55	110	%	30	%	17	110	%	30	%			%
2-Methylnaphthalene	91-57-6	0.2	0.1	ug/L	45	110	%	30	%	32	110	%	33	%			%
3 & 4 Methylphenol	15831-10-4	2	0.75	ug/L	44	110	%	30	%	31	110	%	42	%			%
Dibenzo(a,h)anthracene	53-70-3	0.2	0.1	ug/L	49	110	%	30	%	10	111	%	63	%			%
Dibenzofuran	132-64-9	1	0.1	ug/L	51	110	%	30	%	36	110	%	30	%			%
3,3'-Dichlorobenzidine	91-94-1	5	0.37	ug/L	22	110	%	30	%	10	110	%	99	%			%
2,4-Dichlorophenol	120-83-2	2	0.8	ug/L	41	110	%	30	%	28	110	%	69	%			%
Diethyl phthalate	84-66-2	1	0.6	ug/L	58	110	%	30	%	42	110	%	30	%			%
2,4-Dimethylphenol	105-67-9	2	0.8	ug/L	32	110	%	30	%	15	110	%	36	%			%
Dimethyl phthalate	131-11-3	1	0.29	ug/L	57	110	%	30	%	42	110	%	30	%			%
4,6-Dinitro-2-methylphenol	534-52-1	5	2.4	ug/L	31	110	%	30	%	10	110	%	93	%			%
2,4-Dinitrophenol	51-28-5	5	2.4	ug/L	10	110	%	30	%	10	124	%	70	%			%
2,4-Dinitrotoluene	121-14-2	5	0.27	ug/L	53	110	%	30	%	37	110	%	56	%			%
Di-n-butyl phthalate	84-74-2	1	0.67	ug/L	57	110	%	30	%	35	110	%	37	%			%
Di-n-octyl phthalate	117-84-0	1	0.8	ug/L	40	110	%	30	%	10	118	%	92	%			%
1,4-Dioxane	123-91-1	1	0.49	ug/L	27	110	%	30	%	21	110	%	60	%			%
Fluoranthene	206-44-0	0.2	0.1	ug/L	54	110	%	30	%	31	110	%	30	%			%
Fluorene	86-73-7	0.2	0.1	ug/L	52	110	%	30	%	36	110	%	30	%			%
Hexachlorobenzene	118-74-1	0.2	0.1	ug/L	50	110	%	30	%	23	110	%	30	%			%
Hexachlorobutadiene	87-68-3	1	0.27	ug/L	33	110	%	30	%	15	110	%	49	%			%
Hexachlorocyclopentadiene	77-47-4	10	0.8	ug/L	10	110	%	30	%	10	110	%	99	%			%
Hexachloroethane	67-72-1	1	0.8	ug/L	35	110	%	30	%	10	122	%	44	%			%
Indeno[1,2,3-cd]pyrene	193-39-5	0.2	0.1	ug/L	50	110	%	30	%	10	110	%	58	%			%
Isophorone	78-59-1	1	0.27	ug/L	49	110	%	30	%	33	110	%	31	%			%
2-Methylphenol	95-48-7	1	0.8	ug/L	42	110	%	30	%	27	110	%	42	%			%
Naphthalene	91-20-3	0.2	0.1	ug/L	44	110	%	30	%	28	110	%	80	%			%
2-Nitroaniline	88-74-4	2	0.8	ug/L	54	110	%	30	%	38	110	%	32	%			%
3-Nitroaniline	99-09-2	2	0.28	ug/L	53	110	%	30	%	22	110	%	69	%			%
4-Nitroaniline	100-01-6	2	0.8	ug/L	54	110	%	30	%	18	110	%	60	%			%
Nitrobenzene	98-95-3	1	0.04	ug/L	42	110	%	30	%	15	110	%	34	%			%
2-Nitrophenol	88-75-5	2	0.28	ug/L	40	110	%	30	%	26	110	%	64	%			%
4-Nitrophenol	100-02-7	5	2.4	ug/L	33	112	%	30	%	16	111	%	65	%			%
N-Nitrosodimethylamine	62-75-9	1	0.31	ug/L	40	110	%	30	%	26	110	%	46	%			%
N-Nitrosodiphenylamine	86-30-6	1	0.31	ug/L	50	110	%	30	%	10	110	%	38	%			%
N-Nitrosodi-n-propylamine	621-64-7	1	0.8	ug/L	47	110	%	30	%	32	110	%	32	%			%
2,2'-oxybis[1-chloropropane]	108-60-1	1	0.4	ug/L	37	110	%	30	%	10	145	%	43	%			%
Pentachlorophenol	87-86-5	5	2.4	ug/L	18	110	%	30	%	10	123	%	76	%			%
Phenanthrene	85-01-8	0.2	0.1	ug/L	53	110	%	30	%	34	110	%	30	%			%
Phenol	108-95-2	1	0.6	ug/L	33	110	%	30	%	25	110	%	74	%			%
Pyrene	129-00-0	0.2	0.1	ug/L	52	110	%	30	%	32	110	%	30	%			%
2,4,5-Trichlorophenol	95-95-4	5	0.3	ug/L	48	110	%	30	%	36	110	%	60	%			%
2,4,6-Trichlorophenol	88-06-2	5	0.8	ug/L	45	110	%	30	%	33	110	%	63	%			%
2-Fluorobiphenyl (Surr)	321-60-8			ug/L			%		%			%		%	20	110	%
2-Fluorophenol (Surr)	367-12-4			ug/L			%		%			%		%	10	110	%
2,4,6-Tribromophenol (Surr)	118-79-6			ug/L			%		%			%		%	21	110	%
Nitrobenzene-d5 (Surr)	4165-60-0			ug/L			%		%			%		%	21	110	%
Phenol-d5 (Surr)	4165-62-2			ug/L			%		%			%		%	21	110	%
Terphenyl-d14 (Surr)	1718-51-0			ug/L			%		%			%		%	24	110	%
2,6-Dinitrotoluene	606-20-2	5	0.8	ug/L	54	110	%	30	%	38	110	%	54	%			%

Groundwater	Perchlorate (IC)	314.0

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSREC - Units	LCSRPD - Precision	LCSRPD - Units	MSREC - Recovery Low	MSREC - Recovery High	MSREC - Units	MSRPD - Precision	MSRPD - Units	SUREC - Recovery Low	SUREC - Recovery High	SUREC - Units
Perchlorate	14797-73-0	4	0.75	ug/L	85	115	%	15	%	80	120	%	20	%			