

Work Plan
for
Geophysical Investigation
at
SWMU 4, McComish Gorge

Naval Surface Warfare Center
Crane Division
Crane, Indiana



Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0010

September 1999



DEPARTMENT OF THE NAVY

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE, INDIANA 47522-5000

IN REPLY REFER TO:

5090
Ser 095/9186

27 SEP 1999

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Illinois, Indiana, and Michigan Section
ATTN: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NAVSURFWARCENDIV Crane) submits three copies of the Final Work Plan for the geophysical investigation at McComish Gorge [Solid Waste Management Unit (04/02)] as enclosure (1). The required Certification Statement is in enclosure (2).

NAVSURFWARCENDIV Crane point of contact is Mr. Thomas J. Brent, Code 09510, telephone 812-854-6160.

Sincerely,

JAMES M. HUNSICKER
Director, Environmental
Protection Department
By direction of
the Commander.

Encl:

- (1) Final Work Plan for Geophysical Investigation at SWMU 04/02
- (2) Certification Statement

Copy to:

ADMINISTRATIVE RECORD (w/2 copies)
SOUTHNAVFACENGCOM (Code 1864) (w/o encl)
IDEM (Mike Sickels) (w/2 copies)
TTNUS (Karen Smecker) (w/o encl)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.


SIGNATURE

ENJ. PROT. Dept. Mgr.
TITLE

9/22/99
DATE

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FOR
GEOPHYSICAL INVESTIGATION
AT
SWMU 4, McCOMISH GORGE**

**NAVAL SURFACE WARFARE CENTER
CRANE, DIVISION
CRANE, INDIANA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406**

**Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220**

**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0010**

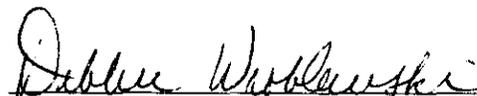
SEPTEMBER 1999

PREPARED UNDER THE SUPERVISION OF:



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ACRONYMS

bgs	below ground surface
CLEAN	Comprehensive Long-term Environmental Action Navy
CTO	Contract Task Order
EM	Electromagnetic
GPS	Global Positioning System
HASP	Health and Safety Plan
IAS	Initial Assessment Study
mS/m	milliSiemens per meter
NACIP	Navy Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Agency
NSWC	Naval Surface Warfare Center
ppt	parts per thousand
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SWMU	Solid Waste Management Unit
TtNUS	Tetra Tech NUS, Inc.
U.S. ACE	United States Army Corps of Engineers
WES	Waterways Experiment Station
WP	Work Plan

1.0 INTRODUCTION

(Note: Brown & Root Environmental was purchased on January 1, 1998 and became Tetra Tech NUS, Inc. (TtNUS).) This Work Plan (WP) has been prepared in support of the completion of a geophysical survey at Solid Waste Management Unit (SWMU) 4, McComish Gorge, Naval Surface Warfare Center (NSWC) Crane, Indiana. This WP was prepared by TtNUS on behalf of the U.S. Navy Southern Division Naval Facilities Engineering Command (SOUTHDIR) and NSWC Crane under the Comprehensive Long-term Environmental Action Navy (CLEAN), Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0010.

In 1981 the Navy initiated the Navy Assessment and Control of Installation Pollutants (NACIP) Program. This initiation included an investigation for designated sites at the facility. These investigations were known as the Initial Assessment Study (IAS). The Naval Energy and Environmental Support Agency (NEESA) completed the IAS in 1983 with assistance from the Ordnance Environmental Support Agency and the U.S. Army Corps of Engineers (U.S. ACE) Waterways Experiment Station (WES). The intent of the IAS was to identify and assess sites posing a potential threat to human health and the environment from past hazardous materials operations. Based on the conclusions of the IAS, it was determined that McComish Gorge did not represent an immediate human health and environmental threat. It was, however, recommended that further study be conducted at SWMU 4 to evaluate potential long-term impacts.

In 1989 NSWC Crane was given a final Resource Conservation and Recovery Act (RCRA) Part B Permit. The permit contained corrective action requirements to be performed at its SWMUs. In response to the IAS recommendations and the requirements of the permit, RCRA Facility Investigations (RFIs) were initiated at McComish Gorge.

Based on requirements of the RCRA Part B Permit, three phases of RFIs have been conducted at SWMU 4. The first phase of the RFI consisted of Environmental Monitoring Reports, which provided background information pertinent to the Facility, contamination, interim measures, and existing data gathered for the site. The objective of the Phase II RFI was to determine the presence or absence of contamination at the site. This study primarily addressed soil contamination only. Nature and extent of contamination was characterized during the Phase III RFI which was never fully completed. Ground water samples were mainly collected as part of the Phase III study. Based on the results of these investigations, chemical releases to the environment from past operations conducted at the SWMU have been identified, requiring the performance of a human health and ecological assessment.

Prior to characterizing the potential risks associated with exposure to site media, the boundaries of McComish Gorge must be delineated. A geophysical survey will be performed to determine the boundaries of past disposal activities. Environmental sampling to be completed for risk assessment activities at SWMU 4 will be determined based on the results of the geophysical survey.

1.1 OBJECTIVE

The purpose of this Work Plan is to outline the methodologies for the conductance of a geophysical survey at McComish Gorge. The primary objective of the geophysical survey is to delineate the approximate boundaries of disposal operations at SWMU 4 so samples for the evaluation of human health and ecological risks can be collected from upgradient and site-specific locations. The identification of anomalies, such as buried metallic objects, will be a secondary objective. The placement of future soil borings and monitoring wells for risk assessment activities will be based on the results of the geophysical survey. The survey will be performed in accordance with the requirements of the site-specific Health and Safety Plan (HASP) (presented in Appendix A).

1.2 ORGANIZATION OF WORK PLAN

The remainder of this section identifies the organization of this Work Plan. Section 1.0 provides this introduction. Section 2.0 contains the description of the site. Section 3.0 describes the type of geophysical survey to be performed. A discussion of the presentation and interpretation of the geophysical results is included in Section 4.0. The site-specific HASP for the geophysical survey is presented in Appendix A.

2.0 SITE BACKGROUND

2.1 SITE DESCRIPTION

McComish Gorge is a 5-acre site, which was used from approximately 1942 to 1972 for the disposal of an unknown amount of garbage, trash, and debris. Material disposed at the site may include construction debris, office trash, plaster filled warheads, metal shavings and possibly small arms ammunition. The site is currently inactive and has been allowed to revegetate. A former access road circles a portion of the site. A jeep trail (Jeep Trail – 1) extends west from the circular access road.

As seen in Figure 2-1, McComish Gorge is located in the northwest corner of the NSWC Crane. The site map (Figure 2-2) shows that it is approximately 500 feet south of Crane Gate No. 4 on Highway 140 (HR-140) at the intersection of Sections 5, 6, 7, and 8 within Township 5 North, Range 4 west.

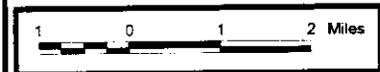
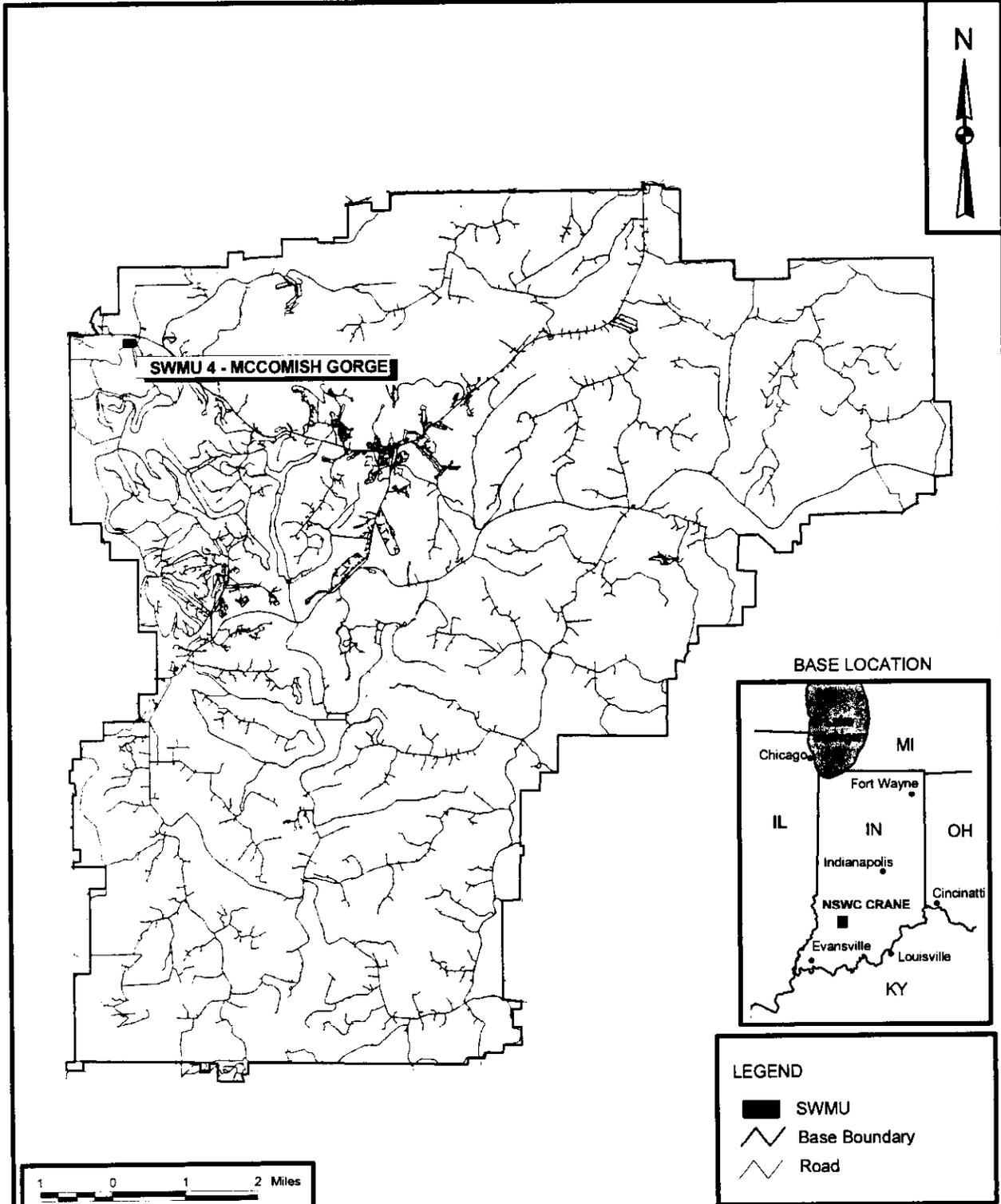
The site is bounded on the north by Culpepper Branch Creek and on the east by HR-140. The southern and western boundaries of the site have not been identified. Initially, areas located to the south and west of the former circular access road were thought to be outside the site boundaries. However, during the RFI Phase II Soils Release Characterization (U.S. ACE WES, 1998), waste was encountered in soil borings 04/02-1A and 04/02-02 (Figure 2-2), which were advanced at locations south of the Jeep Trail –1.

2.1 TOPOGRAPHY

The topography at McComish Gorge consists of undulating terrain dissected by many small drainage-ways. Surface runoff drains into Culpepper Branch Creek, which is a tributary of Furst Creek.

2.2 GEOLOGY

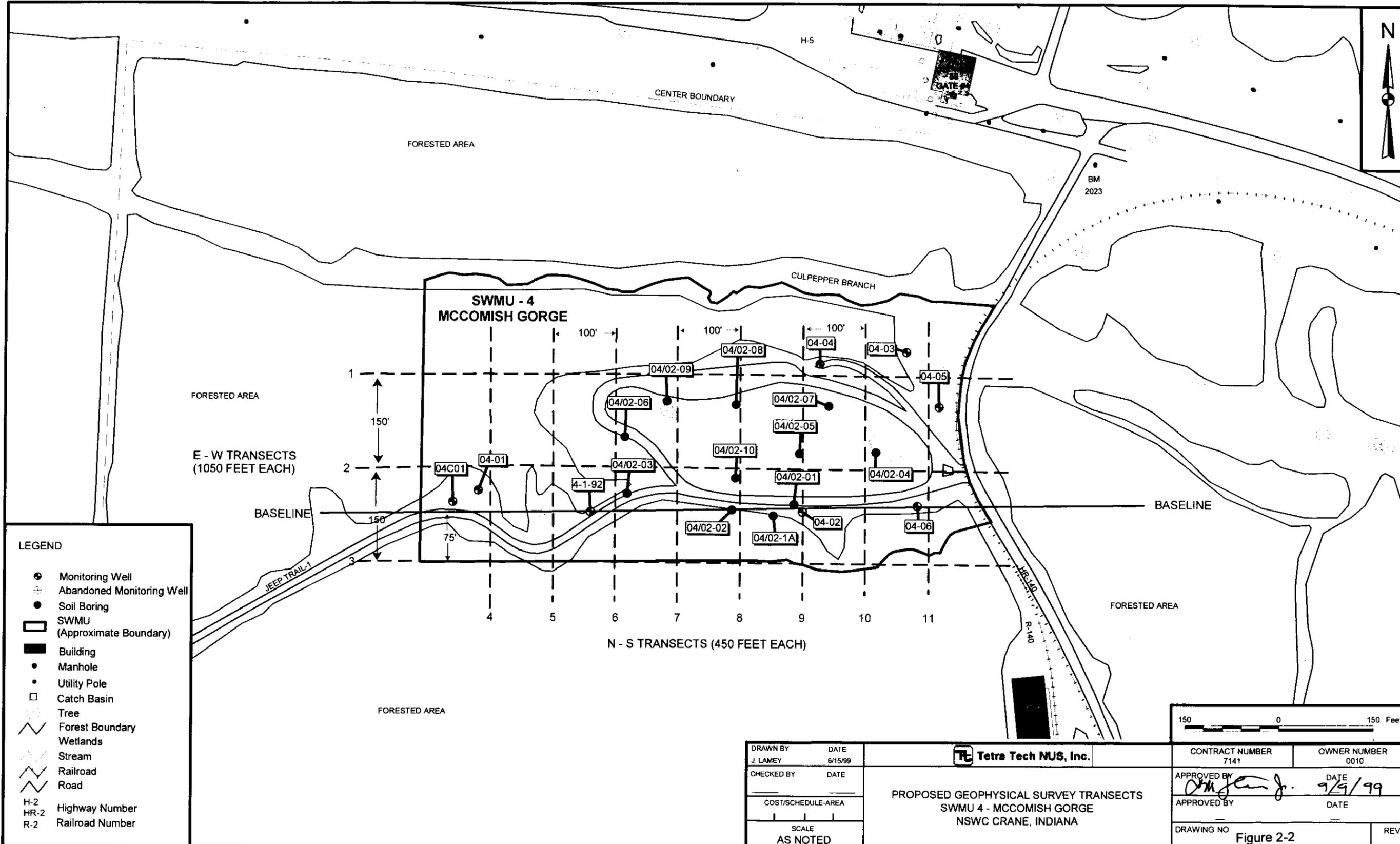
McComish Gorge is located on the Crawford Upland, a rugged, dissected plateau formed by differential erosion of Pennsylvanian- and Mississippian-age sedimentary rocks. The rock units underlying McComish Gorge and forming the surrounding hills consist of Mansfield Formation shales and sandstones of the Pennsylvania-age Raccoon Creek Group.



DRAWN BY J LAMEY	DATE 3/3/99	Tetra Tech NUS, Inc. SITE LOCATION MAP SWMU 4 - MCCOMISH GORGE NSWC CRANE, INDIANA	CONTRACT NUMBER 7141	OWNER NO 0010
CHECKED BY	DATE		APPROVED BY KAREN M. SMECKER	DATE 3/30/99
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO Figure 2-1	REV

P:\GIS\NSWC_CRANE\CTO-10_SWMU04.APR 8/29/99 JAL SITE LOCATION LAYOUT

P:\GIS\NSWC_CRANE\CTO-10_SWMU04.APR PROPOSED GEOPHYSICAL SURVEY 8/17/99 JAL



LEGEND

- Monitoring Well
- ⊕ Abandoned Monitoring Well
- Soil Boring
- SWMU (Approximate Boundary)
- Building
- Manhole
- Utility Pole
- Catch Basin
- Tree
- ~ Forest Boundary
- ~ Wetlands
- ~ Stream
- ~ Railroad
- ~ Road
- H-2 Highway Number
- HR-2 Railroad Number
- R-2 Railroad Number

DRAWN BY J. LAMEY DATE 6/15/99		CONTRACT NUMBER 7141	OWNER NUMBER 0010
CHECKED BY DATE COST/SCHEDULE/AREA SCALE AS NOTED	PROPOSED GEOPHYSICAL SURVEY TRANSECTS SWMU 4 - MCCOMISH GORGE NSWC CRANE, INDIANA		APPROVED BY DATE 9/9/99
		APPROVED BY DATE DRAWING NO Figure 2-2	REV

Most of the McComish Gorge site is situated in the dissected alluvial valley of Culpepper Branch Creek. Soils across the site ranged from 0 to 65 feet in thickness. Several processes formed the unconsolidated sediments found at McComish Gorge. During the Pleistocene, the site was filled with lacustrine (lake) deposits and alluvial (stream outwash) deposits that are facies included in the Artherton Formation. At this location, these deposits primarily consist of interbedded sand, silt, and clay indicating a heterogeneous nature to the subsurface soils. Only small amounts of coarse sand or gravel were encountered at the site during previous site investigations.

Colluvium derived from the hill slopes and soils reworked as a direct result of disposal activities also compose the soils found at the site. The part of the soil horizon that has been disrupted by human activity (estimated depth of 3 to 4 feet bgs) contains items such as plastic, rubber, metal, and wood wastes. In addition, staining of this horizon has also been observed (U.S. ACE WES, 1998).

A linear, sandy zone of soil has been identified at the site. This sandy zone is interpreted as a paleostream channel deposit.

2.3 HYDROGEOLOGY

The ground water gradient at SWMU 4 is eastward. During previous investigations, ground water was encountered at shallow depths, approximately 10 feet below ground surface (bgs) near the western edge of the site to approximately 3 feet bgs near Culpepper Branch Creek. The elevation of the creek is approximately coincident with the elevation of groundwater; therefore, it may discharge into Culpepper Branch Creek.

Ground water appears to infiltrate vertically through clay and silt soils until rock is encountered. Ground water then moves laterally along the soil/rock interface until it reaches fractured rock through which it would enter the rock aquifer system. The subsurface linear sandy zone of soil present at the site acts as a conduit where groundwater would preferentially move laterally through the sand zone.

3.0 GEOPHYSICAL INVESTIGATION

An electromagnetic (EM) survey will be conducted at McComish Gorge along eight north-south and three east-west transects (Figure 2-2) to delineate the boundaries of the disposal area. Each east-west transect will be approximately 1,050 feet in length; each north-south transect will be approximately 450 feet in length. Based on cultural features identified in the field at the time of the surveying, the length of transects may be increased. A Geonics EM31 Terrain Conductivity Meter (EM31) will be used in this survey. The apparent boundary between the fill and undisturbed areas identified by the EM-31 along a transect line will be further investigated by walking the EM-31 on either side of the transect line as site conditions allow and flagged/staked in the field.

The EM-31 is a frequency domain device that uses the principle of EM induction to measure the apparent conductivity and magnetic permeability of materials and their pore fluids. The instrument is equipped with a very low frequency radio transmitter and receiver coil. The EM31 transmits at a frequency of 9.8 kilohertz. The transmitter and receiver coils are separated by a distance of 3.7 meters and are located at either end of a rigid non-metallic pole. Data will be collected continuously in 1-second intervals along transects, with the instrument held at waist height (approximately 3 feet), in the vertical dipole mode and oriented parallel to the direction of travel. The investigation depth is expected to be approximately 16 feet, but varies depending on site-specific surface and subsurface conditions.

Terrain conductivity and magnetic permeability will be collected simultaneously through the use of a digital data logger. Terrain conductivity data is measured in units of milliSiemens per meter (mS/m) and used to differentiate between fill and undisturbed soils. Magnetic permeability is recorded in dimensionless units of parts per thousand (ppt) and is used to identify the presence of buried metallic objects, pipes, and utilities. Records will be investigated to identify utilities and other features prior to the survey. Some uncertainty in the interpretation of the apparent conductivity is possible because changes in conductivity are affected by water content of soil and shallow stratigraphic changes.

Readings will be collected in a designated background area before and after the survey. The survey will be conducted along traverses with a positioning check at a maximum of every 200 feet. Furthermore, if the pace is altered or interrupted along a transect line, notes and position verification will be placed into the data file using the data logger connected to the EM-31. Jeep Trail -1 will be used as a baseline to assist in locating the transects. In general, straight-line transects perpendicular to and parallel with the baseline will be traversed using a compass and/or dead-reckoning methods. Limited clearing of

vegetation along the transects may be necessary to allow equipment operators to traverse transects at a constant pace.

4.0 PRESENTATION OF GEOPHYSICAL RESULTS

The results of the geophysical survey for SWMU 4 will be presented in the WP for Risk Assessment at SWMUs 4, 5, 9, and 10 (TINUS, May 1999). A brief discussion of the results and graphical presentations of terrain conductivity and the magnetic permeability for each transect will be provided. Additionally, a site map depicting the location of each transect will be provided and presented with CADD and/or GIS planimetric overlays for reference purposes. The software used to interpret the data will be the latest version of DAT31, provided by Geonics.

Based on the results of the geophysical survey, locations to be sampled for risk assessment purposes will be selected. Subsurface soil samples will be obtained at locations where geophysical anomalies are observed and at locations spatially dispersed throughout the site. Once the boundaries of the site are identified, two monitoring wells will be installed at the site. One well to be placed west of the site will monitor upgradient ground water conditions. One well will be installed to monitor conditions at the southern end of the site.

REFERENCES

U.S. ACE WES, 1998. RCRA Facility Investigation Phase II Soils Release Characterization, SWMU 04/02 McComish Gorge, Naval Surface Warfare Center Crane, Indiana, Final Report. Prepared by U.S. Army Corps of Engineers Waterways Experiment Station. Tech. Report GL-98-21.

Health and Safety Plan
for
Geophysical Surveys
at
Solid Waste Management Unit
(SWMU) 4

Naval Surface Warfare Center
Crane Division
Crane, Indiana



Southern Division
Naval Facilities Engineering Command
Contract No. N62467-94-D-0888
Contract Task Order 0010

September 1999

HEALTH AND SAFETY PLAN
FOR
GEOPHYSICAL SURVEYS
AT
SOLID WASTE MANAGEMENT UNITS (SWMU) 4

NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY CONTRACT

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
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PREPARED UNDER THE
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APPROVED FOR SUBMITTAL BY:

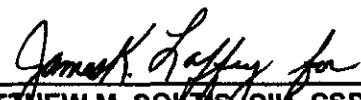

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ATTACHMENT II - TICK CONTROL AND LYME DISEASE

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to provide practices and procedures for Tetra Tech NUS, Inc. (TtNUS) and subcontractor personnel engaged in investigatory activities at Solid Waste Management Units (SWMU) 4 at the Naval Surface Warfare Center Crane (NSWC Crane), located in Crane, Indiana. This HASP is to be used in conjunction with the TtNUS Health and Safety Guidance Manual. Both of these documents must be present at the site during the performance of all site activities. The Guidance Manual provides supporting information pertaining to the HASP as well as applicable TtNUS Standard Operating Procedures (SOPs). 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).

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 at the site. The HASP will be modified if new information becomes available. All changes to the HASP will be made with the approval of the TtNUS Project Health and Safety Officer (PHSO) and the TtNUS CLEAN Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the PHSO, who will determine if the changes are necessary. The PHSO will notify the Task Order Manager (TOM), who will notify all affected personnel of changes.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for all onsite health and safety. These persons will be the primary point of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for onsite activities.

- The TtNUS TOM is responsible for the overall direction of health and safety for this project.
- The PHSO is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:
 - i. Providing information regarding site contaminants and physical hazards associated with the site.

- ii. Establishing air monitoring and decontamination procedures.
 - iii. Assigning personal protective equipment based on task and potential hazards.
 - iv. Determining emergency response procedures and emergency contacts.
 - v. Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.
 - vi. Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
 - vii. Modify this HASP, as it becomes necessary.
- The TtNUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed SSO. The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.
 - The SSO supports site activities by advising the FOL on all aspects of health and safety on site. These duties may include:
 - i. Coordinates all health and safety activities with the FOL.
 - ii. Selects, applies, inspects, and maintains personal protective equipment.
 - iii. Establishes work zones and control points in areas of operation.
 - iv. Implements air monitoring program for onsite activities.
 - v. Verifies training and medical clearance of onsite personnel status in relation to site activities.
 - vi. Implements Hazard Communication, Respiratory Protection Programs, and other associated health and safety programs as they may apply to site activities.
 - vii. Coordinates emergency services.
 - viii. Provides site-specific training for all onsite personnel.
 - ix. Investigates all accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)
 - x. Provides input to the PHSO regarding the need to modify, this HASP, or applicable health and safety associated documents as per site-specific requirements.
 - Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the TtNUS CLEAN HSM.

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

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. All site activities (including responding to emergency incidents) will be coordinated with the client contact, Thomas Brent. In the event of an emergency which cannot be mitigated using onsite resources, personnel will evacuate to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that the majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, TtNUS and subcontractor personnel will not provide emergency response support beyond responding to easily-controlled, minor incidents. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. NSWCRANE contact Thomas Brent will be notified anytime outside response agencies are contacted. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

TtNUS will, through necessary services, provide the following emergency action measures:

- Incipient stage fire fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Initial medical support for injuries or illnesses requiring basic first-aid
- Site control and security measures as necessary

2.2 PRE-EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from chemical, physical, or fire hazards are the types of emergencies which could be encountered during site activities.

To minimize and eliminate the potential for these emergency situations, pre-emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with local Emergency Response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures. Base Fire Protection and Emergency Services will be notified of scheduled events and activities. This is most imperative in situations where their services may be required.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:
 - Chemical Inventory (of chemicals used onsite), with Material Safety Data Sheets.
 - Onsite personnel medical records (Medical Data Sheets).
 - A log book identifying personnel onsite each day.
 - Hospital route maps with directions (these should also be placed in each site vehicle).
 - Emergency Notification - phone numbers.

The TtNUS FOL will be responsible for the following tasks:

- Identifying a chain of command for emergency action.

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

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

- Providing the necessary equipment to safely accomplish identified tasks.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Emergency situations that may be encountered during site activities will generally be recognized by visual observation. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are discussed in detail in Sections 5.0 and 6.0. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an

emergency. The FOL and/or the SSO will be responsible for performing surveys of work areas prior to initiating site operations and periodically while operations are being conducted. Survey findings will be documented by the FOL and/or the SSO in the Site Health and Safety logbook, however, all site personnel will be responsible for reporting hazardous situations. Where potential hazards exist, TtNUS will initiate control measures to prevent adverse effects to human health and the environment.

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

2.3.2 Prevention

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

2.4 EVACUATION ROUTES, PROCEDURES, AND PLACES OF REFUGE

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

In the event of an emergency requiring evacuation, all personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the primary place of refuge is not possible, personnel will proceed to a designated alternate location and remain until further notification from the TtNUS FOL. Safe places of refuge will be identified prior to the commencement of site activities by the SSO and will be conveyed to personnel as part of the pre-activities training session. This information will be reiterated during daily safety meetings. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the TtNUS FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will perform a

head count at this location to account for and to confirm the location of all site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel. The SSO will document the names of all personnel onsite (on a daily basis) in the site Health and Safety Logbook. This information will be utilized to perform the head count in the event of an emergency.

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

2.5 DECONTAMINATION PROCEDURES / EMERGENCY MEDICAL TREATMENT

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

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Medical attention above that level will require assistance and support from the designated emergency response agencies. Attachment I provides the procedure to follow when reporting an injury/illness, and the form to be used for this purpose. **If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-1.**

FIGURE 2-1 EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of exposure situations.

In the event of a personnel exposure to a hazardous substance or agent:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, 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 exposed 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 Continuum Healthcare physician. Continuum Healthcare will contact the medical facility and request specific testing which may be appropriate. The care of the victim will be monitored by Continuum Healthcare physicians. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call Continuum Healthcare at 1-800-229-3674, being prepared to provide:
 - Any known information about the nature of the exposure.
 - As much of the exposure history as was feasible to determine in the time allowed.
 - Name and phone number of the medical facility to which the victim(s) has/have been taken.
 - Name(s) of the exposed Tetra Tech NUS, Inc. employee(s).
 - Name and phone number of an informed site officer who will be responsible for further investigations.
 - Fax appropriate MSDS to Continuum Healthcare at (770) 457-1429.
- Contact Corporate Health and Safety Department (Matt Soltis) at 1-800-245-2730.

As environmental data is gathered and the exposure scenario becomes more clearly defined, this information should be forwarded to the Continuum Healthcare Medical Director or Assistant Medical Director.

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

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. This generalized summary will be accompanied by a personalized letter describing the individual's findings/results. A copy of the personal letter will be filed in the continuing medical file maintained by Continuum Healthcare.

**FIGURE 2-1 (continued)
POTENTIAL EXPOSURE REPORT**

Name: _____ Date of Exposure: _____

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

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

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

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

Was there skin contact? _____

Was the exposing agent inhaled? _____

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

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath

Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough

Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

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

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis

Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

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

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicating: _____ Physician Treated: _____

2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at NSWC CRANE. As a result, hand signals, voice commands, and line of site communication will be sufficient to alert site personnel of an emergency. When project tasks are performed simultaneously in different areas, vehicle horns will be used to communicate emergency situations.

If an emergency occurs on Base, the following procedures are to be initiated:

- Initiate an emergency notification by hand signals, voice commands, air horn, or two-way radios to the FOL/SSO. Describe to the FOL/SSO (who will serve as the Incident Coordinator) what has occurred and as many details as possible.
- Have your partner evacuate non-essential persons from the incident scene, engage initial response measures given the emergency type (i.e., spill response, fire extinguisher, first-aid)

In the event that site personnel cannot control the incident through offensive and defensive measures, the FOL/SSO will enact the emergency notification procedures to secure additional outside assistance in the following manner:

- On Base, call 854-3300 or 854-1333* and other appropriate emergency contacts (Table 2-1) and report the emergency. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of what occurred. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

***NOTE:** On-base extensions 3300 and 1333 are the primary emergency phone numbers. From an NSWC Crane phone, on Base extensions must be preceded by "854". Off-base numbers can only be reached by dialing "990" or "991" first. Furthermore, all emergencies involving site activities should subsequently be reported to the Environmental Office (x6160).

Evacuate all Tetra Tech NUS and subcontractor personnel to the identified safe place of refuge. Conduct a head count of site personnel using the site logbook.

TABLE 2-1
EMERGENCY REFERENCES
NSWC CRANE, CRANE, INDIANA

AGENCY	TELEPHONE
Base Emergency Number (Fire Department, Base Security, Ambulance)	(812) 854-3300 or (812) 854-1333
Base Environmental Office	(812) 854-6160
Bedford Ambulance	(812) 279-6545
Bloomington Hospital (Bloomington, IN)	(812) 336-9515
Hospital, Bedford Medical Center (Bedford, IN)	(812) 275-1200
Poison Control Center	1-800-382-9097
National Response Center	1-800-424-8802
Base Contact, Thomas Brent	(812) 854-6160
Explosive Disposal Director, Walt Waggoner	(812) 854-1317
Contract Task Order Manager, Karen Smecker	(412) 921-8893
Tetra Tech NUS Office, Pittsburgh	1-800-245-2730
	(412) 921-7090
Project Health and Safety Officer, Delwyn E. Kubeldis, CIH, CSP	(412) 921-8529
CLEAN Health and Safety Manager, Matthew M. Soltis, CIH, CSP	(412) 921-8912

NOTE: All emergency contacts to emergency services off base require the notification of NSWC CRANE Emergency Dispatch. Information to be provided will include the type and extent of the emergency and agencies notified.

2.7 PPE AND EMERGENCY EQUIPMENT

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

2.8 EMERGENCY CONTACTS

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

2.9 EMERGENCY ROUTE TO HOSPITAL

Directions to the Bloomington Hospital:

Exit NSWC Crane on H-45 through the Bloomington Gate. Follow Highway 45 North to Bloomington at Highway 45 and Highway 37. Continue going straight over the overpass (Bloomfield Road). Follow Bloomfield Road North; this road turns into 2nd Street. Follow 2nd Street, hospital will be on the right (601 West 2nd Street)

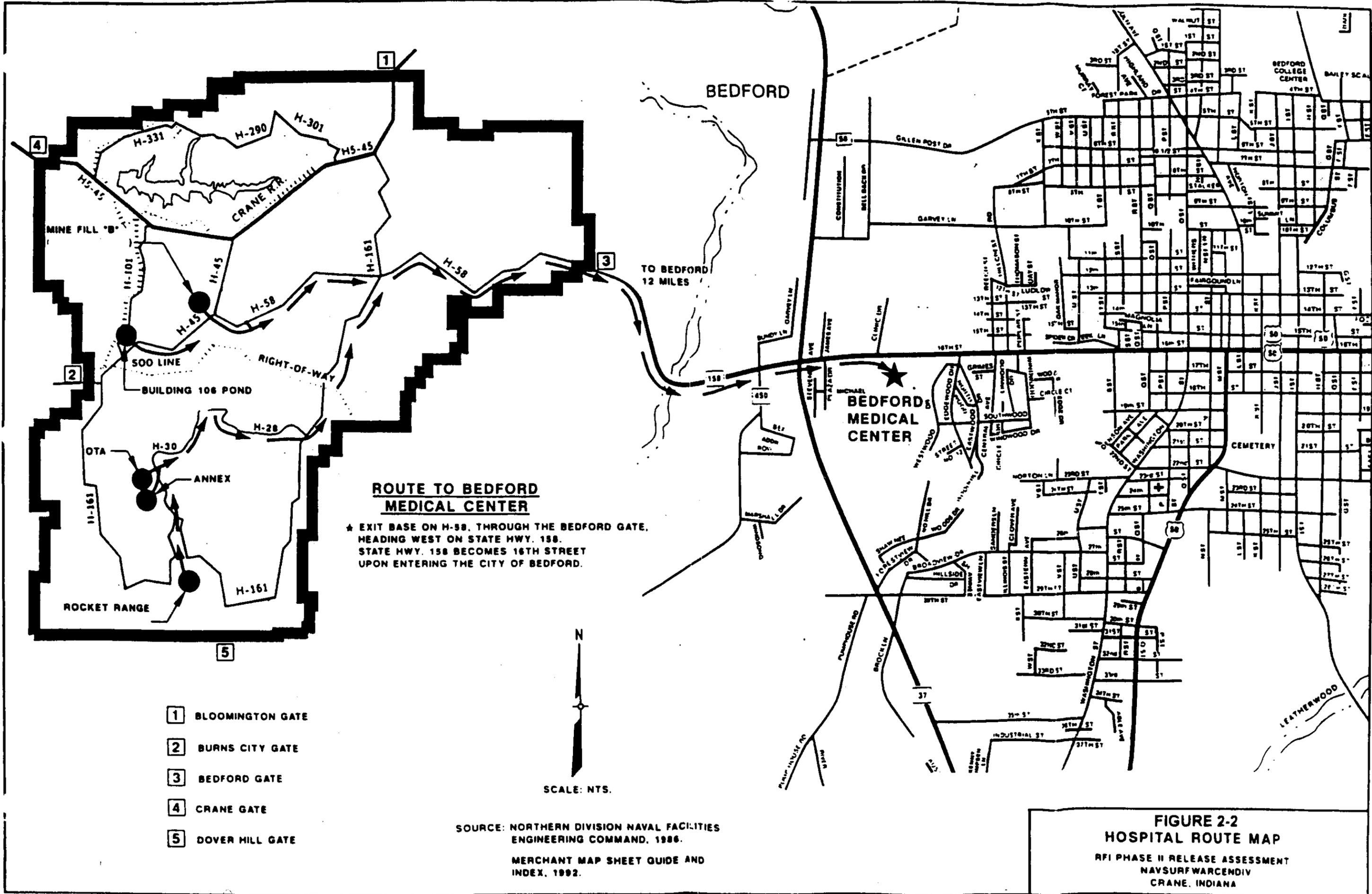
Directions to Bedford Medical Center:*

Exit the base on H-58, through the Bedford Gate. Head West on State Highway 158. State Highway 158 becomes 16th Street upon entering the City of Bedford. The medical center is on the right shortly after Plaza Drive.

***NOTE:** The Bedford Gate is open only from 0600 - 0830 and 1500 - 1800 hours, whereas the Bloomington Gate is open 24 hours. Maps indicating the travel route from the site to the hospitals will be inserted as Figure 2-2 and 2-3.

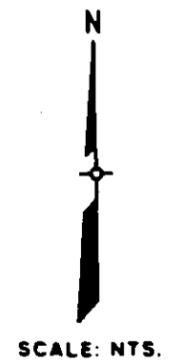
As soon as possible, Navy contact Thomas Brent must be informed of any incident or accident that requires medical attention.

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



ROUTE TO BEDFORD MEDICAL CENTER
 ★ EXIT BASE ON H-58. THROUGH THE BEDFORD GATE, HEADING WEST ON STATE HWY. 158. STATE HWY. 158 BECOMES 16TH STREET UPON ENTERING THE CITY OF BEDFORD.

- 1 BLOOMINGTON GATE
- 2 BURNS CITY GATE
- 3 BEDFORD GATE
- 4 CRANE GATE
- 5 DOVER HILL GATE



SOURCE: NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND, 1986.
 MERCHANT MAP SHEET GUIDE AND INDEX, 1992.

FIGURE 2-2
HOSPITAL ROUTE MAP
 RFI PHASE II RELEASE ASSESSMENT
 NAYSURFWARCENDIV
 CRANE, INDIANA

CHARLOTTE, NC 800-760-7774
 CURTIS PARR

3.0 SITE BACKGROUND

This section provides information pertaining to NSWC Crane and the specific site that is to be investigated. This information will be revised if additional information becomes available or if additional sites are added to the scope of work.

3.1 SITE HISTORY

NSWC Crane is located in Crane, Indiana approximately 75 miles southwest of Indianapolis and 71 miles northwest of Louisville, Kentucky. The facility encompasses 98.2 square miles (62,832 acres) in Davies, Greene, Lawrence, and Martin Counties. It is located in a rural, sparsely populated area. The acreage surrounding the Base is either wooded or farmed land. The facility, originally called Naval Ammunition Depot (NAD), Burns City, was opened in 1941 to serve as an inland ammunition production and storage center. The Depot's name was changed to NAD, Crane in 1943. In 1975, the name was changed to Naval Weapons Support Center, Crane and in 1992, the name was again changed to Naval Surface Warfare Center, Crane. Today NSWC Crane's mission is to "provide quality and responsive engineering, technical and material support to the Fleet for combat subsystems, equipment and components, microelectronic technology, microwave components, electronic warfare, acoustic sensors tests, engineering pyrotechnics, small arms, electronic module test and system command." Under the Single Service Management Program, a segment of the Center's mission is to provide support (including environmental protection) to the Crane Army Ammunition Activity (CAAA). The Army is tasked with the production and renovation of conventional ammunition and related items, the performance of manufacturing, engineering, and product quality assurance to support production; and the storage, shipment, demilitarization, and disposal of conventional ammunition and related components. Because of the nature of the Army's operations, CAAA contributes significant financial support for the environmental program through an Inter-service Support Agreement.

3.2 SWMU 4 MCCOMISH GORGE

McComish Gorge is located in the northwest corner of NSWC Crane approximately 500 feet south of the Crane Gate, Gate No. 4. The site occupies approximately 5 acres. McComish Gorge is bounded on the north by Culpepper Branch Creek and on the east by Highway 140. The southern and western boundaries of the site have not been identified.

McComish Gorge was used as a dumpsite for an unknown period of time between 1942 and 1972. Undefined amounts and types of garbage and trash, such as construction debris, office trash, plaster filled warheads, and metal shavings, were buried in a gorge at the site. Reportedly, small arms ammunition

may also have been buried at the site (USACE, September 1998). Currently, the site is inactive (i.e., not used for waste disposal activities) and has been revegetated. Prior sampling activities identified Volatile Organic Compounds (VOCs), Polychlorinated Biphenyls (PCBs), pesticides, and metals at the site.

4.0 SCOPE OF WORK

This section describes the project tasks that will be performed at NSWC CRANE. Additionally, each task has been evaluated and the associated hazards and recommended control measures are listed in Table 5-1 of this HASP. The planned activities involved in this effort are presented in detail in the Work Plan (WP) developed for the project. If new tasks are to be performed at the site, Table 5-1 and this section will be modified accordingly.

Specific tasks to be conducted include the following:

- Mobilization and demobilization
- Geophysical survey at SWMU 4

For more detailed description of the associated tasks refer to the WP. If additional tasks are determined to be necessary, this HASP will need to be amended and a hazard evaluation of the additional tasks performed.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site-specific HASP which identifies the tasks that are to be performed as part of the scope of work. This table will be modified and incorporated into this document as new or additional tasks are performed at the site. The anticipated hazards, recommended control measures, air monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures for each site task are discussed in detail. This table and the associated control measures shall be changed, if the scope of work, contaminants of concern, or other conditions change.

Through using the table, site personnel can determine which hazards are associated with each task and at each site, and what associated control measures are necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to use based on proper air monitoring techniques and site-specific conditions.

As discussed earlier, the Health and Safety Guidance Manual supports this table and HASP. The manual is designed to further explain supporting programs and elements for other site -specific aspects as required by regulatory requirements. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of Tetra Tech NUS' SOPs are also provided in this Guidance Manual.

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**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR
NAVAL SURFACE WARFARE CENTER - CRANE DIVISION, CRANE INDIANA**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
Mobilization/ Demobilization	<p><i>Physical Hazards</i></p> <ol style="list-style-type: none"> 1) Lifting (strain/muscle pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Vehicular and foot traffic 5) Ambient temperature extremes (heat stress) <p><i>Natural hazards</i></p> <ol style="list-style-type: none"> 6) Insect/animal bites and stings (including fire ants and Eastern diamondback rattlesnakes) 7) Inclement weather 	<ol style="list-style-type: none"> 1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 3) Preview work locations for unstable/uneven terrain. 4) Traffic and equipment considerations are to include the following: <ul style="list-style-type: none"> - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements. 5) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TINUS Health and Safety Guidance Manual. 6) Avoid potential nesting areas of biting/stinging insects and snakes. Use commercially available insect repellents. Wear appropriate clothing, including snake chaps where warranted. Tape ankle and wrists areas to prevent fire ants, ticks, chiggers, etc. from attaching themselves to your skin. Wear light colored clothing so that biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 and Attachment II concerning natural hazards. 7) Suspend or terminate operations until directed otherwise by SSO. 	Not required	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - Safety glasses - Hardhat (when overhead hazards exists, or identified as a operation requirement) - Reflective vest for high traffic areas - Coveralls may be worn to protect exposed skin from insects, ticks, etc. Joints (ankles and wrists) should be taped. - Snake chaps shall be worn in areas of known or suspected snake infestation. <p><i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i></p>	Not required
Geophysical surveys at SWMU 4.	<p><i>Chemical hazards:</i></p> <p>Potential site contaminants includes VOCs, metals, PCBs, and pesticides.</p> <p>Exposure to these potential site contaminants during these activities, however, is unlikely given the nature of the work and the limited contact with potentially contaminated media.</p> <p><i>Physical hazards:</i></p> <ol style="list-style-type: none"> 1) Slip, trips, and falls <p><i>Natural Hazards:</i></p> <ol style="list-style-type: none"> 2) Insect/animal bites and stings, poisonous plants, etc. 3) Inclement weather 	<ol style="list-style-type: none"> 1) Preview work locations and site lines for uneven and unstable terrain. Clear necessary vegetation, establish temporary means for traversing hazardous terrain(i.e., rope ladders, etc.) 2) Avoid potential nesting areas of biting/stinging insects and snakes. Use commercially available insect repellents. Wear appropriate clothing, including snake chaps where warranted. Tape ankle and wrists areas to prevent fire ants, ticks, chiggers, etc. from attaching themselves to your skin. Wear light colored clothing so that biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 and Section 4.0 of the Health and Safety Guidance Manual. 3) Suspend or terminate operations until directed otherwise by SSO. 	<p>No air monitoring is needed given the unlikelihood that volatile contaminants are present during surveying activities and the non-intrusive nature of the task. The potential for exposure to site contaminants during this activity is considered minimal.</p> <p>Minimize the generation of airborne dusts since most site contaminants are in the form of a particulate or may be bound to particulates.</p>	<p>These miscellaneous activities will be performed in Level D protection (unless otherwise indicated) consisting of the following:</p> <ul style="list-style-type: none"> - Standard field dress including sleeved shirt and long pants - Steel-toe work boots or shoes - Safety glasses and hard hats (if working near machinery) - Coveralls may also be worn to protect exposed skin from insects, ticks, etc. Joints (ankles and wrists) should be taped. - Snake chaps shall be worn in areas of known or suspected snake infestation. 	<p>Personnel Decontamination - A structured decontamination is not required as the likelihood of encountering contaminated media is considered remote.</p> <p>Workers should inspect themselves and one another for the presence of fire ants, ticks, and other insects when exiting wooded areas, grassy fields, etc. This action will be employed to stop the transfer of these insects into vehicles, homes, and offices.</p>

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards anticipated to be present during the activities to be conducted. Table 6-1 provides information related to chemical constituents that have been identified by analysis or are suspected to be present at the site based on historical data. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with NSWC CRANE include inhalation, ingestion, and dermal contact of various contaminants that may be present in surface soils. Based on historical uses for the site and prior sampling results, the types of contaminants anticipated include the following primary classes of contaminants (with specific compounds of interest where applicable):

- Volatile Organic Compounds (VOCs), including solvents and halogenated hydrocarbons. Specific compounds of concern include 1,2-Dichloroethylene and trichloroethylene.
- Metals (specifically arsenic, chromium, and lead)
- Polychlorinated Biphenyls (PCBs)
- Pesticides (specifically 4,4'-DDT and Chlordane)

Also, small arms explosives may have been buried at SWMU 4. The geophysical survey to be conducted, however, is not anticipated to initiate or adversely affect any explosives if present. None of the site contaminants presented are anticipated to be available in significant concentrations to present an inhalation hazard. Further, occupational exposures to field crews via ingestion and skin contact are also not anticipated given the proposed site activities and previously detected very low concentrations of site contaminants. Table 6-1 provides information on these compounds and individual substances. Included is information on the toxicological, chemical, and physical properties of these substances. Exposure to these compounds is most likely to occur through ingestion and inhalation of contaminated soil, or hand-to-mouth contact during soil disturbance activities. For this reason, PPE and basic hygiene practices (washing face/hands before leaving site) will be extremely important.

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL SURFACE WARFARE CENTER - CRANE DIVISION
CRANE, INDIANA**

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter; or HNO ₃ or H ₂ O ₂ desorption; or Atomic absorption detection. NIOSH Method #7082 or #7300.	OSHA: 0.05 mg/m ³ ACGIH: 0.05 mg/m ³ NIOSH: 0.10 mg/m ³ IDLH: 100 mg/m ³ as lead	The use of a air purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m ³ . Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 3164°F; 1740°C Melting Pt: 621°F; 327°C Solubility: Insoluble Flash Pt: Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/LFL: Not applicable UEL/UFL: Not applicable Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 11.34 Incompatibilities: Strong oxidizers, peroxides, sodium acetylide, zirconium, and acids Appearance and Odor: Metal: A heavy ductile, soft gray solid.	Overexposure to this substance via ingestion or inhalation may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic), CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, partial paralysis possibly coma and death. Extended exposure may result in damage to the kidneys, gingival lead line, brain, and anemia.
Chromium Compounds	7440-47-3 (Element)	Not detectable by PID. Not detectable by FID.	Air sample using mixed cellulose - ester filter; acid desorption and analysis by atomic absorption. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7024.	OSHA & NIOSH: (Chromium II, III) 0.5 mg/m ³ (Chromium VI) 0.1 mg/m ³ (Ceiling) ACGIH: 0.5 mg/m ³ (Chromium II, III compounds), 0.05 mg/m ³ (Chromium VI compounds) IDLH: 30 mg/m ³ (Chromium VI compounds)	The use of a air purifying, full face-piece respirator with a high efficiency particulate filter for concentrations up to 0.1 mg/m ³ . Recommended Gloves: This is in particulate form. Therefore any glove suitable to prevent skin contact.	Boiling Pt: 4788°F; 2642°C Melting Pt: 3452°F; 1900°C Solubility: Insoluble Flash Pt: Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/LFL: Not applicable UEL/UFL: Not applicable Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 7.14 Incompatibilities: Strong oxidizers, peroxides, and alkalis Appearance and Odor: Appearance and odor vary depending upon the specific compound.	Health hazards are characterized normally through chronic exposure manifesting as histologic fibrosis of the lungs and ulceration of the nasal septum and skin. IARC, NTP and ACGIH list various chromium compounds as possessing carcinogenic properties.

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL SURFACE WARFARE CENTER, CRANE, INDIANA
PAGE 2**

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Arsenic	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using a particulate filter; acid desorption; AAS detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7900.	OSHA: Organic compounds 0.5 mg/m ³ Inorganic compounds 0.01 mg/m ³ NIOSH: (Ceiling) 0.002 mg/m ³ ACGIH: 0.01 mg/m ³ IDLH: 5 mg/m ³ as arsenic	No identifiable warning properties to indicate presence and thereby detection. Recommended APR Cartridge: Suitable for dust and fume. Organic vapor acid gases with HEPA filter. This substance may be presented as a pesticide, therefore a cartridge suitable for pesticides (MSA-GMP). Recommended Gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: sublimation @ 1134°F; 612°C Melting Pt: 1497°F; 814°C @ 36 atm Solubility: Insoluble in water; soluble in nitric acid Flash Pt: Nonflammable, however, airborne in the form of a dust this substance will support combustion LEL/LFL: Nonflammable UEL/UFL: Nonflammable Vapor Density: Not available Vapor Pressure: 1 mmHg @ 372°C (sublimes) Specific Gravity: 5.73 Incompatibilities: Oxidizers, halogens, zinc, lithium, azides, and acetylides Appearance and odor: Gray to black, brittle, crystalline, amorphous, odorless.	Overexposure to this substance through inhalation or ingestion may result in ulceration of the nasal septum, GI disturbances resulting in violent purging and vomiting, hoarse voice, sore throat, excessive salivation, peripheral neuropathy (numbness and burning sensations beginning at the extremities followed by motor weakness), respiratory irritation leading to possible pulmonary edema. Skin or eye contact may result in irritation, conjunctiva, dermatitis, and hyperpigmentation (darkening of the areas exposed) of the skin. This substance has been judged to be a Human carcinogen by NTP, and IARC.
Aroclor-1260 (Polychlorinated Biphenyl, PCB) It should be noted that this substance is representative of the more common isomers Aroclor - 1242, 1254, which may be encountered.	11096-82-5 53469-21-9 (42%) 11097-69-1 (54%)	Substance is not volatile (VP=0.00006 mmHg), I.P. is unknown however is anticipated to be elevated, therefore, PID is not anticipated to detect substance. Substance is non combustible and as a result will not be detected by FID.	Air sample using a particulate filter, Florisil sorbent tube with glass fiber filter; hexane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #5503 (PCBs).	OSHA; ACGIH: 0.5 mg/m ³ (skin) NIOSH: 0.001 mg/m ³ IDLH: 5 mg/m ³	Inadequate - However due to the low volatility it is assumed unless agitated this substance does not present a volatile vapor or gas respiratory threat. For dusty conditions where this material may cling to particulates, use a HEPA filter. APRs are approved for escape only when concentrations exceed the exposure limits. Concentrations greater than the exposure limits require PAPR or supplied air respirators. Recommended glove: Butyl rubber >24 hrs; Neoprene rubber >24.00 hrs; Silver shield or Viton (for pure product).	Boiling Pt: distillation range 689- 734°F; 365-390° C Melting Pt: -2 to 50°F; -19 to 10°C Solubility: Insoluble Flash Pt: Not applicable LEL/LFL: Not applicable UEL/UFL: Not applicable Nonflammable liquid, however, exposure to fire results in black soot containing PCBs, dibenzofurans, & chlorinated dibenzo-p-dioxins Vapor Density: Not available Vapor Pressure: 0.00006 - 0.001 mmHg Specific Gravity: 1.566 @ 60°F; 15.5°C Incompatibilities: Strong oxidizers Appearance and Odor: Colorless to pale yellow, viscous liquid or solid (Aroclor 54 below 50°F) with a mild, hydrocarbon odor	This substance is irritating to the eyes and skin. Chronic effects of overexposure may include potential to cause liver damage, chloracne, and reproductive effects. Recognized as possessing carcinogenic properties by NIOSH, and NTP.

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**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL SURFACE WARFARE CENTER, CRANE, INDIANA
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
DDT and the major metabolites; DDD and DDE.	50-29-3 72-54-8 72-55-9	Substance is not volatile, I.P. is unknown, detection by PID is unknown. Substance non-combustible, therefore a FID is anticipated to have reduced response to DDT.	Air sample using a binder free, glass fiber filter; isooctane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #3(S274).	OSHA; ACGIH: 1 mg/m ³ NIOSH: 0.5 mg/m ³	Adequate - Can use air purifying respirator with high efficiency particulate air filter (HEPA). Recommended glove: Nitrile acceptable for incidental contact.	Boiling Pt: 230°F; 110°C Melting Pt: 226°F; 108°C Solubility: Insoluble Flash Pt: 162-171°F; 72-77°C LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: Low Specific Gravity: 0.99 Incompatibilities: Strong oxidizers and alkalis Appearance and Odor: Colorless crystals or off-white powder with a slight aromatic odor	Large doses are followed by vomiting due to gastric irritation, diarrhea may follow. Numbness and paresthesias of the lips tongue and face associated with malaise, headache, sorethroat, fatigue and weakness. Coarse tremors (usually first of the neck, head, and eyelids). This may be accompanied by confusion, apprehension, and depression. Convulsions may result and death may occur from respiratory failure. DDT is absorbed and retained in the fat of humans. Chronic exposure may result in damage to the liver, kidneys and Peripheral Nervous System. DDT is recognized as possessing carcinogenic properties by IARC and NTP.
Chlordane	57-74-9	Substance is not volatile (VP=.00001 mmHg) I.P. is unknown, therefore detection by PID is unknown. Substance is non-combustible, therefore a FID is not expected to have a response to chlordane.	Air sample using Chromosorb-102 sorbent tube with mixed cellulose-ester filter or a xad-2 sorbent tube with filter. Toluene desorption and analysis by gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #5510 or OSHA Method #67.	OSHA; NIOSH; ACGIH: 0.5 mg/m ³	Adequate - can use an air purifying respirator with an organic vapor & high efficiency air filter cartridges. Recommended gloves: PTFE Teflon for pure product. Nitrile acceptable for incidental contact.	Boiling Pt: 347°F; 175°C Melting Pt: Not available Solubility: Insoluble Flash Pt: Not available LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: 0.00001 mmHg Specific Gravity: 1.56 @ 60°F; 15.5° C Incompatibilities: Strong oxidizers and alkaline reagents Appearance and Odor: Amber-colored, viscous liquid with a pungent, chlorine like odor.	Earliest signs of overexposure manifest as hypersensitivity of the central nervous system characterized by hyperactive reflexes, muscle twitching, tremors, incoordination, ataxia, and clonic convulsions. Cycles of excitement and depression may be repeated over and over. Chronic health hazard information similar to those for DDT.
1,2-Dichloroethylene	540-59-0	PID: I.P. 9.65 eV, high response with PID and 10.2 eV lamp. FID: 50% response with FID.	Air sample using charcoal tube; and carbon disulfide desorption; Sampling and analytical protocol in accordance with OSHA Method #07; and NIOSH Method #1003.	OSHA; NIOSH; ACGIH: 200 ppm IDLH: 1000 ppm	Adequate- odor threshold 0.085-17 ppm. Use organic vapor/acid gas cartridges for exceedances above the TWA up to 1,000 ppm. >1,000 ppm should use pressure-demand supplied air respirator above exposure limits. Recommended glove: nitrile - 0.12 hrs; viton - 0.95 hrs	Boiling Pt: 117°F; 47°C Melting Pt: 7°F; -13.8°C Solubility: 0.4% Flash Pt: 36°F; 2.2°C LEL/LFL: 5.6% UEL/UFL: 12.8% Vapor Density: 2.0 Vapor Pressure: 180-260 mmHg Specific Gravity: 1.27 @ 90°F; 32°C Incompatibilities: Strong oxidizers, alkalis, potassium hydroxide, and copper. When heated to decomposition temperatures will emit toxic fumes of phosgene. Appearance and Odor: Colorless liquid with an acid odor.	Overexposure may result in CNS depression with potential to cause sleepiness, hallucinations, distorted perceptions, and stupor (narcosis). Systemically, symptoms may result in nausea, vomiting, weakness, tremors, and cramps. May also irritate the eyes, skin, and mucous membranes. Chronic exposures may result in dermatitis, liver, kidney, and lung damage.

**TABLE 6-1
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
 NAVAL SURFACE WARFARE CENTER, CRANE, INDIANA
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Trichloroethylene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp. FID: 70% Response with FID.	Air sample using charcoal tube; carbon disulfide desorption; Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1022 or #1003.	OSHA: 50 ppm 200 ppm (Ceiling) ACGIH: 50 ppm 100 ppm STEL NIOSH: 25 ppm IDLH: 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand supplied air respirator. Recommended gloves: PV Alcohol unsupported > 16.00 hrs; Silver shield > 6.00 hrs; Teflon > 24.00 hrs; or Viton > 24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	Boiling Pt: 188°F; 86.7°C Melting Pt: -99°F; -73°C Solubility: 0.1% @ 77°F; 25°C Flash Pt: 90°F; 32°C LEL/LFL: 8% @ 77°F; 25°C UEL/UFL: 10.5 @ 77°F; 25°C Vapor Density: 4.53 Vapor Pressure: 100 mmHg @ 90°F; 32°C Specific Gravity: 1.46 Incompatibilities: Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) Appearance and Odor: Colorless liquid with a chloroform type odor. Combustible liquid, however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in GI disturbances including nausea, and vomiting NIOSH lists this substance a potential human carcinogen.

6.2 PHYSICAL HAZARDS

The physical hazards that may be present during the performance of site activities are summarized below:

- Slips, trips, and falls
- Lifting (strain/muscle pulls)
- Pinches and compressions
- Vehicular and foot traffic
- Ambient temperature extremes (heat stress)

These physical hazards are discussed in Table 5-1 as applicable to each site task. Further, many of these hazard are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, inclement weather, and other natural hazards must be considered given the location of activities to be conducted. In general, avoidance of areas of known infestation or nesting will be the preferred exposure control. Use of additional PPE with joints (ankles and wrists) taped, such as long pants tucked into boots or coveralls, is also recommended. Specific discussion on principle hazards of concern follows:

6.3.1 Insect/Animal Bites and Stings

Ticks, insect/animal bites, and stings are difficult to control given the climate and environmental setting of NSWC Crane. However, in an effort to minimize this hazard the following control measures will be enacted where possible.

- Commercially available bug sprays and repellents will be used whenever possible – TCLP Pesticides analytical screening includes chlordane, endrin, lindane, methoxychlor, toxathene and heptachlor. Commercially available repellants may be used providing these components are not part of this analyte listing. Products such as DEET should not be applied directly to the skin due to potential irritation. This product, when permitted for use, should be applied over clothing articles.
- Loose fitting light colored clothing with long sleeves, where possible should be worn. This will also aid in insect control by providing a barrier between the field person and the insects and to provide easy recognition of crawling insects against the lighter background. Pant legs should be secured to the work-

boots using duct tape to prevent access by ticks. Mosquito nets are also recommended for use when commercially available repellents are not permitted.

- Clothing/limited body checks for ticks and other crawling insects should be conducted upon exiting heavily vegetated areas. Workers should perform a more detailed check of themselves when showering in the evening. Ticks prefer moist areas of the body (arm-pits, genitals, etc.) and will migrate to those locations.
- The FOL/SSO will preview all access routes and work areas in an effort to identify physical hazards including nesting areas in and around the work sites. These areas will be flagged and communicated to all site personnel.
- The FOL/SSO must determine if site personnel (through their Medical Data Sheets), suffer allergic reactions to bee and other insect stings and bites. When personnel are on-site who are predisposed to these conditions, the FOL/SSO will take the appropriate measures to secure physician directed antidotes.

Note to all personnel: It is imperative that any allergies be reported on the Medical Data Sheets and to the SSO.

Tick and Mosquito Transmitted Illnesses And Diseases

Ticks and mosquitoes have been identified in the transmission of diseases including Lyme's disease and malaria. Warm months (Spring through early Fall) are the most predominant time for this hazard. However, due to the climate and environmental setting of NSWC Crane, this hazard may occur year round. Information concerning transmitted Lyme's Disease including recognition, evaluation, tick removal, and control is provided in Section 4.0 of the Health and Safety Guidance Manual.

Malaria may occur when a mosquito or other infected insect sucks blood from an infected person, and the insect becomes the carrier to infect other hosts. The parasite reproduces within the mosquito, and is then passed on to another person through the biting action. Acute symptoms include chills accompanied by fever and general flu like symptoms. This generally terminates in a sweating stage. These symptoms may recur every 48 to 72 hours.

Conditions such as this should not be taken for granted and should be reported to the SSO immediately.

Snakes And Other Wild Animal Encounters

Indigenous animals including snakes (poisonous and non-poisonous varieties), raccoons, and other animals native to the region may have to be contended with. These animals may be encountered if work locations encroach on nesting or territories claimed by these animals.

To avoid the obvious hazards conveyed as part of a direct encounter, the following actions will be taken to minimize impact on the field crews and/or operations.

- FOL/SSO will preview access routes and work locations for nesting areas or signs of animal activities (tracks, foraging areas, etc.). All identified suspect areas will be communicated to the field crews. To the extent possible, suspected nesting/habitat areas are to be avoided. Otherwise, snake chaps will be required as a precaution.

6.3.2 Poisonous Plants

Various plants that can cause allergic reactions may be encountered during fieldwork. These include, but may not be limited to, poison ivy, poison oak, and poison sumac. Contact of field personnel with previous plants may occur when clearing vegetation for access to work areas, or through movement through these plants. An irritating, allergic reaction can occur when direct contact is achieved between the plant and the bare skin of a field person, or the plant and some piece of equipment or clothing article that then later comes in contact with the bare skin of a field person. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritating, allergic reaction can vary significantly from one person to the next.

Protective measures to control and minimize the effects of this hazard may include, but not limited to, the following:

- Identify plants for field personnel.
 - Poison Ivy - Characterized by climbing vines, three leaf configuration ovate to elliptical in shape, deep green leaves with a reddish tint, greenish flowers, and white berries.
 - Poison Sumac - Characterized as a tall bush of the sumac family bearing compound leaves (7-13 entire leaflets), branched from a central axis, drooping, with auxiliary clusters of white fruit.

NOTE: These white fruits and berries may exist only during pubescent stages.

- Poison oak - Characterized as similar to poison ivy consisting of a shrub, stems erect, 0.3 to 2.0 meters tall, leaflets consist of broad thick lobes coarsely serrated configuration, denser at the base, less so than the top.
- Protective measures may include wearing disposable garments such as Tyvek when clearing brush. These may be carefully removed and disposed of along with any oils accumulated from the plants.
- Personal Hygiene - The oils obtained from the plants will only elicit an allergic response when the person's bare skin layer is contacted. This can be aggravated through skin pores open when perspiring, or through breaks in the skin such as cuts, nicks, scratches, etc.. This can also be accomplished when using excessively hot water for cleaning the skin, which also causes pores to open. Prior to break time, lunchtime, etc. personnel should wash with cool water and soap to remove as much of the oils as possible. In heavily vegetated areas of these plants, additional measures including barrier creams and blocks may be used to prevent the oils from accessing and penetrating the skin.

All of these plants present an airborne sensitization hazard when burned. This is not to occur as part of this scope of work and therefore will not be addressed.

6.3.3 Incident Weather

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

7.0 AIR MONITORING

Site contaminants are not anticipated to be present or generated during the geophysical survey given the non-intrusive nature of the work. Further, most anticipated site contaminants (metals, PCBs, and pesticides) are not volatile and are unable to be detected with the use of typical direct reading instruments (DRIs) such as the Photoionization Detector (PID) or Flame Ionization Detector (FID). As a result a PID, FID, or any other real-time monitoring instrument, will not be required to screen survey points or worker breathing zones.

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

All TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NSWC Crane. Additionally, TtNUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel. Documentation of TtNUS introductory, supervisory, and refresher training as well as site-specific training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

TtNUS will conduct a pre-activities training session prior to initiating site work. Additionally, a brief meeting will be held daily to discuss operations planned for that day. At the end of the workday, a short meeting will be held to discuss the operations completed and any problems encountered.

Given the nature of planned site activities, subcontractors will not be used.

8.2 SITE-SPECIFIC TRAINING

TtNUS will provide site-specific training to all site personnel who will perform work on this project. Site-specific training will also be provided to all personnel [U.S. Department of Defense (DOD), EPA, etc.] who may enter the site to perform functions that may or may not be directly related to site operations. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures

Site-specific documentation will be established through the use of Figure 8-2. All site personnel and visitors must sign this document upon receiving site-specific training.

8.3 MEDICAL SURVEILLANCE

8.3.1 Medical Surveillance Requirements for TtNUS Personnel

All TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection

Documentation for medical clearances will be maintained in the TtNUS Pittsburgh office and made available, as necessary.

8.3.2 Medical Data Sheets

Each field team member and visitors entering the geophysical survey area shall be required to complete and submit a copy of Medical Data Sheet presented in Section 7 of the Health and Safety Guidance Manual. This shall be provided to the SSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

9.0 SPILL CONTAINMENT PROGRAM

9.1 SCOPE AND APPLICATION

It is anticipated that quantities of bulk potentially hazardous materials (greater than 55-gallons) will not be handled during the site activities. It is possible, however, that as the job progresses disposable PPE and other non-reusable items may be generated. As needed, 55-gallon drums will be used to contain unwanted items generated during geophysical activities. The drum(s) will be labeled with the site name and address, the type of contents, and the date the container was filled as well as an identified contact person. As warranted, samples will be collected and analyzed to characterize the material and determine appropriate disposal measures. Once characterized the drum(s) will be removed from the staging area and disposed of in accordance with Federal, State and local regulations. Given the likely solid nature of drum contents, a comprehensive Spill Containment Program is not necessary. The following discussion is provided as contingency information only.

9.2 POTENTIAL SPILL AREAS

Should drums contain liquid wastes, potential spill areas will be monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Areas designated for handling, loading, and unloading of potentially contaminated waters and debris present limited potential for leaks or spills.

9.2.1 Site Drums/Containers

All drums/containers used for containing liquids will be sealed, labeled, and staged within a centralized area awaiting shipment or disposal.

9.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, periodic inspections by the SSO will be conducted during working hours to visually determine that containers are not leaking. If a leak is detected, the first approach will be to transfer the container contents using a hand pump into a new container. Other provisions for the transfer of container contents will be made and appropriate emergency contacts will be notified, if necessary. In most instances, leaks will be collected and contained using absorbents such as Oil-dry, vermiculite, and/or sand, which may be stored at the staging area in a conspicuously marked

drum. This material too, will be containerized for disposal pending analyses. All inspections will be documented in the Project Logbook.

9.4 PERSONNEL TRAINING AND SPILL PREVENTION

All personnel will be instructed on the procedures for spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and/or the SSO will serve as the Spill Response Coordinator for this operation should the need arise.

9.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the types of equipment that may be maintained at the staging area for the purpose of supporting this Spill Containment Program (depending on the likelihood that drums and/or liquid wastes are generated).

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- Drums (55-gallon U.S. DOT 17-E or 17-H)
- Shovels, rakes, and brooms
- Labels

9.6 SPILL CONTROL PLAN

This section describes the procedures the TtNUS field crewmembers will employ upon the detection of a spill or leak.

- 1) Notify the SSO or FOL immediately.
- 2) Take immediate actions to stop the leak or spill by plugging or patching the drum or raising the leak to the highest point. Avoid contacting drum contents. Spread the absorbent material in the area of the spill covering completely.

It is not anticipated that a spill will occur in which the field crews cannot handle. Should this occur; however, the FOL or SSO will notify appropriate emergency response agencies.

10.0 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 recognized that the performance of geophysical surveys is not conducive to the establishment of clearly defined work zones. Nonetheless, the principals of contamination control (where applicable) will be followed, including the use of a modified three-zone approach to site activities. This three-zone approach will utilize an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. Use of such controls will restrict the general public, minimize the potential for the spread of contaminants, and protect individuals who are not cleared to enter work areas.

10.1 EXCLUSION ZONE

The Exclusion Zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are present in the proposed work areas of this site. Therefore, for this project the areas where geophysical surveys are conducted will be considered the Exclusion Zone (see Table 5-1 for specific operation).

10.1.1 Exclusion Zone Clearance

Given that only geophysical surveys will be conducted during this project, utility clearances will not be required unless otherwise indicated to the FOL or SSO. During geophysical activities, access to work areas will be controlled by TtNUS personnel. No personnel will be permitted to enter site Exclusion Zones without site-specific training. Site visitors will be provided site-specific training and will be escorted by TtNUS personnel at all times (see section 10.4).

10.2 CONTAMINATION REDUCTION ZONE

The Contamination Reduction Zone (CRZ) will be a buffer area between the Exclusion Zone and any area of the site where contamination is not suspected. The personnel decontamination (if applicable) will not take place in this area, but will take place at a central location established for this project. This area instead will serve as a focal point in supporting Exclusion Zone activities.

10.3 SUPPORT ZONE

The Support Zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the Support Zones

will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

10.4 SITE VISITORS

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

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (EPA, OSHA, etc.)
- MSWC Crane personnel
- Other authorized visitors

All personnel working on this project are required to gain initial access to the site by coordinating with the TtNUS FOL or designee and following established site access procedures.

Upon gaining access to the site, all site visitors wishing to observe operations in progress will be escorted by a TtNUS representative (arranged for by the FOL) and shall be required to meet the following minimum requirements:

- All site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity which they represent, and the purpose of the visit.
- All site visitors will be required to produce the necessary information supporting clearance to the site. This shall include information attesting to applicable training (40-hours of HAZWOPER training) and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

Note: All visitors will be escorted at all times while at the site.

Once the site visitors have completed the above items, they will be permitted to enter the operational zone. All visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. Any and all visitors not meeting the requirements stipulated in this plan will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause the termination of all onsite activities until the unauthorized visitor is removed from the

premises. Removal of unauthorized visitors will be accomplished with support from the FOL, SSO or on-site security personnel.

10.5 SITE SECURITY

Site security will be accomplished using existing base security resources and procedures, supplemented by TtNUS personnel, if necessary. TtNUS will retain control over active operational areas. The first line of security will take place at the base boundaries restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL. The FOL will serve as a focal point for site personnel, and will serve as the final line of security and the primary enforcement contact.

10.6 SITE MAPS

A site map may or may not be generated to potential points of contact with the public, roadways, and other significant characteristics that may impact site operations and safety. If generated, site maps will be posted to illustrate adjustment of zones and access points if warranted.

10.7 BUDDY SYSTEM

Personnel engaged in onsite activities will practice the "buddy system" to ensure their safety during this operation.

10.8 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

It is not anticipated that any chemicals will be brought on-site to support this project.

10.9 COMMUNICATION

TtNUS personnel will be working in close proximity to each other at NSWCrane. As a result and since two-way radio communication may or may not be available, hand signals, voice commands, and line of sight will provide the initial means of communication. External communication will be accomplished by using provided telephones at the site. External communication will primarily be used for the purpose of resource and emergency resource communication.

10.10 SAFE WORK PERMITS

Given the non-intrusive nature of geophysical surveys Safe Work Permits will not be used during this project.

11.0 CONFINED SPACE ENTRY

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

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

A Permit-Required Confined Space is one that:

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

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS 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
- A full-size OSHA Job Safety and Health Poster (posted in the site trailers)
- Training/Medical Surveillance Documentation Form (Blank)
- Emergency Reference Information (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted at the site for quick reference purposes. In situations where posting of these documents is not feasible (such as no office trailer), these documents should be filed in a transportable file container and immediately accessible. The file should remain in the FOL's possession.

The OSHA Job Safety & Health Protection Poster - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

Site Clearance Posting - This list is found within the training section of the HASP (See Figure 8-1). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance and 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) - This list of emergency numbers and hospital directions will be maintained at all phone communications points and in each site vehicle.

Medical Data Sheets/Cards - Medical Data Sheets will be filled out by all onsite 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.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
CFR	Code of Federal Regulations
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
DOD	Department of Defense
DOT	Department of Transportation
EPA	Environmental Protection Agency
eV	electron Volts
FID	Flame Ionization Detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
LEL/O ₂	Lower Explosive Limit/Oxygen
N/A	Not Available
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
PVC	Poly Vinyl Chloride
SCBA	Self Contained Breathing Apparatus
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
TOM	Task Order Manager
TWA	Time Weighted Average
UV	Ultraviolet
WP	Work Plan

ATTACHMENT I

**INJURY/ILLNESS PROCEDURE
AND REPORT FORM**

**TETRA TECH NUS, INC.****INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM**

**WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A
RESULT OF YOUR EMPLOYMENT:**

- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room.
- If incident involves a chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Diethorn at (412) 921-8475, and the Corporate Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours. You will be required to complete an Injury/Illness Report (attached). You may also be required to participate in a more detailed investigation from the Health Sciences Department.
- If further medical treatment is needed, The Hartford Network Referral Unit will furnish a list of network providers customized to the location of the injured employee. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work. Please call Marilyn Diethorn at (412) 921-8475 for the number of the Referral Unit.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

Contact your local human resources representative, corporate health and safety coordinator, or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries (Tetra Tech or Company) pay premiums on behalf of their employees. The type of injuries or illnesses covered and the amount of benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are not covered by Tetra Tech's Worker's Compensation plan.



CASE NO. _____

WHAT IS COVERED:

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported. Please note that if you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits.



**TETRA TECH, INC.
INJURY/ILLNESS REPORT**

Did employee die? Yes No

Was employee performing regular job duties? Yes No

Was safety equipment provided? Yes No

Was safety equipment used? Yes No

Note: Attach any police reports or related diagrams to this accident report.

Witness(es):

Name:

Address:

Telephone:

Describe the Illness or Injury and Part of Body Affected:

Name the Object or Substance which Directly Injured the Employee:

Medical Treatment Required:

No Yes First Aid Only

Physician's Name: _____

Address: _____

Hospital or Office Name: _____

Address: _____

Telephone No.: _____

Lost Work Days:

No. of Lost Work Days _____

Last Date Worked _____

Time Employee Left Work _____

Date Employee Returned to Work _____

No. of Restricted Work Days _____

None

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: _____

Date of Report: _____ **Time of Report:** _____

	Printed Name	Signature	Telephone No.	Date
Project or Office Manager				
Site Safety Coordinator				
Injured Employee				

To be completed by Human Resources:

Date of hire:

Hire date in current job:

Wage information: \$ _____ per _____ (hour, day, week, or month)

Position at time of hire:

Shift hours:

State in which employee was hired:

Status: Full-time Part-time Hours per week: _____ Days per week: _____

Temporary job end date:

To be completed during report to workers' compensation insurance carrier:

Date reported:

Reported by:

TeleClaim phone number:

TeleClaim account number:

Location code:

Confirmation number:

Name of contact:

Field office of claims adjuster: