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

Prepared for:

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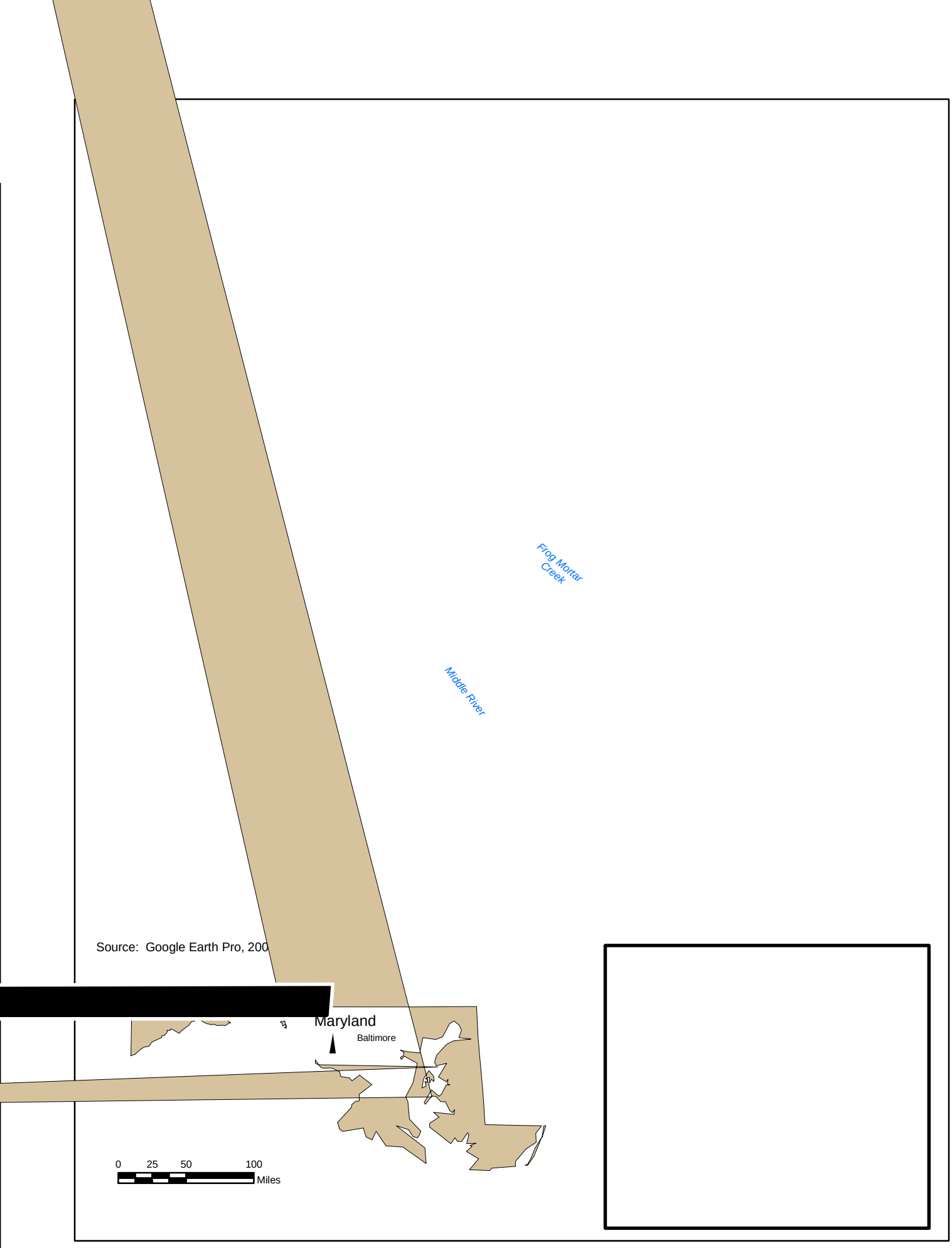
ACRONYMS

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

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 goa


Frog Mortar Creek
Middle River
Source: Google Earth Pro, 200
Maryland
Baltimore
0 25 50 100
Miles

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

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 southMans to itho.0474 Tw[lou.rou.32 ruadpped 0 TD ci1(p)(A)ltivitiessh

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

(depths > 6"). This investigation indicated potential human-health and ecological risks from

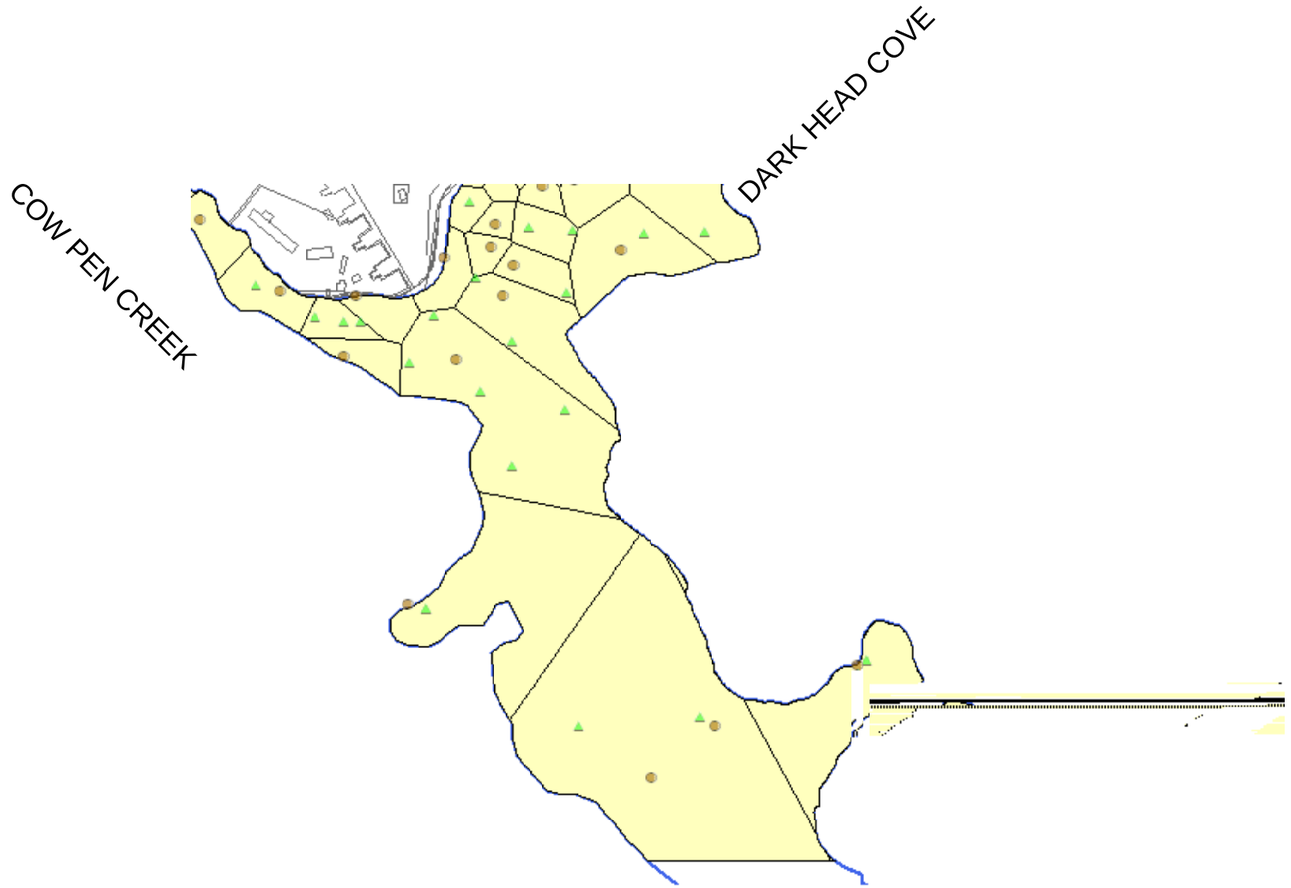
OAK POINT RD

DARK HEAD COVE

CREEK

CONSERVATION
BUILDING

MIDDLE RIVER COMPLEX



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 for organotins

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

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

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-$^{1}_{2}$-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 725 TD.0006 Tceach p3]13589 0 TD.0012 Tc.1825 r9.91 0 ch p3]ch (20 -21 av4.655 -1.dim sed The 614 alo

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

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

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 area(s). MBE combo systems require very high quality motion sensors to measure the boat's roll, pitch, heave, hich,venr is raeter .Survey rs will uls,ous eApplanix

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 shor

Table 3-1

Sediment Characterization Summary
Middle River Complex, Middle River, Maryland

LOCATION/name of core	Sample Depths (inches)	Priority	Surface Water Chemistry Analysis	Pre-design samples

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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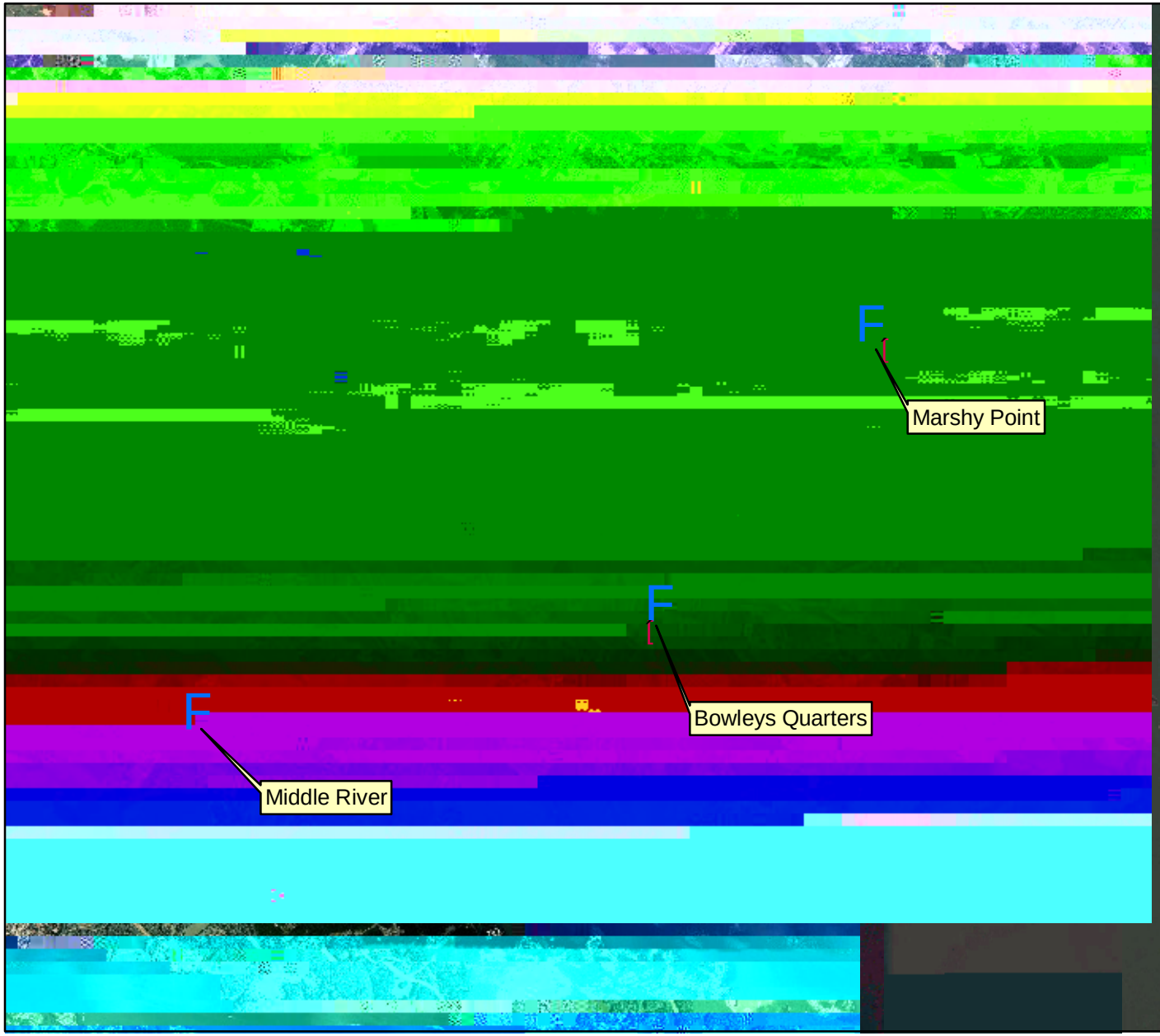

TETRA TECH

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

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

Contract Number: 112IC01633

Map Document: (K:\GProject\middle_river\Maps\Figure 3-2 Sediment Reference Locations.mxd)
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Section 4
Benthic Assessment

4.1 BENTHIC MACROIN

samples to represent the benthic community at each location. The individual grab samples at each

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

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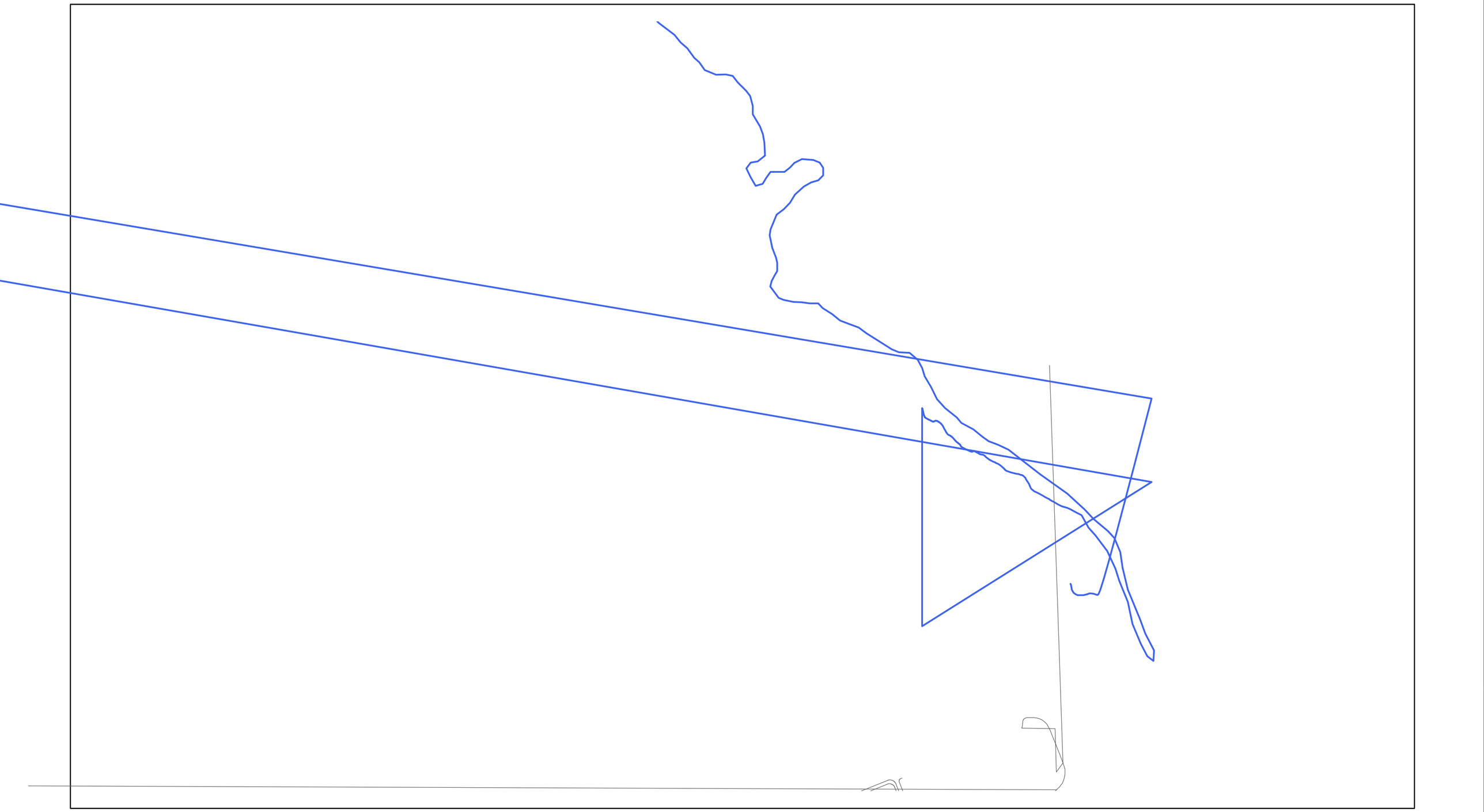
			Benthic bioassessment
LOCATION/name of core	No. fish to be collected, target species #1 (e.g., channel catfish)	No. fish to be collected, target species #2 (e.g., brown bullhead)	No. grabs to be collected



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

(e.g., tubes can be stacked; filtrate can be drained directly to a surface stream or collected in

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

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.

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

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 wTJ9.fo9etionnd nJ20.4sting, th(p)na

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

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.

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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:

Tetra Tech NUS, Inc.
20251 Century Boulevard, Suite 200

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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.

- 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.

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 hav

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.

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

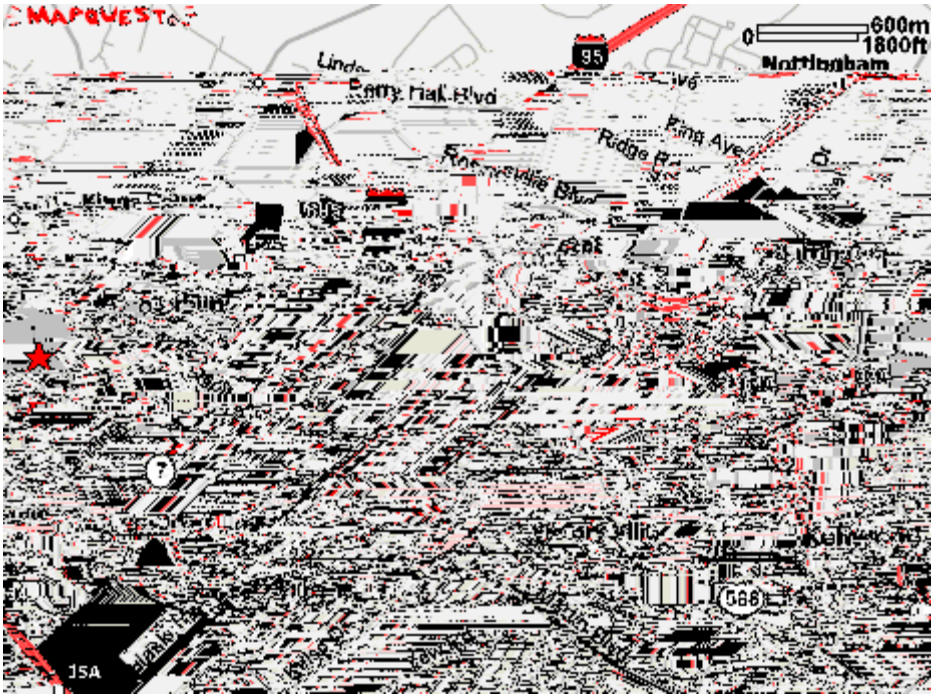
Driving Directions:

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



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 avera[bl ma dose of fifty percent).

Protective clothing such as suits, aprons, bootsbl mgloves shall be worn where there is a hazard to the body through dermal contact with chemicals, dusts, heatbl mother harmful agentsbl mconditions.

Hard hatsbmeeting the ANSI Z89.1 Standard will be worn in all areas where there is danger of impact to the headbl mhazard from falling l mmoving lbjects.

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 subcontractl mpersonnel conducting work at Lockheed Martin will adhere to Title 29, Code of Federal Regulations, Section 1910.120 – Hazardous Waste Operations and Emergency Respons bl mthe applicable state OSHA standards.

TtNUS and/l msubcontractl mpersonnel will to performperiodic work area inspections to determine the effectiveness of the site safety and health plan and to identify and correct unsafemconditions in the work area. Thes binspections 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.

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.

FIGURE 2-2 (continued)
WORKCARE
POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____

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

Client Contact: _____ Phone No.: _____

Company Name: _____

TABLE 3-1

MIDDLE RIVER COMPLEX
PRIMARY CONTAMINANTS OF

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

DESCRIPTION	PRIMARY CONTAMINANTS OF CONCERN[2]
Building “A” Plating Shop	

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

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.

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.

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

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.

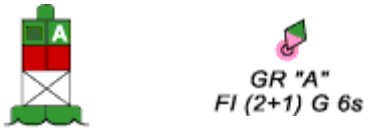
When work activities take personnel within four feet of navigable waters edge personnel will have immediately accessible a lifeline with a throwing bag or Type IV flotation device facilitate extraction from the water. Personnel working on waters edge will do so using the buddy system to assist in rescue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

Device	Type

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

Green Light Only

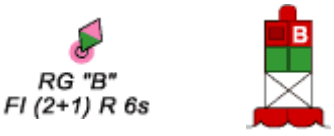
Composite Group Flashing (2+1)

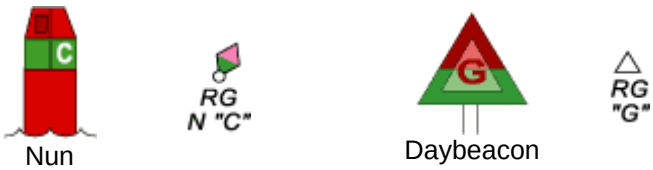


Preferred Channel No Numbers-May Be Lettered
Preferred Channel To Port Topmost Band Red

Red Light Only

Composite Group Flashing (2+1)

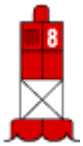




Quick Flashing

ISO

Light



Lighted Buoy

Nun

N2 6"/ID2 BD p0E0 0.65 1.144 E0 Ef0 Tc 1.8 8.6 0 BT/P0.928 Td("2" (N pe AD2 BD q2

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 loca

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

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)		

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.

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 t

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

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

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 detect

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

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 moni

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER

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

Site visitors will be directed to the FOL/SSO, who will sign them into the field logbook. Information to

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

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

FIGURE 9-1
SAFE WORK PERMIT

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

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.

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.

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.

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 t

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 requiction 3.21 of the LM Attach sl I). 18-1

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

ATTACHMENT I

LOCKHEED MARTIN'S

REMEDIATION CONTRACTOR'S ESH

HANDBOOK

REMEDIATION CONTRACTOR'S ESH HANDBOOK

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

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:

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 respirat

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

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.

Lead and/or on-site facility operator (if applicable) so power can be resumed to tg4ROv-TJ0.0

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,

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

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 extinguish

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 conduc

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.

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

4.4.1 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 p996 ( )TjE720.0307 Tc 0.3007 Te applicab(s)suravailicab

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

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: _____

ATTACHMENT II

INCIDENT REPORT FORM

CORRECTIVE ACTIONS
Corrective action(s) immediately taken by unit reporting the incident:
_____ _____ _____
Corrective action(s) still to be taken (by whom and when):

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**

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)	

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.

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	

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

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** **Respiratory equipment required**

Level D ☒

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):

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	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
Safety Glasses ..... ☐ Yes ☐ No
Chemical/s

Hearing Protection (Plugs/Muffs) ..... ☐ Yes ☒ No
Safety belt/harness ..... ☐ Yes ☒ No

SAFE WORK PERMIT
MARINE OPERATIONS (FROM WATER VESSEL)
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

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

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** **Respiratory equipment required**
Level D ☒

SAFE WORK PERMIT
DECONTAMINATION ACTIVITIES

ATTACHMENT V
EQUIPMENT INSPECTION CHECKLIST
FOR DRILL/DPT RIGS

Unit/Serial No#:_____

Unit/Serial No#: _____ **Inspection Date:** ____/____/____

Yes	No	NA	Requirement	Comments

TETRA TECH, INC.

Explanation of Required Items

Ç **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.

Ç **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.

Ç **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 accessibl*e." Boats 16 Feet or longer, must also have one Type IV (throwable) device, which shall be " *immediately availabl*e." PFDs shall NOT be stored in unopened plastic packaging.

Ç **4. VISUAL DISTRESS SIGNALS:** Boats 16 feet and over or the are required to carry a minimum of either:
1." 2ts) e ondayenon-pyrotechnsti

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.

Ç **7. BACKFIRE FLAME ARRESTER:** Gasoline powered inboard/outboard or inboard motor boats must be equipped with an approved backfire flame control device.

Ç **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.)

Ç **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.

Ç **10. POLLUTION PLACARD:** Boats 26 feet and over with a machinery compartment must display an oily waste “pollution” placard.

Ç **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

ATTACHMENT VII

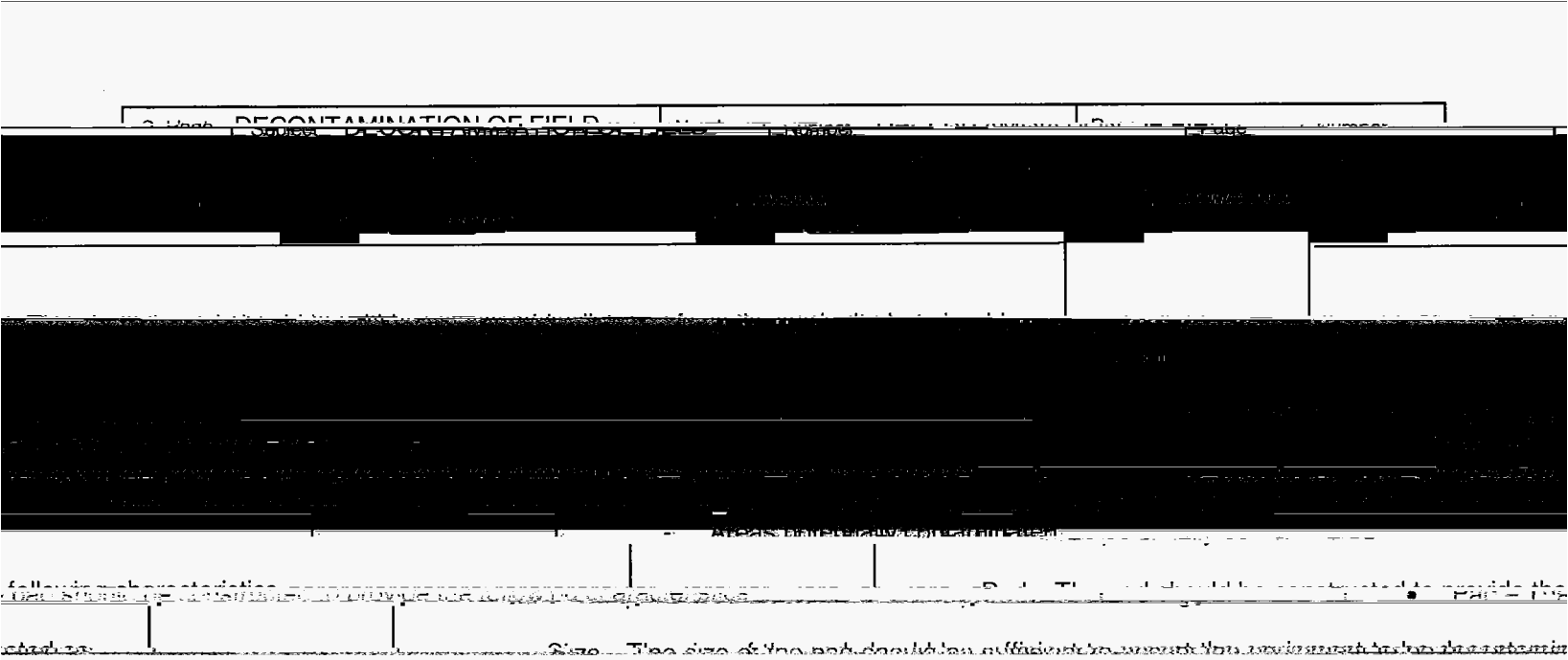
TTNUS DECONTAMINATION OF FIELD EQUIPMENT AND WASTE HANDLING STANDARD OPERATING PROCEDURE

[redacted]

D. Genovich

TABLE OF CONTENTS

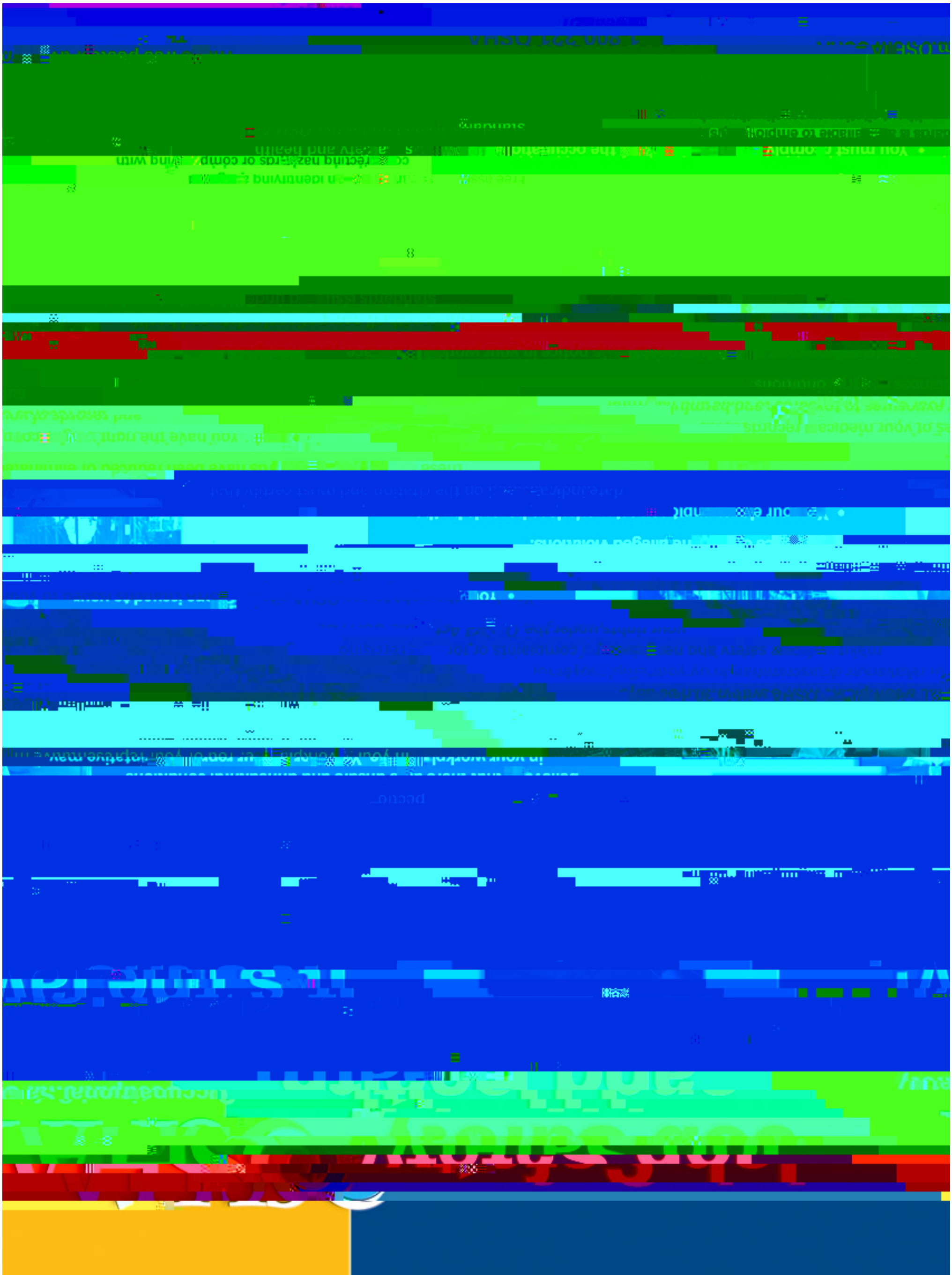
Subject DECONTAMINATION OF FIELD	Number	Page


DECONTAMINATION OF FIELD

[redacted]

ATTACHMENT VIII

OSHA POSTER



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

TABLE OF CONTENTS

ACRONYMS

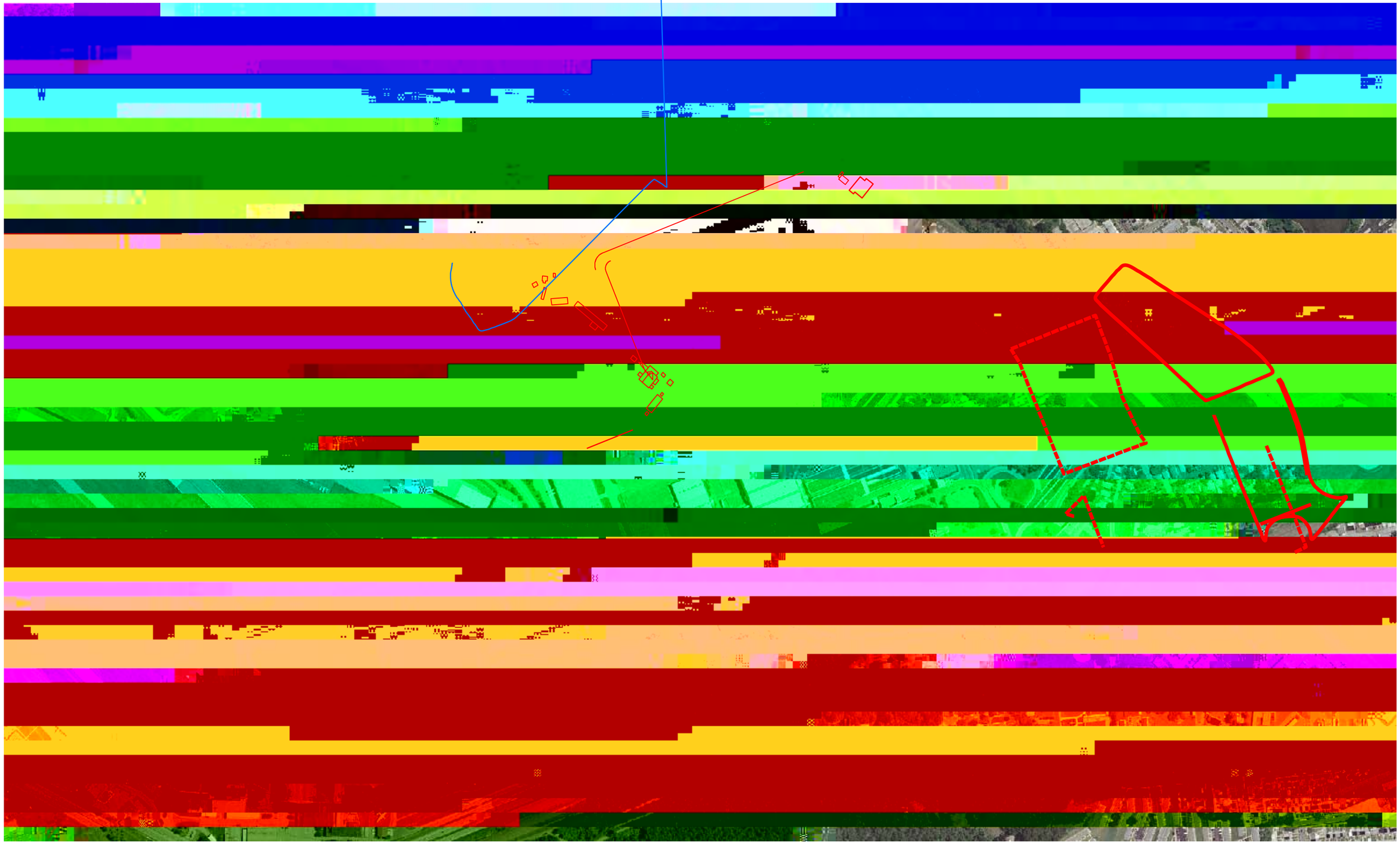
CFR	*Code of Federal Regulations*
EESH	Energy, Environment, Safety, and Health
HAZWOPER	hazardous waste operations
IDW	Investigation-derived waste
LMCPI	Lockheed Martin Corporation Properties, Inc.
Lockheed Martin	Lockheed Martin Corporation
MDOT	Maryland Department of Transportation
MRC	Middle River 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

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.



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,

4.1.3 Storing

Investigation derived waste storage areas will m

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

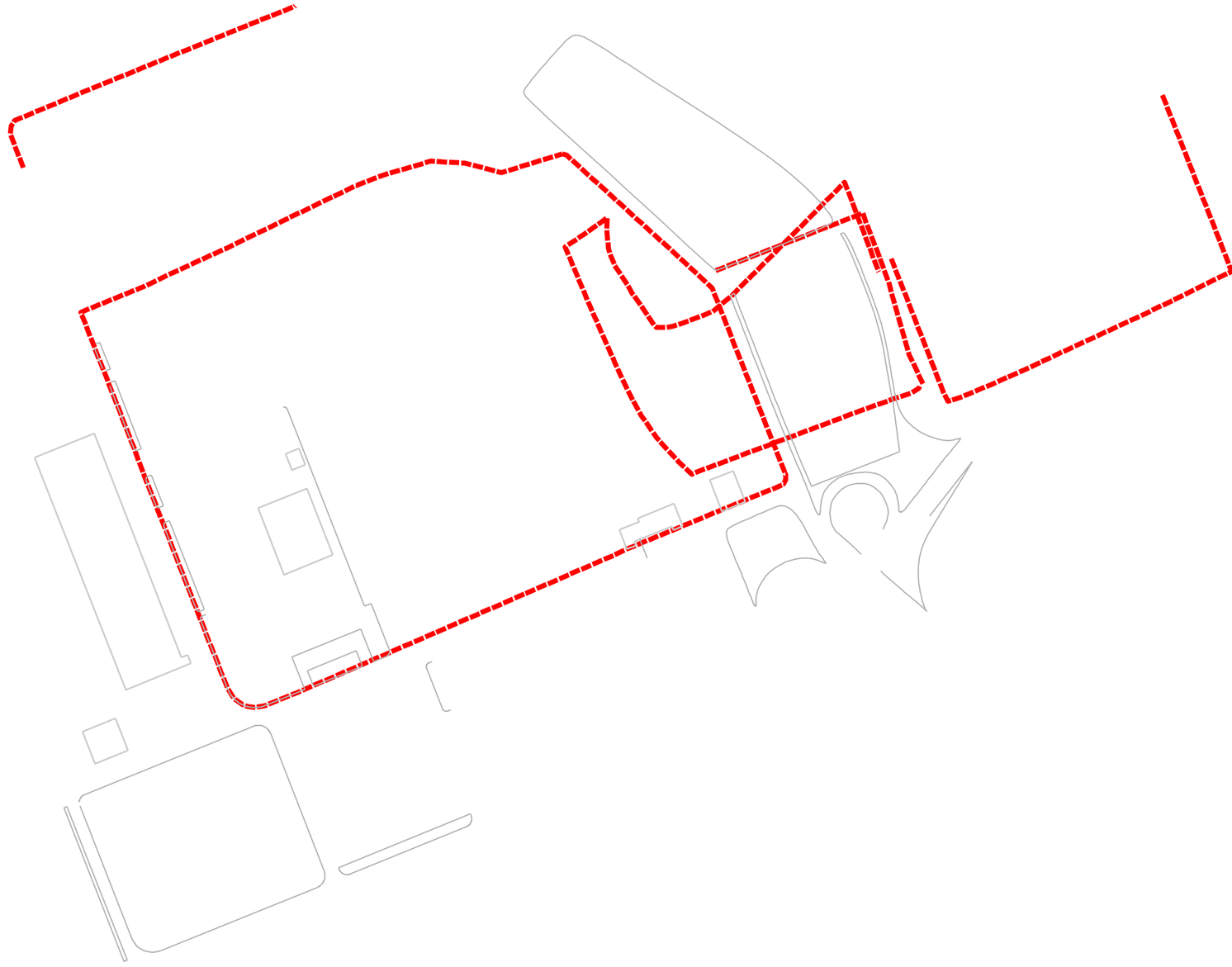
United States Department of Transportation "HAZMAT Employee" training is required for anyone involved in shipment preparation, offering for transport, and transportation of hazardous waste, including signing hazardous waste manifests (see 49 CFR 172, Subpart H).

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**.**

The documentation noted above must be retained for three years. All documents should be properly stored and available for review upon request.



APPENDIX A — WASTE IDENTIFICATION AND CLASSIFICATION FORM

APPENDIX B — HAZARDOUS-WASTE MANIFEST SIGNATURE-AUTHORIZATION FORM

APPENDIX C —
HAZARDOUS-MATERIAL/WAS TE-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

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: _____

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

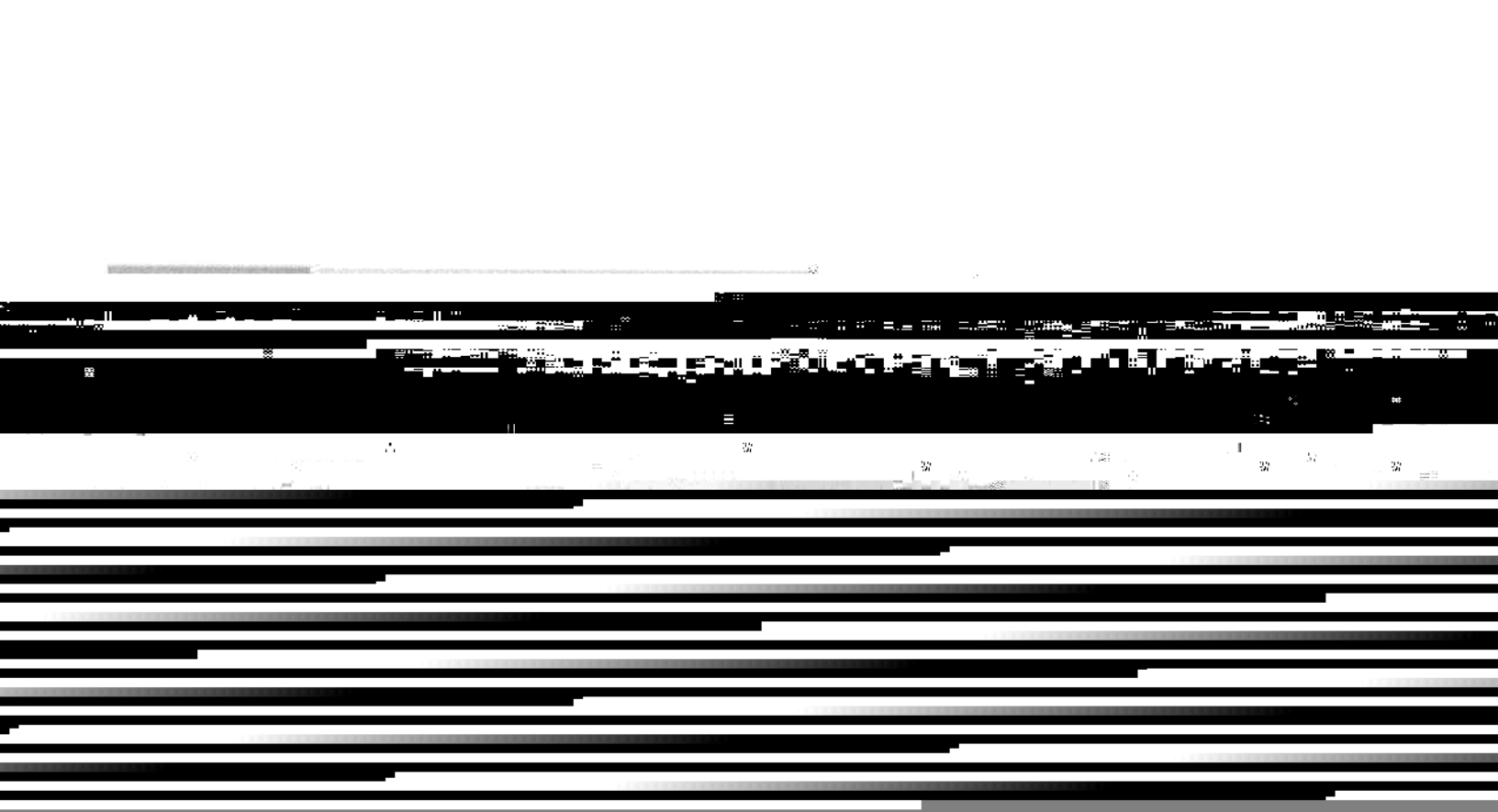
7) A&A Environmental / Spill Response: 1-800-404-8037

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)



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

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:**