Additional Characterization and Sediment-Sampling Work Plan Middle River Complex 2323 Eastern Boulevard Middle River, Maryland

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Lockheed Martin Corporation

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ACRONYMS

AVS/SEM	acid-volatile sulfides/simultaneously extracted metals
BRF	Tetra Tech Biological Research Facility
CM	centimeter
COC	chemicals of concern
COPC	chemicals of potential concern
Cs	cesium
CSS	chemical stabilization/solidification
CV	coefficient of variability
DGPS	Differential Global Positioning System
EDAS	"Ecological Data Application System"
EFDC	"Environmental Fluids Dynamics Code"
EPA	U. S. Environmental Protection Agency
ERA	ecological risk assessment
ESA	environmental site assessments
GC/SIM	Gas Chromatography Selective Ion Monitoring
GIS	geographic information system
GPS	global positioning system
HASP	health and safety plan
HBT	hanging-bag test
HHRA	human-health risk assessment
IDW	investigation derived waste
Lockheed Martin	Lockheed Martin Corporation
MBE	multi-beam echo-sounder
MDE	Maryland Department of the Environment
ml	milliliter
mm	millimeter
MQO	measurement quality objective
MRAS	Middle River Aircraft Systems
MS2	Mission Systems & Sensors
MSA	Martin State Airport
NPDES	"National Pollutant Discharge Elimination System"

PAHs	polycyclic aromatic hydrocarbons
Pb	lead
PCBs	polychlorinated biphenyls
POS/MV	Position and Orientation Systems for Marine Vessels
PP	polypropylene
PPE	personal protective equipment
ppm	parts per million
PSE	percent sorting-efficiency
psi	pounds-per-square-inch
PT	pillow test
PW	pore water
QA	quality assurance
QC	quality control
Ra	radium
REC	"Recognized Environmental Condition"
RTK	Real Time Kinematic
SED	sediment
SM	standard method
SOP	standard operating procedures
TOC	Total organic carbon
TSS	total suspended solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USCG	United States Coast Guard
UTM	"Universal Transverse Mercator"
VCP	MDE "Voluntary Cleanup Program"
VOC	volatile organic compounds

Section 1
Introduction

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc. has prepared this work plan to characterize the sediments of waterways adjacent to the Middle River Complex (MRC) at 2323 Eastern Boulevard in Middle River, Maryland (see Figure 1-1). The objectives of this proposed sediment and biological sampling program are to finalize characterization of Dark Head Cove and Cow Pen Creek with respect to area wide environmental conditions and to establish the basis of cleanup goals and potential remediation alternatives. Work performed under this program will supplement and enhance existing sediment data collected during the 2005 and 2008 sediment investigations in the Cow Pen Creek and Dark Head Cove areas. These objectives will be met by collecting an array of chemical, environmental, geotechnical, and physical data and conducting bathymetric surveys and hydraulic analyses of sediment stability. This work plan is organized as follows:

Section 2 – Site Background: Briefly describes the site history and previous investigations

Section 3 – Sediment Characterization: Presents the technical approach to the investigation and describes the field methodology for chemical sampling and analysis, hydraulic analysis of sediment stability, and bathymetric surveying protocols

Section 4 – Benthic Assessment: Presents the investigation's technical approach and describes the field methodology for collecting and assessing the benthic (i.e., soil dwelling) invertebrate community near the MRC and at selected reference locations

Section 5 – Fish Tissue Sampling and Analysis: Presents the investigation's technical approach and describes the field methodology for collecting and assessing fish tissue near the MRC and at selected reference locations

Section 6 – Pre Design Testing: Presents the investigation's technical approach and describes the field methodology for the collection of sediment that will be submitted for geotechnical analysis and dewatering testing to be used in later studies, should remediation be necessary at this site

Section 7 – Project Deliverables: Describes the final reports that will summarize the findings of the investigation program

Section 8 – References: Cites references used in compiling this planning document

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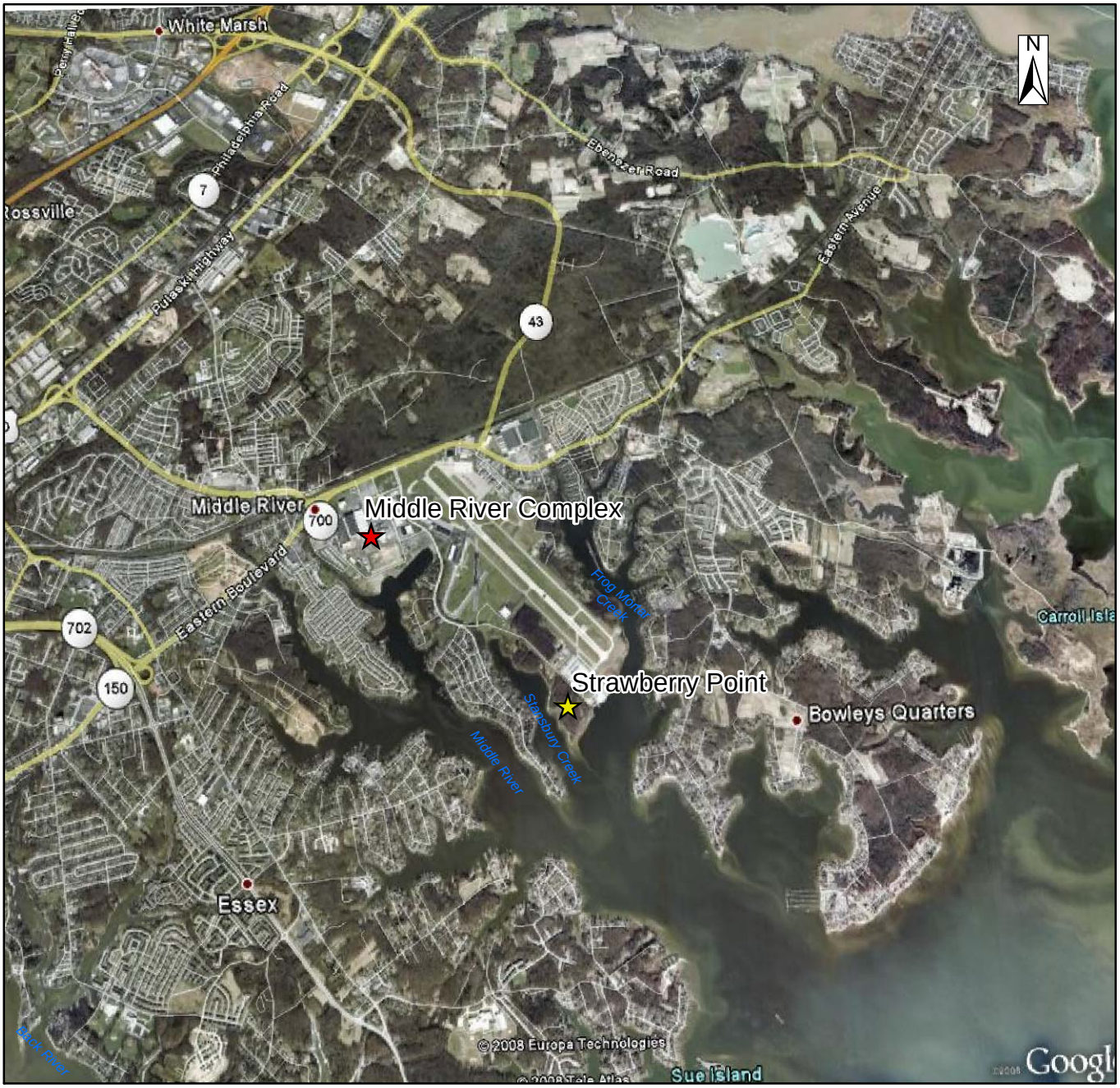

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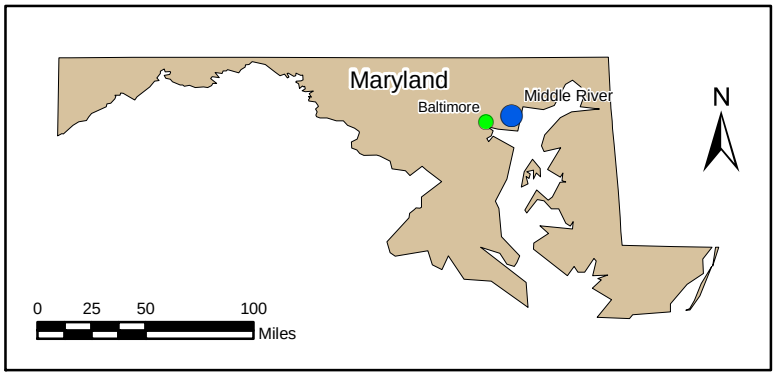

Figure 1-1

Middle River Complex
Site Location Map

Lockheed Martin Middle River Complex
Middle River, Maryland

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Tetra Tech, Inc.

Section 2
Site Background

2.1 SITE DESCRIPTION

The Lockheed Martin MRC is at 2323 Eastern Boulevard in Middle River, Maryland. A facility layout map is provided as Figure 2-1. The site consists of approximately 180 acres of land and 12 main buildings. The property includes an active industrial area and yard, perimeter parking lots, an athletic field, a vacant concrete covered lot, a trailer and parts storage lot, and numerous grassy areas along the facility perimeter. Locked chain-link fences surround all exterior lots and the main industrial area. The site is bounded by Eastern Boulevard (Route 150) to the north, Dark Head Cove to the south, Cow Pen Creek to the west, and Martin State Airport (MSA) to the east.

Lockheed Martin activities at the site are currently limited to facility and building management and maintenance. Two main tenants occupy the site: Middle River Aircraft Systems (MRAS) and Mission Systems & Sensors (MS2). MRAS designs, manufactures, fabricates, tests, overhauls, repairs, and maintains aeronautical structures, parts, and components for military and commercial applications. MS2 fabricates, assembles, tests, and otherwise supports vertical-launch systems. Historically, the property has been used for aircraft and missile-launching-systems design, development, and sales.

2.1.1 Physical Setting

2.1.1.1 Land Use

The MRC is an industrial facility within the broader Chesapeake Industrial Park. The area surrounding the property primarily consists of commercial, industrial, and residential establishments. Six other facilities, comprising the remainder of the Chesapeake Industrial Park, lie adjacent to the Lockheed Martin MRC. These include Tilley Chemical Company, Inc. (a distributor of food- and pharmaceutical-chemicals for the personal care and other industries), North American Electric (an industrial and commercial electrical-contractor), Johnson and Towers

(a heavy-duty diesel equipment, truck, and boat repair and maintenance company), Poly-Seal Corp. (a producer of flexible packaging for various items), Exxon (a gasoline filling-station and convenience store), and the Middle River Post Office. Residential developments lie on the opposite shores of Cow Pen Creek, Dark Head Cove, and Dark Head Creek (not shown in the figures but flowing from Dark Head Cove to Middle River, which is a tributary to Chesapeake Bay), as well as north of Eastern Boulevard (Route 150).

2.1.1.2 Physiography

The site lies within the Western Shore of the Coastal Plain Physiographic Province. The Coastal Plain topography is generally characterized by low relief. The topography of the MRC is gently sloping, ranging from sea level to approximately 32-feet above mean sea level (Cassell, July 1977). The topography slopes from Eastern Boulevard to the southwest and south, towards Cow Pen Creek and Dark Head Cove.

2.1.1.3 Hydrology

The Lockheed Martin MRC lies at the junction of Cow Pen Creek and Dark Head Cove. Both are tidal surface-water bodies that feed into Dark Head Creek, a tributary to Middle River, which is a tributary to Chesapeake Bay. The facility lies approximately 3.2 miles upstream of Chesapeake Bay. No surface-water bodies lie within or cross the Lockheed Martin MRC.

Excluding areas immediately adjacent to Cow Pen Creek and Dark Head Creek, surface-water runoff discharges from the facility via storm drains, soil infiltration, and evaporation. Nine storm water drain systems at the facility that discharge to Cow Pen Creek and Dark Head Cove were mapped by TAI Consulting Engineers in 2001 (see Figure 2-2). Other outfalls may have been used historically but are no longer in service. Storm-water runoff from the Chesapeake Industrial Park and a portion of the Martin State Airport (across Wilson Point Road), as well as from some of the area along Eastern Avenue, is collected through a storm-water-conveyance system and discharged to Cow Pen Creek and Dark Head Cove.

Lockheed Martin MRC maintains a State of Maryland "National Pollutant Discharge Elimination System" (NPDES) permit (State discharge permit No.: 00-DP-0298, NPDES permit No.: MD0002852) issued by Maryland Department of the Environment (MDE) Industrial

Discharge Permits Division, Water Management Administration (Earth Tech, February 2003). MRAS generates sanitary wastewater and process wastewater and is categorized as an "Industrial User." The facility pre-treats and discharges its wastewater under the "Industrial User Discharge Permit" (permit No.: WWDP#1390), issued to MRAS by the Baltimore County Department of Public Works, Bureau of Utilities (Earth Tech, February 2003). The permit authorizes the facility to discharge its processed and sanitary wastewater from seven permitted discharge points (i.e., outfalls).

2.1.2 Subsurface Conditions

2.1.2.1 Soils

Soils underlying the Lockheed Martin MRC have been mapped as Mattapex-Urban Land Complex and Sassafras-Urban Land Complex by the United States Department of Agriculture (USDA) Soil Conservation Service. Mattapex-Urban Land soils consist of deep, well-drained, silty soils, the original texture of which has been disturbed, graded over, or otherwise altered before construction. Sassafras-Urban Land soils consist of deep, well-drained, sandy soils, the original texture of which has been disturbed, graded over, or otherwise altered before construction (USDA, September 1993). MRC site-assessment activities, however, indicate that a high percentage of these soils contain a very high clay and silt content, with poor surface drainage.

2.1.2.2 Geology

Geologic maps of Baltimore County show that the Lockheed Martin MRC is underlain by the Potomac Group, a Cretaceous-age interbedded gravel, sand, silt, and clay unit ranging in thickness from 0–800 feet. The Potomac Group is composed of three units: the Raritan and Patapsco Formations, the Arundel Clay, and the Patuxent Formation. The Raritan and Patapsco Formations range up to 400 feet thick and are composed of a gray, brown, and red variegated silt and clay unit with lenticular lenses of sand and few gravels. The Arundel Clay is composed of dark gray and maroon lignitic-clays ranging from 25–200 feet thick. The Patuxent Formation is described as a white or light-gray to orange-brown, moderately sorted sand unit with quartz gravels, silts, and clays ranging up to 250-feet thick (Reinhardt, 1977).

The "Geologic Map of the Middle River Quadrangle" (Reinhardt, 1977) maps the entire survey area as either the clay or sand facies of the Patapsco Formation. The sands are more concentrated

on the peninsulas east of Martin State Airport and in areas north of Eastern Boulevard, whereas all of the peninsulas (except for the Wilson Point Road area) west of the airport are mapped as belonging to the clay facies. The Arundel Clay is mapped as outcropping northwest of the MRC facility (Reinhardt, 1977).

Lithologic logging of soils beneath the MRC (conducted during extensive site-characterization activities) identifies a very heterogeneous substrate. The underlying soils are composed primarily of silty sands, fine-grained to medium-grained sands, silty clays, clayey silts, and plastic clay, with the primary lithology being clay to silty clay. Sand lenses were encountered but do not appear to be continuous beneath the facility. Shallow groundwater tends to flow in the more sandy lenses towards the surface-water bodies, and the water table is generally a subdued representation of the surface topography.

2.2 PREVIOUS INVESTIGATIONS

Numerous environmental investigations have been conducted at the Lockheed Martin MRC. These include underground storage-tank closures and abandonments, soil excavations, "Phase I Environmental Site Assessments" (ESAs), and "Phase II ESAs." In 2003, a facility-wide Phase I ESA was conducted at the Lockheed Martin MRC. The Phase I investigation identified 13 "Recognized Environmental Concerns" (RECs) at the facility associated primarily with current site conditions (Earth Tech, February 2003). Subsequent review of historic site activities identified another 18 RECs at the facility (Tetra Tech, August 2004).

Many of the RECs are in the southern portion of the facility along the waterfront. Soil and groundwater sampling at the RECs identified sporadic soil and groundwater contamination in environmental media underlying the facility. The MRC has entered into the MDE "Voluntary Cleanup Program" (VCP) and studies of soil and groundwater at the MRC are ongoing.

With respect to surface water and sediment studies, on March 17–18, 2005, surface water and sediment were sampled in the surface-water bodies (i.e., Cow Pen Creek, Dark Head Cove, and Dark Head Creek) adjacent to the facility's southern and western property boundaries. Ten additional surface water and 50 additional sediment samples were collected in October 2005 to further characterize and delineate chemicals identified during the March sampling event. The later

event included much more extensive investigation of Dark Head Cove, as well as vertical profiling of chemical concentrations in sediments.

In March 2005, seven surface-water samples (SW-1 through SW-7) and 12 sediment samples (SD-1 through SD-12) were collected from Cow Pen Creek and Dark Head Cove. Two (SW/SD-1 and SW/SD-2) were collected as background reference-samples, one (SW/SD-1) was hydraulically upgradient of the facility's first outfall (along Cow Pen Creek), and one (SW/SD-2) was from a cove within Dark Head Creek. The remaining sampling locations were positioned along the facility waterfront approximately 10 feet from the shoreline and spaced to generally coincide with outfall locations.

In October 2005, 10 surface-water samples (SW-8 through SW-17) and 50 sediment samples from 30 locations (SD-13 through SD-42) were collected from Cow Pen Creek and Dark Head Cove. Surface-water sampling locations were distributed to provide data sufficient to broadly evaluate surface-water quality. Sediment-sampling locations were chosen to evaluate the horizontal distribution of chemicals of concern previously identified in March 2005.

Surface sediments were collected from all 30 sediment-sampling locations (approximately the top six-inches of unconsolidated material). At nine of the 30 sampling locations (SD-13, 14, 16, 19, 27, 28, 29, 40, and 42), samples were collected at depths of approximately 1–2-feet below the sediment/surface-water interface. Sampling locations selected for coring were relatively close to the MRC shoreline and were intended to confirm previous sampling results and evaluate the vertical distribution of chemicals.

The 2006 human health risk assessment (HHRA), based on data from the 2005 sampling events, concluded that non-carcinogenic effects for both surface water and sediment were regulatory acceptable because the "Hazard Index" calculated for a hypothetical recreational receptor was less than 1.0. Carcinogenic risks of exposures to surface water (incidental ingestion, dermal contact) were less than the MDE threshold limit of 1E-05, or a one–in-100,000 probability of developing cancer (Tetra Tech, 2006). Carcinogenic risks for exposures to sediment exceeded this MDE threshold for carcinogenic effects; however, the estimated risks were within the U. S. Environmental Protection Agency (EPA) acceptance range of 1E-04 to 1E-06, or a one-in-10,000 to one-in-one-million probability of developing cancer.

Moreover, the risk assessment overstates exposure to sediments, as the water depth of the surface water bodies will minimize direct exposure to contaminated sediments. The primary chemicals of concern (COC) in sediment were identified as arsenic, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). Arsenic concentrations in sediment were recognized as likely attributable to naturally occurring background concentrations. The HHRAs estimates of potential risk are presumed conservative.

The 2006 HHRA evaluated incidental ingestion and dermal contact with surface waters and sediments as direct contact exposure pathways. Risks associated with consumption of fish from the study area were not evaluated in the 2006 HHRA. The 2006 ecological risk assessment (ERA) (likewise based on the 2005 data) identified cadmium in surface water and barium, silver, benzo(a)pyrene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene as the primary chemicals of potential concern (COPC) in sediment. Food-chain modeling also identified mercury in sediment as a concern (Tetra Tech, 2006).

A 2008 technical memorandum provides a current evaluation of the 2005 data (Tetra Tech, September 2008). It uses Thiessen polygons to display and evaluate the distribution of available sediment data. Each polygon represents the data for one sediment boring advanced during the 2005 field investigation. Thiessen polygons are a means of displaying area wide concentrations by normalizing the concentrations available for the various sampling locations according to the size of the area each concentration data point represents.

The memorandum's risk evaluation was used to identify several polygons for a potential remedial action based on the analytical data for the one boring advanced within that polygon in 2005. This analysis led to further sediment sampling in 2008 to obtain analytical data to better define the distribution of PCBs and other COPCs, primarily PAHs and metals (identified during the March and October 2005 sampling events), and to update the human health and ecological risk assessments originally prepared on the basis of environmental data collected in 2005. A second field investigation was conducted in November 2008.

To better delineate the horizontal and vertical extent of the contamination, sampling in November 2008 focused on areas where initial sampling indicated that removal might be required, as well as adjacent areas. Additional locations were also sampled based on the lack of data for deeper sediment

(depths > 6"). This investigation indicated potential human-health and ecological risks from chemicals in the sediment. For human health, the greatest risk drivers were PAHs, total Aroclors, and several metals (arsenic, antimony, cadmium, and chromium).

Risks estimated for the fish-ingestion exposure pathway exceeded those for the direct-contact (i.e., incidental ingestion and dermal contact) exposure pathways. For ecological receptors, sediment invertebrates face the greatest potential risks, from PAHs, total Aroclors, and several metals. Risks to piscivorous birds (e.g., belted kingfisher) were considered possible from PCBs in the sediment, after having accumulated in fish. For total Aroclors, potential risks were greatest from the surface sediment, whereas for PAHs and metals risks are greatest from the subsurface sediment. Because no current complete exposure-pathway for subsurface sediment exists, potential risks to human and ecological receptors would only occur if the deeper sediment was exposed in the future, either because of natural conditions (e.g., scouring, storms) or deliberate actions (e.g., dredging) (Tetra Tech, 2009). All 2005 and 2008 sampling locations are shown in Figure 2-2.

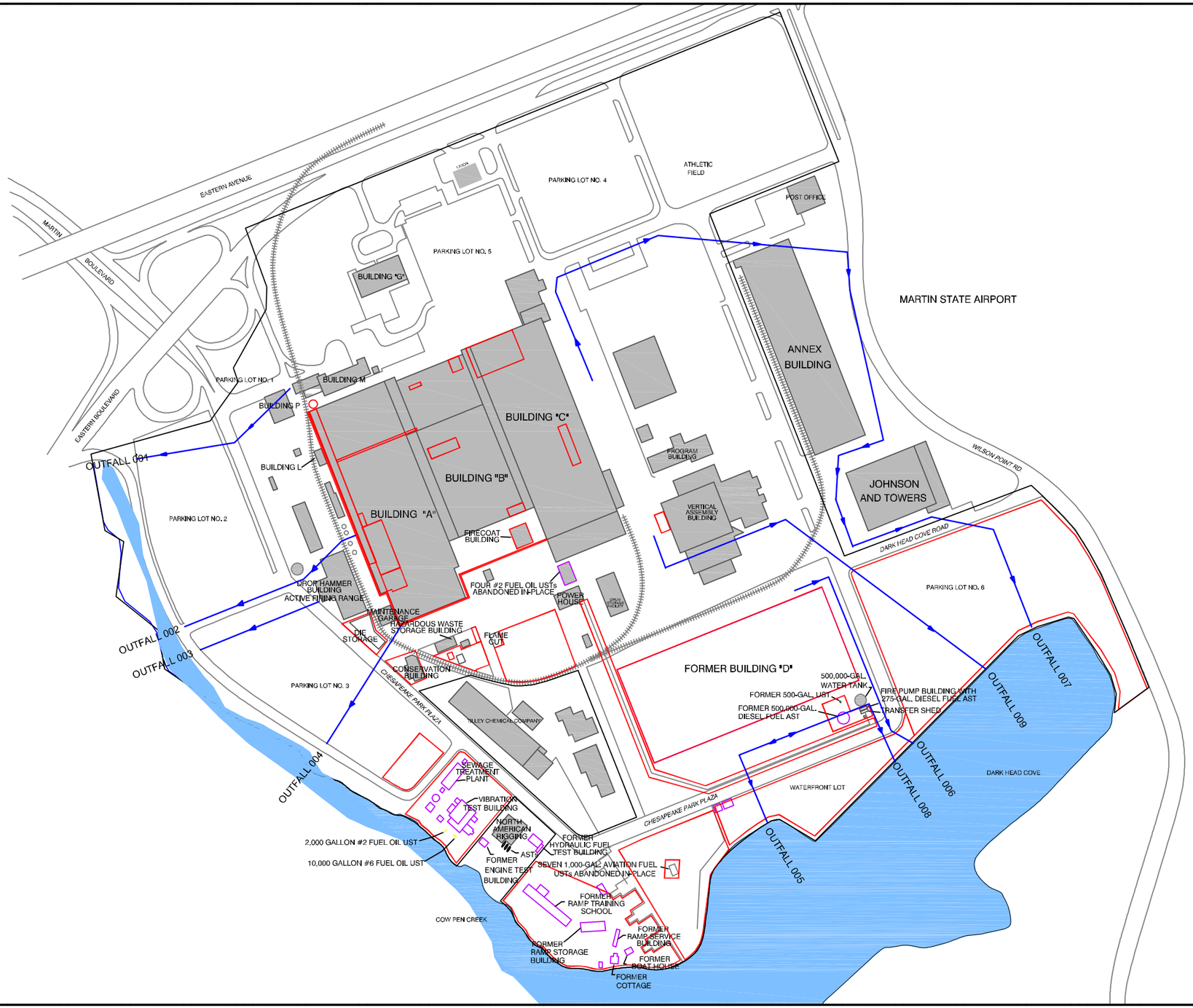

FIGURE 2-1

MIDDLE RIVER COMPLEX FACILITY MAP

LEGEND

OUTFALL 004 NPDES PERMITTED OUTFALL

STORMWATER AND FLOW DIRECTION

EXISTING STRUCTURE

FORMER STRUCTURE

Lockheed Martin Middle River Complex
Middle River, Maryland

0 200 400

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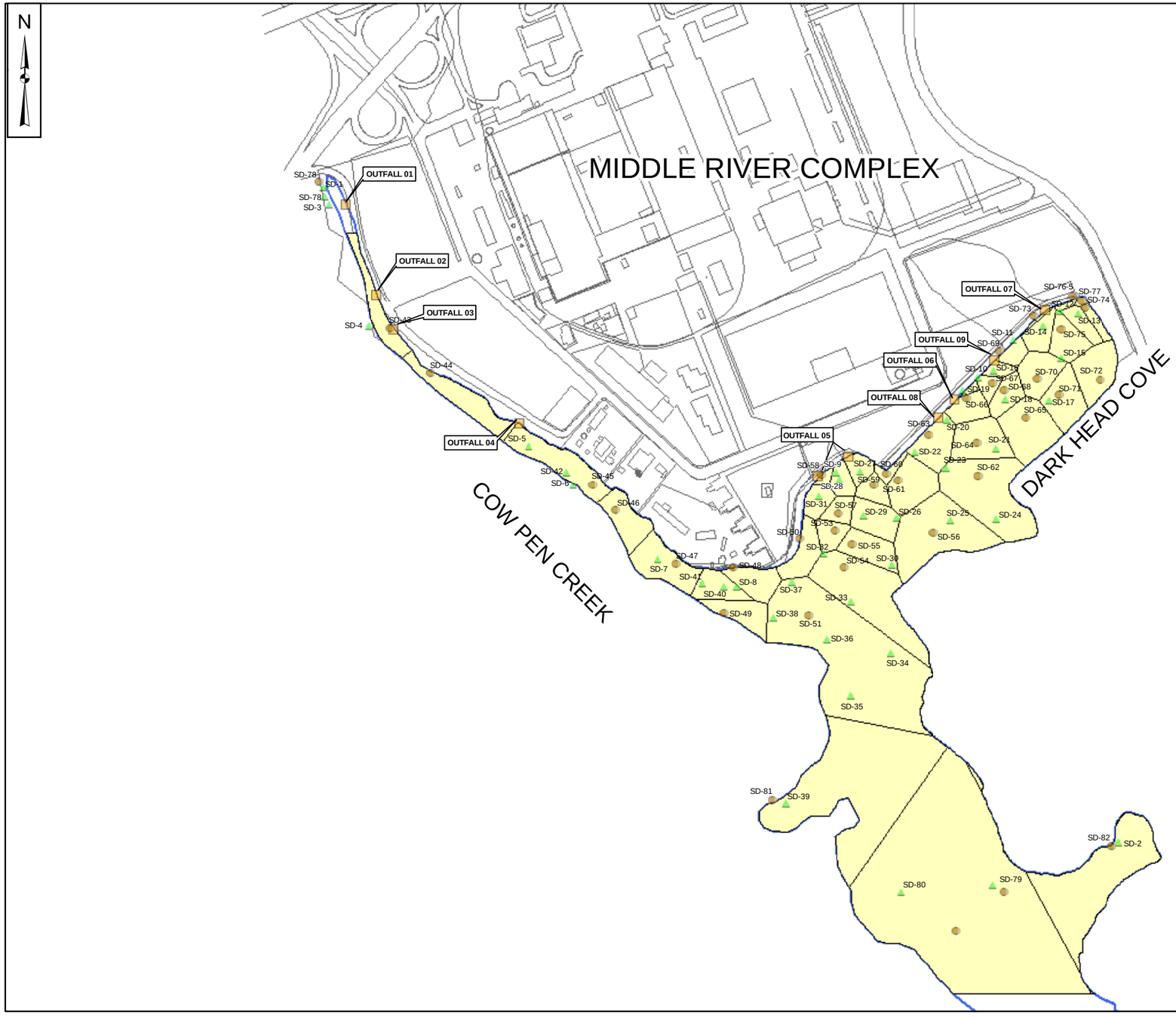

TETRA TECH

Figure 2-2
Historic Sample Location Map
Lockheed Martin Middle River Complex
Middle River, Maryland

Legend

- Sample Locations- 2005
- Sample Locations- Nov 2008
- Stormwater Outfall Locations
- Middle River Complex
- Water

500 250 0 500
Feet

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Section 3
Sediment Characterization

Sediment samples will be collected from selected locations in Cow Pen Creek, Dark Head Cove, Dark Head Creek, and three reference locations (Marshy Point, Bowleys Quarters, and Middle River at a location removed from possible MRC influences). The sampling program's multiple objectives are as follows:

- A bathymetric survey will be performed to accurately represent the sediment surface that will influence surface water flow in Dark Head Cove, Cow Pen Creek, and Dark Head Creek

- Chemical sampling for PCBs, PAHs, and metals will focus on areas where insufficient data are available and the Thiesen polygons used for data analyses represent too large an area to provide sufficient resolution on the distribution of COPC at the site

- Additional chemical sampling and analyses will be conducted on a subset of samples for alkylated PAHs to forensically evaluate potential sources of these compounds

- Pore water sampling in areas with elevated metals, PAH, and PCB concentrations will evaluate steady-state concentrations of the potentially bioavailable fractions of these contaminants in affected sediments

- Pore water sampling adjacent to the shoreline at areas of groundwater discharge will document concentrations of volatile organic compounds (VOCs) that may be moving into surface-water bodies from contaminated groundwater at the MRC

- Physical-characterization sampling and testing will evaluate characteristics of the various sediment environments that may affect remedial activities and factor into feasibility studies

- Benthic macroinvertebrate sampling will assess the diversity and abundance of native organisms in Cow Pen Creek and Dark Head Cover relative to three reference areas near Middle River

- Fish tissue sampling will document concentrations of COPC in edible fish species and compare concentrations between near-site and remote reference-locations

- Upstream sampling will evaluate what chemicals may be moving into Cow Pen Creek and Dark Head Cove from areas off-site along Eastern Avenue and Martin State Airport, respectively

- Sediment-age dating will evaluate sediment stability, estimate the period during which COPCs may have been released to the sediments, and assess rates of natural recovery

Before sediment sampling begins, appropriate Tetra Tech personnel will become familiar with the site-specific health and safety plan (HASP) and the respective "Safe Work Permits" included therein. Before all field events, Tetra Tech will conduct a mandatory daily health and safety tailgate meeting. . Safety requirements are addressed in more detail in the site-specific Tetra Tech HASP included as Appendix A.

3.1 ENVIRONMENTAL SEDIMENT-SAMPLING AND ANALYSIS

Sediment samples will be collected from 24 site locations and three reference locations during this investigation. Sampling locations were selected primarily to provide data that would allow a reduction of the areas of the previously discussed Theisien polygons so that the lateral and vertical extent of COPC can be determined in greater detail. Figure 3-1 presents the locations of the proposed sediment-sampling locations; Figure 3-2 depicts the three reference locations. Final reference locations will be determined in the field after site sampling near the MRC. Criteria used to assess the similarity of the reference locations to the site locations will include grain size (qualitatively), water depth, salinity, temperature, and pH. Table 3-1 presents the analytical program.

Sediment samples will be collected from each location at four depths: 0–6, 6–18, 18–30, and 30–52 inches below the surface-water/sediment interface. These intervals are consistent with depths sampled during previous investigations and will allow for consistency in data evaluation and risk assessment/management. All sediment samples will be analyzed for PAHs, PCBs, and priority-pollutant metals (including mercury). A subset of sediment samples will be analyzed for acid-volatile sulfides/simultaneously extracted metals (AVS/SEM). Additional samples will be collected for quality assurance purposes at a frequency of 10%. Five duplicate samples will also be collected and submitted for analysis.

3.1.1 Sediment-Sampling Protocols

Sediment samples will be collected using a four-inch diameter stainless-steel Vibracore® sampling-tube fitted with a polyethylene bag or acetate liner. Surface-water/sediment-interface samples may also be collected using another sampling method (e.g., push corer, ponar dredge) as

necessary and appropriate. A subcontractor will be procured and a boat will be used to collect the sediment samples. All reusable equipment contacting sediments will be decontaminated between sampling locations, as described in section 3.1.4.

The sampling tubes will be advanced by manual or mechanical (i.e., vibrating head) means, depending on the geology and sediment resistance of the creek bottom materials. Samples will be logged to describe sediment characteristics such as color, grain size, sorting, texture, and any other pertinent soil characteristics. The sediment's textural properties will be determined using tables specified in the ASTM D2488-00 method. Sorting will be determined by observing grain size distribution. Grain size will be determined by comparing sediment grains to a grain size chart. All information will be properly documented on a sediment-sampling form.

Each location will be surveyed by means of a global positioning system (GPS) with sub meter accuracy, using a portable Trimble Pro XRS GPS unit (or equivalent). The GPS unit will use the Maryland State plane-coordinate "Universal Transverse Mercator" (UTM) Zone 18. Tide stage at the time of the survey will be recorded and the depth to the top of the surface-water/sediment interface will be measured using a weighted tape. Sampling intervals and the total depth of the Vibracore® borings will also be recorded.

Sediment cores will likely be processed onshore. Care will be taken to avoid disturbing the sediment during transport. Sediment from each specific sampling interval will be homogenized in disposable aluminum pans using disposable plastic spatulas. After the sample is homogenized, the sediment will be placed into the sampling containers supplied by the analytical laboratory. All chemical samples will be analyzed for PAHs by USEPA SW846 Method 8270 gas chromatography selective ion monitoring (GC/SIM), for PCBs by USEPA SW846 Method 8082, and for priority-pollutant metals by USEPA SW864 Method 6010C or 6020 (including for mercury by Method 7471A). Samples will be analyzed with a standard 15-business-day turnaround.

3.1.2 Sample Nomenclature and Handling

Samples submitted to the laboratory will be labeled with an "SD" prefix, identifying the sampled medium as sediment, followed by a two-digit numeral to identify the sampling location, followed by

an indication of the depth interval: "SS" for surface sediment (0–6 inches), "01" for the 6–18-inch depth sample, "02" for the 18–30-inch depth sample, and "04" for the 30–52-inch depth sample. An example would be SD-83-SS for a surface sediment sample collected at location 83 and SD-85-02 for the 18–30-inch depth sample from location 85. Pore water samples will be designated with a "PW" prefix and then a sequential number.

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 demonstrate that the samples have been handled and transferred in a manner that would prevent tampering.

Sample containers will be released under signature from the laboratory and will be accepted under signature by the sampler(s) or responsible individual, who will maintain custody until the containers are transferred to the sampler(s). Transport containers 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.

3.1.3 Equipment Decontamination

Reusable sampling equipment will be decontaminated between sampling locations before each use as follows:

- Alconox® and potable-water wash
- Potable-water rinse
- Reagent grade isopropanol rinse (to thoroughly wet the equipment with isopropanol)
- Analyte-free water rinse
- Air drying
- Decontamination solutions will be collected for disposal

3.1.4 Waste Management

Investigation derived waste (IDW) (consisting of equipment rinse water, residual sample cores, and personal protective equipment [PPE]) will be generated during this sediment-sampling event. PPE will be dry brushed to remove any gross soil/sediment, placed in trash bags, and disposed of

in a Lockheed Martin designated trash container. Residual sample cores and equipment rinse water will be collected in 55-gallon drums and stored at a Lockheed Martin designated central staging area. All drums will be appropriately labeled and logged on a drum inventory form. The waste will be characterized and disposed of in accordance with applicable state and federal regulations. IDW will probably be disposed of as non-hazardous waste. A waste management plan conforming to Lockheed Martin procedure EROP-03 is included as Appendix B.

3.2 PHYSICAL-CHARACTERIZATION SAMPLING AND ANALYSIS

Tetra Tech will collect samples for physical characterization of sediment in Cow Pen Creek, Dark Head Cove, and Dark Head Creek. Physical-characterization data will be used to develop a feasibility study if remediation is necessary. Analyses to be performed are discussed in section 6, "Pre-Design Testing."

Minimally disturbed sediment cores will also be collected from three locations across the investigation area for vertical hydraulic-conductivity testing. Cores will extend a minimum of four feet below the mud line, if possible, and will be collected in straight thin walled Shelby-tube or equivalent cylinders. Acquired cores will remain upright and be handled in a manner to minimize disturbance of the contained sediment during transfer to the laboratory. Up to three vertical permeability tests will be run on each core using flex-wall permeameter testing methods (ASTM Method D-5084-03). In addition, grain size and percent solids analyses will be performed on three intervals per core, with the intervals corresponding to the permeability tests. Sampling locations for these cores are shown in Figure 3-1.

3.3 SEDIMENT-AGE DATING

Sediment cores will be collected from three locations and evaluated for sediment age, stability, and sedimentation rate. Age dating entails measuring the amount of naturally occurring radioactive isotopes in various layers of the sediment. Cores will be collected from identified depositional areas in Dark Head Cove, the confluence of Dark Head Cove and Cow Pen Creek, and in Middle River. Sediment cores will be collected and handled in a manner to minimize disturbance and preserve sediment stratification in the cores.

A core diameter sufficiently large to allow collection of at least 20 grams of dry material equivalent from the smallest (one centimeter [cm]) sections will be collected. A four inch-diameter core will probably be adequate for sediments with porosity less than 90%. Following collection, cores will be processed as necessary for sample shipment to the analytical laboratory to undergo selected radioisotope age-dating analysis.

The collected cores will be brought to shore and sectioned into discrete intervals. The collected cores will be processed for shipment to the laboratory by sectioning the cores at 2 cm intervals. Wet core sections will be placed into pre-cleaned wide mouth polypropylene plastic jars with lined, tight fitting lids. Appropriate steps will be taken to minimize leakage, because this could affect dry-bulk density determinations. Steps will also be taken to avoid losing water during sectioning. No special storage requirements are needed unless the sediments are emitting methane, in which case the samples will be kept at a temperature below 6° Celsius.

Lead (Pb)-210, and cesium (Cs)-137 analyses will most likely be used. Age dating may take up to three months due to the time required for radiation counts to achieve the detection limits necessary for the analysis. Approximately 6 sections per core will be initially analyzed for Pb-210. Cs-137 will also be measured, because it often serves to validate the Pb-210 data. A minimum of six Cs-137 analyses will be required per core.

3.4 SEDIMENT PORE-WATER AND SURFACE-WATER SAMPLING

Sediment pore water will be collected to satisfy two project objectives. The first is to determine the equilibrium concentrations of COPC in pore water both laterally and vertically near the MRC. These data will be used to evaluate the potential for risk posed to sediment-dwelling organisms by estimating the steady-state concentrations of COPC in pore water at areas with elevated COPC concentrations in sediment. The second objective is to quantify sediment and surface-water concentrations of VOCs, which may be discharging from groundwater plumes at the MRC.

The first objective will be achieved by core sampling seven locations throughout the site. A sufficient number of cores will be collected to obtain pore water for chemical analyses at each sampling location. For priority-pollutant metals, this will include collecting the top three sediment intervals at two locations in Cow Pen Creek, three locations in Dark Head Cove, and two locations

at the confluence of Dark Head Cove and Cow Pen Creek. PAHs and PCBs in pore water will be evaluated at two intervals in three areas in Dark Head Cove where elevated concentrations of these compounds are present in sediments. The sampling intervals to be collected correspond to horizons where elevated concentrations of contaminants have previously been detected. Pore water will be extracted at the laboratory for core depths corresponding to the top three intervals sampled for chemical compounds in sediments (0–6, 6–18, and 18–30 in.).

The second objective will be achieved by collecting pore water and surface-water samples for VOC analysis from locations immediately offshore from the two VOC plumes at the MRC. Samples will be collected along transects with five locations along each of the east and west plumes. The five sampling locations for each plume will be spaced so that three are near shore, bracketing the identified land-based dimensions of the plume, and two will be situated approximately 50 feet offshore within the plume boundary (as shown in Figure 3-1).

A Solinst Model 615 S drive point piezometer will be used to collect sediment pore water for VOC analysis. The Model 615 piezometer has a stainless steel 50-mesh cylindrical filter screen within a ¾ inch (20 millimeter [mm]) stainless steel drive point body and screen support. The screen is six inches long. The 615 S shielded drive point has a single use, 1-½-inch (38 mm) diameter shield to avoid smearing and plugging of the screen during installation. The strengthened connector at the top of the drive point acts as an annular seal, which prevents contamination from higher levels in the hole.

A 2-inch PVC pipe sealed with a plastic bag will be driven into the sediment before installing the temporary piezometers. The PVC pipe will serve as an outer casing to mitigate surface-water infiltration. The Solinst Model 615 piezometer will be driven through the visqueen to maximum depth in the sediment. The temporary piezometer will then be retracted to remove the shield and expose the screen. Teflon® tubing will be inserted into the temporary piezometers to the screen.

A peristaltic pump will be used to purge the piezometer and conductivity and temperature will be recorded using a direct reading instrument (e.g., Horiba, YSI) to determine the interface between groundwater and the brackish surface water. Sediment pore water samples will be collected from the fresh groundwater zone and the brackish water zone within the sediment. This method has been used successfully at a site in EPA Region IV. The piezometers' screens and steel rod will be

decontaminated between each borehole by successive washing with Luminox® (a new detergent from Alconox®) and rinsing with deionized water.

Tetra Tech will collect co-located surface-water samples near the pore water VOC locations. Two surface-water samples will be collected from each of the mapped discharge areas. Two samples will also be collected at locations away from plume discharge areas (i.e., unaffected areas; e.g., across Dark Head Cove). Surface-water samples will be collected approximately one foot above the mud line. Based on tidal conditions, samples collection will be attempted between three and five hours after high tide to assess conditions of maximum groundwater discharge. VOC samples (10 pore water and six surface water, plus quality assurance/quality control [QA/QC] samples) will be analyzed by EPA Method 8260, and for 1,4-dioxane by EPA Method 8270c SIM.

3.5 STORM-WATER RUN-ON SAMPLING AND ANALYSIS

Storm water sediment run-on samples will be collected from the head of Cow Pen Creek (including runoff from Eastern Boulevard) and from the outfalls of Martin State Airport (a composite from all outfalls). The objective of the storm water sediment sampling is to evaluate whether storm water may be transporting land based contaminants to sediments in Cow Pen Creek and Dark Head Cove. Samples will be collected when it is raining and protocols will be consistent with those specified in EPA's NPDES Storm-Water-Sampling Guidance Document (EPA 833-8-92-001). The two sediment samples will be analyzed for total metals and alkylated PAHs.

3.6 SEDIMENT ALKYLATED-PAH ANALYSIS

Tetra Tech will collect a subset of the environmental sediment-samples from Cow Pen Creek, Dark Head Cove, and Dark Head Creek and analyze them for alkylated PAHs. These additional analyses are intended to provide data on the source(s) of PAHs; therefore, samples for alkylated-PAH analysis will be distributed to evaluate possible background sources and the potentially different PAH signatures vertically and laterally in sediment within this area of sediment characterization (i.e., Cow Pen Creek, Dark Head Cove, and Dark Head Creek). Five locations, as shown in Figure 3-1 and presented in Table 3-1, each with three samples vertically from the top three sampling intervals, will be collected and submitted for the following analyses:

- Total petroleum and saturated hydrocarbons based on the following methods: EPA 8015D, EPA 8100, and EPA 8000C

- Analysis of parent and alkylated PAHs, selected heterocyclic compounds, steranes, triterpanes, and triaromatic steroids based on EPA Method 8270C

3.7 HYDRAULIC ANALYSIS

3.7.1 Introduction

The area's hydraulic characteristics will be studied to evaluate sediment stability and, in turn, the potential for contaminant mobility in Cow Pen Creek, Dark Head Cove and Middle River near the MRC. The "Environmental Fluids Dynamics Code" (EFDC) surface-water modeling system will be used to simulate hydrodynamics and their effects on sediment stability in the three water bodies. The EFDC model will be configured to simulate tidal- and runoff-driven circulation in the study area and to predict maximum bed-stress, which will likely be associated with spring tide conditions. The bed stress will be used to evaluate the sediment-bed stability or potential for erosion. If significant erosion potential is identified, the model will be extended to simulate sediment transport to evaluate possible sediment-bound contaminants.

3.7.2 Data Assembly and Analysis

This phase of the project will assemble, process, and analyze historical and new data for conducting the hydrodynamic-modeling-based analysis of sediment stability in Cow Pen Creek, Dark Head Cove, and Middle River. Data groups will include local watershed topography and land use, water-body bathymetry, sediment-bed physical properties, and hydrodynamic-forcing data. Recommendations regarding resolution of critical data-deficiencies will be made before moving to the next task.

3.7.3 Watershed and Runoff Modeling

The next step will be to estimate watershed and site storm-water-systems' inflows to the receiving water bodies under storm conditions, including a 100-year-recurrence event. Specifically, the contributing watershed and its runoff characteristics will be identified and modeled to develop storm-flow hydrographs. The site storm-drain system will likewise be identified, and the model will simulate site runoff from the design event as being routed through the system to outfalls in the receiving water body.

3.7.4 Configuration and Calibration of the Hydrodynamic- and Sediment-Transport Model

An EFDC-based hydrodynamic- and sediment-transport model will be configured for the study area using provided bathymetry and sediment-bed physical-property data, including grain-size distribution and bulk density with depth in the bed, as available. The model will be forced with watershed and storm-water-runoff flows from events developed during the watershed and runoff modeling. Additional forcing functions will include wind-forcing consistent with the modeled storms and astronomical and storm tides. Calibration of the model to known conditions will permit observation of water level fluctuations recorded at the site and any nearby tide gauge stations.

3.7.5 Sediment Stability Analysis

The hydrodynamic- and sediment-transport model will be used to evaluate the stability of the sediment under extreme or maximum bed-stress conditions incorporated into the model during the configuration and calibration phase. Conditions will include, but not be limited to, 100-year storm-inflow conditions at critical tide-phases and maximum wind and storm-tide conditions. Sediment erosion potential will be evaluated throughout the spatial domain by comparing the model's predicted bed stresses with critical stresses for erosion and corresponding erosion rates.

Spatially variable critical stresses and erosion rates will be specified based on sediment-bed physical characteristics and literature or site-specific erosion studies. If literature information is used, studies at sites in the Chesapeake Bay region with similar bed characteristics will be identified. If the potential for significant erosion is identified, sediment-transport simulation will be used to evaluate the corresponding potential for mobility of sediment-bed contaminants, as well as the possible need for additional field studies to further quantify erosion potential.

3.8 BATHYMETRIC SURVEY

3.8.1 Introduction

A bathymetric survey will be performed in Dark Head Cove, in accessible portions of Cow Pen Creek, and at the confluence of the two water bodies. This survey will document tide relative water depth, mud-line surface topography, and potential solids, utilities, or obstructions that may influence investigation-location selection and/or future remediation activities. A plan drawing and electronic file with the survey results will also be provided.

3.8.2 Survey Procedures

A detailed survey of the subject area will be conducted as follows:

- Before the survey, one or more horizontal and vertical control-point(s) will be established or verified based on existing site-survey information. The control point(s) may be used as a base station for a GPS, as well as for QA/QC data-point check and verification. The control point(s) will also provide a method for consistent positional referencing between repetitive or additional surveys.

- To provide the best possible data for horizontal position (X,Y), surveyors will use an Real Time Kinematic (RTK) GPS-enabled Applanix Position and Orientation Systems for Marine Vessels (POS/MV) system, which, in concert with a Leica 1230 RTK GPS and/or United States Coast Guard (USCG)-provided differential corrections, can provide 0.2-foot and three-foot horizontal positional accuracies, respectively.

- The RTK GPS corrections will be received on the survey vessel via radio receiver and either a shore-based RTK GPS base-station or a local RTK GPS broadcast. Unknown events could restrict GPS satellite signals, resulting in intermittently degraded or lost horizontal and vertical positional data. Surveyors will use a positioning system that incorporates an inertial sensor that will maintain accurate horizontal-positions (approximately ±3-feet) data through short periods of potential GPS outages.

- Bathymetric surveys will use a high-resolution multi-beam echo-sounder (MBE). If necessary, MBE data combined with single beam sonar may be used to fill data gaps in shallow-water areas. MBE sonar systems require the use of very high quality correctional sensors to measure the boat's roll, pitch, heave, and heading. The system to be used for this survey will provide roll, pitch, and heading accuracies of 0.03 degree (1 sigma). Real-time heave will be measured to an accuracy of 5 cm or 5% of the vertical displacement, whichever is greater. Surveyors will also use Applanix "TrueHeave" processing, which significantly improves the accuracy of heave measurements.

3.8.3 Survey Equipment

The following equipment will be used to survey the project area at the MRC:

- **Survey vessels:** a 22-foot shallow-draft (≤ 1.5 feet) vessel equipped with a data acquisition and processing lab, custom mounts for the multi-beam sonar, and davit systems. The survey vessel will be operated by a USCG-licensed captain

- **RESON multi-beam sonar:** Flexible plan RESON SeaBat 7125 dual 200/400 kHz (or equivalent)

- **Position, heading, and motion reference system:** Applanix POS/MV (or equivalent)

- **Sound-velocity profiler:** Seabird 19 (or equivalent)

- **Data processing:** Hypack/Hysweep (or equivalent), CARIS HIPS, Fledermaus Pro, and ArcMap

- **Secondary positioning system:** Trimble Ag132 Differential Global Positioning System (DGPS) receiver with USCG differential beacon

To maximize coverage in shallow water and shorelines, the surveyors may rotate the MBE sonar to port or starboard as necessary. With a rotated configuration the sonar will provide survey coverage nearly to the water surface.

Table 3-1

Sediment Characterization Summary
Middle River Complex, Middle River, Maryland

		Bulk Sediment Chemistry Analyses						Porewater Chemistry analyses							Surface Water Chemistry Analysis	Pre-design samples	Age-dating intervals		
LOCATION/name of core	**Sample Depths (inches)**	Priority Pollutant Metals inc Hg	PAHs	Alkylated PAHs (top three sample depths only)	PCBs	Total Organic Carbon	Acid Volatile Sulfide/ Simultaneously Extracted Metals	Priority Pollutant Metals inc Hg (porewater - top three sample intervals only)	PAHs (porewater - top three sample intervals only)	PCBs (porewater - top three sample intervals only)	Porewater VOCs (single depth interval)	Dissolved Organic Carbon	Hardness	pH	SurfaceWater VOCs and 1,4 Dioxane	Vertical Permeability Test, grain size, percent solids	Pb-210	Ra-226	Cs-137
Cow Pen Creek (CPC)																			
SD- CPC Stormwater		1		1															
SD-83	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-84	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-85, PW-01	0-6, 6-18, 18-30, 30-52	4	4		4	3	4	3				3	3	3					
SD-86	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-87, PW-02	0-6, 6-18, 18-30, 30-52	4	4	3	4	3	4	3				3	3	3					
CPC-Permeabilty																3			
PW-08,											1								
PW-09, SW-18											1				1				
PW-10											1								
PW-11, SW-19											1				1				
PW-12											1								
SW-20															1				
Dark Head Cove (DHC)																			
SD - MSA Stormwater		1		1															
SD-88, PW-03	0-6, 6-18, 18-30, 30-52	4	4		4	3	4	3	3	3		3	3	3					
SD-89, PW-04	0-6, 6-18, 18-30, 30-52	4	4		4	3	4	3	3	3		3	3	3					
SD-90, PW-05	0-6, 6-18, 18-30, 30-52	4	4	3	4	3	4	3	3	3		3	3	3					
SD-91	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-92	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-93	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-94	0-6, 6-18, 18-30, 30-52	4	4	3	4														
SD-95	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-96	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-97	0-6, 6-18, 18-30, 30-52	4	4	3	4														
DHC - Permeability																3			
DHC - Age Dating																	1	1	1
PW-13											1								
PW-14, SW-21											1				1				
PW-15											1								
PW-16, SW-22											1				1				
PW-17											1								
SW-23															1				

Table 3-1

Sediment Characterization Summary
Middle River Complex, Middle River, Maryland

		Bulk Sediment Chemistry Analyses						Porewater Chemistry analyses							Surface Water Chemistry Analysis	Pre-design samples	Age-dating intervals		
LOCATION/name of core	**Sample Depths (inches)**	Priority Pollutant Metals inc Hg	PAHs	Alkylated PAHs (top three sample depths only)	PCBs	Total Organic Carbon	Acid Volatile Sulfide/ Simultaneously Extracted Metals	Priority Pollutant Metals inc Hg (porewater - top three sample intervals only)	PAHs (porewater - top three sample intervals only)	PCBs (porewater - top three sample intervals only)	Porewater VOCs (single depth interval)	Dissolved Organic Carbon	Hardness	pH	SurfaceWater VOCs and 1,4 Dioxane	Vertical Permeability Test, grain size, percent solids	Pb-210	Ra-226	Cs-137
Confluence DHC and CPC																			
Dark Head Creek																			
SD-98	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-99, PW-06	0-6, 6-18, 18-30, 30-52	4	4		4	3	4	3				3	3	3					
SD-100	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-101, PW-07	0-6, 6-18, 18-30, 30-52	4	4	3	4	3	4	3				3	3	3					
SD-102	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-103	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-104	0-6, 6-18, 18-30, 30-52	4	4		4												1	1	1
SD-105	0-6, 6-18, 18-30, 30-52	4	4		4														
SD-106	0-6, 6-18, 18-30, 30-52	4	4		4														
Confluence Permeability																3			
Confluence - Age Dating																	1	1	1
Reference Locations																			
Marshy Pt	0-6, 6-18, 18-30, 30-52	4	4		4	1													
Bowley's Quarters	0-6, 6-18, 18-30, 30-52	4	4		4	1													
Middle River Downstream	0-6, 6-18, 18-30, 30-52	4	4	3	4	1													
QA Samples		5	5	1	5														
Totals		114	113	20	113		28	21	9	9	10	21	21	21		9	3	3	3

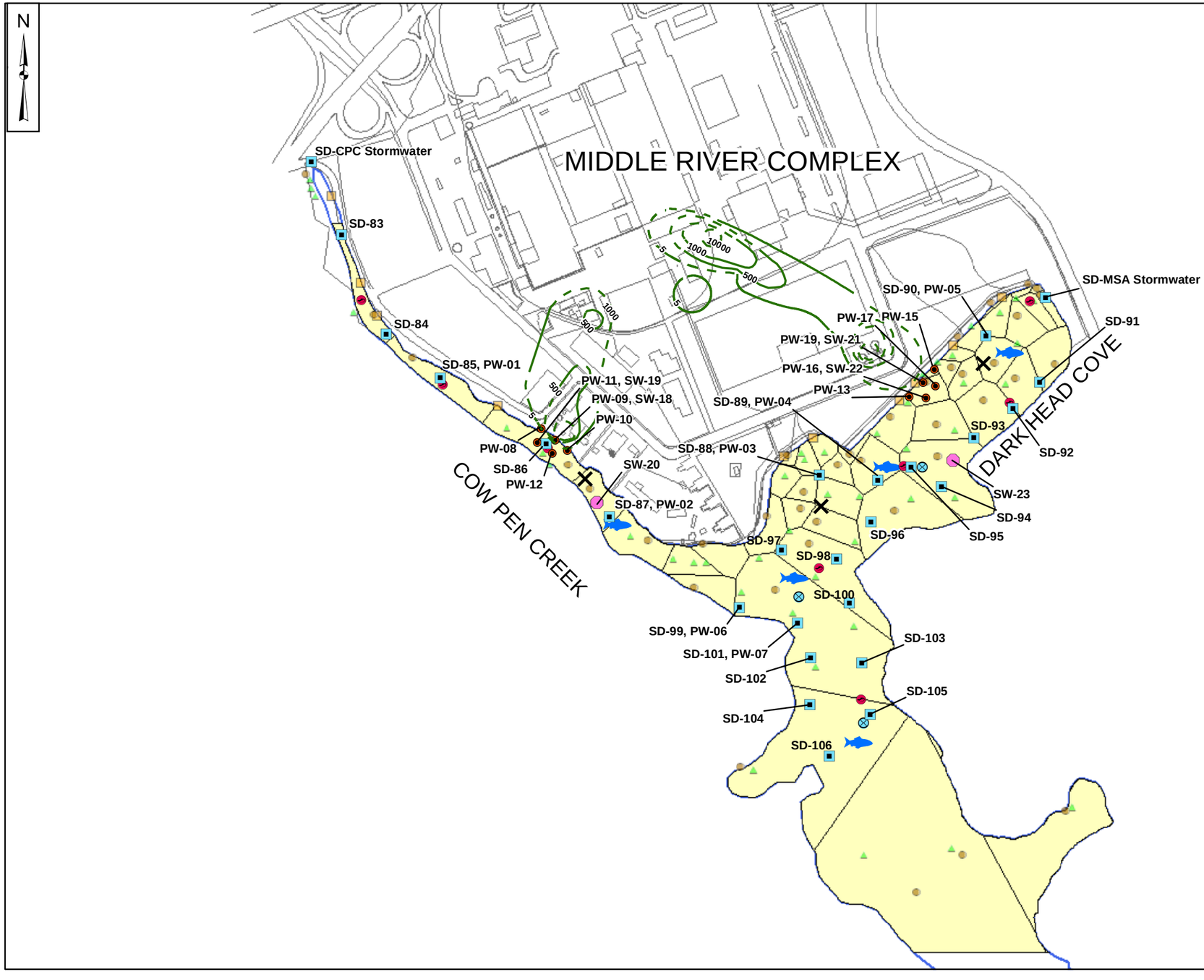

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Figure 3-1
Proposed Sample Locations
August 2010
Lockheed Martin Middle River Complex
Middle River, Maryland

Legend

- Sample Locations- 2005
- Sample Locations- Nov 2008
- Stormwater Outfall Locations
- Proposed Delineation Sample
- Proposed Age Dating Sample
- Proposed Porewater Sample (VOCs)
- Proposed Surface Water Sample
- Proposed Permeability Test
- Tce Isoconcentration (UG/L)
- Inferred
- Middle River Complex
- Water

500 250 0 500
Feet

Drawn By: MP 7/16/10
Checked By:
Approved By:

Contract Number: 112IC01633

Map Document: (K:\GProject\middle_river\Maps\Figure 3-1_sediment_sample_locations 071610.mxd)
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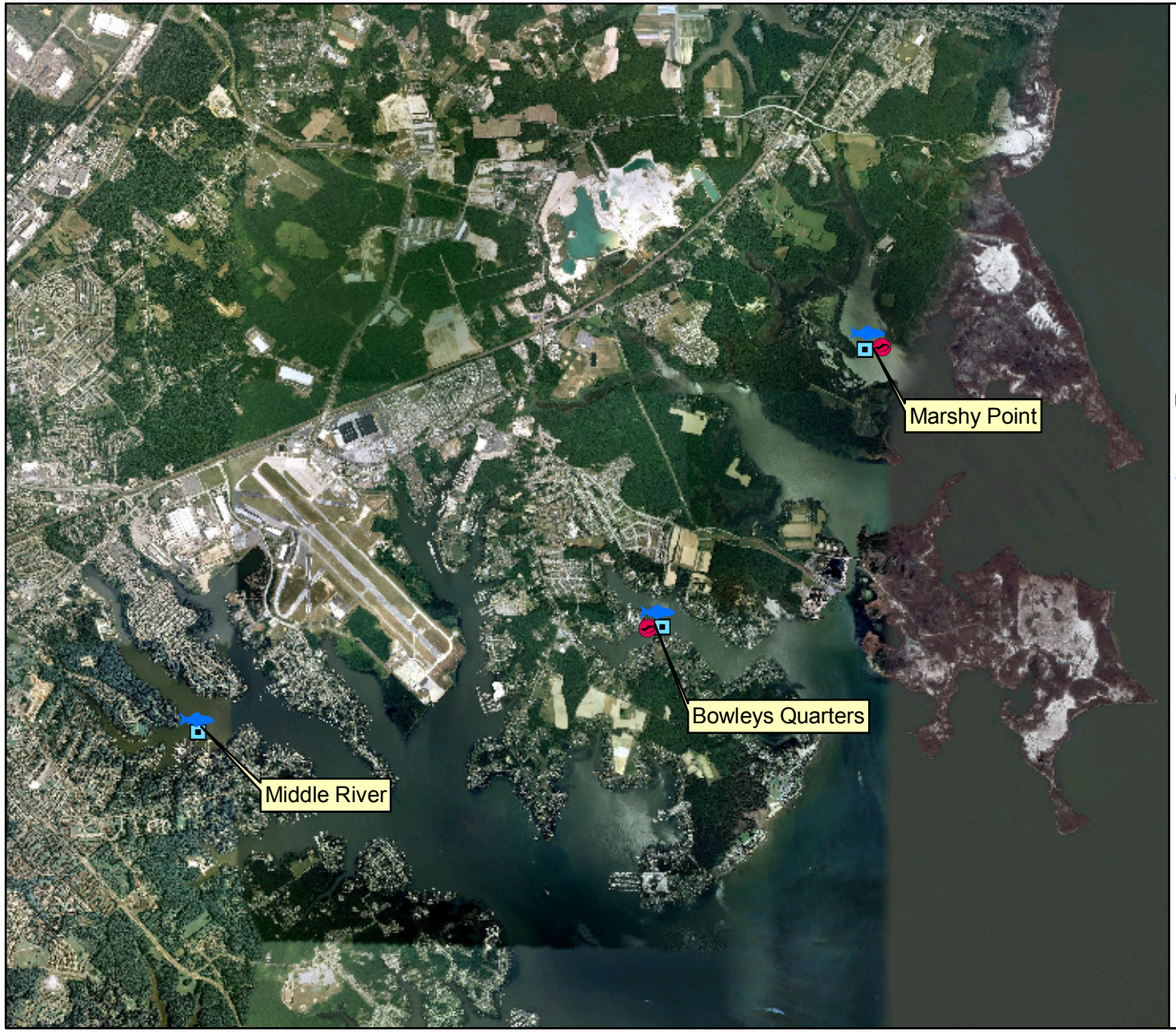

TETRA TECH

Figure 3-2
Reference Locations
August 2010
Middle River, Maryland

Legend

- Proposed Delineation Sample
- Benthic Invertebrate Sampling Location
- Fish Sampling Location

0 2,000 4,000 6,000
Feet

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Approved By:

Contract Number: 112IC01633

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Section 4
Benthic Assessment

4.1 BENTHIC MACROINVERTEBRATE SAMPLING

Benthic macroinvertebrate samples will be collected from seven site locations and three reference locations during this investigation to help evaluate the health of benthic communities residing in sediment at the site. These include two locations in Cow Pen Creek and five in Dark Head Cove (see Figure 4-1 and Table 4-1). To compare these locations with similar environments in the Middle River area, Tetra Tech will perform identical diversity and abundance assessments at three reference areas.

The reference areas include one with little to no shoreline development (e.g., Marshy Point), one with typical regional waterfront development (e.g., Bowleys Quarters), and the Middle River at a location removed from potential MRC influences. Reference locations are shown on Figure 3-2. The actual sampling locations within each reference area will be selected to avoid potential effects associated with any recognized industrial point-sources. Reference locations will be confirmed with GPS readings during field reconnaissance in the initial stages of fieldwork to ensure that the specific reference-sampling locations are as similar as possible to those in Cow Pen Creek and Dark Head Cove.

Criteria to assess the similarity of the reference locations to the site locations will include grain size, water depth, salinity, temperature, and pH. Field instrumentation will measure salinity, temperature, and pH. Depth will be measured with a tape and grain size will be evaluated qualitatively by comparison to a grain-size chart. To compare substrate from the reference locations, a composite sample will be collected from each sampling location and analyzed for grain size, total organic carbon (TOC), PCBs, PAHs, and total priority-pollutant metals.

Five individual grab samples will be collected at each sampling location, since the distribution of benthic macroinvertebrates in sediment is heterogeneous. These will be treated as separate

samples to represent the benthic community at each location. The individual grab samples at each location will be collected from within an approximately 25-foot circle, with care being taken to avoid sampling the same sediment twice.

4.2 BENTHIC MACROINVERTEBRATE SAMPLING PROTOCOLS

Samples of benthic macroinvertebrates will be collected at each location from a boat using a grab sampler such as a ponar or Eckman dredge. Sediment from each sample will be placed into a 500-micron-sieve bucket and wet sieved to remove all the sediment particles smaller than 500 microns. Sediment remaining on the sieve will be placed in sampling containers that will then be filled with 70% ethanol, or equivalent, to preserve the organisms. The sampling containers will be labeled as follows:

- sample number
- sampling location
- number of containers comprising the sample
- replicate number
- sampling date
- sampler's initials

Samples will be taken to Tetra Tech's Biological Research Facility (BRF) in Owings Mills, Maryland and held for analysis. No holding times apply once the samples are preserved. Depending on the outcome of the other evaluations described herein, if analysis of the benthic macroinvertebrate samples is necessary the following steps will be conducted:

1. Sample sorting (that is, separating organisms from the sampled material) will be performed in the laboratory, and all samples will be sorted in their entirety (i.e., no sub-samples will be taken), without the aid of magnification

2. After sorting, clean samples will be sent for identification to a subcontracted macroinvertebrate taxonomist. All taxa will be identified to a target hierarchical level, primarily genus, but a coarser level if genus is not possible. Specimen characteristics occasionally making definitive genus-level identifications problematic include damage or fragmentation, and early instar (newly hatched) or juvenile specimens. The taxonomist will enter the data electronically into an *Excel*® spreadsheet in a standard format that will allow straightforward uploading to the database described below

3. This project will use the Microsoft *Access*® based "Ecological Data Application System" (EDAS) database, developed by Tetra Tech scientists, to facilitate data entry, management, and analysis

4.3 QUALITY ASSURANCE AND QUALITY CONTROL

4.3.1 Field Sampling

Data-quality evaluation for field sampling will be based on precision. Using sampling sets (replicates), data-quality indicators will be calculated to describe sampling consistency and will include the mean and standard deviation, coefficient of variability (CV), and mean relative-percent difference. Any wide precision-estimate that cannot be explained by differences in the associated physical habitat, hydrology, or stressor will be deemed questionable; appropriate caveats will be used when describing site conditions based on such data.

4.3.2 Laboratory Sample Sorting

The Tetra Tech BRF manager will oversee sample-sorting QC in real-time. Sort residue from the first five samples will be checked for missed specimens, and the proportion of missed recovered-specimens to those found in the primary sort (expressed as "percent sorting-efficiency" [PSE]) will be calculated for each. An individual sorter must have a PSE > 90% for five consecutive samples before they are then checked on only one-of-every 10 samples. Also, of the total sampling lot, 10% of the sort residues will be randomly selected and sent to an outside laboratory to check for missed specimens. Corrective actions will be implemented as necessary.

4.3.3 Taxonomy

After primary taxonomy and delivery of the data to Tetra Tech, 10% of the samples will be randomly selected for QC purposes. Those samples will be sent to an independent taxonomist for blind re-identification. Tetra Tech will perform a direct comparison of the results on a spreadsheet, quantify error rates (taxonomic precision to proportion of disagreements), and implement corrective actions as necessary. Measurement-quality objectives (MQOs) will be used for two aspects of taxonomic precision: counting and identification. Taxonomic results will be considered acceptable if there is a percent-difference in enumeration < 5% and percent-taxonomic disagreement < 15%.

4.3.4 Data Entry

Tetra Tech will hand check 100% of the data entries to verify that they match with handwritten data sheets. All errors will be corrected.

4.4 BENTHIC-MACROINVERTEBRATE DATA EVALUATION

If evaluation of the benthic data is deemed necessary, a suite of benthic-assemblage level characteristics (i.e., metrics) such as taxonomic diversity, percent dominant-taxa, frequency and dominance of stressor-tolerant taxa, percent composition of different feeding types (such as shredders, collector-gathers, and predators), among others, will be calculated for each sample. These biological metrics from the site locations will be compared to those from the reference locations to determine whether the health of the benthic community at the site has been affected.

Table 4-1
Fish Tissue Analysis and Benthic Bioassessment Summary
Middle River Complex, Middle River, Maryland

	Fish Collection and Tissue Analysis		Benthic bioassessment
LOCATION/name of core	**No. fish to be collected, target species #1 (e.g., channel catfish)**	**No. fish to be collected, target species #2 (e.g., brown bullhead)**	**No. grabs to be collected**
Cow Pen Creek (CPC)			
FT-CPC1	3	3	
BN-CPC1			5
BN-CPC2			5
BN-CPC3			5
Dark Head Cove (DHC)			
DHC1	3	3	
DHC2	3	3	
BN-DHC1			5
BN-DHC2			5
BN-DHC3			5
Confluence of CPC and DHC			
DHC3	3	3	
DHC4	3	3	
BN-DHC4			5
BN-DHC5			5
REFERENCE AREAS			
Marshy Pt (MP)			
MP1	3	3	5
Bowley's Quarters (BQ)			
BQ1	3	3	5
Middle River			
MRD1	3	3	

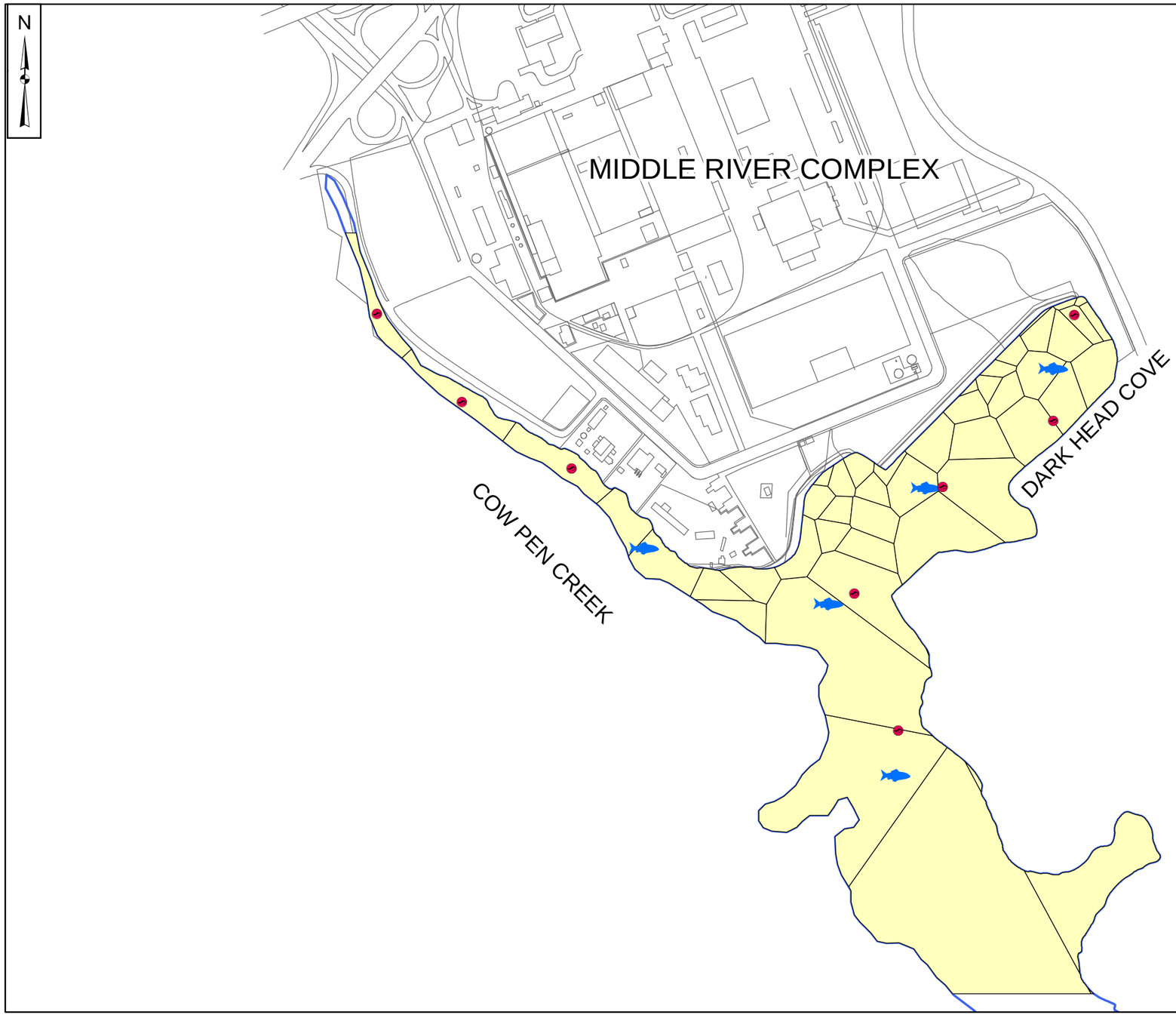

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Figure 4-1
Fish Tissue and Benthic Sample Locations
August 2010
Lockheed Martin Middle River Complex
Middle River, Maryland

Legend

- Benthic Invertebrate Sampling Location
- Fish Sampling Location
- Middle River Complex
- Water

500 250 0 500
Feet

Drawn By: MP 7/16/10
Checked By:
Approved By:

Contract Number: 112IC01633

Map Document: (K:\GProject\middle_river\Maps\sediment_sample_locations 071610.mxd)
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Section 5
Fish Tissue Sampling and Analysis

5.1 FISH TISSUE SAMPLING

Fish samples will be collected from up to five site locations and three reference locations during this investigation to determine chemical concentrations in their tissue. The site locations for attempted fish collections include one in Cow Pen Creek, two in Dark Head Cove, and two at the confluence of the two water bodies (see Figure 4-1 and Table 4-1). Site sampling locations are spatially located across the area. To compare these locations with similar environments in the Middle River area, Tetra Tech will collect samples from the same fish species at three reference areas. The reference areas include one with little to no shoreline development (i.e., Marshy Point) and two with typical regional waterfront development (i.e., Bowleys Quarters and Middle River), as shown in Figure 3-2.

5.2 FISH SAMPLING PROTOCOLS

Fish sampling protocols and the two target species selected for fish tissue analyses are consistent with MDE's regional fish-monitoring program. Two species are targeted for collection and tissue-residue analysis: the channel catfish and the brown bullhead. Both are demersal (i.e., bottom-feeding) and expected to be resident (i.e., non migratory). Collection of fish tissue will be consistent with MDE sampling protocols set forth in "Standard Operating Procedures for Fish and Shellfish Collection and Analysis" (MDE Science Services Administration, 2009) and in scientific permitting requirements.

As recommended by MDE, at least three similarly sized specimens representing each species will try to be collected from all five site sampling-locations and all three reference sampling-locations. Each set of three specimens of each species will be composited into one sample per species per location. Fish will be collected by standard methods including nets, hook and line, and trotlines.

Fish tissue will be processed in the laboratory to remove edible fillet. Chemical analyses of fish tissue will include PCBs and priority-pollutant metals.

Likewise, using similar methods, at least three specimens from each species will attempted to be collected from the three reference locations. Each set of three specimens of each species will be composited into one sample per species per location for a total of six reference samples (three from each species). Reference areas will probably be the same for both the benthic assessment and fish tissue sampling, except that samples for benthic analysis will not be collected at the Middle River reference stations.

5.3 FISH DATA EVALUATION

Analytical results of the tissue analysis will determine whether contaminant concentrations in the fish collected from Cow Pen Creek and Dark Head Cove are significantly greater than the contaminant concentrations in the reference fish or in concentrations in fish throughout the state (as reported in MDE's database).

Section 6
Pre Design Testing

6.1 INTRODUCTION

Pre design testing of sediment samples will help evaluate dewatering characteristics and methods that may be used during the design of future sediment-remediation activities at the MRC, if such is deemed necessary. This testing will provide information regarding available sediment-dewatering technologies and associated dewatering and performance characteristics (e.g., achievable sediment percent-solids) as a starting point for sediment remediation. This project task will determine if sediment-tube dewatering technology can dewater Cow Pen Creek and/or Dark Head Cove sediments so that the final sediment-product can be further treated (via chemical solidification/stabilization) or managed (via landfill disposal). The following section describes the focus of the pre design testing (e.g., passive sediment-dewatering testing such as pillow tests/hanging-bag tests), implementation of dewatering tests, performance definitions for chemical and geotechnical laboratory tests, and reporting of the sediment-dewatering test results.

6.2 TREATMENT TECHNOLOGY DESCRIPTION

Technology alternatives for dewatering dredged sediments include:

- centrifuges (mechanical dewatering)
- belt presses (mechanical dewatering)
- sediment-drying beds
- plate-and-frame-filter presses (mechanical dewatering)
- geotextile bags/containers and tubes (passive dewatering)

This testing will evaluate the passive-dewatering alternative, since it is a relatively low-cost, high volume dewatering approach that has been used successfully in environmental dredging projects around the nation. In addition, the application of geotextile tubes allows for flexible operations

(e.g., tubes can be stacked; filtrate can be drained directly to a surface stream or collected in containment structures) at remediation sites where space for remedial activities may be limited and unsuitable for mechanical dewatering facilities/equipment.

The sediment-dewatering cycle associated with the use of geotextile tubes/containers includes the following three phases:

- **Phase 1 – Sediment Filling/Containment:** Sediment, typically pretreated with a sediment/sludge-conditioning polymer, is pumped into the top of the geotextile bag/tube. The sediment bag/tube, constructed of a high strength permeable geotextile, is uniquely designed to retain sediment or sludge solids and release pore water so that it flows from the sediment bag/tube

- **Phase 2 – Sediment Dewatering:** Pore water, separated from sediment primarily by means of an optimal conditioning-polymer, drains from pores in the geotextile bag/tube, thus dewatering the sediment and reducing its volume. In many cases, the water quality of released pore water will allow for its discharge to a receiving water body without subsequent treatment

- **Phase 3 – Sediment Consolidation:** After Phases 1 and 2, sediment solids continue to consolidate and release the residual moisture from the sediment through the pores of the geotextile tube/container. Often, if the sediment tube is allowed to continue dewatering and consolidate, sediment volume reduction can reach as high as 90%.

Either a hanging bag test (HBT) or the pillow test (PT) can test the applicability of geotextile tubes for dewatering a site-specific sediment. This project will evaluate the pillow test for the following reasons:

- PTs require less sediment-slurry volume (approximately 20 gallons) than the HBT (50 gallons)

- PTs have constant-fill pressure via a mechanical fitting, whereas the HBT has periodic high-fill pressure (head) when pumped or poured sediment falls from the top of the open bag to the bottom. The PT can monitor the pressure head, whereas the HBT does not measure pressure head. Quantitatively monitoring hydraulic head (i.e., inlet pressure) allows assessment of the effects of fabric, slurry, and chemical (polymer) additives on passive dewatering of dredged sediments

- PTs use a small one-cubic-foot geotextile bag with a horizontal orientation, whereas the HBT requires a larger, bulky, vertical bag which can hold up to approximately 50 gallons of liquid. The PT simulates the orientation of the sediment tubes used in full scale environmental remediation applications

- PTs better simulate dewatering processes that occur in full scale sediment dewatering tubes/bags

6.3 TREATABILITY TESTING OBJECTIVES

Should remediation be required and dredging is selected as the preferred alternative, the dredged sediments will require dewatering before being transferred to a landfill. Dewatering the sediment will reduce its volume and the cost of transporting it to the landfill. The specific dewatering test to be performed is a passive one called the "PT." The objectives of the PT and associated tests (i.e., analytical and geotechnical tests) are as follows:

- Define optimal chemical-conditioning agent that can enhance sediment dewatering in a sediment tube/bag
- Visualize sediment dewatering on a field scale
- Define sediment-dewatering rates and dewatering cycle-time based upon test-data evaluation
- Determine the flow of sediment solids (i.e., suspended solids) through the geotextile container (tube or bag) holding the dredged sediment
- Define dewatered sediments' final total-solids-concentration (i.e., achievable percent solids) and determine if the sediment tubes can generate a final product that meets project dewatering goals
- Define sediment pore-water chemical characterization needed to develop management alternatives
- Define physical and geotechnical characteristics of dewatered sediment
- Define which chemical stabilization/solidification agent (e.g., fly ash, cement, kiln dust, other agent) can produce a sediment matrix sufficiently strong for landfill disposal

Review of information associated with geotextile manufacturers/suppliers indicates that relatively few commercially available geotextile types are designed for sediment-dewatering applications. TenCate's Geotube GT 500 dewatering fabric is one of the only fabrics identified specifically for and proven effective in dewatering dredged sediments, so this fabric will be used in the pillow tests. GT 500 geotextile-container material is a specially engineered dewatering geotextile manufactured from high tenacity polypropylene (PP) multifilament and monofilament yarns. These PP yarns are woven into a stable network to form the containment structure. The

GT 500 geotextile container is inert to biological degradation and resistant to chemicals typically encountered in surface waters containing sediments, as well as being resistant to acidic or basic solutions.

6.4 EXPERIMENTAL DESIGN AND PROCEDURES

The following subtasks will achieve the objectives previously defined.

6.4.1 Test-Sediment Chemical and Geotechnical Characterization

Three sediment samples collected from various locations in Cow Pen Creek and Dark Head Cove will be initially analyzed for grain size (including a hydrometer test), organics content, and Atterberg Limits. Upon their receipt at PDC Laboratories (where Tetra Tech will perform the sediment-dewatering testing), the buckets used to collect and ship the individual samples will be composited into a 55-gallon container to create three representative samples. One gallon aliquots will be collected out of the three large sediment-composite containers for shipment to Shively Geotechnical Laboratories to undergo the geotechnical analyses required under this subtask. Additional details regarding the analytical requirements under this subtask are presented in Table 6-1 ("Testing Performance").

6.4.2 Sediment Conditioning— Polymer Jar-Testing

Polymer jar tests are screening level tests to determine which chemical-conditioning agents (i.e., polymers) can enhance sediment dewatering. Polymers or other additives which produce acceptable floc formation with clear supernatants are prime conditioning candidates for sediment PTs. Preliminary conditioning-agent selections will be made based upon chemical- and distributor-manufacturer recommendations. Tetra Tech has already communicated with a chemical-conditioning/polymer distributor that will supply the polymer test kit for the sediment dewatering tests and make recommendations regarding three candidate polymers to test during the bench scale jar testing.

Up to 27 jar tests will be conducted during this subtask (three sediments × three polymers/conditioning agents recommended by the polymer distributor × three polymer doses = 27 jar tests). Polymer performance will be evaluated through turbidity analyses and visual observations. The jar testing procedure in this subtask will be as follows:

- **Step 1:** Measure 100 milliliters (ml) of water into each of three glass beakers in which to prepare three different polymer solutions

- **Step 2:** Generate 1.0%, 0.5% and 0.25% polymer solutions by adding "neat" polymer to each beaker of 100 ml water. Place a stirring bar in each beaker and place on a stir plate. Rapidly mix the water and polymer in the beakers for approximately 10-15 seconds and allow the mixtures to age for 15-20 minutes. Repeat this procedure for each of the candidate polymers to be tested.

- **Step 3:** Create a small cone filter using a funnel, geotextile filter-fabric, and a collection beaker

- **Step 4:** Place 500 ml of the sediment sample to be tested in a 1000-ml beaker with a stir bar. Place the beaker on a stir plate. Select an initial polymer dosage to test; 40 ppm is suggested. Using a syringe, add polymer-stock solution to the beaker. Rapidly mix for < 30 seconds and then floc until sediment begins to coagulate and settle. If the initial polymer dosage in the beaker cannot produce a floc, increase the dosage until the starting dosage is established. If the initial dosage creates a good floc, test a lower dosage until the optimal dosage is determined. This will require some trial and error to determine the optimal polymer dosage.

- **Step 5:** After the optimal polymer dosage is established, pour the conditioned sludge into the filter apparatus and time the free-water flow through the filter and record this information. Remove the filter and roll the geotextile fabric back and forth to examine how the cake releases from the fabric.

- **Step 6:** Examine the filtrate in the filter apparatus for clarity and turbidity. After all the jar tests are complete, the optimal conditioning-polymer will be the one which takes the least time to dewater, produces the most filtrate, and produces a filtrate with the lowest turbidity. Note that unconditioned sediment samples will also be filtered through the geotextile fabric as the control against which to compare filtrate-release performance to sediment samples conditioned with various dosages of polymers.

6.4.3 Sediment-Composite Preparation for PT Testing

Once the conditioning agents have been selected for the PTs, conditioned sediment-composite samples will be prepared in appropriate containers for placement in the sediment-dewatering tubes. Sediment must be combined/mixed with surface-water sampling media to simulate the sediment-composite percent-solids concentration that the sediment-dewatering tube/bag may receive in a full scale operation. A review of the literature suggests that 10% should be the target percent-solids going to the dewatering bags from the sediment slurry. Mixing the sediment surface-water to obtain the 10% slurry will be based on laboratory calculations.

Once the composites for the three sediment types are created in the laboratory, optimal polymer dosages will be added and mixed (using a drill mixer) into the composite container to create the conditioned sediment to be placed into the dewatering pillows. Conditioned sediment-composites will be analyzed for grain size, Atterberg Limits, and moisture and organic content. These data will be the starting point of the dewatering tests; they will later be compared with the final dewatered sludge that will be collected from the pillows to define the percent-solids and volume reduction achievable with passive dewatering technology.

6.4.4 PTs— Sediment-Dewatering Tests

PTs will be performed in a controlled laboratory environment (i.e., PDC Laboratories). As previously discussed, the PTs aim to: (a) visualize sediment-dewatering, (b) evaluate the efficiency of the selected sediment-conditioning polymer, (c) assess the quality and clarity of the sediment-bag filtrates, and (d) predict the achievable percent-solids using passive dewatering technology. The PT procedure is as follows:

- **Step 1**: Assemble the sediment-pillow-bag frame/support structure and place a 35–45 gallon plastic container under the frame to capture the effluent that will flow from the sediment pillow. Place the sediment-pillow bag on the top of the frame and insert the 27-inch standpipe into the pillow-bag fill-port. The 27 inch standpipe represents approximately one pound-per-square-inch (psi) of head pressure on the pillow during filling.

- **Step 2**: Using the optimal conditioning-polymer (as determined through jar testing and experimentation), place 35 gallons of the conditioned 10% sediment slurry (bulk sediment/surface water) into a 50-gallon container. Gently stir the slurry mixture to prevent sediment floc from settling before pouring it into the one-cubic foot sediment pillow. The container will be calibrated so that the volume of sediment placed in the pillow is known. Knowing the sludge volume and density placed in the pillow permits calculation of the weight of the sediment in the pillow.

- **Step 3**: Fill up the sediment pillow by pouring the conditioned sediment into the top of the 27-inch standpipe. Record the volume of sediment poured into the pillow.

- **Step 4**: Continue to fill the sediment pillow with conditioned sediment as rapidly as possible until the sediment rises in the standpipe to the 1 psi calibration mark. When that mark is reached, the bag is considered full and the collection of effluent samples (filtrate) can begin. After the sediment pouring has stopped and the sediment has emptied from the standpipe, the standpipe can be carefully removed from the pillow and the fill-port plug can be installed for the remainder of the test.

Water will probably begin to flow out of the pores of the geotextile fabric into the collection reservoir while filling up the sediment-dewatering bag. This "first flush" water (filtrate or pore water) will be collected for 10 minutes after it has begun to flow out of the bag and analyzed for total suspended solids (TSS) and turbidity, then saved to be incorporated into another bucket of conditioned sediment that will be introduced into the sediment-dewatering bag to fill it up according to the manufacturer's specifications. Pore water collected after the first 10-minute flush of the dewatering-pillow test will be composited throughout the test duration. This pore water, which is not considered the "first flush," is identified as the "steady state" pore water and will be composited and analyzed as discussed in section 6.4.5.

- **Step 5**: Sediment-pillow effluent samples (i.e., filtrate) will be collected as grab samples throughout the PT duration (likely no more than 14 days) and evaluated for TSS and periodic field-turbidity measurements. TSS samples will then be collected at the following intervals: 0.5, 1, 6, 24, 48, 96, 144, 192, 240, 288, and 336 hours.

- **Step 6**: In addition to collecting TSS samples during the pillow tests, dewatering sediment in the geotextile pillows will be analyzed for moisture content and paint-filter tests at specified times throughout the PT. Moisture content and paint-filter test samples will then be collected at the following intervals: 0.5, 1, 6, 24, 48, 96, 144, 192, 240, 288, and 336 hours. As with the TSS samples, be sure to record the mass of sediment collected during each sediment-sampling event. This information will be used later to calculate the solids-mass balance during the report preparation phase of the project. Visual observations and measurements (i.e., estimated sediment depth in the dewatering pillow) will define sediment-dewatering behavior and conditions that will signal that the dewatering tests have been completed. Photographs taken during the pillow tests and other laboratory activities will document these observations.

6.4.5 Pore Water-Composite Collection and Chemical Characterization

Pore water will be generated throughout the duration of the PTs and analyzed for TSS/turbidity at specified times. Laboratory technicians will daily measure the volume of "steady-state" pore water (water generated after the 10 minute first-flush flow from the bags) released from the dewatering geotextile-bag. After this measurement, the pore water collected in the container under the dewatering bag will be poured into the composite container dedicated for each PT.

After the PT has been completed, the dedicated composite containers shall be combined and representative samples will be collected and analyzed for total suspended solids, PCBs, PAHs, and 13 priority-pollutant metals. Another set of filtered samples will be analyzed for PCBs, PAHs, and metals to assess pore water characterization without suspended solids. Filtration may significantly improve water quality, since some of the pollutants of concern have an affinity for clays associated

with sediment materials. These analyses will identify subsequent pore water management alternatives.

6.4.6 CSS Evaluation of Dewatered Sediment (for Landfill Disposal) with Associated Unconfined Compressive-Strength Tests

At the completion of the PTs, a portion of the dewatered sediments will be evaluated to determine how various chemical stabilization/solidification (CSS) agents will strengthen the dewatered sediment-matrix for landfill disposal. Four CSS agents will be used (Portland cement, lime, kiln dust, and fly ash) at three different CSS-agent-to-sediment ratios for three dewatered sediment samples (36 CSS tests total). After these CSS tests, a portion of the resultant sediment/CSS-agent matrix will be placed in a 2" diameter × 4" tall plastic mold and cured for 28 days before unconfined compression-strength tests are performed. During the 28 day cure time, specimens will be pulled off after three, seven, and 14 days for unconfined compression-strength testing. Specimen strength is evaluated over time to understand when the material reaches its strength specification and thus can be removed from the dewatering area for subsequent management. Chemical analyses are not required on the dewatered sediment/CSS agent matrices at this time.

CSS agents will be added to sediments at a quantity of approximately 5%, 15%, and 30% by weight of the sediment material. After adding the CSS agent to a sediment material, it will be blended into a homogeneous matrix, placed in the 2" diameter × 4" tall mold, and taken to the geotechnical laboratory for curing.

After curing, specimens will be removed from the mold and subjected to the unconfined compression-strength tests. Upon completion of the unconfined compression-testing, the unconfined compressive-strength measurements will be graphed versus time. A contractor can then use these graphs to estimate the time needed for the sediment/CSS-agent blend to reach the required strength.

6.4.7 Geotechnical Analyses of Dewatered Sediment

Dewatered sediment-samples (i.e., unsolidified) will be weighed at the time of test termination (as signaled by minimal or no release of effluent sample from the sediment pillow) and then samples

will be collected for the following analyses: mechanical grain-size/hydrometer test, Atterberg Limits, moisture and organics content, unconfined compression-strength, and paint-filter tests.

6.4.8 Chemical Analyses of Dewatered Sediment

No chemical analyses of the dewatered sediments from the PTs are specified at this time.

6.5 SAMPLING AND ANALYSIS

6.5.1 Bulk Sediment Sampling

Bulk sediment samples required for sediment-dewatering tests will be collected at the MRC during the field investigation described in section 3. The following volumes of sediment and surface water will be required from each of the three sampling locations being tested:

- sediment for characterization: 2.5 gallons
- sediment for conditioning assessment (polymer jar-testing): 2.5 gallons
- sediment for dewatering tests: 15 gallons
- surface water for slurry preparation: 40 gallons

6.5.2 Sediment-Dewatering Test-Performance Sampling and Analysis

Chemical and geotechnical analyses will be conducted during the PTs to assess how dewatering affects the characteristics of the sediment product and determine the physical and chemical characteristics of the sediments before and after dewatering. Table 6-1 identifies the performance analyses associated with the sediment-dewatering testing.

6.5.3 Quality Assurance Objectives

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. 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. Both testing facilities (PDC and Shively Geotechnical) 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" (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. Sample representativeness will be assessed by evaluating duplicate samples.

- *Comparability* is the confidence with which one data set can be compared to another. Comparability will be established through the use of SOPs based on standard methods 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, and a goal of 85% will be established based on the completeness of data generated for similar projects.

6.5.4 Chain-of-Custody Procedures

Proper chain-of-custody will be maintained for all samples that will be submitted for laboratory analysis. The chain-of-custody will accompany the samples at every step, from collection at the site until they are received at PDC Laboratories. Separate chain-of-custody forms will also be created for all samples generated during the testing procedures.

6.5.5 Data Analysis and Interpretation

Once the analytical chemistry and geotechnical data have been reviewed and accepted as complete and usable, Tetra Tech will evaluate the data to prepare the sediment-dewatering-testing report. Data evaluation/interpretation of each sediment-sample tested should provide the following information:

- A determination of the optimal chemical-conditioning agent (i.e., polymer) for passive dewatering of the sediments collected from the Lockheed Martin MRC

- An estimate of the time required to obtain a sediment material that will pass the PT

- A definition of the percent-solids achievable with sediment, along with the associated cycle time

- Establishing solids mass-balance information showing where solids go through the dewatering process, including solids consolidated in the sludge cake and solids released in sediment-pillow effluents

- A definition of effluent volume and quality and suggested management options to consider

- A determination as to which CSS agent produces the strongest matrix for landfill disposal for the sediment tested in the pillow tests

Table 6-1

Testing Performance Summary
Middle River Complex, Middle River Maryland
Page 1 of 2

Media	Analysis	Number of samples (est.)	Analytical method	Laboratory	Purpose
SED	Particle size, organic content, Atterberg Limits	3 3	ASTM D422 ASTM D 2974 ASTM D4318	Shively Geotechnical	Bulk sediment characterization
PW	Turbidity	27	USEPA 180.1/SM 2540E	PDC Laboratories	Assess polymer which conditions the sediment to produce PW with minimal turbidity (suggests minimal TSS)
SED	Particle size Organic content Moisture content Atterberg Limits	3 3 3	ASTM D422 ASTM D 2974 ASTM D 2216 ASTM D4318	Shively Geotechnical	Conditioned sediment characterization (input dewatering test material)
SED	Moisture content Paint filter test	30 30	ASTM D 2216 USEPA 9095	PDC Laboratories	Assess sediment-dewatering characteristics over time to determine when to terminate dewatering cycle
PW	TSS PCBs PAHs Priority-pollutant metals (13)	30 3 3 3	SM 2540 D USEPA 608/8082 USEPA 8270 USEPA 200.7/6010 (ICP); Hg— USEPA 245.1/7470/7471 (CV)	PDC Laboratories	To assess water quality associated with pore water generated from sediment dewatering operations; determine TSS flow from sediment containment tube/bag
SED	Unconfined compressive-strength tests	36	ASTM D 1633	Shively Geotechnical	Assess if solidified sediment specimens are suitable for landfill disposal

Table 6-1

Testing Performance Summary
Middle River Complex, Middle River Maryland
Page 2 of 2

Media	Analysis	Number of samples (est.)	Analytical method	Laboratory	Purpose
SED	Unconfined compressive-strength tests	3	ASTM D 1633	Shively Geotechnical	Assess geotechnical characteristics of dewatered sediment product
	Grain size and hydrometer	3	ASTM D 422	Shively	
	Atterberg Limits	3	ASTM D4318	Shively	
	Moisture content	3	ASTM D 2216	Shively	
	Organics content	3	ASTM D 2974	Shively	
	Paint-filter test	3	USEPA 9095	PDC Laboratories	

Notes:

SED sediment

SM standard methods

PW pore water

TSS total suspended solids

Section 7
Project Deliverables

Field activities, including sampling locations, sample collection and handling, analytical or laboratory results, and predesigned testing results, will be documented in a sediment-characterization report. It will describe recent and historic investigations, including comprehensive analytical summary tables and figures (depicting all sediment and pore water sampling locations), and describe the distribution of analytes detected in the various environmental media sampled at each sampling location. This task also includes updating the geographic information system (GIS) database and preparing graphical representations of sampling locations and results at all depth intervals.

The report will present analytical data in tabular form and compare them to applicable criteria. All project-specific sampling techniques and standard operating procedures implemented at each sampling location will also be described. The report will summarize the sampling and related tasks that were completed and present the investigators' findings and conclusions.

The results of the proposed sampling and analyses will be used to update the existing risk assessment for Dark Head Cove and Cow Pen Creek. Tables from the previous risk assessment will be updated to include the new data, and the previous risk assessment's conclusions will be reviewed to determine if any changes are necessary. The update will also incorporate and interpret the results of bioavailability analyses (i.e., pore water, AVS/SEM), benthic biodiversity assessments (if conducted), and fish tissue sampling. The risk assessment will be prepared in accordance with EPA Region III protocols.

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Section 8
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APPENDIX A – *HEALTH AND SAFETY PLAN FOR LOCKHEED MARTIN CORPORATION*

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:

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APRIL 2010

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1.0 INTRODUCTION

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

This HASP must be used in conjunction with the TtNUS Health and Safety Guidance Manual (HSGM). The HSGM contains TtNUS 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 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 TtNUS 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 TtNUS 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 TtNUS 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 TtNUS 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.

- Compliance with the requirements of this HASP are monitored by the SSO and coordinated through the TtNUS 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.

1.3 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

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

LMC Contact: Tom Blackman **Phone Number:** (301) 214-9958

Purpose of Site Visit: Multimedia Characterization activities

Proposed Dates of Work: April 2010 until completion

Project Team:

TtNUS Management Personnel:	Discipline/Tasks Assigned:	Telephone
Tony Apanavage	Project Manager (PM)	(301) 528-3021
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) 921-8409

Non-TtNUS Personnel	Affiliation/Discipline/Tasks Assigned	Telephone
Steve Thompson	Facilities Manager	410-682-1304
Mike Musheno	Environment Safety & Health/Projects	484-875-2819
Tom Ambrose	Facilities Supervisor	410-682-1308
LMC Security Office (Chief Philip Johnston)	Site Security	410-682-1050
Jimmy Yeager	Lockheed Martin ESH Manger	301-873-1444

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.

TtNUS 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 TtNUS 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 TtNUS 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

Emergency situations that may be encountered during site activities will generally be recognized by visual observation. Visual observation will also play a role in detecting potential exposure events to some chemical hazards. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with the principle site contaminants of concern as presented in this HASP. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are discussed in detail in Sections 5.0 and 6.0. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL and/or the SSO will be responsible for performing surveys of work areas prior to initiating site operations and periodically while operations are being conducted. Survey findings are documented by the FOL and/or the SSO in the Site Health and Safety logbook, however, site personnel will be responsible for reporting hazardous situations. Where potential hazards exist, TtNUS will initiate control measures to prevent adverse effects to human health and the environment.

The above actions will provide early recognition for potential emergency situations, and allow TtNUS to instigate necessary control measures. However, if the FOL and the SSO determine that control measures are not sufficient to eliminate the hazard, TtNUS will withdraw from the site and notify the appropriate response agencies listed in Table 2-1.

2.3.2 Prevention

TtNUS 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

TtNUS and subcontractor personnel are responsible for fire 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). Approved fire-fighting equipment and extinguishers, in adequate quantities for their work activates must be provided.

The Lockheed Martin Project Lead will be notified as soon as possible of any fire, if TtNUS or subcontractor personnel use a Lockheed Martin fire extinguisher, and of any and all fires that are extinguished. In case of fire, TtNUS 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 TtNUS 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 TtNUS 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
WorkCare	(800) 229-3674
PM, Tony Apanavage	(301) 528-3021
HSM, Matthew M. Soltis, CIH, CSP	(412) 921-8912
PHSO, Clyde Snyder	(412) 921-8904
Steve Thompson, Facilities Manager	(410) 682-1304
Mike Musheno, ESH/ Projects	(484) 875-2819
Tom Ambrose, Facilities Supervisor	(410) 682-1308
LMC Security (Chief Philip Johnston)	(410) 682-1050

2.6 EMERGENCY ROUTE TO HOSPITAL

Franklin Square Hospital
9000 Franklin Square Drive
Baltimore, Maryland 21237
(410) 682-7000

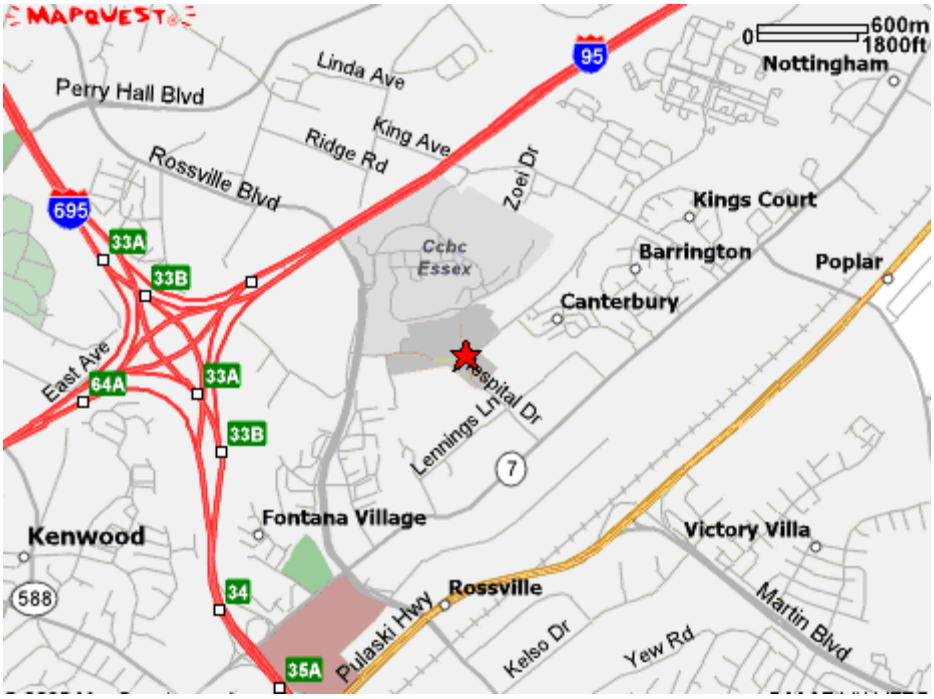
Driving Directions:

1) From Eastern Boulevard, take the Interstate 695.
2) Exit at exit number 34 (Philadelphia Road) and turn right.
3) Proceed on Philadelphia Road and turn left on Rossville Boulevard.
4) Proceed on Rossville Boulevard and take a right on Franklin Square Drive.
5) Proceed on Franklin Square Boulevard to 9000 and the hospital will be on the left hand side.

Routes and directions to the hospital are provided in Figure 2-1.

FIGURE 2-1

ROUTE TO HOSPITAL



2.7 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at Lockheed Martin Middle River Complex (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.
- 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 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 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 MSHA/NIOSH-approved respiratory protective devices must be worn when applicable state and/or federal action levels or OSHA permissible exposure levels are exceeded. Appropriate air

monitoring and respiratory protection equipment will be supplied and maintained if inhalation hazards are anticipated and a respiratory protection adhering to all state and federal regulations implemented.

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).

2.9 HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE

TtNUS 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.

TtNUS 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.

TtNUS 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. **If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-2.**

2.11 INJURY/ILLNESS REPORTING

If any TtNUS personnel are injured or develop an illness as a result of working on site, the TtNUS "Incident Report Procedure" (Attachment II) must be followed. Following this procedure is necessary for documenting of the information obtained at the time of the incident.

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. 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**.**

TtNUS 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.

FIGURE 2-2
POTENTIAL EXPOSURE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations. In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, being prepared to provide:

    - Any known information about the nature of the injury.
    - As much of the exposure history as was feasible to determine in the time allowed.
    - Name and phone number of the medical facility to which the victim(s) has/have been taken.
    - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
    - Name and phone number of an informed site officer who will be responsible for further investigations.
    - Fax appropriate information to WorkCare at (714) 456-2154.

- Contact Corporate Health and Safety Department (Matt Soltis) and Human Resources Department (Marilyn Duffy) at (412) 921-7090.

As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

FIGURE 2-2 (continued)
WORKCARE
POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____

Social Security No.: _____ Age: _____ Sex: _____

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

_____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was their skin contact? _____

Was the exposing agent inhaled? _____

Were other persons exposed? If yes, did they experience symptoms? _____

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat	Chest Tightness / Pressure
Tearing	Nausea / Vomiting
Headache	Dizziness
Cough	Weakness
Shortness of Breath	

Delayed Symptoms:

Weakness	Loss of Appetite
Nausea / Vomiting	Abdominal Pain
Shortness of Breath	Headache
Cough	Numbness / Tingling

IV. Present Status of Symptoms (check off appropriate symptoms)

Burning of eyes, nose, or throat	Nausea / Vomiting
Tearing	Dizziness
Headache	Weakness
Cough	Loss of Appetite
Shortness of Breath	Abdominal Pain
Chest Tightness / Pressure	Numbness / Tingling
Cyanosis	

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicated: _____ Physician Treated: _____

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 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. Table 3-1 provides a list for the facilities within the Middle River Complex as well as the primary contaminants of concern associated with each facility.

TABLE 3-1

MIDDLE RIVER COMPLEX
PRIMARY CONTAMINANTS OF CONCERN FOR EACH BUILDING

DESCRIPTION	PRIMARY CONTAMINANTS OF CONCERN[1]
Dark Head Cove	Various metals, PCBs and PAHs. in sediment and surface water
Former Building "D"	PCB - Aroclor-1260 Metals – Arsenic, Beryllium, Cadmium, Chromium, Lead, Nickel, Zinc VOCs – Chlorobenzene, 1,1-Dichloroethene, 1,2-Dichloroethane, Trichloroethene, Vinyl Chloride, Methyl-t-butyl ether, Gasoline Range Organics (GRO)
Product Pipeline	**Groundwater only:** VOCs – Benzene, GRO
Former 500,000 Gallon Aboveground Storage Tank (AST) and associated tanks	VOCs – Benzene, Diesel Range Organics (DRO)
Boat Launch Area Former Aviation Fuel Underground Storage Tank (UST)	VOCs – GRO Metals – Arsenic, Beryllium, Cadmium, Chromium, Lead, Nickel, Zinc, Mercury, Thallium
Waterfront Lot/Parking Lot 6	PCB - Aroclor-1260 PAHs (soils only) Metals – Arsenic, Beryllium, Chromium, Lead, Nickel, Zinc, Mercury VOCs – Trichloroethene, Naphthalene
Existing Monitoring Wells	VOCs – Benzene, Toluene Ethylbenzene, Xylene (BTEX), GRO, Napthalene Metals - Beryllium, Chromium, Lead, Nickel
Abandoned 25,000 gallon fuel oil UST	VOC – Benzene, Naphthalene, DRO
Former 2000 gallon waste oil UST	VOC – DRO, GRO, 1,1, Dichloroethene, 1,2-Dichloroethene, Trichloroethene, Chloroethane, Tetrachloroethene
Sewage Treatment Plant/Wind Tunnel Test Building/Vibration Test Building	VOC - 1,1, Dichloroethene, 1,2-Dichloroethene, Trichloroethene, GRO, Benzene, Naphthalene Metals –Beryllium, Lead, Nickel, Mercury PAHs

[1] Based on exceedences of Maryland Preliminary Screening Criteria for Soil and/or Groundwater. Chemicals designated as primary contaminants of concern within this table do not necessarily indicate that they present an occupational exposure threat to site workers.

TABLE 3-1 (Cont.)
MIDDLE RIVER COMPLEX
PRIMARY CONTAMINANTS OF CONCERN FOR EACH BUILDING

DESCRIPTION	PRIMARY CONTAMINANTS OF CONCERN[2]
Building "A" Plating Shop	**Soils Only:** VOC - 1,1, Dichloroethene, 1,2-Dichloroethene, Trichloroethene
Basement "A" – Wastewater Underground Lines	**Soils Only:** VOC - 1,1, Dichloroethene, Trichloroethene
Buildings "A" and "B" Groundwater	**Groundwater only:** VOC - 1,2-Dichloroethene, GRO, Benzene, Naphthalene Metals – Cadmium, Chromium, Lead, Nickel, Zinc
Building "A" Former Finishing Shop	None Identified
Incinerator/Conservation Building	PAHs VOCs – Naphthalene, 1,1-Dichloroethene
Die Storage Area	Metals – Antimony, Beryllium, Cadmium, Chromium, Lead, Nickel, Zinc, Mercury
Bone Yard	Metals – Arsenic, Beryllium, Lead, Nickel, Zinc, Mercury, Thallium
Former Hazardous Materials Storage Pad	**Soils Only:** Metals – Mercury
Firecoat Building	**Soils Only:** Metals – Arsenic, Mercury
Marforms	**Soils Only:** VOCs - Methylene chloride
Building C Subsurface Basement Slab Investigation	**Soils:** VOCs, (TCE, DCE) **Groundwater:** VOCs (TCE, DCE)
Southern Portion of Lot 3	Metals – Arsenic, Beryllium, Lead, Nickel PAHs VOC - 1,1, Dichloroethene, 1,2-Dichloroethene, Trichloroethene, GRO, Naphthalene
Former Boat Dock Area	VOC – DRO, GRO, Naphthalene PAHs Metals – Beryllium, lead, Nickel, Mercury
Recently abandoned hydraulic pits	Metals - Mercury

[2] Based on exceedences of Maryland Preliminary Screening Criteria for Soil and/or Groundwater – Chemicals designated as primary contaminants of concern within is table do not necessarily indicate that they present an occupational exposure threat to site workers.

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
- Indoor Air Quality Sampling using Summa Canisters
- Soil borings via Direct Push Technology (DPT)
- 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
- Geophysical Survey
- IDW Management

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 911, 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 DRILLING (HSA/DPT/LITTLE BADGER UNIT/ROTOSONIC) SAFE WORK PRACTICES

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

5.2.1 Before Drilling

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

5.2.2 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.

5.2.3 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.

5.2.4 Concrete Coring Operations

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

- 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.

5.3 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.

Refer to the TtNUS Boat Safety Checklist in Attachment VI of this HASP.

5.3.1 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 waters 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.

5.3.2 U.S.C.G Boat Regulations

No person born on or after January 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
- Bowriding, 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.

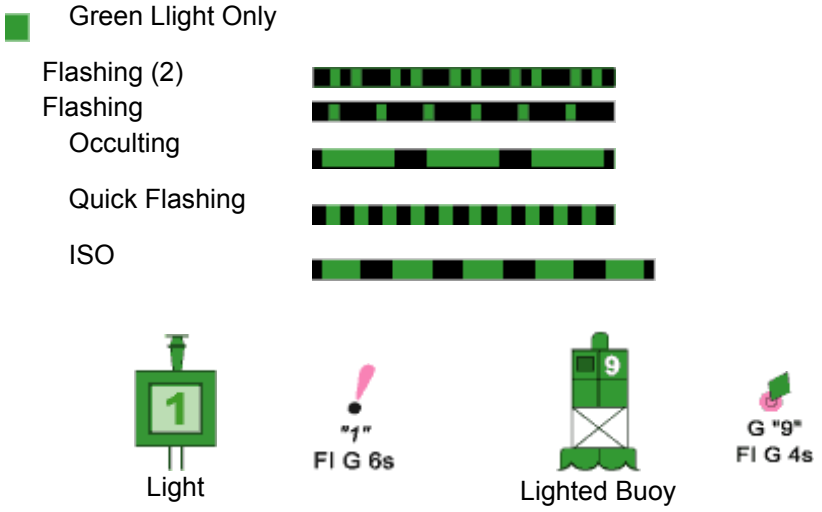
Vessels Required to be Registered in Maryland

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.

5.3.3 Uniform State Waterway Marking System (USWMS)

Lateral System (As Seen Entering From Seaward)

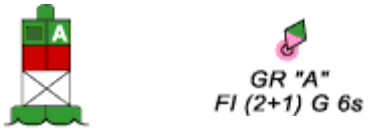
Port Side Odd Numbered Aids



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

Green Light Only

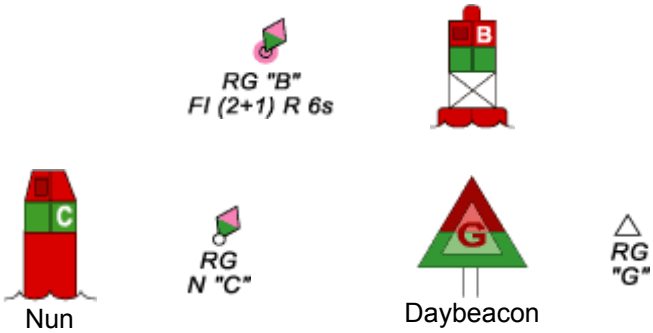
Composite Group Flashing (2+1)



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

Red Light Only

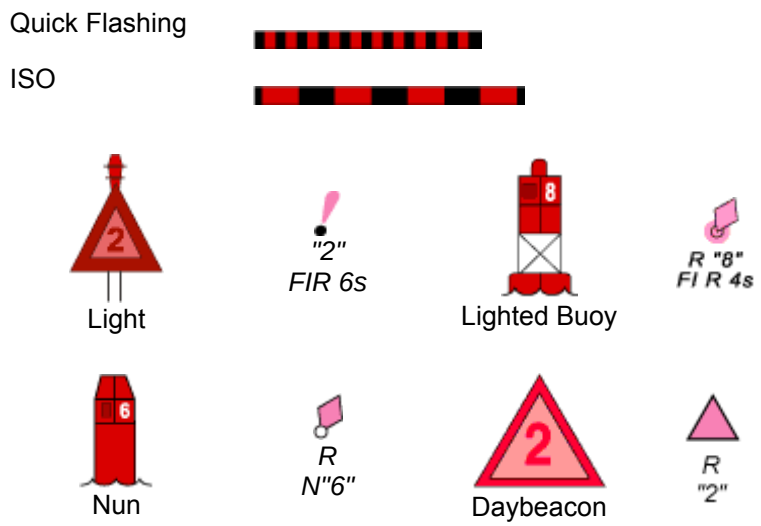
Composite Group Flashing (2+1)



Starboard Side Even Numbered Aids

Red Light Only

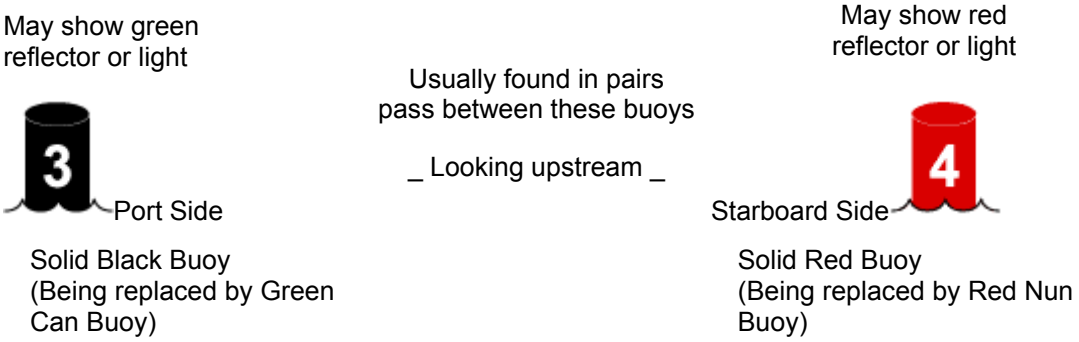
Flashing (2)
Flashing
Occulting



Lateral Aids to Navigation generally indicate 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



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

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

Installation of permanent soil gas vapor monitoring points will be conducted within buildings on site. Soil gas monitoring points will be installed at various locations using a diesel powered DPT rig. If necessary, a gasoline or electric powered concrete coring machine will be used if the DPT rig cannot push through the concrete floor.

Operation of diesel/gasoline powered equipment within enclosed areas such as buildings presents unique hazards particularly the inhalation of exhaust gasses, fumes, and dusts generated during concrete coring or soil boring. Additional hazards that may be present during these operations include, increased noise levels, contact with utilities, electrocution hazards (particularly if water is present), and the movement of heavy equipment.

The major gaseous products of both diesel and gasoline fueled engines are carbon monoxide and water, but lower percentages of carbon monoxide, sulfur dioxide, and nitrogen dioxides as well as low molecular weight hydrocarbons and their derivatives are also formed. Submicron-size particles are present in the exhaust emissions of internal combustion engines. The particles present in diesel engine exhaust are composed mainly of elemental carbon, absorbed organic material, and traces of metallic compounds. The particles emitted from gasoline engines are composted primarily of metallic compounds, elemental carbon and adsorbed organic material. However, the composition and quantity of the emissions from an engine depend mainly on the type and condition of the engine, fuel composition and additives, operating conditions, and emission control devices.

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. Although there have been relatively few studies on the long-term health effects of exhaust gasses/fumes, the available studies indicate that they can be harmful to your health. According to the National Institute for Occupational Safety and Health (NIOSH), human and animal studies show that diesel/gasoline exhaust should be treated as a human carcinogen. Exposure to diesel/gasoline exhaust in combination with other cancer causing substances may increase your risk of developing lung or other forms of cancer. 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.

The follow controls may be used to minimize potential exposures to exhaust gases/fumes:

- Use flexible tailpipe or stack exhaust hoses to vent equipment exhaust gases/fumes to the outside.

- Use of general ventilation (roof vents, open doors and windows, roof fans, rollup doors, floor fans, etc.) to move air through the work area to facilitate dilution of airborne exhaust gases/fumes. If exhaust gas/fume concentrations cannot be diluted with existing general ventilation methods, use local exhaust ventilation devices (portable axial blowers, coppus blowers) to vent exhaust gases/fumes to the outside.

- If feasible, use grade 1K diesel fuels which burns more clearly than Diesel 1 fuels.

- All equipment must have regular maintenance and frequent tune ups including checks of the exhaust system to determine if leaks exist. All equipment will be inspected using the Equipment Inspection Checklist provided in Attachment V.

- Prolonged idling of machinery should be avoided.

- Minimize the number of personnel in the area where internal combustion engines are operating. Observe workers for signs and symptoms of exposure.

- Monitor the work area for airborne concentrations of carbon monoxide which will be used to control exposures to carbon monoxide and other exhaust gases – follow established action levels.

- Use wetting methods to suppress airborne dusts generated during concrete coring or soil boring within the building.

5.5 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.

5.6 HOUSEKEEPING / CLEANUP SAFE WORK PRACTICES

Housekeeping procedures described in Section 5 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.

- TtNUS 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.

- TtNUS 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.

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 not yet been fully characterized. However, based on recent raw data from the previous sampling events the following contaminats were found to exist:

- Benzene
- 1,1-Dichloroethene
- Trichloroethylene
- Vinyl Chloride
- Lead
- Mercury
- Gasoline Range Organics (GRO) and Diesel Range Organics (DRO)
- Polynuclear Aromatic Hydrocarbons (PAHs)
- Polychlorinated Hydrocarbons (PCBs)

Although this is a possibility, it is very unlikely that the chemicals of potential concern (COPCs) listed above will 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 (Metals in soil)	Worst-Case Air Concentration That Could Be Encountered	Current OSHA PEL or ACGIH TLV
Lead	8.6 mg/kg in soil	ACGIH: 0.5 mg/m^3 TWA_8
Mercury	2.7 mg/kg in soil	ACGIH: 0.025 mg/m^3, TWA_8
(Volatile Compounds in Water)		**Current OSHA PEL and/or ACGIH TLV**
Benzene (VOC/PAH)	186.76 ug/l in water 12.94 ppm in air	ACGIH: 0.5 ppm TWA_8 1 ppm STEL
TCE (VOC)	17,000 ug/l in water 1,274.45 ppm in air	OSHA: 300 ppm Ceiling ACGIH: 50 ppm TWA_8 100 ppm STEL
Vinyl Chloride (VOC)	520 ug/l in water 231.3 ppm in air	OSHA: 1 ppm, TWA_8 5 ppm Ceiling
Total PCBs	Not Available	OSHA: 0.5 mg/m^3 TWA_8 (skin)
General PAHs	Not Available	OSHA limit: 0.2 mg/m3
DRO	Not Available	OSHA: 5 mg/m3 TWA_8 (as oil) ACGIH: 100 mg/m3 TWA_8 (as diesel fuel)

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

As indicated in the Table 6-1, from a worst-case scenario, COC concentrations immediately above a captured air phase above contaminated groundwater (such as in the head space of a monitoring well) 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 groundwater value used in this evaluation was the ***highest*** concentration detected during the two most recent groundwater monitoring events

As a result of these factors, it is very unlikely that workers participating in this activity will encounter any airborne concentrations of COCs that would represent an occupational exposure concern. To monitor this route, real-time direct reading monitoring instruments will be used (as described in section 7.0). This will performed during the intrusive tasks of groundwater sampling 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 also considered very 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 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 Petroleum/Oil/Grease Products

Prolonged or repeated contact to these products may result in contact dermatitis which is characterized by dryness, chapping, and reddening of the skin. Prolonged or repeated contact may also result in oil acne which is characterized by blackheads with possible secondary infection. On rare occasions exposure to oil mists pose a risk of pulmonary disease such as chronic lung inflammation. Shortness of breath and cough are the most common symptoms of exposure to these products. These products also have laxative properties and may result in abdominal cramps and diarrhea, if ingested. Exposure to a large single dose, or repeated smaller doses, may lead to lung aspiration, which can lead to lipid pneumonia or chronic lung inflammation. These are low-grade, chronic localized tissue reactions.

6.1.4 Polychlorinated Biphenyls (PCBs)

PCBs are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

6.1.5 Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides. PAHs have the potential to cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure.

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 SUB SLAB AND IAQ SAMPLING BUILDINGS A,B,C

Previous sampling data indicates the presence of VOC'S particularly benzene, and vinyl chloride within the Buildings A, B, C (see Table 6-1) for concentrations. Review the following information on these contaminants:

6.3.1 Benzene

Benzene is an aromatic hydrocarbon used as a solvent. It is a clear liquid with a sweet odor. Origin of the substance: Benzene occurs naturally but is primarily produced from petroleum products. Uses: Description: Benzene is used as an intermediate in the manufacture of a number of chemicals, including ethylbenzene (used in the synthesis of styrene), cumene (used in the synthesis of phenol and for the manufacture of phenolic resins and nylon intermediates), cyclohexane (used to make nylon resins), and nitrobenzene (used in the synthesis of aniline). Benzene is also a precursor in the manufacture of urethanes, chlorobenzene, and maleic anhydride. Benzene was previously used widely as a solvent, but this use has decreased in many countries due to the concern over carcinogenic effects.

HUMAN EXPOSURE: Main risks and target organs: Acute exposure to high concentrations of benzene in air results in neurological toxicity and may sensitize the myocardium to endogenous catecholamines. Acute ingestion of benzene causes gastrointestinal and neurological toxicity. Chronic exposure to benzene results primarily in hematotoxicity, including aplastic anemia, pancytopenia, or any combination of anemia, leukopenia, and thrombocytopenia Chronic benzene exposure is associated with an increased risk of leukemia. Summary of clinical effects: Acute neurological toxicity from benzene exposure may cause headache, dizziness, drowsiness, confusion, tremors, and loss of consciousness. Exposure to high concentrations may have effects on multiple organ systems.

6.3.2 Vinyl Chloride

Vinyl chloride is used in the manufacture of numerous products in building and construction, automotive industry, electrical wire insulation and cables, piping, industrial and household equipment, medical supplies, and is depended upon heavily by the rubber, paper, and glass industries. Adhesives for plastics and was formerly a component of aerosol propellants. Vinyl chloride and vinyl acetate copolymers are used extensively to produce vinyl asbestos floor tiles. Monitor for CNS and respiratory depression after acute exposure. Treatment should focus on good supportive care such as appropriate airway management and aggressive treatment of neurologic symptoms. Acute exposure, deaths are most often due to CNS and respiratory depression. The primary toxic hazard is exposure to vinyl chloride monomer (VCM) gas rather than to poly vinyl chloride (PVC) products (except during pyrolysis). There may be a long latent period between exposure and symptom onset. Dermal exposure can cause frostbite injury.

6.4 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.

6.4.1 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.

6.4.2 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.

6.4.3 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 TtNUS Health and Safety Guidance Manual, which the SSO is responsible for reviewing and implementing as appropriate on this project.

6.4.4 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.

6.4.5 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.

6.4.6 Vehicular and Equipment 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.

6.4.7 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, 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.

6.4.8 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 TtNUS 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.

6.4.9 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.

6.4.10 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 MONITORING

The primary COCs have the potential to be present in concentrations that could present an inhalation hazard during planned site activities. 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 site. A Photoionization Detector (PID) using a lamp energy of 10.6 eV will be used to monitor the air when conducting site activities. 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. However, many of the COCs (PAHs, PCB, metals) are not volatile and are unable to be detected with traditional field instrumentation (photoionization detectors). 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. Site metals are within the visible spectram, for visible dust use area wetting methods to suppress dust.

There is one 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.

TtNUS 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.

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.

Instrument Action Levels: The use of either a PID or an will be acceptable, provided that the following action levels are observed:

- 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:

- PID Action Level: 1.75 ppm above BG in BZ areas for 4 exposure of 5 minutes maximum time in any one work day.

7.1.1 Carbon Monoxide Detector and Colorimetric Tubes for Nitrogen Dioxide

A direct-read carbon monoxide detector such as a Drager 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 (NO2) will also be available for use and will be required whenever elevated CO readings are observed. To evaluate NO2 concentrations a Nitrogen Dioxide Drager 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 NO2.

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

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.)

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 TtNUS personnel participating in on site activities. TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the LMC MRC. TtNUS 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. TtNUS 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 TtNUS 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

TtNUS SSO will provide site-specific training to TtNUS 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 TtNUS 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

TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program. Documentation for medical clearances will be maintained in the TtNUS 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. TtNUS 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 TtNUS
- Regulatory personnel (i.e. EPA, MDEP, OSHA)
- Property Owners
- Authorized Personnel
- Other authorized visitors

Non TtNUS personnel working on this project are required to gain initial access to the facility by coordinating with the TtNUS 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 TtNUS 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 TtNUS operations. If a visitor has authorization from the client and from the TtNUS 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 TtNUS 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 TtNUS 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.

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 NUS 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 TtNUS
- Regulatory personnel (i.e. EPA, MDEP, OSHA)
- Property Owners
- Authorized Personnel
- Other authorized visitors

Non TtNUS personnel working on this project are required to gain initial access to the facility by coordinating with the TtNUS 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 TtNUS 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 TtNUS operations. If a visitor has authorization from the client and from the TtNUS 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 TtNUS 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.

TtNUS 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 TtNUS'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 TtNUS 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 _____ 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: _____

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: _____

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, TtNUS 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. TtNUS 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.

- Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Drums (55-gallon U.S. DOT 1A1 or 1A2)
- Shovels, rakes, and brooms
- 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 TtNUS 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, TtNUS 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

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

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

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).

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).

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 TtNUS 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.

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).

15.0 DANGEROUS OPERATIONS

TtNUS and subcontractor personnel will isolate their work areas from Lockheed Martin operations, employees, and the public. Barricades, signs, and signals will be employed as necessary and will be visible at all times where hazards exist.

TtNUS and subcontractors will effectively barricade excavations, floor openings, etc. as required by OSHA regulations.

Prior to beginning work, TtNUS and subcontractors must inform the Lockheed Martin Project Lead of any potentially dangerous operations.

All requirements addressing dangerous operations are detailed in Section 3.7 of the LM Handbook and will be adhered to.

16.0 EXCAVATIONS, TRENCHES, AND EARTHWORK

No excavation, trenchwork, or earthwork is being conducted as part of this field effort. Should excavation, trenchwork, or earthwork be required, this HASP will be amended/updated as necessary to 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.

17.0 ASBESTOS

No asbestos abatement 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 3.19 of the LM Handbook (Attachment I).

It is not anticipated during this field effort, but should asbestos containing material (ACM) or presumed asbestos containing material (PACM) be disrupted, TtNUS 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 discovery, disturbance, and/or spill of ACM and/or PACM. All operations will cease 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.

TtNUS 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.

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).

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).

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).

21.0 MATERIALS AND DOCUMENTATION

The TtNUS 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 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 VIII)** - 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. TtNUS 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 ay 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.

22.0 ACRONYMS / ABBREVIATIONS

CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CSP	Certified Safety Professional
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)
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
TtNUS	Tetra Tech NUS, Inc.
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds

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	

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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

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.

_____

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?

Yes ☐ No ☐

Time individual began work

_____ 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.

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 ☐
Telephone Number	Did the individual die? Yes ☐ No ☐ If yes, date:
	Will a worker's compensation claim be filed? Yes ☐ No ☐

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.

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.

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**	

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 TtNUS 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 the 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
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 _____ 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 and safety footwear. Hard hats and hearing protection will be worn when working near operating equipment.

VI. Chemicals of Concern | **Hazard Monitoring / Action Level(s)** | **Response Measures**
None anticipated | None | 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
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 will employ 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 _____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: _____

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
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 _____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: _____

VI. Chemicals of Concern

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
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 _____TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____TtNUS

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)	>1.75 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	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
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 _____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: Coast Guard approved personnal floatation device (pfd).

VI. Chemicals of Concern

COCs	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.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
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 _____ 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: _____

VI. Chemicals of Concern (COCs) and Actions

COCs	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	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.

ermit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
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 _____ TtNUS
Equipment Inspection required ☐ Yes ☒ No Initials of Inspector _____ TtNUS

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
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 _____ 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, 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: _____

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

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 or the 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 VII

TTNUS 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	

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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 VIII

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 FOR MIDDLE RIVER COMPLEX*

Waste Management Plan Middle River Complex Middle River, Maryland

Prepared for:

Lockheed Martin Corporation

Prepared by:

Tetra Tech, Inc.

February 2010

Michael Martin, P.G.
East Coast Regional Manager

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APPENDICES

LIST OF FIGURES

ACRONYMS

CFR	*Code of Federal Regulations*
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
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

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.

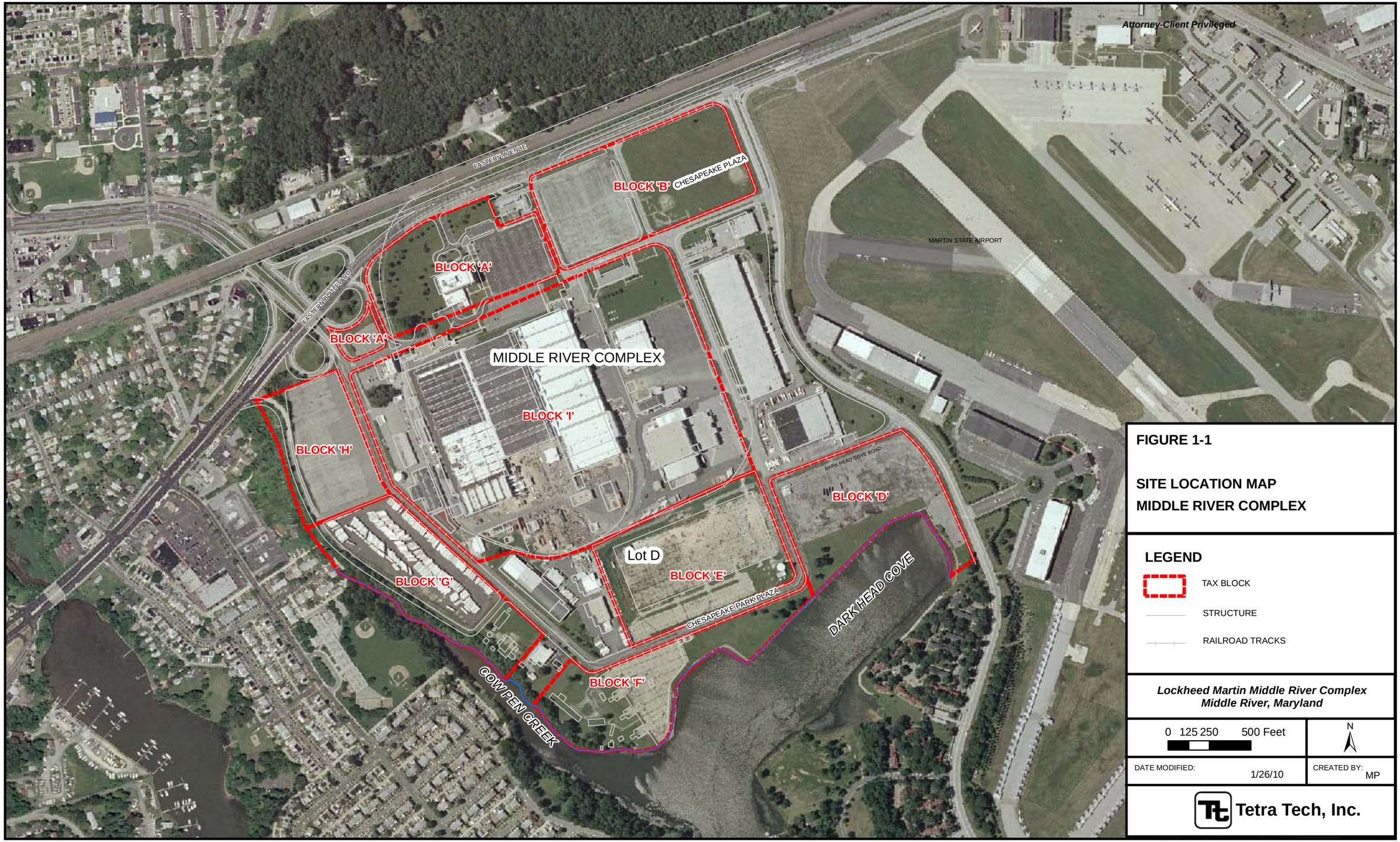

FIGURE 1-1

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.

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, or
- 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 e29 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 MDD985381318.

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):

- A temporary spill-containment system, constructed of polyethylene sheeting and 2-inch × 6-inch boards creating a bermed edge, will be placed under the container(s) 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.
- Store 55-gallon drums on self-containing pallets with four (or fewer) drums per pallet. Self-containing pallets will be stored on a hard flat surface covered with polyethylene sheeting.
- 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.
- 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.
- 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. Drums will be temporarily staged on a hard flat surface overlain by polyethylene sheeting and will sit on self containing plastic pallets that act as secondary containment. These pallets must be capable of containing the entire contents of one 55-gallon drum. All IDW drums will be stored on secondary containment until they can be removed from 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 MDD985381318. 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.

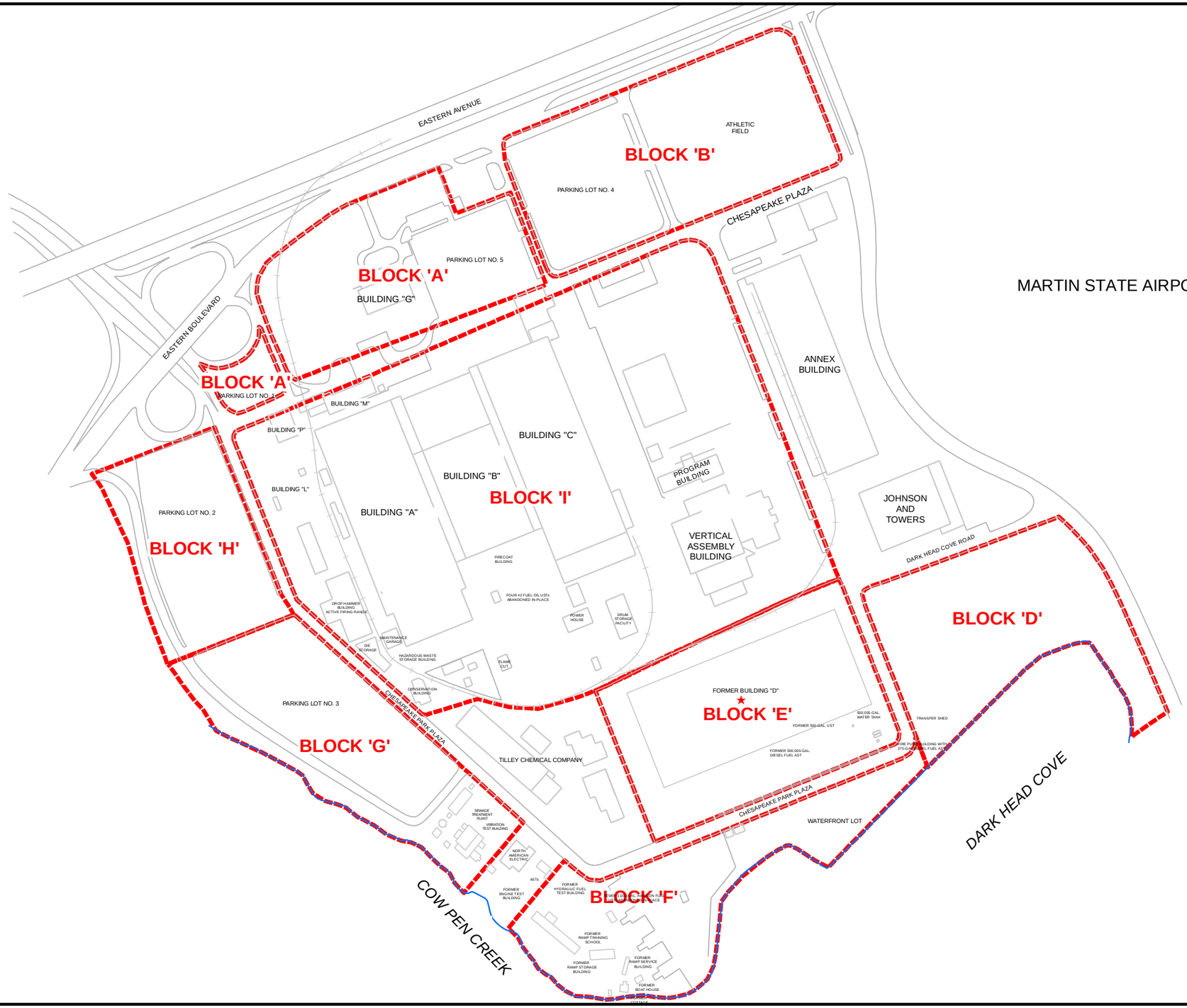
For non-hazardous waste, Tetra Tech will use Lockheed Martin's "Hazardous-Material/Waste-Shipment Checklist" (see Appendix B) during the preparation and pre-transport review of waste shipments, and will submit a completed electronic copy to the Lockheed Martin project lead along with the shipping documentation. 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, and
- 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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APPENDIX A — WASTE IDENTIFICATION AND CLASSIFICATION FORM

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	

APPENDIX B — HAZARDOUS-WASTE MANIFEST SIGNATURE-AUTHORIZATION FORM

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

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

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: _____

APPENDIX E— SITE CONTACT SHEET

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)

APPENDIX F— EESH-REMEDIATION OPERATING PROCEDURE NO. EROP-03, “EESH-REMEDIATION WASTE MANAGEMENT”

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.