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HEALTH AND SAFETY PLAN FOR EXPLORATORY MUNITIONS AND EXPLOSIVES OF CONCERN INVESTIGATION OF QUARRY AREA NAS BRUNSWICK ME

10/1/2010

TETRA TECH NUS

EXPLORATORY
MEC INVESTIGATION OF QUARRY AREA

HEALTH AND SAFETY PLAN
FOR
CLEARANCE OF MUNITIONS
AND
EXPLOSIVES OF CONCERN

QUARRY MUNITIONS RESPONSE SITE

NAVAL AIR STATION BRUNSWICK
BRUNSWICK, MAINE

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ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
DOD	Department of Defense
DOT	Department of Transportation
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
HSM	Health and Safety Manager
HMX	Cyclotetramethylene tetranitramine octagen
MEC	Munitions and Explosives of Concern
MPPEH	Materials Potentially Presenting an Explosive Hazard
MRP	Munitions Response Program
NAVFAC	Naval Facilities Engineering Command
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PG	Professional Geologist
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
RAD	Radiation
RDX	Cyclo-1,3,5-trimethylene-2,4,6-trinitramine
SOP	Standard Operating Procedure
SSO	Site Safety Officer
SVOC	Semi Volatile Organic Compound
UXO	Unexploded Ordnance

1.0 INTRODUCTION

This Health and Safety Plan (HASP) is specifically written to provide safe practices and procedures for Tetra Tech, Inc. (Tetra Tech) personnel engaged in the activities at the Quarry area (Quarry) located within the Naval Air Station Brunswick (NAS Brunswick), located in Brunswick, Maine. The primary goal of this investigation is to determine whether hazardous chemical constituents are present in soil at the Quarry Area.

The primary goal of the munitions and explosives of concern (MEC) research investigation is to determine whether MEC or materials potentially presenting an explosive hazard (MPPEH) are present in the subsurface at the Quarry and, if present, to delineate the general depth and extent of MEC. The investigation will focus on whether MEC are present in a number of areas identified throughout the site during previous geophysical investigations.

Radiological screening will of excavated materials will also be conducted after the area has been cleared of MEC. A main focus is full scan for chemical constituents including VOCs, SVOCs, metals, pesticides, PCBs, and petroleum hydrocarbons in case chemical contamination is present (non munitions related). Sampling for chemical contaminants will subsequently be conducted.

In addition to the HASP, a copy of the Tetra Tech Health and Safety Guidance Manual must be present at the site during the performance of site activities. The Guidance Manual provides supporting information pertaining to the HASP, as well as Tetra Tech Standard Operating Procedures (SOPs). Both documents must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response standard or HAZWOPER).

A MEC Accident Prevention Plan prepared in accordance with United States Army Corps of Engineers Guidance EM 385-1-1 will be used to further describe MEC operations is included as Attachment I of this document.

A Radiation Protection Plan, which has been approved by NAVFAC, will be used to guide RAD operations and is included in this HASP as Attachment II.

This HASP/APP has been developed using the latest available information regarding known or suspected chemical contaminants, MEC, Radiation, and potential physical hazards associated with the proposed work at the site. These documents will be modified if new information becomes available. Changes will be made with the approval of the Tetra Tech Project Health and Safety Officer (PHSO) and the Tetra

Tech Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the SSO, who will determine if the changes are necessary. The SSO will notify the Project Manager (PM), who will notify affected personnel of changes.

The information contained in this plan, as well as policies on conducting on-site operations, have been obtained from the Tetra Tech Health and Safety Program, the MEC Accident Prevention Plan, Radiation Protection Plan and supporting Standard Operating Procedures (SOPs), and NAS Brunswick policies and procedures concerning explosive ordnance.

1.1 STOP WORK AUTHORIZATION

ALL employees are empowered, authorized, and responsible to STOP WORK at any time when an imminent and uncontrolled safety or health hazard is perceived. In a Stop Work event (immediately after the involved task has been shut down and the work area has been secured in a safe manner) the employee shall contact the Project Manager and the Corporate Health and Safety Manager. Through observations and communication, all parties involved shall then develop, communicate, and implement corrective actions necessary and appropriate to modify the task and to resume work.

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. Site activities will be coordinated with the NAS Brunswick point of contact, Mike Fagan. 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, Tetra Tech will only provide emergency response support to the level of their training.

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.

The NAS Brunswick site contact, Mike Fagan, will be notified anytime emergency 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).

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

- Initial stage fire fighting support and prevention
- Initial 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

Personnel will also comply with the requirements outlined in the MEC Accident Prevention Plan for the work performed at NAS Brunswick.

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from physical, or fire hazards, unexploded ordnance (UXO) and radiation (RAD) are the types of emergencies that could be encountered during site activities.

To minimize and eliminate these potential emergency situations, emergency planning activities associated with this project include the following. The FOL, SSO and the Senior UXO Supervisor (SUXOS) and UXO Safety Officer/Quality Control are responsible for:

- Coordinating with NAS Brunswick Emergency Services personnel to ensure that Tetra Tech emergency action activities are compatible with existing facility emergency response procedures. This includes military EOD for review of the Tetra Tech MEC for NAS Brunswick.
- 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 (used on-site), with Material Safety Data Sheets.
  - On-site personnel medical records (see medical data sheets Attachment III).
  - A logbook identifying personnel on site each day.
- It is the responsibility of the Tetra Tech FOL to ensure this information is available and present at the site.
- In the event of an emergency the FOL will serve as the Incident Commander until Emergency Services arrive.
- The SUXOS will be consulted on the ordnance-related matters.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and to provide early recognition and prevention where possible. This will include:
  - Site-specific training
  - Tailgate/Safety Meetings
  - Activity Hazard Analysis (AHA) Review

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. This will be done by the UXO Technicians clearing the surface of any potential ordnance related materials. In addition, the UXO Technician (Tech II or higher) will provide training and instruction on ordnance types that may be encountered, avoidance measures

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. If suspect MEC/MPPEH are discovered, it will be sorted, secured, and treated as necessary. The location will be recorded. Findings will be documented by the FOL and/or the SSO.

The above actions will provide early recognition for potential emergency situations, and allow Tetra Tech to initiate the necessary control measures.

2.3.2 Prevention

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

If MEC is discovered and must be treated in place the SUXOS will notify the Fire Department and Base Public Relations Departments 24 hours prior to the treatment. See Attachment IV of this HASP.

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; and evidence of personnel overexposure to potential site contaminants.

In the event of an emergency requiring evacuation, personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the

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

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

2.5 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

Tetra Tech personnel will be working in close proximity to each other at NAS Brunswick. As a result, hand signals, cell-phone (when service is available), voice commands, and line of site communication will be sufficient to alert site personnel of an emergency. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations. If an emergency warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via cell-phone, hand signals, voice commands, line of site communication, or vehicle horns. The following signals shall be utilized when communication via vehicle horn is necessary:

HELP	three short blasts	(. . .)
EVACUATION	three long blasts	(- - -)

- Report to the designated refuge point.

- Once non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.
- Describe to the FOL (FOL will serve as the Incident Coordinator) pertinent incident details.

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

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

2.6 EMERGENCY CONTACTS

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

TABLE 2-1

EMERGENCY CONTACT NUMBERS

NAS BRUNSWICK, BRUNSWICK, MAINE

AGENCY	TELEPHONE
NAS Brunswick Emergency Number for On-Base Fire and Police and Ambulance	**9-1-1** or **(207) 921-1719**
Fire Department (non-emergency)	(207) 921-1719
Site Contact, Lisa Joy	(207) 921-1717
Police Department (non-emergency)	(207) 921-1719
Mid Coast Hospital	(207) 373-3635
BRAC PMO NE RPM, Todd Bober	(215) 897-4911
NASB Point of Contact (POC), Mike Fagan	(207) 921-1717
Explosives Safety Officer, Brion Hall	207-921-1319
EOD Support	Contact the RPM or POC
Northern New England Poison Center	(800) 222-1222
Tetra Tech Office, Pittsburgh	(412) 921-7090
Tetra Tech NUS Project Manager, Linda Klink	(412) 921-8650
CLEAN Health and Safety Manager, Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer, James K. Laffey	(412) 921-8679
Tetra Tech UXO Program Manager, Ralph Brooks	(770) 413-0965 ext 231

2.7 EMERGENCY ROUTE TO HOSPITAL

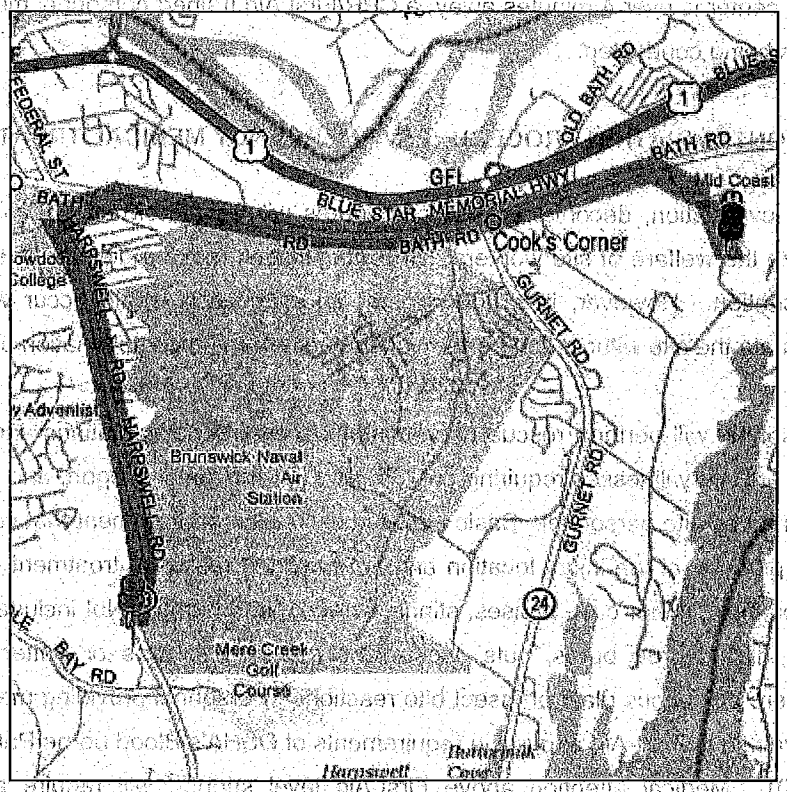
DIRECTIONS TO HOSPITAL

Hospital Name: Mid Coast Hospital
Hospital Address: 123 Medical Center Drive,
Brunswick, ME 04011

Distance: 6.1 miles

Turn onto Harpswell Road and head North	2 miles
Go Straight on ME-123	0.2 miles
Turn Sharp Right onto Bath Road	3.1 miles
Turn Right onto Medical Center Drive	0.7 miles
Hospital is on the Left	

FIGURE 2-1
MAP TO THE MID COAST HOSPITAL



As soon as possible, the NAS Brunswick site contact 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.

2.8 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 blood borne pathogens will also be available on site. Personnel identified within the field crew with blood borne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance. In addition, due to the fact that the nearest hospital/medical center is over 4 minutes away, a CPR/First Aid trained personnel must be on-site during the times work is being conducted.

2.9 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 may be delayed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

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

2.10 INJURY/ILLNESS REPORTING

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

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

3.0 SITE BACKGROUND

This section provides information pertaining to NAS Brunswick and the sites that are to be investigated. This information will be revised if additional information becomes available or if additional sites are going to be investigated.

3.1 NAS BRUNSWICK HISTORY

NAS Brunswick occupies approximately 3,200 acres in Brunswick, Cumberland County, Maine. NAS Brunswick has been home to three active duty and two Reserve squadrons and 29 tenant commands (Malcolm Pirnie, 2007). The facility is in the closure process and scheduled to close in 2011 based on the recommendation of the 2005 BRAC Commission. The NAS Brunswick Main Base is situated between the Androscoggin River and Casco Bay southeast of the Town of Brunswick and approximately 25 miles northeast of Portland, Maine.

3.1.1 Location and Setting

The NASB is located in Cumberland County, approximately 25 miles northeast of Portland, Maine. The installation is located just south of United States (U.S.) Route 1, approximately 2 miles east of Brunswick's main business district and 5 miles inland from the Atlantic Ocean.

The NASB sits on approximately 3,200 acres.

3.2 SPECIFIC SITE TO BE INVESTIGATED

Clearance of the following site will be performed as part of this field effort. This site has Munitions and Explosives of Concern (MEC) and will require a UXO escort.

3.2.1 Quarry Area Description

The Quarry is located southwest of the runways at the NAS Brunswick western boundary, adjacent to Maine State Route 123. The approximate 4-acre area has been used as a rock quarry and contains an approximate 20- to 30-foot rock face. The area is vegetated. A road cuts through the Quarry and ends in a lot where nearby indications of disturbance are evident (i.e., the eastern area of the site that was used for land spreading in the 1990s). Man-made disturbances are also present throughout the southern end of the Quarry.

Rock quarrying activities took place in the 1940s and 1950s. From 1992 to 1995, land spreading was conducted at the Quarry. These land-spreading events were conducted from 1992 to 1995 at the Quarry. In 1992, 350 to 450 cubic yards of soil generated from the removal and cleaning of a gasoline underground storage tank at NAS Brunswick, Building 538, were spread to a depth of 6 to 10 inches on top of the existing soil with no liner to protect the soil below. This soil was then amended to promote bioremediation. The soil was to be tilled and turned 10 times before removal. However, there is no documentation indicating that the treated soil was removed from the Quarry. Similar operations occurred again in 1993 and 1995.

The Quarry is currently inactive, and future land use is unknown. Access to the area is restricted by a locked gate located south of the control tower, but the Quarry gate is not guarded.

The Quarry may have been used for past EOD activities. Site activities were reportedly limited to open burning of small arms ammunition. A significant amount of debris which includes partially buried scrap metal, tires, and concrete, was observed along the rock face at the eastern end of the Quarry.

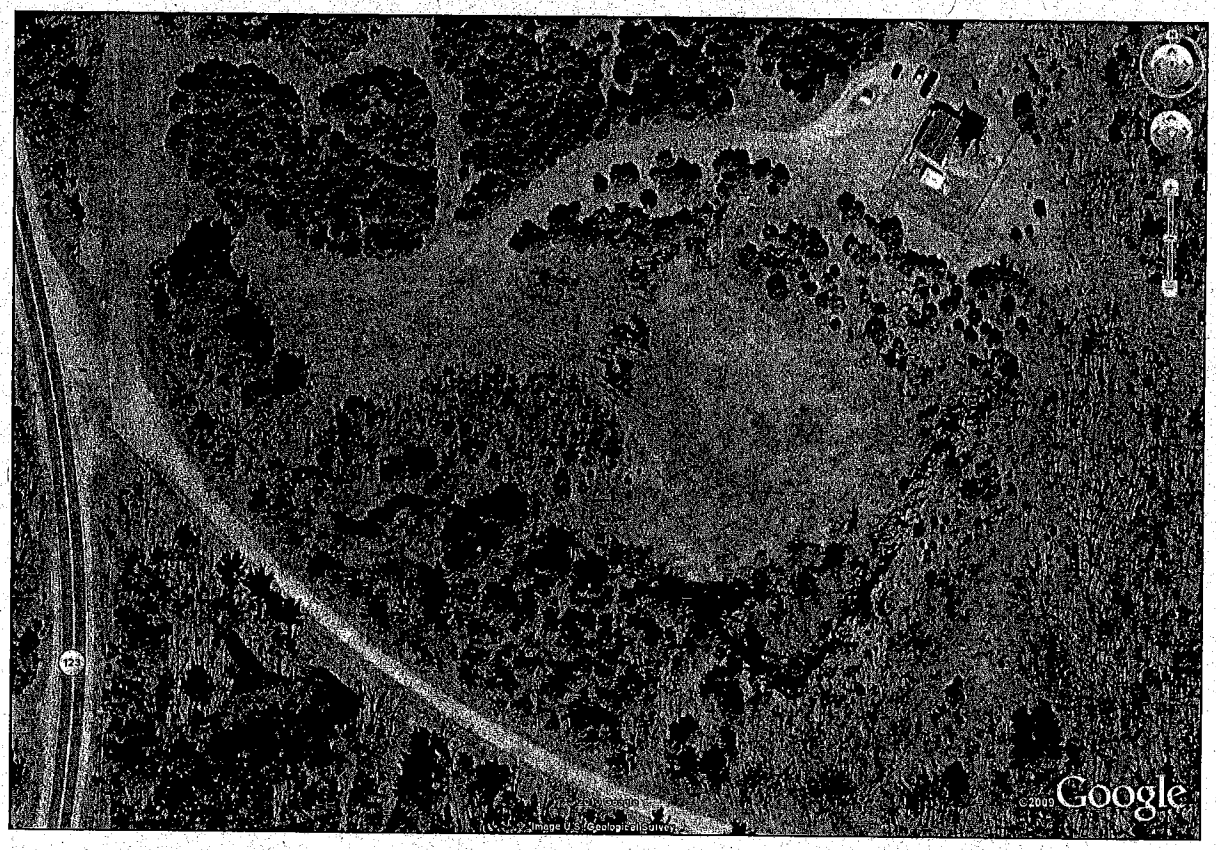
Dumping/disposal of live ordnance on land at NAS Brunswick was unlikely to have been practiced; an alternative method of ocean dumping was available and practiced. A radar tower (Building 646) is located directly north of the site, but there are no structures located within the Quarry. There are overhead electrical power lines along the road leading to the radar tower; however, no utilities are located within the Quarry.

The ground surface was previously investigated during a Site Inspection (SI) at the Quarry. MEC at the Quarry in the subsurface is not anticipated but needs to be confirmed. Potential receptors that may be exposed to MEC in subsurface soil include both human and ecological receptors.

A facility location map and a site location map showing the location where Tetra Tech employees will be performing work are included as part of the Work Plan. Figure 3-1 is an aerial photograph which outlines the area where the work will be performed.

FIGURE 3-1

AERIAL VIEW OF THE QUARRY



4.0 SCOPE OF WORK

This section describes the project tasks that will be performed at NAS Brunswick. Additionally, each task has been evaluated and the associated hazards and recommended control measures are listed in the APP in Section 14.0 Activity Hazard Analysis (AHA). The planned activities involved in this effort are presented in detail in the Work Plan developed for the project. If new tasks are to be performed at the site, the APP and AHA and this section will be modified accordingly.

The following activities are planned for the Quarry Area:

- Mobilization Demobilization
- Detector-aided surface survey
- Clearing and grubbing of site vegetation
  - Hand held brush cutters
  - Mechanized equipment
- Trenching and excavation
  - Manual procedures
  - Excavators
  - Remotely operated hydraulic excavator
  - Radiological Screening
  - Chemical contaminant sampling
- Anomaly investigation and MEC clearance based on SI geophysical and detector-aided survey results
  - Trenches in high anomaly areas to a maximum depth of 4 feet
  - Hand tool digs in low anomaly areas to a maximum depth of 2 feet
- On-site treatment of suspect MEC/MPPEH

The above listing represents a summarization of the tasks as they apply to the scope and application of this HASP. For more detailed description of the associated tasks, please refer to the Site-Specific Work Plan and Explosives Safety Submission (ESS). If additional tasks are determined to be necessary, this HASP will be amended and a hazard evaluation of the additional tasks performed.

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

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

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

5.1 GENERAL SITE SAFE WORK PRACTICES

In addition to the task-specific work practices and restrictions identified in the SWPs attached to this HASP, the following general safe work practices are to be followed when conducting work on-site.

- Avoid contact with potential MEC or MPPEH by avoiding metallic objects and following the instructions of the UXO Technicians. See UXO Standard Operating Procedures in Attachment VI.
- Eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists is prohibited.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area.
- If a source of potable water is not available at the work site that can be used for hands-washing, the use of waterless hands cleaning products will be used, followed by actual hands-washing as soon as practicable upon exiting the site.
- Keep monitoring equipment away from potentially contaminated surfaces.
- Plan and mark entrance, exit, and emergency evacuation routes.
- Rehearse unfamiliar operations prior to implementation.

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

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

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

- Establish appropriate decontamination procedures for leaving the site.

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

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

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

5.2 MEC/MEC RELATED ITEMS SAFE WORK PRACTICES

One of the obvious hazards associated with this activity is the potential for encountering MEC which could affect site personnel and the local population due to its explosive potential.

- The unintended detonation of MEC or a MEC related item could result in injury or possibly death.
-
- Activities in areas potentially containing MEC hazards shall be conducted with approval from the Naval Ordnance Safety and Security Activity (NOSSA) and in accordance with:
- OPNAV 8020.15
- NAVSEA Operations Pamphlet (OP) 5
- NOSSAINST 8020.15
- DOD 6055.9-Std
-
- The contractor will perform the work in accordance with the approved Explosives Safety Submission (ESS) Determination per NOSSAINST 8020.15.

- To address MEC hazards, the following measures will be incorporated:

5.2.1 General MEC Avoidance Measures

Tetra Tech Unexploded Ordnance (UXO) Support will perform a visual detector-aided survey of the areas to be entered.

- Site personnel will follow instructions and directions provided by the UXO Technician.
- Site personnel will restrict themselves to the areas identified by UXO personnel.
- Personnel will be assigned in such a manner to permit the direct visual observation of one another as well as provide any emergency assistance should it be required.
- Personnel will notify the UXO Technician should they encounter suspect MEC/MPPEH articles or unidentified items.
- Smoking is prohibited on site.
- Matches, lighters, or other fire, flame, or spark-producing devices are prohibited the site.
- Cell phones or two-way radios will be only be used under the direct supervision and expressed permission of the UXO Technician.
- Personnel shall suspend outdoor activities in the event of inclement weather (thunderstorms, lightning, heavy rain).

5.3 EXCAVATION SAFE WORK PRACTICES

Various types of excavation will occur at up to thirty low intensity anomaly areas (hand tool digs maximum of 2 feet below ground surface) and eleven high intensity and anomaly areas (exploratory trenching maximum 4 feet below ground surface) at the Quarry.

- Identify underground utilities and buried structures before the commencement of any excavation activities following the Tetra Tech Utility Locating and Excavation Clearance Standard Operating Procedure provided in Health and Safety Guidance Manual Section 7.0.
- Heavy equipment will be subjected to an equipment inspection, upon arrival on-site and prior to leaving using the Equipment Inspection Checklist provided in Attachment VII of this HASP.

- Establish traffic patterns for foot and small vehicular traffic out of the pattern for heavy equipment.
- Areas subjected to subsurface investigative methods will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards.
- In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews working in the area.
- The initial exclusion zones will be established at 200 feet at each site

5.3.1 Low Intensity Area Anomaly Investigation

- Excavations will be conducted using manual procedures until the sidewalls and bottom of each small excavation are clear of anomalies, not to exceed 2 feet bgs.
- Each intrusive "dig team" will consist of two qualified UXO personnel including at least one UXO Technician II or higher.
- Dig teams will be supervised by a UXO Team Leader (UXO Technician III) who will be able to supervise up to three dig teams at one time as long as visual and verbal communications can be maintained between the UXO Team Leader and his assigned dig teams.
- Intrusive activities will only begin after the UXO Safety Officer has given a site-specific safety briefing, communications are established, and all nonessential personnel are evacuated from the area.
- If a suspect MEC/MPPEH item is discovered:
  - Work will stop
  - The SUXOS will identify the item and the associated hazards and if it is safe to move
  - MEC items will be secured in place
  - The SUXOS will coordinate treatment of the item with a donor charge using Blow-in-Place (BIP) procedures.
  - To the extent possible, items will be treated on the day of discovery.
  - Items that cannot be treated the same day will be secured and reported to NASB POC.
  - Security will be maintained until it is treated or until responsibility is transferred to the NASB POC.

5.3.2 High Intensity Area Anomaly Investigation

The trenching operation at the Quarry Site will be performed by a team consisting of 3 personnel with responsibilities as follows:

- SUXOS will be responsible for general oversight of the entire operation.
- A UXO Safety Officer (UXOSO)/UXOQCS will be responsible for oversight of safety and QC.
- One UXO Technician (one Technician III) will be responsible for conducting the detector-aided surface survey of the material and debris during excavation of the trench for the presence of MEC/MPPEH.
- One UXO Technician (Technician II or higher) will be responsible for observing the excavations for the presence of MEC/MPPEH.
- Two Tetra Tech contracted operators will be responsible for conducting remote excavator operations.

5.4 CLEARING AND GRUBBING SAFE WORK PRACTICES

Clearing and grubbing is a surface operation for the cutting and removing of timber, logs, brush, stumps and debris which encroach on the area where a task is to be performed. The term also covers excavating and removing stumps, roots, submerged logs, snags, and other perishable or objectionable material. The FOL/SUXOS is responsible to identify the area to be cleared and the means to clear it. Prior to the start of clearing and grubbing the equipment to be used will be:

- Inspected in accordance with the manufacturer's instructions and using the Hand and Power Tool Inspection Checklist provided in Attachment VII prior to beginning work.
- Only manufacturer approved parts may be used in repair of site equipment.
- Equipment must be operated by knowledgeable field personnel.
- Only personnel directly supporting the clearance activity will remain in the area, others will stay at least 50-100 feet away from the point of operation.
- Site personnel will be instructed in the location and operation of the emergency shut off devices.

- The equipment will be tested initially (and then periodically) to ensure its operational status.
- Work areas will be kept clear of clutter.
- Avoid insect nesting areas and apply insect repellents prior to the start of work.
- Report potential hazards to the SSO.
- Only use tools such as rakes, pitch forks, etc. pull brush away from piles when avoiding nesting areas
- Traffic considerations:
  - Establish safe zones and routes of approach to the operation.
  - All personnel working among equipment traffic are required to wear reflective vests.
- Secure all loose clothing articles to avoid possible entanglement.
- Boundaries will be established based on the size of trees give sufficient space to keep personnel away from hazards (noise, flying projectiles, etc.)

5.4.1 Chainsaw Operations

- Inspect the chainsaw prior to each use.
- Ensure the blade is adjusted and sharp, and all parts are lubricated per the manufacturer's instruction.
- Test safety devices initially and then periodically to ensure a safe operational status.
- Never cut with tip of the saw blade.
- Plan the cut.
- Know where the tree will fall.
- Have a clear escape plan when dropping trees greater than 2 inches in width

- Never stand between falling trees, branches, equipment or other trees.
- Never cut above your head.
- Only cut wood and/or brush with a chainsaw.
- Monitor, the condition of the saw during use, make adjustments, as necessary.
- When cutting a limb, cut from the opposite side of the trunk, the trunk will act as a shield to protect the worker.
- Watch how the trunk moves when removing limbs making sure to keep out of the pathway of falling limbs or branches.
- Keep the work area free from clutter to avoid potential slip, trip, and fall hazards.

5.4.2 Hand Tools

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

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

5.5 RADIOLOGICAL SAFE WORK PRACTICES

The potential exists that radioactive material in the form of radioluminescent dials and gauges could have been processed through the incinerator and therefore could be present in the ash. As a result, project personnel, tools/equipment and soil will be radiologically screened for health and safety coverage. The methods for this screening can be found in Attachment II, Radiological Screening for Soil Investigations.

Listed below are methods and techniques that should be employed to minimize worker exposures to radioactive material.

- Maximize the distance from the source.
  - The dose rate for most gamma and x-radiation varies with the inverse square of the distance from a "point" source.

- The farther you position yourself for the source of radiation, the smaller the dose you receive.
  - For example, doubling the distance from a radiation source will result in 1/4 the exposure in the same amount of time.

- Whenever possible use remote handling devices such as forceps, tongs, etc. to minimize direct contact with sources and containers.

- A small increase in distance can result in a dramatic decrease in dose rate.

- Minimize time of exposure.
  - The less time you remain in a radiation field, the smaller the dose you receive.
  - Perform the task as quickly and as efficiently as possible without increasing the probability of an accident.

- Shield the radiation source. Place shielding between yourself and a source of penetrating radiation to decrease your dose.

- NEVER introduce any food or drink into a survey area, even for temporary storage.

- Use measures that prevent the contamination of skin and eyes. If there is any possibility that the clothes have been contaminated, remove this clothing before leaving the area.
  - Eye protection, (e.g. goggles, face shield) is encouraged to prevent contamination of the eyes.
  - Wear protective gloves at all times when working with radioactive materials.
  - Change gloves frequently during the work, disposing of the used gloves as radioactive waste.

- Wash hands after using radioactive materials and monitor the hands for contamination, especially before eating or smoking, and prior to leaving the site.

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards anticipated to be present during the site activities to be conducted.

6.1 CHEMICAL HAZARDS

General contaminants of concern associated with these sites include: low levels of VOCs and SVOCs, including polycyclic aromatic hydrocarbon (PAH), and metals. None of the VOCs detected surpassed the Maine Remedial Action Guidelines (RAGS) for industrial or residential soil. It is not anticipated that levels of these constituents will be encountered that are of concern to field crews, however it is recommended that exposure (via inhalation, ingestion, or skin contact) to these contaminants be minimized through the use of PPE and good work hygiene practices.

The signs and symptoms of exposure for these substances are summarized below:

6.1.1. Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs)

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

6.1.2 Metals

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

6.1.3 Munitions Constituents

General munitions constituents (MC) contaminants of concern associated with MEC sites may include energetics such as 2,4,6-Trinitrotoluene (TNT), Royal Demolition Explosive (RDX), High Melting Explosive (HMX), and perchlorate as well as metals such as Chromium, Lead, Mercury, and Phosphorous. As a precaution dust control will be used during intrusive activities to minimize any potential inhalation exposures. It is recommended that exposure (via inhalation, ingestion, or skin contact) to these contaminants be minimized through the use of PPE and good work hygiene practices. The signs and symptoms of exposure for these substances are summarized below:

Chromium: Health hazards are characterized normally through chronic exposure manifesting as histologic fibrosis of the lungs and ulceration of the nasal septum and skin. International Agency for Research on Cancer (IARC), National Toxicology Program (NTP) and American Conference of Governmental and Industrial Hygienists (ACGIH) list various chromium compounds as possessing carcinogenic properties.

Lead: Lead poisoning is most often a chronic disorder and may not cause acute symptoms. With or without acute symptoms, poisoning eventually has irreversible effects. The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

Mercury: This substance is corrosive. Systemic symptoms include irritability, wakefulness, muscle weakness and tremors, increased reflexes, gingivitis, anorexia, headache, tinnitus, hypermobility, GI disturbances (nausea, vomiting), diarrhea (sometimes bloody), liver changes, dermatitis, and fever. Symptoms experienced via inhalation include to those above coughing, chest pain, dyspnea, bronchial pneumonitis, and excessive salivation.

Phosphorous: Ingestion of elemental white or yellow phosphorus typically causes severe vomiting and diarrhea, which are both described as "smoking," "luminescent," and having a garlic-like odor. Other signs and symptoms of severe poisoning might include dysrhythmias, coma, hypotension, and death. Contact with skin might cause severe burns within minutes to hours

HMX: (Cyclotetramethylene tetranitramine) Routes of exposure are inhalation, ingestion, skin and eye contact. Signs and symptoms of overexposure may include headaches, dizziness, nausea, hyperactivity, convulsions, seizures, fatigue, and irritability. These effects may be experienced quickly or several hours later. HMX is topically irritating to skin and eyes.

RDX and TNT: Routes of exposure are inhalation, ingestion, skin and eye contact. Signs and symptoms of overexposure may include headaches, dizziness, nausea, hyperactivity, convulsions, seizures, fatigue, and irritability. These effects may be experienced quickly or several hours later.

Perchlorates: Perchlorates are oxidizers commonly used in the production of pyrotechnics, explosives, and solid rocket fuels. Routes of exposure are inhalation, ingestion, skin and eye contact. Signs and symptoms of overexposure may include irritation of the eyes and upper respiratory system. Perchlorates target the eyes, skin, respiratory system, and reproductive system. Human health is impacted by interfering with iodide uptake into the thyroid gland.

6.1.4 Ingestion and Skin Contact:

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

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

6.2 RADIOLOGICAL HAZARDS

The potential health hazards associated with work to be conducted at the Quarry Area include external radiation hazards presented by exposure to emissions from radioactive sources and contaminants such as dials and gauges containing radioluminescent paint with Radium 226 (Ra-226). External radiation hazards may also be posed by surface contamination, airborne contamination, or waterborne contamination.

Radium is a naturally radioactive, silvery-white metal when freshly cut. It blackens on exposure to air. Purified radium and some radium compounds glow in the dark (luminesce). The radiation emitted by radium can also cause certain materials, called "phosphors" to emit light. Mixtures of radium salts and appropriate phosphors were widely used for clock dials and gauges before the risks of radium exposure were understood. Metallic radium is highly chemically reactive. It forms compounds that are very similar to barium compounds, making separation of the two elements difficult. The various isotopes of radium originate from the radioactive decay of uranium or thorium. Radium-226, the most common isotope, is an alpha emitter, with accompanying gamma radiation, and has a half-life of about 1600 years. Radium decays to form isotopes of the radioactive gas radon, which is not chemically reactive. Stable lead is the final product of this lengthy radioactive decay series.

Gamma emitting isotopes are primarily an external or whole-body hazard. Beta-gamma isotopes pose both external (whole-body and skin/eye dose) and internal (inhalation and ingestion) hazards. Alpha isotopes pose an internal (inhalation and ingestion) hazard.

PPE and basic hygiene practices (washing face and hands before leaving site) will be extremely important. Inhalation exposure will be avoided by using appropriate PPE and engineering controls where necessary. Significant exposure via inhalation is not anticipated during the planned scope of work.

Activities involving radioactive materials will be controlled by Radiological Protection Plan and the Radiological Standard Operating Procedures (SOP), which are located in Attachment II of this HASP.

It is not expected that particulate airborne activity will be present during the planned field activities such that airborne concentrations would exceed 10% of the derived air concentration (DAC) for Ra-226 (3.0×10^{-10} microcurie per milliliter), as established by the Nuclear Regulatory Commission (NRC). Therefore, occupational exposure monitoring is not required in accordance with Title 10 Code of Federal Regulations (CFR) 20.1502.

TABLE 6-1

RELEASE LIMITS FOR MATERIALS AND EQUIPMENT

Radiation Type	Release Limits (Fixed) (dpm per 100 cm^2)	Release Limits (Removable) (dpm per 100 cm^2)
Alpha (α)	100	20
Beta Gamma (β-γ)	1000	200

Notes:

Release Limits are based on Atomic Energy Commission (AEC) Regulatory Guide 1.86 (AEC 1974)

cm^2 – square centimeters

dpm – disintegrations per minute

6.3 PHYSICAL HAZARDS

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

- Slips, trips, and falls
- Contact with UXO
- Lifting
- Vehicular and foot traffic
- Heavy equipment
- Excavation and trenches
- Ambient temperature extremes

These physical hazards are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual.

6.3.1 Slips, Trips, and Falls

Conditions such as steep terrain and/or heavy vegetation may create an increased potential for slip, trip, and fall hazards.

- The safest approach will be identified and cleared to permit field crew access to locations being investigated.
- Establish anchor points and rope handrails for traversing/ascending/descending angles and slopes greater than 45% grade.
- Footwear with an adequate traction.
- Prepare work areas by removing tripping hazards (ruts, roots, debris). This is especially critical around rotating equipment, where a fall into the rotating apparatus could be life threatening.

6.3.2 Contact with UXO

Because of the prior uses of these areas that are being investigated, there is a possibility that UXO may be encountered during site operations. Activities at these sites will be conducted consistent with the UXO procedures detailed in the MEC Accident Prevention Plan for these sites. The UXO Specialist will conduct a surface sweep in the remaining areas of the site that are not used for regular vehicular or pedestrian traffic prior to the commencement of intrusive activities.

- In general, field personnel will practice UXO avoidance techniques.
- Do not pick-up or kick any unknown materials.
- Notify the UXO Technician if you encounter unknown materials.
- Where the potential exists for UXO materials the UXO Technician will clear the access routes and work areas.

To minimize the risk of a UXO encounter, a trained UXO Technician will provide support during the site activities. In all cases, an exclusion zone of 300 feet will be established before detection activities begin.

6.3.3 MEC or Related items Hazards

One of the obvious hazards associated with this activity is the potential for encountering MEC. The unintended detonation of MEC or a MEC related item could result in injury or possibly death. To minimize this potential, the following measures will be incorporated.

MEC avoidance measures include:

- Tetra Tech UXO Technicians will perform a visual and magnetic survey sweep of all the areas to be entered.
- All personnel will follow instructions and directions provided by the UXO Technicians. Personnel will restrict themselves to the areas identified by the UXO Technician as cleared.
- Non-UXO personnel will be directed not to pick up, kick, or otherwise disturb articles lying on the ground.
- At no time will non-UXO personnel be permitted to engage in intrusive activities such as digging or unearthing items.
- Personnel will be assigned in such a manner as to permit the direct visual observation of one another as well as provide any emergency assistance should it be required.
- Personnel will notify the UXO Technicians should they encounter suspected MEC articles or unidentified items.

- There shall be NO SMOKING, eating, drinking, chewing gum or tobacco, or other hand-to-mouth activities permitted while on the site.
- No matches, lighters, or other fire, flame, or spark-producing devices shall be taken onto the site.
- Personnel shall not use cell phones or radios in the vicinity of any site areas that may contain suspected MEC items.
- Personnel shall suspend all outdoor activities in the event of inclement weather (thunderstorms, lightning, heavy rain).

6.3.4 Discovery of Chemical Warfare Materiel

Potential exposure to Chemical Warfare Material (CWM) on this site is not anticipated. In the event that CWM is located or suspected, Tetra Tech personnel will evacuate the area immediately in an upwind direction from the CWM, secure the site, and request assistance from the NASB Point of Contact (POC).

Upon discovery of suspect materials, the responsible UXO Technician III will:

- Ensure that all personnel are clear of the area
- Maintain security of the area until relieved

After the area is clear and secured, the responsible UXO Technician III will:

- Notify the Tetra Tech UXO Program Manager
- Notify the NASB POC
- Stop all field operations
- Assemble the crew at a designated assembly point
- Standby to provide assistance as required

6.3.5 Strain/Muscle Pulls from Heavy Lifting

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

6.3.6 Vehicular and Equipment Traffic

Hazards associated with vehicular and equipment traffic are likely to exist during various site activities and whenever site personnel performed work on or near roadways. To minimize the potential for injuries associated with these hazards, a traffic control plan will be prepared if necessary. As necessary, the traffic control plan will be implemented through the use of warning signs, traffic cones, and flagmen. Additionally, site personnel will be instructed to maintain awareness of traffic and moving equipment when performing site activities. When working near roadways, site personnel will wear high visibility vests.

6.3.7 Heavy Equipment

It is anticipated that heavy equipment such as excavators and front-end loaders will be used to perform soil excavation. The following precautions will be used when working at or near the heavy equipment:

- All equipment will be inspected using the Equipment Inspection Checklist. (Attachment VII)
- Heavy equipment will be operated and supported by knowledgeable operator(s).
- All self-propelled equipment with restricted field of vision moving backwards shall be equipped with a back up alarm.
- Personnel will not be present within the swing radius of the excavation equipment.
- Personnel will remain at least four feet away from the edge of any excavation or trench.

6.4 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. As previously discussed, some portions of the site include vegetated areas which increases the potential for field crews to encounter ticks, bees, mosquitoes/insects, snakes, and poisonous vegetation.

6.4.1 Insect Bites and Stings

Insect/animal bites and stings are difficult to control given the climate and environmental setting of NAS Brunswick. However, in an effort to minimize this hazard the following control measures will be implemented where possible.

- Commercially available bug sprays and repellents will be used whenever possible.
- Insect repellants should contain at least 10% DEET for protection against biting insects.

- Stronger repellants (such as those containing Permethrin) may be designed to be applied only to clothing, and not directly onto the skin.
- Always follow the manufacturer's label instructions for the proper application processes and re-application frequencies.
- Where possible, loose-fitting and light-colored clothing with long sleeves should be worn to aid in insect control by providing a barrier and to provide easy recognition of crawling insects against the light background.
- Pant legs should be secured to the work-boots using duct tape to prevent access by ticks.
- Mosquito nets are 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 the access routes and work areas in an effort to identify physical hazards including nesting areas. These areas will be flagged and communicated to the site personnel.
- The FOL/SSO must determine if site personnel (through completion of Medical Data Sheets), suffer allergic reactions to bee and other insect stings and bites.
- Field crew members who are allergic to bites should have their emergency kit containing antihistamine and a preloaded syringe of epinephrine readily available. Any allergies (insect bites, bee stings, etc.) must be reported on the Medical Data Sheet 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.

Information concerning 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.

Precautions include:

- Limit outdoor activities during peak mosquito times – at dusk and dawn.
- Avoid standing water
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturers instruction to exposed skin.
- An effective repellent will contain 20% to 30% DEET (N,N-diethyl-meta-toluamide).
- Avoid products containing more than 30% DEET.
- Spray clothing with repellents containing permethrin or DEET,
- Mosquitoes may bite through thin clothing

6.4.2 Snakes and Other Wild Animals

Indigenous animals including snakes (there are no poisonous snakes in Maine), raccoons, and other animals native to the region may be present at the site. 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. The FOL/SSO will preview access routes and work locations for nesting areas or signs of animal activities (tracks, foraging areas, etc.). The identified suspect areas will be communicated to the field crews. Snake chaps will be required as a precaution.

6.4.3 Poisonous Plants

Various plants which can cause allergic reactions may be encountered during field work. These include poison ivy, poison oak, and poison sumac. Contact with these plants may occur when clearing vegetation for access to work areas, or as a result of movement through these plants. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. 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 be 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 axillary clusters of white fruit: However, 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 when skin pores are open (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.

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.

6.4.4 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, hailstorms, etc.),

the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

Each of these physical hazards is discussed in the Health and Safety Guidance Manual. Additionally, information on these physical hazards and their associated control measures are discussed in the Safe Work Permits.

6.4.5 Temperature Extremes (Heat Stress and Cold Stress)

Given the anticipated project schedule, encountering extremely high ambient temperatures during the planned work could be encountered. Likewise, exposures to extremely cold temperatures could be encountered due to the geographic location of the project site. If such conditions are encountered, information on heat and cold stress recognition, prevention, and control may be found in Section 4.6 of the Health & Safety Guidance Manual.

7.0 MONITORING INSTRUMENTS

None of the chemical contaminants are expected to be present in significant concentrations to present an inhalation hazard during planned site activities. As a precautionary measure to assure that such exposures are avoided and documented, a direct reading instrument will be used to monitor worker exposures to chemical hazards present at the site. For this project a Photoionization Detector (PID) with a 10.6 eV lamp will be used to monitor the air. Based on the properties of the munitions constituents that may be present, workers will use area wetting techniques, if necessary, for dust suppression if visible dust is present during intrusive activities.

Radiological monitors will be used to monitor surface and sub surface soils. Because of the possibility of UXO, various detection instruments will also be employed.

7.1 AIR MONITORING INSTRUMENTS AND USE

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

- The SSO shall order site personnel to stop work and retreat upwind to a safe, unaffected area, where they will remain until further directed by the SSO.
- The SSO shall allow at least 5 minutes to pass so that the work area can ventilate, and will then re-approach the work area while continuously monitoring the BZ areas.
- Only when BG levels are regained in BZ areas will work be permitted to resume. If BG levels are not regained, the SSO will contact the HSM for additional direction.

7.1.1 Photoionization Detector Action Level

The maximum a worker can be exposed to is 10 ppm for 4 exposures of 5 minutes in any one work day.

7.2 UXO SURVEY INSTRUMENTATION, METHODS AND STANDARDS.

The Vallon and Schonstedt GA-52Cx or equivalent will be used as the primary survey instruments to conduct the surveys. In addition to the Schonstedt, a White's Spectrum XLT all-metals detector, or equivalent, will be used in surface survey areas to assist in the location of metal targets with little or no ferrous metal content. Given the nature of the site, where ferrous and nonferrous ordnance may be present, this is the best combination of technology for the operation based on industry standards.

The detection capabilities of the instruments to be used by the UXO team during detector-aided surface surveys are limited by the size and orientation of the target and soil characteristics of the work area. These instruments provide an audio signal for response but do not store data. The Schonstedt GA-52Cx magnetic locator (magnetic gradiometer) does not need to be calibrated. The White's all metal detector requires setup to establish the sensitivity setting for UXO detection. To ensure that each detector is operating properly, the operator turns on the instrument and slowly moves the locator towards metal. As the probe advances toward the target, the audio signal will increase. Failure to detect the object is reason to reject the instrument.

The standard setting for the Schonstedt magnetic locator instrument is 2; setting the instrument to 3 or 4 will make it more sensitive and setting the instrument to 1 will make it less sensitive. The Schonstedt instrument will not detect non-ferrous munitions such as those made of copper, brass, or aluminum. Standard settings for the White's Spectrum XLT when used during MEC surveying operations are located in Tetra Tech MRP SOP 01.

7.3 RADIOLOGICAL MONITORS AND USE

This section provides guidance for the instruments that will be used for radiological screening of excavated material during test pit activities at IRP Site 9. The primary concern is the padium contamination associated with radioluminescent dials and gages paint with Radium 226 (Ra-226).

7.3.1 Instrument Action Level

A stop work action level is established at 500 µR/hr.

7.3.2 Ludlum Model 19 NaI (sodium iodide) gamma detector

The Ludlum Model 19 MicroR survey meter is used for low level micro R gamma survey. It is a compact, rugged, internal scintillation detector survey meter. The Model 19 Micro R survey meter includes an internal 1"x1" NaI detector, five ranges and splash proof shields for outdoor use. No external detector is

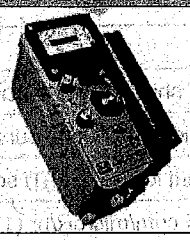
required. Sensitivity, based on Cs-137 gamma, is typically 175 cpm/microR/hr. This meter over-responds to scatter and low energy gamma which makes it more sensitive than any survey meter available. Range selections include 0 - 25, 0 - 50, 0 - 250, 0 - 500, 0 - 5000 micro R/hr.

LUDLUM MODEL 19 MICRO R SURVEY METER	
PART NUMBER	48-1615
WORKING ENVIRONMENT	Splash proof shields for outdoor use
INDICATED USE	Low level (microR) gamma survey
DETECTOR	1" X 1" sodium iodide (NaI)Tl scintillator
SENSITIVITY	Typically 175 cpm/microR/hr (137Cs gamma)
ENERGY RESPONSE	Energy dependent
METER DIAL	0 - 25 microR/hr, 0 - 50 microR/hr, BAT TEST
RANGE SELECTIONS	0 - 25, 0 - 50, 0 - 250, 0 - 500, 0 - 5000 microR/hr
LIGHT	Push-button to activate
LINEARITY	Reading within plus or minus 10% of true value
AUDIO	Built in unimorph speaker with ON/OFF switch (greater than 60 dB at 2 ft.)
CALIBRATION CONTROLS	Accessible from front of instrument (protective cover provided)
RESPONSE	Toggle switch for FAST (4 sec) or SLOW (22 sec) from 10% to 90% of final reading
RESET	Push-button to zero meter
POWER	2 each "D" cell batteries (housed in sealed compartment that is externally accessible)
BATTERY LIFE	Typically 600 hours with alkaline batteries (battery condition can be checked on meter)
METER	2.5" (6.4cm) arc, 1 mA analog type
CONSTRUCTION	Cast and drawn aluminum with beige polyurethane enamel paint
TEMPERATURE RANGE	-4° F(-20° C) to 122° F(50° C) May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE	7.8"(19.8 cm)H X 3.5"(8.9 cm)W X 8.5"(21.6 cm)L
WEIGHT	4.5 lbs(2.1 kg) including batteries

7.3.3 Ludlum Model 2360 Ratemeter/Scaler/Data Logger

Model 2360 is an optimized Alpha Beta Radiation Ratemeter/Scaler/Data Logger that has traditional analog readout supplemented with a digital LCD for the scaler function. Up to 550 data points consisting

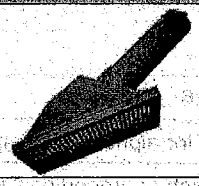
of sample number, date/time stamp, both alpha & beta sample measurements and 10 character location identifier. The location identifier can be input via an optional external device through the RS-232 serial port. A front panel mounted three way switch facilitates selecting alpha only, beta only or alpha plus beta. Other controls include a rotary switch for selecting any of 4 decades, battery test and instrument shut off, a switch for viewing the high voltage or resetting the counts, an audio volume adjustment knob, a scaler count time selector rotary switch and finally a handle mounted push button for logging and starting scaler count cycles.

LUDLUM MODEL 2360 RATEMETER/SCALER/DATA LOGGER	
	
PART NUMBER	48-2872
INDICATED USE	Alpha, Beta Radiation Discrimination, and Data Logging
COMPATIBLE RADIATION DETECTORS	Dual phosphor scintillation and gas proportional detectors
LOGGING PUSHBUTTON	Located in handle; used to activate scaler and/or log a count
LOGGING FUNCTION CONTROL	Internal selection that enables the pushbutton to log ratemeter reading, initiate scaler count and log resulting reading, log scaler and ratemeter reading, or disable the logging function.
HEADER INFORMATION	Six lines of user defined memory at the beginning of the stack for storing user name, survey name, serial numbers, etc. (information is dumped with logged data)
RS-232 PORT	Located on the can, this allows the instrument to be connected to a PC for data dump and parameter setup
AUDIO	Built-in unimorph speaker w/volume control (> 60 db at 2 feet, full volume). Selectable dual or individual click per event for alpha and beta counts and divisions of 1, 10, 100, or 1000 events per click (beta counts only)
METER FACE	0 – 500 Cpm, 0 – 2 Kv, Bat Ok, Ol (overload)
MULTIPLIERS	X1, X10, X100, X1000
LINEARITY	Reading within 10% of true value
SCALER	6 digit LCD display with 0.25"(0.64 cm) digits, overflow arrow, colons to indicate when a count is in process, and backlight.
COUNT TIME	Switch selectable times of 0.1, 0.5, 1, 2, 5, 10, 60 minutes, or pc to allow for a specific count time to be set from a PC.
SELECTOR SWITCH	Toggle Switch to Select Alpha+Beta or "Alpha", Only, Or "Beta" Only

ALARM	Scaler and ratemeter alarm capabilities. Independent alarm settings for alpha, beta, and alpha/beta channel. Alarm set points from 0 – 999999. Alarm points can be set via keypad, or PC
RESET/READ HV	2 position momentary action switch to allow for the meter to be reset or a reading of the HV setting
HIGH VOLTAGE	Adjustable from 200 – 2000 volts (can be read on meter)
OVERLOAD	Senses detector saturation indicated by red lamp on meter and meter deflecting to full scale (internally adjustable)
RESPONSE	Varies according to number of counts. Typically 2 – 11 seconds from 10% - 90% of final reading.
BATTERY LIFE	Typically 150 hours with alkaline batteries (battery condition can be checked on meter)
TEMPERATURE RANGE	-4° F to 122° F (-20° C to 50° C) may be certified for operation from -40° F to 150° F (-40° C to 65° C)
SIZE	6.5" H X 3.5" W X 8.5" L (16.5 X 8.9 X 21.6 Cm)
WEIGHT	3.5 Lbs (1.6 Kg), including batteries

7.3.4 Ludlum Model 43-89 Alpha Radiation Scintillation Detector

The Model 43-89 is a 100 cm² dual phosphor alpha/beta scintillator that is designed to be used for simultaneously counting alpha and beta contamination.

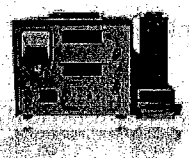
LUDLUM MODEL 43-9 ALPHA RADIATION SCINTILLATION DETECTOR	
	
PART NUMBER	47-2430
INDICATED USE	Alpha-beta survey
SCINTILLATOR	ZnS(Ag)
WINDOW	Typically 1.2 mg/ square cm aluminized mylar
WINDOW AREA	Active – 125 cm^2 – Open 100 cm^2
EFFICIENCY	(4pi geometry): Typically 16% - Pu-239;5% - Tc-99; 16% - Sr-90/Y-90
BACKGROUND	Alpha – Less than 3 cpm – Beta – Typically 300 cpm or less
NONUNIFORMITY	Less than 10%
CROSS TALK	Alpha to Beta – Less than 10% Beta to Alpha – Less than 1%
COMPATIBLE INSTRUMENTS	Model 2224, 2360, 2929

TUBE	1.5" (3.8 cm) diameter magnetically shielded photomultiplier
OPERATING VOLTAGE	Typically 500 – 1200 volts
DYODE STRING RESISTANCE	100 megohm
CONNECTOR	Series C
CONSTRUCTION	Aluminum housing with beige polyurethane paint
TEMPERATURE RANGE	-4° F(-20° C) to 122° F(50° C) may be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE	5.5" (13.9 cm)H X 4" (10.2 cm)W X 12.3" (33 cm)L
WEIGHT	1.5 lb (0.7 kg)

7.3.5 Ludlum Model 2929 Alpha/Beta Scaler with Model 43-10-1 Detector

This instrument combines Ludlum's Model 2929 Dual Channel Scaler with its Model 43-10-1 Sample Counting Head to create a alpha/beta sample counter. The Model 2929 is a dual-channel scaler incorporating a pulse height analyzer that provides alpha beta separation and displays the counts for each on dedicated 6 digit LED readouts.

Ludlum Model 2929 Alpha/Beta Scaler With Model 43-10-1 Detector



PART NUMBER	48-1426
INDICATED USE	Scaler for alpha beta sample counting
DETECTOR COMPATIBILITY	Phoswich or proportional type detectors
HIGH VOLTAGE	Adjustable from 200-2500 volts
THRESHOLDS	Beta: 4 mV Alpha: 175 mV
BETA WINDOW	50 mV
SCALERS	2 ea. 6-digit LED displays with a range of 0-999999 counts
SCALER LINEARITY	Reading within 2% of true value
TIMER	Thumb wheel adjustment from 0-99 minutes with selectable multipliers of x0.1, x1, x10, or EXT for manual timing
DATA-OUTPUT	Two 15-pin connectors allowing for recorder and printers (one for alpha, one for beta)
AUDIO	Built-in unimorph type speakers with volume controls to provide a dual tone

	(1 per channel) click-per-event audio
AMP OUT	"BNC" connector provides amplified detector pulse
METER DIAL	0-2.5 kV
METER	6.4 cm (2.5 in.) arc, 1 mA movement analog type
POWER	95-250 Vac, 50-60 Hz single phase
SIZE	24.5 x 37.3 x 25.1 cm (9.6 x 14.6 x 9.9 in.) (H x W x D)
WEIGHT	5.5 kg (12.06 lb) including detector

7.4 INSTRUMENT MAINTENANCE AND CALIBRATION

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

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

Radiological survey instruments will be prepared for use in accordance with SOP 2, *Preparation of Portable Radiation and Contamination Survey Meters and Instruments for Field Use.*

7.5 DOCUMENTING INSTRUMENT READINGS

The SSO is responsible for ensuring that air monitoring instruments are used in accordance with the specifications of this HASP and with manufacturer's specifications/recommendations. In addition, the SSO is also responsible for ensuring that the instrument use is documented. This requirement can be

satisfied either by recording instrument readings on pre-printed sampling log sheets or in a field log book. **This includes the requirement for documenting instrument readings that indicate no elevated readings above noted daily background levels (i.e., no-exposure readings).** At a minimum, the SSO must document the following information for each use of an air monitoring device:

- Date, time, and duration of the reading
- Site location where the reading was obtained
- Instrument used (e.g., PID, RAD meter, etc.)
- Personnel present at the area where the reading was noted
- Other conditions that are considered relevant to the SSO (such as weather conditions, possible instrument interferences, etc.)
- Radiological surveys will be documented in accordance with SOP 1, *Radiation and Contamination Surveys.* (See Attachment II)

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: _____ PROJECT NO.:_____

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

8.0 SPILL CONTAINMENT PROGRAM

8.1 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 sampling 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.

8.2 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.

NOTE: Liquid waste is not anticipated outside of expected decontamination materials.

8.3 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. Inspections will be documented in the Project Logbook.

8.4 PERSONNEL TRAINING AND SPILL PREVENTION

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.

8.5 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 1A1 and/or 1A2)
- Shovels, rakes, and brooms
- Labels

8.6 SPILL CONTROL PLAN

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

- Notify the SSO or FOL immediately.
-
- The SSO or FOL will notify NAS Brunswick point of contact immediately.
- 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.

9.0 SITE CONTROL

This section outlines the means by which Tetra Tech will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. A three-zone approach will be used to control 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.

9.1 EXCLUSION ZONE

An exclusion zone (EZ) is intended to keep non-essential persons from being exposed to hazardous blast overpressure and fragments resulting from an unintentional detonation. Calculation of the EZ size around UXO and geophysical operations is described in the ESS.

For this project, the initial exclusion zones will be established at 200 feet, which is the Hazardous Fragmentation Distance (HFD) for the munition with the greatest fragmentation distance (MGFD); the 2.75-inch Rocket Motor, MK 40. If non-site personnel or non-essential non-UXO personnel enter an exclusion zone, all MEC operations will cease until the exclusion zone is re-established. The exclusion zones for the various activities that may occur on this site are shown in Tables 6-2a & b in the ESS.

During intentional detonation operations, the EZ will be established at 1095 feet from the outer edge of the planned detonation area. The Base Fire Department will be on standby to control any potential fires.

Exclusion zones will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility site personnel and visitors, as necessary.

A pre-startup site visit will be conducted by members of the field team in an effort to identify proposed investigation locations and provide up-front notices concerning scheduled activities within the facility. When base personnel are working within the proximity of this investigation, they will be moved or their operation temporarily discontinued protecting them from potential hazards associated with UXO investigation and clearance.

Access to the EZ is limited to personnel essential to the operation being conducted. However, under specific conditions and on a case-by-case basis, authorized visitors may be granted access to the EZ when operations are being conducted. The ESS details specific protocols for access of EZs by non-UXO personnel.

9.2 CONTAMINATION REDUCTION ZONE

The Contamination Reduction Zone (CRZ) will be a buffer area between the EZ and any area of the site where UXO is not suspected. The personnel and equipment decontamination 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.

9.3 SUPPORT ZONE

The Support Zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. The Support Zones will be established at areas of the site where exposure to site hazards would not be expected during normal working conditions or foreseeable emergencies.

9.4 SITE VISITORS

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

- Personnel invited to observe or participate in operations by Tetra Tech
- Regulatory personnel (EPA, OSHA, etc.)
- NAS Brunswick personnel
- Other authorized visitors

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

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

- 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.

- 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 EZ during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

- The ESS details specific protocols for access of EZs by non-UXO personnel.

Note: Visitors will be escorted by UXO personnel while at the site.

Once the site visitors have completed the above items, they will be permitted to enter the EZs. Visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. 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 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.

9.5 SITE SECURITY

Site security will be maintained to ensure that non-essential personnel do not access the exclusion zones during the UXO operations at the site. Barricades will be positioned on access routes a minimum of 200 feet from the edge of the site. Notification procedures will be posted on the barricades to ensure that non-essential personnel notify the team working in the area prior to entering the area during active operations. Barricades will be removed when operations stop for the day.

9.6 SITE MAPS

A site map will be generated once access routes, are determined, and it will be adjusted as site conditions change. These maps will show potential points of contact with the public, roadways, and other significant characteristics that may impact site operations and safety. Site maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points if warranted.

9.7 BUDDY SYSTEM

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

9.8 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

Tetra Tech personnel will retain MSDSs for chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of chemicals used on site will be developed using Section 5.0 of the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location and will be available for anyone to review upon request.

9.9 COMMUNICATION

Tetra Tech personnel will be working in close proximity to each other at NAS Brunswick. As a result and since two-way radio communication may or may not be available, hand signals, voice commands, and line of site will provide the initial means of communication. If two-way communication is available, its use will be cleared with Base personnel prior to initiating activities.

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.

9.10 ACCIDENT PREVENTION PLAN/ACTIVITY HAZARD ANALYSES

The work conducted in support of this project will be performed using an Accident Prevention Plan (APP), including Activity Hazard Analyses (AHAs) to guide and direct field crews on a task-by-task basis. The APP including the AHAs is included as Attachment I. Daily safety meetings will be conducted during site work and the task-specific AHA(s) will be reviewed prior to initiating any field activities. This effort will ensure that site-specific considerations and changing conditions are incorporated into the planning effort. Use of the APP will provide the communication line for reviewing task-specific hazards and protective measures associated with each operation. The HASP will be used as the primary reference for selecting levels of protection and control measures.

The FOL and/or the SSO will be responsible for making the parties aware of the contents and requirements of the APP. Any problems encountered with the protective measures required will be documented and brought to the attention of the SSO.

As an ongoing quality assurance effort, the SSO will review operations to ensure the AHAs adequately address potential hazards for the tasks being conducted. Where deficient, they will be corrected and that information shared with the field personnel. Amended AHAs will be forwarded to the PHSO for inclusion in future APPs for similar activities.

10.0 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 SSO. 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.

11.0 MATERIALS AND DOCUMENTATION

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

- A complete copy of this HASP
- A complete copy of the APP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- MSDSs for chemicals brought onsite, including decontamination solutions, fuels, lime, sample preservatives, calibration gases, etc.
- 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)

11.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

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

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

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

The OSHA Job Safety & Health Protection Poster (posted) - 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 (maintained) - This list is found within the training section of the HASP (See Figure 8-2). This list identifies site personnel, dates of training (including site-specific training), and medical

surveillance. The list indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

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

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be completed by 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 personnel to carry at times.

Hearing Conservation Standard (29 CFR 1910.95) (posted) - This standard will be posted any time hearing protection or other noise abatement procedures are used.

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

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

The purpose, as stated above, is to allow site personnel quick access to this information. Variations concerning location and methods of presentation are acceptable as long as the objection is accomplished.

ATTACHMENT I

ACCIDENT PREVENTION PLAN/ ACTIVITY HAZARD ANALYSIS

Accident Prevention Plan
For
EXPLORATORY
MEC INVESTIGATION OF QUARRY AREA

Naval Air Station Brunswick
Brunswick, Maine

Submitted to:
BRAC PMO Northeast
4911 South Broad Street
Philadelphia, Pennsylvania 19112-1303

Submitted by:
Tetra Tech, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406

October 2010

PREPARED UNDER THE SUPERVISION OF:

Linda Klink

LINDA KLINK, P.E.
PROJECT MANAGER
TETRA TECH, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

Matthew M. Soltis

MATTHEW M. SOLTIS, CIH, CSP
HEALTH AND SAFETY MANAGER
TETRA TECH, INC.
PITTSBURGH, PENNSYLVANIA

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1 Employee Training/Qualifications

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1 NAS Brunswick Activity Hazard Analysis

ACRONYMS

§	Section
dB	decibels
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
BBP	Blood borne pathogen
BLS	Bureau of Labor Statistics
CFR	Code of Federal Regulations
CPR	Cardiopulmonary resuscitation
CTO	Contract Task Order
DART	Days Away/Restricted Duty/Transfer
DDESB	Department of Defense Explosives Safety Board
DEET	N, N-diethyl-m-toluamide
EM	Engineer Manual
EMR	Experience Modification Rate
EOD	Explosive Ordnance Disposal
ESS	Explosive Safety Submission
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
MC	Munitions Constituents
MEC	Munitions and explosives of concern
MPPEH	Material potentially presenting an explosive hazard
NAICS	North American Industry Classification System
NAVFAC MA	Naval Facilities Engineering Command Mid-Atlantic
NEHC	Navy Environmental Health Center
NHSO	Navy Health and Safety Officer
NIOSH	National Institute of Occupational Safety and Health
NRR	Noise Reduction Rating
NAS Brunswick	Naval Air Station Brunswick
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PPE	Personal Protective Equipment
RCIR	Recordable Case Incident Rate
RPM	Remedial Project Manager

SHM	Safety and Health Manager
SSC	Site Safety Coordinator
SUXOS	Senior UXO Supervisor
TP	Technical Paper
UST	Underground Storage Tank
UXO	Unexploded Ordnance
UXOSO/QC	Unexploded Ordnance Safety Officer/Quality Control

1.0 TITLE, SIGNATURE, AND PHONE NUMBER OF THE PLAN PREPARER.

Prepared by:

James K. Laffey
Tetra Tech
Project Health and Safety Officer

Signature

(412) 921-8678
Phone

Concurred by:

Matthew M. Soltis, CIH, CSP
Tetra Tech
Safety and Health Manager

Signature

(412) 921-8912
Phone

Approved by:

John Trepanowski, P.E.
Tetra Tech
Vice-President

Signature

(610) 491-9688
Phone

2.0 BACKGROUND INFORMATION

Contractor: Tetra Tech

Contract Number: **N62472-03-D-0057**

Project Name: Exploratory MEC Investigation of Quarry Area at Naval Air Station Brunswick in Brunswick, Maine

2.1 PROJECT DESCRIPTION

The objective of this task will be to implement munitions response activities including characterization, investigation, and clearance of suspect MEC at Naval Air Station Brunswick in Brunswick, Maine. This Accident Prevention Plan (APP) addresses only the activities to be performed by Tetra Tech personnel. The site-specific health and safety provisions in this document have been developed for use during the provision of unexploded ordnance (UXO) investigation, characterization, and clearance during the Naval Air Station (NAS) Brunswick exploratory investigation. This document addresses applicable items specified under the U.S. Army Corps of Engineers Safety and Health Requirements Manual, Engineering Manual (EM) 385-1-1, and United States Occupational Safety and Health Administration (OSHA) Title 29 of CFR, § 1910.120(b). This APP will be available to (1) on-site personnel who may be exposed to hazardous on-site conditions, including Tetra Tech and subcontractor personnel participating in field activities and UXO avoidance activities, and (2) site visitors, including regulatory agency representatives. Site-specific sections of EM 385-1-1 applicable to this field effort are as follows:

- ☒ 1 - Program Management
- ☐ 2 - Sanitation
- ☒ 3 - Medical and First Aid Requirements
- ☐ 4 - Temporary Facilities
- ☒ 5 - Personal Protective and Safety Equipment
- ☒ 6 - Hazardous Substances, Agents, and Environments
- ☐ 7 - Lighting
- ☐ 8 - Accident Prevention Signs, Tags, Labels, Signals, Piping System Identification, and Traffic Control
- ☒ 9 - Fire Prevention and Protection
- ☐ 10 - Welding and Cutting

- ☐ 11 - Electrical
- ☐ 12 - Control of Hazardous Energy
- ☐ 13 - Hand and Power Tools
- ☐ 14 - Material Handling, Storage, and Disposal
- ☐ 15 - Rigging
- ☒ 16 - Machinery and Mechanized Equipment
- ☐ 17 - Conveyors
- ☐ 18 - Motor Vehicles and Aircraft
- ☐ 19 - Floating Plant and Marine Activities
- ☐ 20 - Pressurized Equipment and Systems
- ☐ 21 - Safe Access and Fall Protection
- ☐ 22 - Work Platforms
- ☐ 23 - Demolition
- ☐ 24 - Floor and Wall Holes and Openings
- ☒ 25 - Excavations
- ☐ 26 - Underground Construction, Shafts, and Caissons
- ☐ 27 - Concrete and Masonry Construction and Steel Erection
- ☒ 28 - Hazardous Waste Operations and Emergency Response (HAZWOPER)
- ☐ 29 - Blasting
- ☐ 30 - Contract Diving Operations

2.2 SITE MAPS

A facility location map is included as and a site location map showing the location where Tetra Tech employees will be performing work are included as part of the Work Plan for the work associated with this field effort at NAS Brunswick.

2.3 TETRA TECH SAFETY STATISTICS

Table 2-1 presents safety statistics for Tetra Tech for the last four calendar years compared to the national averages for our industry. This comparison uses data collected by the United States Department of Labor, Bureau of Labor Statistics (BLS) for different types of employers, segregated by North American Industry Classification System (NAICS) codes.

Table 2-1

Comparison of Tetra Tech and 2008 BLS Data for NAICS Code 541 (RCIR and DART Case Rates)

	NAICS 541 Professional, Scientific and Technical Services 2008	Tetra Tech 2006	Tetra Tech 2007	Tetra Tech 2008	Tetra Tech 2009
Total Recordable Case Incident Rate (RCIR)	1.1	0.55	0.91	0.3	0.2
Days Away/Restricted Duty/Transfer Case Rate (DART)	0.5	0.3	0.3	0.2	0.2

The data comparison illustrates that Tetra Tech' performance compares favorably with the most-recent national averages for the environmental engineering and hazardous waste services industries.

2.3.1 Tetra Tech, Inc. Experience Modification Rates and OSHA Logs:

Policy Year (October 1 - September 30) 2006-2007	0.90
Policy Year 2007-2008	0.92
Policy Year 2008-2009	0.81
Policy Year 2009-2010	0.74

2.4 WORK PHASES

Work on this project will occur in the following phases. Associated dates when Tetra Tech personnel will be on site performing work will be listed for each phase of the project.

- Phase 1 - Mobilization
- Phase 2 - UXO Support and field activities
- Phase 3 – Demobilization

2.5 SPECIFIC SITE ACTIVITIES

The detailed Scope of Work for field activities to be performed during UXO support for the remedial investigation at NAS Brunswick will include the following tasks:

- Mobilization Demobilization

- Clearing and grubbing of site vegetation
- Trenching and Excavation
- Anomaly investigation and MEC clearance to a maximum depth of 4 feet
  - Based on geophysical and detector-aided survey results
- On-site treatment of suspect MEC/MPPEH

For each of these tasks, detailed Activity Hazard Analyses (AHAs) have been prepared and are provided in Section 14.0 of this APP.

3.0 STATEMENT OF SAFETY AND HEALTH POLICY

Tetra Tech is committed to providing our employees with a safe and healthful workplace. It is the goal of Tetra Tech to continue excellent safety performance on NAVFAC contracts to support the Navy in their safety efforts. Specifically, Tetra Tech will perform work in a manner that is consistent with the Zero Incident Philosophy. It is our goal to plan and perform the work in a manner that integrates safety and health considerations so that worker injuries or illnesses, environmental releases/impacts, or property damage are eliminated. In addition to the line and staff management functions described in this APP and the accompanying HASP, each individual performing work under this contract has the responsibility for their own personal health and safety, as well as assisting in assuring the health and safety of their co-workers. This element is also the first one listed in our corporate Health and Safety Policy Statement, which requires that "each employee recognize a *personal* responsibility for their own health and safety and for actions that affect the health and safety of fellow employees." This employee responsibility includes observing specified health and safety requirements and communicating with the designated SSO on matters such as the effectiveness of specified control measures, identification of new potential hazards, and other related issues.

An employee's failure to adhere to the requirements of this APP and HASP or to observe specified safety requirements and restrictions or to properly use identified protective equipment may lead to injury or illness. As a result, deviation from safety and health procedures is not tolerated. Failure to comply with health and safety procedures and requirements will lead to reprimand up to and including dismissal.

Health and safety-related information is communicated to employees through meetings, postings, written communications, and reporting of hazards.

The principal elements of our program are founded on the requirements presented in the Health and Safety Policy on the following page.

4.0 RESPONSIBILITIES AND LINES OF AUTHORITY

The Tetra Tech Site Safety Officer (SSO) for this project has been appointed by the Project Manager (PM) and is responsible for field implementation of tasks and procedures contained in the HASP (see Section 15.0) portion of the APP. The SSO for this project may be the UXO Safety Officer/Quality Control (UXOSO/QC) technician on site. The SSO has completed 40-Hour HAZWOPER and subsequent 8-Hour HAZWOPER Refresher Training, 8-Hour HAZWOPER Supervisor Training, and First Aid/CPR and Blood-borne Pathogen training in accordance with regulatory requirements applicable to the work that will be performed for this project. The Tetra Tech SSO has primary responsibility for responding to and correcting emergency situations and for taking appropriate measures to ensure the safety of site personnel and the public (e.g., evacuation of personnel from the site area). The SSO is also responsible for ensuring that corrective measures have been implemented, appropriate internal and Navy authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSO within the parameters of their Scopes of Work.

Personnel are required to immediately report injuries, illnesses, spills, fires, and property damage to the SSO. The SSO must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed. The SSO is also responsible for informing the Navy Remedial Project Manager (RPM) of major incidents and associated corrective actions.

Management at Tetra Tech has the authority and responsibility for implementing and maintaining this APP and HASP. An organization chart presenting the lines of authority for this project is shown on the next page.

The work under this contract, including this field effort, is subject to a comprehensive health and safety program developed, designed, and implemented by Matthew M. Soltis, CIH, CSP. Mr. Soltis serves as Director of Health and Safety for Tetra Tech and as the Safety and Health Manager (SHM) for the planned work addressed in this APP.

TETRA TECH NUS, INC.
HEALTH AND SAFETY POLICY

Tetra Tech NUS, Inc., is committed to providing our employees with a safe and healthful workplace. We believe that occupational injuries and illness can be prevented; and we are convinced that a strong Health and Safety Program is essential to achieve this objective.

The principal elements of our program are founded on the requirements that our managers and employees:

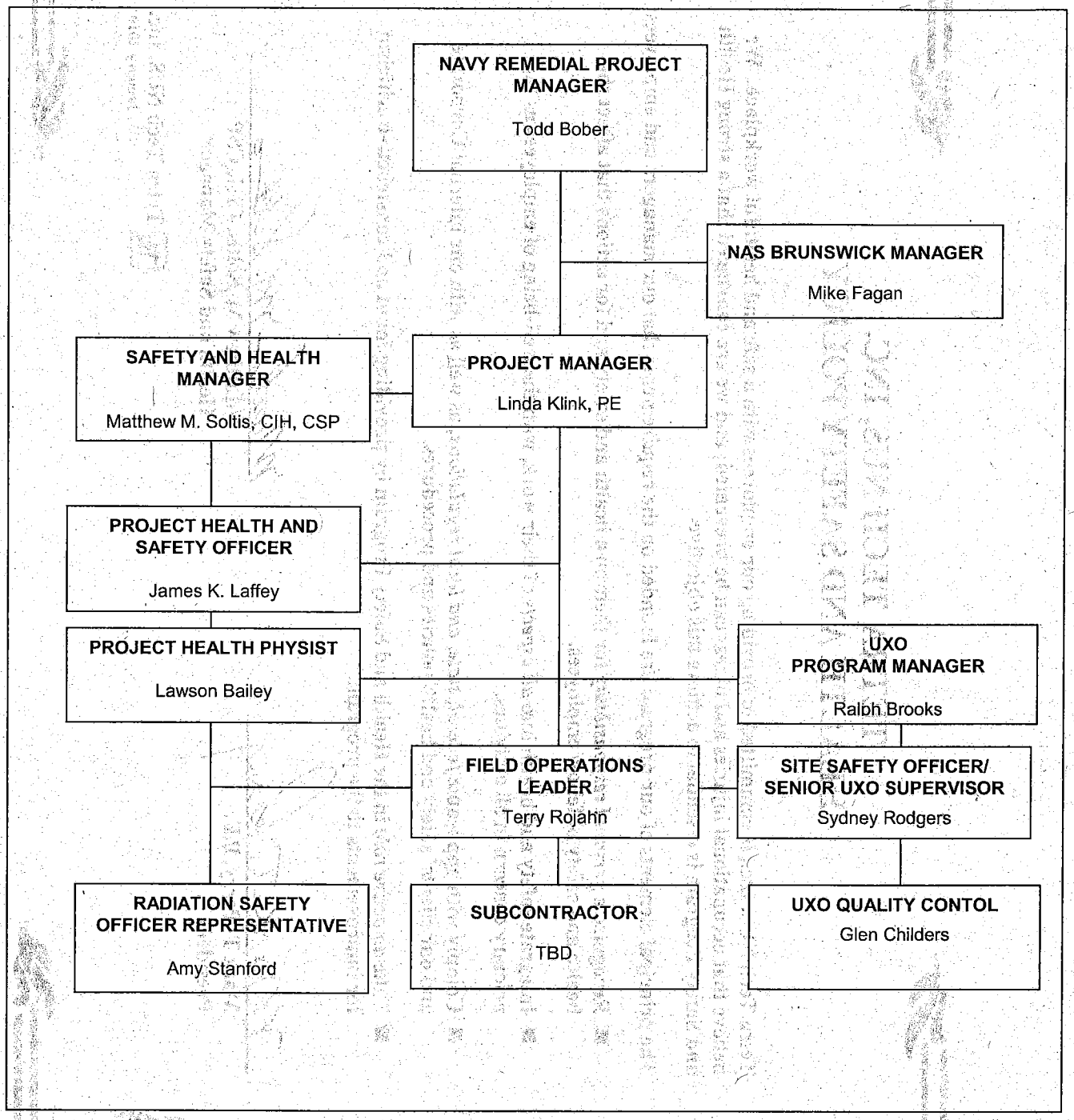
- Recognize a *personal responsibility* for their own health and safety and for actions that affect the health and safety of fellow employees.
- Integrate safety and health into *all aspects* of their work, with the well-being of employees as the primary concern in all activities.
- Comply with applicable *federal, state, and local regulations*, as well as with our internal Corporate and our clients' safety and health policies and procedures.
- Take *an active role* in the Health and Safety Program by providing input and constructive criticism for improvements to the program.

Mark T. Perry, P.E.
President

Matthew M. Soltis, CIH, CSP
Health and Safety Manager

Tetra Tech NUS, Inc.
January 2010

FIGURE 4-1
ORGANIZATION CHART
ON-SITE CONSTRUCTION SUPPORT OF
FIELD ACTIVITIES AT NAS BRUNSWICK



4.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for Tetra Tech employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for 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.

4.1.1 Project Manager

The Tetra Tech PM is responsible for the overall direction of health and safety for this project.

4.1.2 Task Manager

The Tetra Tech TM is responsible for the implementation and coordination of the CTO.

4.1.3 Field Operations Leader

The Tetra Tech NUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed Site Safety Officer (SSO). The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan. Other duties include:

- Ensuring that all notifications are given prior to beginning work.
- Conducting intrusive operations.
- Verifying training and medical clearance of onsite personnel status in relation to site activities.
- Selecting, applying, inspecting, and maintaining personal protective equipment.
- Implementing Hazard Communication, Respiratory Protection Programs, and other health and safety programs as needed.
- Providing site-specific training for onsite personnel.
- Investigating accidents and injuries (Attachment V in the HASP – Incident Report Form)

4.1.4 Project Health and Safety Officer

The PHSO is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:

- Providing information regarding site contaminants and physical hazards associated with the site.
- Establishing air monitoring and decontamination procedures.
- Assigning personal protective equipment based on task and potential hazards.

- Determining emergency response procedures and emergency contacts.
- Stipulating training requirements and reviewing training and medical surveillance certificates.
- Providing standard work practices to minimize potential injuries and exposures.
- Modifying this HASP, as necessary.

4.1.5 Senior UXO Supervisor/Field Operation Leader/Site Safety Officer

The SUXOS is responsible for advising the FOL on UXO matters, including the measures that will be necessary to effectively implement and adhere to the site-specific Work Plan and Unexploded Ordnance and Chemical Warfare Agents Activities SOP. The SUXOS has the overall responsibility for the day-to-day MEC operations at the site, and directs site personnel resources at the site on MEC support issues to ensure their safety. The SUXOS is responsible for MEC documentation. Other responsibilities of the SUXOS include:

- Scheduling and executing site MEC activities.
- Coordinating with emergency response personnel including establishing communications.
- Training site UXO personnel in accordance with the HASP/APP.
- Establishing and maintaining required work zones including the exclusion zones.
- Implementing the UXO safety program.
- Analyzing MEC and explosives operational risks, hazards, and safety requirements.
- Enforcing personnel limits and safety exclusion zones for MEC operations.
- Conducting safety inspections.
- Participating in site specific training sessions.
- Maintaining familiarity with the Tetra Tech UXO SOPs.
- Conducting daily and in progress functional tests on instruments used in the survey
- Providing input to the FOL regarding the need to modify this HASP/APP or other health and safety documents as per site-specific requirements.

4.1.6 UXO Quality Control

The UXOSO/QC is independent from the SUXOS and reports directly to the UXO Program Manager for quality control issues. The UXO Program Manager also has a separate reporting line from the TM and is responsible for management of the UXO QC Program. This ensures that the QC program will be unbiased. Although the UXOSO/QC is separate and independent from the SUXOS, he is part of the problem resolution process and must maintain close and open communication with the SUXOS. The UXOSO/QC is responsible for:

- Issuing Stop Work Requests when conditions warrant
- Implementing the Quality Control Plan
- Conducting quality control indoctrination training for project personnel and for site visitors.
- Initiating QC surveillance and inspection consistent with the CQ program/QC policies and procedures
- Identifying, evaluating, initiating, and approving corrective action to ensure work complies with the contract
- Recommending changes to the CQ program
- Providing project QC update to the SUXOS
- Communicating with client QA project oversight
- Conducting inspection and surveillance activity
- Completing reports and other documentation; maintaining a daily log of activities
- Implementing the three-phase control process: preparatory, initial, and follow-up inspections
- The UXOSO/QC has the authority to stop-work whenever a condition is identified that has a negative effect on the quality of the product

4.1.7 Radiation Safety Officer Representative

- Radiation Safety Officer Representative (RSOR) is responsible for providing oversight of radiological activities in accordance with the Tetra Tech Nuclear Regulatory Commission (NRC) Radioactive Materials License.

4.1.8 Project Health Physicist

- Project Health Physicist (PHP) assists in the development and approval of the work plan and in the identification of radiological analysis needs:

- Provides technical support for field activities, health physics guidance on an as-needed basis, and radiological control protection services, if required.

- Assists project personnel in proper completion of radiological records, reviews and approves project field procedures that involve handling radioactive materials or access to radiological areas, and conducts radiation incident investigations and project inspections.

- Coordinates with the analytical laboratory and data validator to assure proper implementation of Sampling and Analysis Plan/Quality Assurance Project Plan requirements.

Compliance with the requirements stipulated in this HASP/APP is monitored by the SUXOS and coordinated through the Tetra Tech HSM. In some cases one person may be designated responsibilities for more than one position. This action will be performed only as credentials, experience, and availability permits.

The work under this contract, including this field effort, is subject to a comprehensive health and safety program developed, designed, and implemented by Matthew M. Soltis, CIH, CSP. Mr. Soltis serves as Director of Health and Safety for Tetra Tech and as the Safety and Health Manager (SHM) for the planned work addressed in this APP.

4.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: NAS Brunswick
Address: Brunswick, Maine

Client Contact: Mike Fagan
Phone Number: (207) 921-1717
Alternate Contact: Lisa Joy
Phone Number: (207) 921-1720

Project Team:

Tetra Tech Personnel:	Discipline/Tasks Assigned:	Phone:
Jeffrey Orient, P.G.	Facility Coordinator	(412) 921-8778
Linda Klink, P.E.	Project Manager	(412) 921-8650
Terry Rojahn	Field Operations Leader	(412) 921-8857
Sydney Rodgers	Senior UXO Supervisor	(770) 413-0965
Glen Childers	UXO Quality Control	(770) 413-0965
Amy Stanford	Radiation Safety Officer Representative	(803) 641-6328
Lawson Bailey	Project Health Physist	(770) 413-0965
Matthew M. Soltis, CIH, CSP	Manager of Health and Safety	(412) 921-8912
James K. Laffey	Project Health and Safety Officer	(770) 413-0965

Non-Tetra Tech Personnel:	Affiliation/Discipline/Tasks Assigned:	Phone:
TBD		
TBD		
TBD		

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

James K. Laffey

5.0 SUBCONTRACTORS

Tetra Tech may employ a subcontractor in the performance of work covered by this HASP/APP. Any subcontractor participating at work at NAS Brunswick are required to prepare and adhere to safety planning and program documents as appropriate for the activities that they will perform on this project site. In addition, subcontractor personnel will also be required to read and comply with the sections of this Tetra Tech HASP/APP. The subcontractor personnel entering the site must sign the Site-Specific Training Documentation form included in the APP. Subcontractor personnel must comply with the applicable 29 CFR §1910.120 training and medical surveillance requirements. Subcontractors are responsible for providing personal protective equipment (PPE) needed to protect personnel as specified by their safety and health planning documents and by this APP, and are directly responsible for assuring the health and safety of their employees. Subcontractors who have not met OSHA training, medical surveillance, and PPE requirements are not permitted to enter areas where exposure to hazardous materials is possible.

This APP and associated HASP shall be rigorously enforced during this field effort. Violators of the HASP will be verbally notified upon first violation, and the violation will be noted by the Tetra Tech SSO in a field logbook. Upon second violation, the violator will be notified in writing, and the Tetra Tech PM and the violator's supervisor will be notified. A third violation will result in a written notification and the violator's eviction from the sites. The written notification will be sent to the human resources development and the SHM.

NOTE: Any violations that are deemed to be serious, intentional, or otherwise egregious will be subject to immediate corrective action, up to and including removal from the site, and will not require adherence to this progressive, three-step disciplinary process.

Personnel will be encouraged to report to the SSO any conditions or practices that they consider detrimental to their health or safety, or those they believe violate applicable health and safety standards. Such reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment are encouraged to bring the matter to the immediate attention of the SSO for resolution. Job site activities presenting danger to life or limb should be stopped immediately and reported to the SSO for resolution.

At least one copy of this APP and the HASP will always be available to site personnel. Each vehicle taken to the job site will contain a copy of the APP and the HASP to ensure quick and easy access by employees. Minor changes in the HASP procedures will be discussed at the beginning of each work day

by the SSO at the daily tailgate safety meeting. Significant HASP revisions must be discussed with the SHM and PM and approved via the HASP amendment form.

6.0 TRAINING

Site personnel who may be exposed to hazardous conditions and who will participate in on site activities are required to meet the training requirements outlined in 29 CFR §1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER). Furthermore, site personnel must satisfy any specialized training requirements that are presented in the AHAs for tasks to be completed under this CTO.

6.1 MANDATORY TRAINING AND CERTIFICATIONS

Tetra Tech personnel qualification and training certification documentation will be obtained by the PM/FOL and included in Appendix 1 of this APP, and a copy maintained on site. Mandatory training and certifications applicable to this project include the following:

- 40 hours of introductory hazardous waste site training prior to performing work at NAS Brunswick.
- 8 hours of refresher training within the past 12 months before being cleared for site work. (Field personnel who have had introductory training more than 12 months prior to site work must complete this training again.)
- 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site personnel operating in a supervisory capacity.
- Specialized operations (UXO) or responsibilities (blood-borne pathogen-first aid) will also require additional training for personnel filling those roles.
- UXO Technicians will carry certificates on their person.

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

In addition to the training/certifications required by the standard above, the radiological training requirements for site personnel working may include the following:

- Radiation awareness training

- Surface contamination monitor (SCM) operations (for appropriate personnel)
- Portable and fixed instrument operations (for appropriate personnel)
- Radiological sampling (for appropriate personnel)
- Project Radiation SOPs

6.2 SITE-SPECIFIC SAFETY AND HEALTH TRAINING

The Tetra Tech SSO will provide site-specific training to Tetra Tech employees who will perform work on this project. This will consist of a brief meeting at the beginning of each day to discuss operations planned for that day and a review of the appropriate AHAs with the planned task participants. Based on field activities, a short meeting may also be held at the end of the day to discuss the operations completed and any problems encountered.

Prior to accessing active work areas of the sites or participating in any intrusive activities, site personnel and visitors will first be required to undergo a site-specific safety and health training session conducted by the SSO, which will include a review of the HASP and signing of the Site-Specific Training Documentation form.

In addition, UXO team members on site will meet or exceed the requirements stated in the Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP) 18 for their respective assignments.

Before on-site activities begin, the Tetra Tech SSO will present a briefing for site personnel who will participate in on-site activities. The following topics will be addressed during the pre-work briefing:

- Names of the SSO and designated alternate
- Site history
- Work tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site
- PPE, including types of respiratory protection to be used for work tasks
- Mandatory training and certification requirements (e.g., HAZWOPER; MEC-specific)
- Environmental surveillance (air monitoring) equipment use and maintenance
- Action levels and situations requiring an upgrade or downgrade of level of protection
- Site control measures including site communications and control zones
- Decontamination procedures
- Emergency communication signals and codes, including incident reporting procedures

- Environmental accident emergency procedures (when contamination spreads beyond exclusion zone)
- Personnel exposure and accident emergency procedures
- Fire and explosion emergency procedures
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before site activities begin are covered during the pre-work briefing by the SSO.

6.3 TRAINING DOCUMENTATION

Figure 6-1 documents the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities. This training documentation identifies personnel who, through record review and attendance of the site-specific training, are cleared for participation in site activities. This document shall be maintained at the site to identify and maintain an active list of trained and cleared site personnel.

6.4 MEDICAL SURVEILLANCE

Site personnel will have had a physical examination that meets the requirements of Tetra Tech's medical surveillance program. Documentation for medical clearances will be maintained in the Tetra Tech Pittsburgh office and made available, as necessary, and will be documented using Figure 6-1 for every employee participating in onsite work activities at the sites.

FIGURE 6-1

SITE-SPECIFIC TRAINING DOCUMENTATION

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

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Emergency response procedures (evacuation/assembly area)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of AHAs
- Stop work authorization and process

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

Name Printed and Signature	Site-Specific	40-Hour	8-Hour Refresher	8-Hour Supervisor	Medical Exam	UXO	RAD

7.0 SAFETY AND HEALTH INSPECTIONS

It is Tetra Tech's internal policy that the job sites involving work for Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MA) are subject to audits by corporate safety staff. Daily site safety inspections shall be conducted by the Tetra Tech SSO during this field effort to ensure safe work areas and compliance with the HASP.

The items noted during field audits will be communicated to the Tetra Tech SHM who maintains a corrective/preventive action database. Responsibility for resolving each item noted during these audits is assigned and tracked through resolution. Results from field audits are also regularly communicated throughout Tetra Tech through training and electronic means as a method of continuous program improvement.

8.0 SAFETY HEALTH EXPECTATIONS AND COMPLIANCE

It is the goal of Tetra Tech to continue excellent safety performance on the NAVFAC MA contracts to support the Navy in their safety efforts. Specifically, Tetra Tech will perform the work in a manner that is consistent with the Zero Incident philosophy. In accordance with this philosophy, it is our stated goal to plan and perform the work in a manner that integrates safety and health considerations so that it is accomplished without experiencing any worker injuries or illnesses, environmental releases/impacts, or property damage events.

In addition to the line and staff management functions described in this APP and the accompanying HASP, each individual performing work under this contract has the responsibility for their own personal health and safety, as well as assisting in assuring the health and safety of their co-workers. This element is also the first one listed in our corporate Health and Safety Policy Statement, which requires that "each employee recognize a *personal* responsibility for their own health and safety and for actions that affect the health and safety of fellow employees." This employee responsibility includes observing specified health and safety requirements and communicating with the designated SSO on matters such as the effectiveness of specified control measures, identification of new potential hazards, and other related issues.

An employee's failure to adhere to the requirements of this APP and HASP or to observe specified safety requirements and restrictions or to properly use identified protective equipment may lead to injury or

illness. As a result, deviation from safety and health procedures is not tolerated. Failure to comply with health and safety procedures and requirements will lead to reprimand up to and including dismissal. Health and safety-related information will be communicated to employees through meetings, postings, written communications, and reporting of hazards.

9.0 INCIDENT REPORTING

Accidents or incidents as well as near-miss events are to be reported using the Tetra Tech incident reporting process and forms. See Section 15.0 for detailed information on incident reporting. The SHM is responsible for assuring that the incidents and serious near-miss events are adequately investigated and is also responsible for collecting, tracking, and trending incident data (e.g., recordable cases, employee hours worked, etc.). Accidents involving near misses, injuries, or illnesses must be immediately reported to the PM and the SHM, and documented on the Tetra Tech Incident Report (in the HASP). Forms must be reviewed by the PM and the SSO.

Hazardous work conditions or unsafe work practices will be corrected in a timely manner, both in the field and in the office. Upon discovery of an unsafe condition at a field site, the degree of hazard must be assessed and action may range from complete shutdown of the operation to phased correction. The Tetra Tech employees working on this project will have "Stop Work" authority in the event that a potentially serious action or condition is observed. Tetra Tech will shut down a project during which life threatening, severe environmental impact, or significant equipment or property damage conditions may exist. Employees shall follow specific information for emergency evacuation and PPE usage as described in this APP and associated HASP. The PM and Navy RPM must be contacted regarding each incident.

10.0 MEDICAL SUPPORT

As required by EM 385-1-1, Tetra Tech will ensure that a minimum of two people have current certifications in CPR, First Aid, and Blood-borne Pathogens. The two people with current training are the Senior UXO Supervisor (SUXOS) and the SSO. Other than rendering basic CPR and First Aid, these employees are not expected to perform emergency medical duties. However, they are authorized to perform emergency rescue or other duties up to the level of their training.

Emergency medical assistance will be acquired from non-Navy sources. The closest hospital to the site is Mid-Coast Hospital. Directions to this hospital are included in the HASP, as well as contact numbers for both the hospital and ambulance services. Tetra Tech personnel are instructed to perform a drive-by of the nearest hospital to ensure that it is accessible and available and that the most efficient route is well mapped.

11.0 PERSONAL PROTECTION REQUIREMENTS

The levels of personal protection to be used for work tasks at the NAS Brunswick site have been selected based on the nature of the planned work activities and on the known or anticipated hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrixes. Specific PPE selected for this project is listed, by task, in the AHAs located in Section 14.0 of this APP.

PPE is selected by the SSO when writing the APP and HASP, and is confirmed through a rigorous review process by the Tetra Tech SHM. To assure proper PPE has been selected, both the physical and chemical hazards present at the job site are taken into account in both developing and reviewing safety-related documents. In lieu of a separate hazard assessment document being developed by Tetra Tech for Navy field efforts, the signatures of the SHM and the SSO on the Signature Page of this APP constitute approval of the hazard assessment contained in the HASP.

The anticipated levels of protection selected for use by field personnel during site activities is Level D. If site conditions or the results of air monitoring performed during site activities warrant a higher level of protection, the field personnel will withdraw from the site, immediately notify the Tetra Tech SSO, and obtain further instructions.

PPE levels can be upgraded or downgraded based on a change in site conditions or investigation findings. When a significant change in site conditions occurs, hazards will be reassessed. Some indicators of the need for reassessment are discussed in Section 15.0.

PPE has been selected based on the results of task-specific hazard assessments. Through the completion of employee training (e.g., introductory 40-hour hazardous waste training, annual refresher training, etc.), Tetra Tech employees have been informed of the proper selection, use, and care of PPE items provided to them. After PPE is provided to an employee, the responsibility for using and caring for it appropriately is the responsibility of that employee. The SSO is responsible for assuring that these

responsibilities are fulfilled through daily observations and work area inspections at the sites. The SSC is also responsible for assuring that appropriate and adequate supplies of PPE are maintained such that they are readily available for issuance/replacement and in a clean and sanitary manner and location. The site personnel will use the procedures presented in Section 15.0 to obtain optimum performance from PPE.

12.0 APPLICABLE SITE SPECIFIC PLANS, PROGRAMS AND PROCEDURES

Listed below are potential site-specific plans and procedures that may be applicable to this Navy field effort. The required plans and safety procedures are included in the HASP, APP, or as attachments to this APP.

- ☐ Layout Plan
- ☒ Emergency Response Plan
- ☐ Spill Plan
- ☒ Firefighting Plan
- ☒ Posting of Emergency Telephone Numbers
- ☐ Wildfire Prevention Plan
- ☒ Man Overboard – Abandon Ship
- ☒ Hazard Communication Program
- ☐ Respiratory Protection Plan
- ☒ Health Hazard Control Program
- ☐ Lead Abatement Plan
- ☐ Asbestos Abatement Plan
- ☐ Abrasive Blasting Plan
- ☐ Confined Space Entry Plan
- ☐ Hazardous Energy Control Plan
- ☐ Critical Lift Procedure
- ☐ Contingency Plan for Severe Weather
- ☐ Access and Haul Road Plan
- ☐ Demolition Plan (engineering and asbestos surveys)
- ☐ Emergency Rescue (tunneling)
- ☐ Underground Construction Fire Prevention and Protection Plan
- ☐ Compressed Air Plan
- ☐ Formwork and Shoring Erection and Removal Plan
- ☐ Jacking Plan (lift) Slab Plan
- ☒ Health and Safety Plan
- ☐ Blasting Plan
- ☐ Diving Plan
- ☐ Prevention of Alcohol and Drug Abuse
- ☐ Fall Protection Plan
- ☐ Steel Erection Plan
- ☐ Night Operations Lighting Plan

- ☐ Site Sanitation Plan
- ☐ Fire Prevention Plan

13.0 CONTRACTOR (TETRA TECH) INFORMATION

Tetra Tech's HASP must accompany this APP on job sites. The HASP contains information specific to the NAS Brunswick effort and provides requirements that employees must follow to ensure that their activities are carried out in accordance with both OSHA and applicable EM 385-1-1 requirements. Compliance with the HASP by Tetra Tech will be the means used to meet the requirements outlined in this APP.

Additionally, site-specific AHAs (Section 14.0) have been developed that comply with OSHA requirements and EM 385-1-1 requirements. By adhering to requirements specified in the AHAs, work will be performed on site in a safe manner. Minor changes to AHAs based on actual site conditions are permitted as necessary and applicable by the SSO in the field. Major changes to AHAs, such as Scope of Work changes, must be documented on a revised AHA forms and are subject to additional review by the Tetra Tech SHM.

14.0 SITE-SPECIFIC HAZARDS AND CONTROLS

Detailed task-specific hazards and controls are provided in the AHAs attached to this APP. Table 1 details the AHAs for the UXO activities being provided in support of the NAS Brunswick field activities.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Mobilization/Demobilization **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Mobilization/Demobilization: Assembling, packing, unpacking equipment and supplies Performing a Jobsite Hazard Evaluation and initial/exit inspections of the intended work areas. Performing initial clearance of travel pathways (foot/vehicular).	1. Minor cuts, abrasions, or contusions handling equipment and tools	1. Wear cut-resistant gloves when handling items with sharp or rough edges.
	2. Heavy lifting (muscle strains and pulls)	2. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on object. Lift with legs not back, obtain help when needed to lift large, bulky, or heavy items).
	3. Vehicular traffic at the work site	3. Locate vehicle and equipment staging areas. Inform site personnel of equipment areas and of their responsibility to stay clear of moving vehicles. Observe designated and marked travel pathways. Wear safety vests when activities involve encroaching on active traffic ways.
	4. Intermittent high noise levels	4. Although not considered a highly probable event, based on the anticipated activities, the use of hearing protection may occasionally be required (at the onsite SSO's/UXOS's discretion). The SSO or the SUXOS will observe the following: • Available data or monitoring results collected from similar operations and/or collected during this activity. • Use of hearing protection within an established distance from an operation potentially generating excessive noise levels until these levels can be quantified. For instance, during the operation of heavy equipment (excavator) typical site control boundary will be the length of the boom/bucket plus 10- feet. This is a sufficient distance to remove personnel from excessive noise levels. Inside this boundary personnel will wear hearing protection. • Employees may utilize the following general rule of thumb to help make these determinations: *If noise levels are such that a worker must raise their voice to communicate with someone who is within arm's reach (approximately 2 feet) of them, excessive noise levels are being approached and hearing protection is required.* • Hearing protection will consist of either ear muffs or ear plugs that have a Noise Reduction Rate (NRR) of at least 25 decibels (dB).
	5. Slip/trip/fall hazards	5. Implement and maintain good housekeeping practices throughout work areas. Preview walking/working areas and maintain them to identify and avoid when possible slipping/tripping hazards. Preview work locations for unstable/uneven terrain.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Mobilization/Demobilization **ANALYZED BY/DATE: J. Laffey 08/10**

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Hand tools (dollies, hand carts, hand knives, shovels, etc.)	Visual inspection of hand tools prior to use by user. The Senior UXO Supervisor (SUXOS) is to perform regular inspections for housekeeping issues and surveys of operational areas to insure compliance with the HASP.	None required.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Vegetation Clearance **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Site Preparation/ Vegetation Clearance	1. Brush clearing equipment	1. Power equipment will be inspected prior to use in accordance with operating instructions. Equipment must be operated by knowledgeable field personnel. The SUXOS is responsible to identify the area to be cleared and the means to clear it. Prior to the start of clearing and grubbing the equipment to be used will be: • Using the Hand and Power Tool Inspection Checklist provided in Attachment VII prior to beginning work. • Only manufacturer approved parts may be used in repair of site equipment. • Only personnel directly supporting the clearance activity will remain in the area, others will stay at least 50-100 feet away from the point of operation. • Site personnel will be instructed in the location and operation of the emergency shut off devices. • Secure all loose clothing articles to avoid possible entanglement. If hand tools (brush hooks, machetes, etc.) are used to clear brush and small trees the following precautions should be followed: • Inspect handles are they in good condition (no cracks, splinters, loose heads/cutting apparatus. • Check cutting tools edges all blades should be sharp without nicks or gouges in the blade. • All hand tools (brush hooks, machetes, etc.) should be kept in a sheath when not in use. • A 10-foot perimeter will be established around areas where brush clearing is being conducted.
	2. Natural hazards • Insect/animal bites	2. Tape up joint between the bottom of pants legs and top of work boot with duct tape. Apply insect repellants containing at least 10 percent DEET. Follow manufacturer's label instructions for proper application and re-application. Perform close body inspections at the end of each day to detect/remove any insects. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.
	• Inclement weather	If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." If no additional lightning and/or thunder is noted within this 30 minutes, work may resume at the SSO's/SUXOS's direction. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. Lightning threat detection will be coordinated within NAS Brunswick's existing systems.
	3. MEC/MPPEH Hazards	3. MEC/MPPEH operations will be conducted by trained UXO Technicians. Non-UXO personnel will be clear of the area during initial surveys and intrusive investigation activities. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. Magnetometers will be tested using inert MEC/surrogates similar in size to suspected target anomalies. Any MEC/MPPEH items on the surface and near surface that has been determined to be safe to move, may be moved for later disposal, or disposed of using BIP procedures. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Vegetation Clearance

ANALYZED BY/DATE: J. Laffey 08/10

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
		• If MEC is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. This identification and the exact location will be recorded in the logbook. • Any suspect MEC/MPPEH item discovered during UXO Surface Survey operations which has been determined safe to move, may be moved to a designated holding area for later disposal, or treated using BIP procedures as stated in the Work Plan and ESS. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. • An inventory will be maintained by the SUXOS with locations and descriptions for suspect MEC/MPPEH discovered during this operation, and the Navy RPM will be provided an inventory update on a daily basis.
	4. Strains/sprains from heavy or improper lifting	4. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, obtain help when needed to lift large, bulky, or heavy items).
	5. Slip/trip/fall hazards	5. Implement and maintain good housekeeping practices throughout work areas. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. Preview work locations for unstable/uneven terrain.
	6. Chemical exposure:	6. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. Area wetting techniques will be employed if significant dust generation occurs. Exposure to contaminants is most likely to occur through incidental ingestion of contaminated water, or hand-to-mouth contact during field activities. For this reason, PPE and basic hygiene practices (washing face and hands before leaving site) will be the principal methods for minimizing exposures. The signs and symptoms of exposure for these substances are summarized in HASP Section 6.0. Potential exposure concerns to the COCs may also occur through ingesting or coming into direct skin contact with contaminated media. The likelihood of worker exposure concerns through these two routes are also considered very unlikely, provided that workers follow good personal hygiene and standard good sample collection/sample handling practices, and wear appropriate PPE as specified in this HASP. • Examples of onsite practices that are to be observed that will protect workers from exposure via ingestion or skin contact include the following: • No hand-to-mouth activities on site (eating, drinking, smoking, etc.) • Washing hands upon leaving the work area and prior to performing any hand to mouth activities. • Wearing surgeon's-style gloves whenever handling potentially-contaminated media, including soils, hand tools, and MEC.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Vegetation Clearance **ANALYZED BY/DATE: J. Laffey 08/10**

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Personal Protective Equipment: **Minimum**: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes. **Optional items**: Hearing protection at SSO/SUXOS discretion, Chainsaw Chaps and Loggers helmet with full faceshield (when operating chainsaws and handheld brushcutters) High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used. **HTRW**: none	PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the SSO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities. Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: UXO Detector-aided survey and Time Critical Removal Action **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
UXO Survey and Time Critical Removal Action of surface and sub-surface MEC/MPPEH	1. MEC/MPPEH Hazards	1. MEC/MPPEH survey and clearance will be conducted by trained UXO Technicians. Non-UXO personnel will be escorted while in the area of concern. Exclusion zone distances will be defined based on those specified in the Work Plan. Operations within the safe separation distance for team operations will immediately stop if MEC/MPPEH is discovered and UXO Technicians will secure the area. All non-UXO personnel will leave the area. If MEC/MPPEH is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. This identification and the exact location will be recorded in the logbook. • Any suspect MEC/MPPEH item discovered during UXO Surface Survey operations which has been determined to be safe to move, may be moved to a designated holding area for later disposal, or treated using BIP procedures as stated in the Work Plan and ESS. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. An inventory will be maintained by the SUXOS with locations and descriptions for suspect MEC/MPPEH discovered during this operation, and the Navy RPM will be provided an inventory update on a daily basis
	2. Insect/animal bites	2. Tape up joint between bottoms of pant legs and top of work boot with duct tape. Apply insect repellants containing at least 10 percent DEET. Follow manufacturer's label instructions for proper application and re-application. Perform close body inspections at the end of each day to detect/remove any insects. If walking through high grass or brush areas, wear snake chaps and avoid approaching or disturbing potential nesting areas.
	3. Inclement weather	3. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." If no additional lightning and/or thunder is noted within this 30 minutes, work may resume at the SSO's/SUXOS' direction. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. Lightning threat detection will be coordinated within NAS Brunswick's existing systems.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: UXO Detector-aided survey and Time Critical Removal Action **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	4.Slips/Trips/Fall Hazards	4. Practice good housekeeping to the extent possible and conduct the following: • Maintain clear walking and working areas. • Eliminate, when possible, any debris and rutted areas that may create a tripping hazard. • Remaining hazards should be pointed out to the UXO Technicians. • Personnel will return the site to a neat and orderly condition prior to leaving the site. • Exit and access pathways will be maintained free of obstructions.
	5. Chemical contaminants, MC contaminants, and/or decontamination fluids	5. Exposure to potential site contaminants during this activity is unlikely given the nature of the work and the limited contact with potentially contaminated media. The following precautionary procedures will be implemented: • Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods will be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to observed airborne dusts. • Use proper protective equipment and good hygiene practices to minimize contact with site contaminants and hazardous decontamination fluids. Obtain manufacturer's MSDS for any decontamination fluids used on-site. These must be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDS. All chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication section of the Health and Safety Guidance Manual (Section 5). • Decontaminate all equipment and supplies between sampling and prior to leaving the site.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: UXO Detector-aided survey and Time Critical Removal Action **ANALYZED BY/DATE: J. Laffey 08/10**

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Personal Protective Equipment: **Minimum:** • Steel toe boots, hard hats, and safety impact eye protection (when in active heavy vehicle operation areas or when handling heavy boxes and/or containers) • Work gloves • Work clothes **Optional items:** • Hearing protection at SSO/SUXOS's discretion • High-visibility vests when near active traffic areas. **Other equipment:** • For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used. • Geophysical survey equipment and magnetometers **HTRW:** none	Initial PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the SUXOS through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities. Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Exploratory Trenching **ANALYZED BY/DATE: J. Laffey 06/09**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
UXO investigation/ clearance during trenching – identifying MEC/MPPEH and other munitions and non-munitions related debris during trenching operations. As part of this activity, excavator will be used to remove and spread soil for survey and clearance. MEC/MPPEH will be removed for later treatment or treated using BIP procedures. Radiological Screening will occur once the soil has been declared free of MEC	1. Injury due to contact with operating/moving heavy equipment (excavator). These include the following potential hazards: • Struck by • Overhead hazards • Eye injury • Foot injury Intermittent noise	1. Be aware of safe work zones and use designated routes of approach. Personnel will not approach operating excavators closer than at least the length of the fully extended boom plus 5 feet with a minimum distance of 25 feet from the point of operation. If it is necessary to screen material in the excavator bucket, the excavator operator will **FIRST** fully lower the bucket at a location of at least 4 feet from the edge of the excavation, and shut down the excavator vehicle controls. Only authorized and essential personnel will be permitted in the soil excavation area. • Heavy equipment such as the excavator and will be equipped with movement warning systems (audible and/or visual). • Wear safety vest when working near heavy equipment. • Hard hats, safety impact eye protection, and steel toe safety footwear must be worn in areas where heavy equipment is actively operating. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used. • Hearing protection at the SSO's/SUXOS' discretion in accordance with the following general rule of thumb: *If noise levels are such that a worker must raise their voice to communicate with someone who is within arm's reach (approximately 2 feet) of them. excessive noise levels are being approached and hearing protection is required.* Hearing protection will consist of ear muffs or ear plugs that have an NRR of at least 25 dB

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Exploratory Trenching **ANALYZED BY/DATE: J. Laffey 06/09**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	2. MEC/UXO Hazards	2. MEC/UXO clearance operations will be conducted by trained UXO Technicians. Non-UXO personnel will be escorted while in the area of concern. The excavation team will be accompanied by a UXO Technician II or higher during all fieldwork and intrusive operations. Exclusion zone distances will be defined based on those specified in the Work Plan and the ESS. Before each phase of excavation begins, the UXO Technician will conduct a visual survey for ordnance at each new dig depth to ensure the surface is free of MEC. Operations will immediately stop if MEC is discovered and UXO Technicians will secure the area. All non-UXO personnel will leave the area. If MEC/UXO is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. This identification and the exact location will be recorded in the logbook. • Suspect MEC/MPPEH items determined to be safe to move during UXO Surface Survey operations may be moved to the designated holding area at Site 12 EOD for later disposal, or treated using BIP procedures as stated in the Work Plan and ESS. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. An inventory will be maintained by the SUXOS with locations and descriptions for suspect MEC/MPPEH discovered during this operation, and the Navy RPM will be provided an inventory update on a daily basis
	3. Radiation	3. Radiological screening will only be performed on surface areas after the area is cleared of MEC by the UXO Technician. • Static measurements will be taken to determine ambient background radiation levels. • The screening action level is twice the established background and not in excess of 20 µR/hr, whichever is lower. • Debris will be flagged and identified so radiological investigation can be performed. • A preliminary surface scan will be conducted. • If surface readings exceed 500 µR/hr, and alternate location will be used. • Positive control of any identified radioactive material will be maintained at all times. The material will be controlled during field activities and stored in a locked location when field activities are not occurring. • Personnel will be monitored periodically and upon exiting the work area. • Tools and equipment will be periodically monitored and unconditional release surveys will be performed prior to removal from work area • Screened soil with radiation levels exceeding the action level will be packaged in a 55-gallon drum and controlled as radioactive waste. • Procedures established in the Radiation Protection Plan and in Radiological Standard Operating Procedures (SOPs) found in Attachment II will be followed

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Exploratory Trenching **ANALYZED BY/DATE: J. Laffey 06/09**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	4. Insect/animal bites	4. Tape up joint between bottoms of pant legs and top of work boot with duct tape. Apply insect repellants containing at least 10 percent DEET. Follow manufacturer's label instructions for proper application and re-application. Perform close body inspections at the end of each day to detect/remove any insects. If walking through high grass or brush areas, wear snake chaps and avoid approaching or disturbing potential nesting areas.
	5. Inclement weather	5. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." If no additional lightning and/or thunder is noted within this 30 minutes, work may resume at the SSO's/SUXOS' direction. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. Lightning threat detection will be coordinated within NAS Brunswick's existing systems.
	6. Slips/Trips/Fall Hazards	6. Practice good housekeeping to the extent possible and conduct the following: • Maintain clear walking and working areas. • Eliminate, when possible, any debris and rutted areas that may create a tripping hazard. • Remaining hazards should be pointed out to the UXO Technicians. • Personnel will return the site to a neat and orderly condition prior to leaving the site. • Exit and access pathways will be maintained free of obstructions. • Personnel will remain 4 feet or more away from the edges of excavations • Personnel will not enter any excavation 4 feet or deeper without approved shoring or sloping. • If excavation holes are to be left open overnight, they must be barricaded.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Exploratory Trenching **ANALYZED BY/DATE: J. Laffey 06/09**

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Personal Protective Equipment: **Minimum**: • Steel toe boots, hard hats, and safety impact eye protection (when in active heavy vehicle operation areas or when handling heavy boxes and/or containers) • Shielding on excavating/earth moving equipment. • Work gloves • Work clothes • Thermoluminescent dosimeters for personnel involved with radiological work **Optional items**: Hearing protection at SSO/SUXOS discretion High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.	Initial PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the SUXOS through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities. Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task. In addition to the training/certifications required by the standard above, the radiological training requirements for site personnel working may include the following: • Radiation awareness training • Surface contamination monitor (SCM) operations (for appropriate personnel) • Portable and fixed instrument operations (for appropriate personnel) • Radiological sampling (for appropriate personnel) • Project Radiation SOPs
HTRW: Radium contamination associated with radioluminescent dials and gages.		

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Handling of Explosives and Explosive Treatment of MEC **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
This activity includes receipt, storage, and transfer of explosives and explosive components.	1. Explosive handling	1. Only UXO Technicians will be permitted to handle and/or transport explosives and detonators. Only UXO Technicians will be permitted to load and detonate explosive materials per this scope of work.
Explosive materials to be handled as part of this activity include: • Helix 1.1 lb bars (Non explosive until mixed) • Non EI with blasting caps.	2. Initiating explosions	2. Segregation - Strict adherence will be practiced with regard to the segregation of initiating devices (cord and detonators) from the explosives during storage and transport. Non-essential personnel will be restricted from operating area.
	3. Storage Precautions	3. The following requirements shall be adhered to when storing explosives: • Store explosives and explosives devices in an authorized storage facility (e.g., secured magazine repository, vault, cubicle, room, or separate facility). • Assure that each container of explosives is properly labeled. • Segregate explosives from detonating devices, incompatible materials. • Environmental conditions within the storage facility shall be maintained as not to subject the explosives to excessive heat and/or cold. Humidity levels above 60% will prevent static electrical accumulation and discharge. If humidity is below 60%, personnel will establish a ground prior to handling explosives. • Stacks of explosives shall be arranged so that air freely circulates to all parts of the stack. • Pallets or appropriate cribbing shall be used to ensure that containers are not stacked directly on the magazine floor. • Maintain a running inventory. • Inspect storage locations and explosives containers at least once a week to ensure continued safe storage. • Storage buildings should be kept clear of combustible or flammable storage/debris at least 25-feet surrounding the perimeter. • If lights are used within the building they shall be intrinsically safe configuration. • All temporary storage facilities will be properly grounded to provide protection against electrical hazards. • Appropriate signage indicating storage content as well as safety signs (NO SMOKING, NO OPEN FLAMES OR SPARK PRODUCING DEVICES) will be placed surrounding the storage.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Handling of Explosives and Explosive Treatment of MEC **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	4. Hazard communication/ Emergency action procedures	4. Hazard Communication/Emergency Action Procedures – Hazard communication will be an integral part of explosive handling to alert transport workers and emergency response personnel of the presence of explosives, extensive hazard communication requirements apply to explosives. These include identifying materials on transport documents, providing specific emergency response information with the transport document and a 24-hour telephone number where more detailed information may be obtained, markings and labels on packaging as well as placarding of the transport units. Each employee is required to be trained on the hazards of materials they handle and their specific responsibilities. • Toxicity - Explosives materials, explosives components (additives or adhesives), and materials such as organic solvents used in the explosives processing procedure that can be toxic when inhaled, ingested, or absorbed through the skin. The most frequently reported effect from working with explosives is a skin rash resulting from skin contact with explosives materials, or with solvents and adhesives used with explosives operations. The following general precautions should be used to: – Know the health hazard and controls before beginning operations. Read your MSDS. If you have questions ask the SUXOS and/or the UXOSO for clarification. – Handle materials in a well-ventilated area; where this is not possible local exhaust ventilation is preferred. – Avoid skin contact; use surgeon's gloves when necessary to avoid direct skin contact and absorption. Cotton coveralls are also recommended. The UXOSO may recommend additional PPE based on site specific conditions. – Practice good work/personal hygiene. Wash before eating, drinking, or smoking (hand to mouth activities), or using toilet facilities; end-of-shift showers
	5. Transportation	5. The motor carrier requirements in 49 CFR 397 include requirements for routing of Explosion Hazard Class Division 1.1, 1.2, and 1.3 explosives away from population centers as well as when these materials should be moved (when traffic is at its lowest point). These standards require that vehicles be operated in accordance with a route plan prepared by the carrier with the intention of avoiding populated areas and critical infrastructure. The regulation also acknowledges that these areas cannot always be avoided and permits reasonable exceptions at the discretion of the carrier or driver. Drivers operating explosive transport vehicles are required to have a Drivers License within their State of Origin with CDL Qualifications.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Handling of Explosives and Explosive Treatment of MEC **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	6. Strains/sprains from heavy or improper lifting	6. Maintain clear walking working areas and good housekeeping to the extent possible. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure clear path of travel, good grasp on object, lift with legs not back, obtain help when needed to lift large, bulky, or heavy items).
	7. Electrical storms/ Inclement weather (high winds, heavy rains, etc.)	7. It will be the responsibility of the UXOSO to acquire weather information each time explosives and detonating materials are transported or handled per this scope. If electrical storms or inclement weather are within the area as determined through local forecasting or weather alerts issued by NAS Brunswick, the SUXOS/UXOSO will suspend all explosive handling activities. The 30-30 rule shall be applied which is - If a time interval of 30 seconds or less is between lightning and its thunder go inside and stay inside for at least 30-minutes. If no additional lightning and/or thunder is noted within this 30-minutes work may resume at the SUXOS/UXOSO's direction. All lightning threat detection will be coordinated within NAS Brunswick existing systems.
UXO Intrusive Activities - This activity includes hand excavation of anomalies identified during the magnetometer and geophysical surveys and treatment of suspect MEC. Excavation will proceed to the point necessary to determine - If the anomaly has a fuse - If the anomaly has energetic material - If the anomaly can be moved for later treatment of MEC If the material in question is a fused MEC then it will be detonated in place using explosive charges.	8. MEC/UXO Hazards	8. UXO Intrusive Activities and treatment- During these activities only trained UXO Technicians will be permitted within the areas of concern and established safety arcs created by the UXO Technician. Once the target anomalies have been unearthed, the UXO Technician or SUXOS will determine treatment methods. If it is to be blown in place the following provisions will apply: • Target anomalies within the closest proximity will be treated first (clearing access paths to within the area of concern. • UXO Technicians will determine the charge size, load the hole, string detonation cord. An air gap will be maintained between the cord and slapper blasting control box. These wires shall be insulated from any and all extraneous electrical discharge as well as physical damage. • At this time the UXO Technician may utilize other (Non-UXO) personnel within cleared pathways to transport sand bags that will serve as cover during the treatment of fuzed MEC. • The SUXOS will walk over the area to insure the load and associated engineering controls (sand bags, soil cover, windows cover, etc.) are satisfactory. • Once approved the SUXOS will notify NAS Brunswick POC of the time of the planned detonation. The SUXOS will sound a warning signal consisting of: • **(1) WARNING SIGNAL** - a one-minute series of long audible signals 5 minutes prior to blast signal;

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Handling of Explosives and Explosive Treatment of MEC **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
		(2) BLAST SIGNAL - a series of short audible signals 1minute prior to the shot; and o UXO Technician will initiate detonation. - No persons will enter the area until all dusts settle and the UXO Technician or Technicians perform a detector aided sweep. The purpose is to insure all of the fuzed MEC has been eliminated as well as the explosives used in the treatment process. **(3) ALL CLEAR SIGNAL** - a prolonged audible signal following the inspection of blast area. The safety signals shall be given by use of a compressed air whistle, a horn, or equivalent means, and shall be clearly audible at the most distant point in the blast area. It should be noted that several MEC items may be treated at the same time.

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Hand Tools - Shovels, Bars, buckets, brushes, etc.	SUXOS to inspect each vehicle prior to permitting site access using Equipment Inspection Checklist.	Equipment operators must demonstrate experience in proper vehicle/equipment operations.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Handling of Explosives and Explosive Treatment of MEC **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Personal Protective Equipment: **Minimum**: • Soft sole shoes without metal fasteners (will not interfere with metal detectors/magnetometers) • Coveralls (No metal fasteners) • Surgeons glove for handling explosives • No outer or inner garments having static-electricity-generating characteristics. • Work gloves for handling sand bags **Optional items**: high visibility vests **HTRW**: Explosives, detonating devices, MEC/UXO materials.	Initial PPE inspection performed by UXOSO. Ongoing (prior to each use) inspections will be the responsibility of PPE users.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees 40 hour HAZWOPER training, which is to be verified by the SUXOS/UXOSO through initial training documentation and review prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities. Personnel who will be handling military munitions will not wear outer or inner garments having static-electricity-generating characteristics. Materials made of 100-percent polyester, nylon, silk, and wool are highly static producing. Refer to DA Pam 385-64 for more information regarding non-static-producing clothing.

TABLE 1

NAS BRUNSWICK ACTIVITY HAZARD ANALYSIS

ACTIVITY: Treatment and Disposal Operations **ANALYZED BY/DATE: J. Laffey 08/10**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Treatment and Disposal Operations This activity will include: **Decontamination:** The decontamination and disposal of explosive residue from metallic debris left behind as a result of the detonation treatment. This would include the collection of Non-energetic MEC related debris prior to disposal.	1. Minor cuts, abrasions or contusions handling equipment and tools	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure clear path of travel, good grasp on object, lift with legs not back, obtain help when needed to lift large, bulky, or heavy items). See Section 9.4 for addition instruction concerning proper lifting techniques.
	2. Heavy lifting (muscle strains and pulls)	2. Wear cut-resistant gloves when handling items with sharp or rough edges.
	3. Vehicular traffic when moving equipment to the work site	3. Designate/demarcate vehicle and satellite storage pre/post treatment locations, equipment staging areas.

15.0 HEALTH AND SAFETY PLAN

This APP is Attachment I to the site-specific HASP and this document as a whole (HASP and APP) will be submitted to the Navy Environmental Health Center (NEHC) for review and comment.

16.0 REFERENCES

United States Army Corps of Engineers (USACE). 2003. Engineer Manual (EM) 385-1-1, Safety and Health Requirements Manual. It is available online at:
http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/entire.pdf

ATTACHMENTS TO ACCIDENT PREVENTION PLAN

Attachment 1
Employee training/qualifications to be attached by PM/FOL
(40-Hour HAZWOPER Certificates; 8-Hour HAZWOPER Refresher Certificates; First Aid/CPR Certificates; Employee Resumes as required)

ATTACHMENT II

RADIOLOGICAL SCREENING FOR SOIL INVESTIGATION

RADIOLOGICAL PROTECTION PLAN

STANDARD OPERATING PROCEDURES

Radiological Health & Safety Screening for Soil Investigations
NAS Brunswick, Brunswick, Maine
Quarry Area of Concern

Purpose: This document provides guidance for the methods that will be used for radiological screening of excavated material during test pit activities at the Quarry Area of Concern (QAC). The primary concern is radium contamination (Ra-226) associated with radioluminescent dials and gauges. These screening activities are being performed to insure personnel safety. No regulatory determinations will be made from the screening data. The screenings are performed in support of the Sampling and Analysis Plan for Exploratory Research MEC Investigation of Quarry Area.

Scope: Test pits will be installed at the Quarry Area (QA) The QA test pits are being installed to investigate the potential for Munitions and Explosives of Concern (MEC) under the Military Munitions Response Program. The test pits will be installed using a narrow bucket backhoe. They may be up to seven to ten feet deep and ten feet long. The soil will be excavated in six inch lifts.

These activities are being performed under Tetra Tech EC, Inc.'s Nuclear Regulatory Commission Materials License number 29-31396-01. The Radiation Protection Plan and supporting Standard Operating Procedures (SOP) are located in Appendix 5 of the Quarry Area Health and Safety Plan.

Screening Methods

[Note: In the Quarry Area of Concern, no radiological screening will be performed on surface areas until area clearance has been granted by the UXO Technician.

1. A reference background area adjacent to the QA will be identified. Static measurements will be obtained at each location to determine ambient background radiation levels. Surveys will be performed in accordance with (IAW) SOP 1, *Radiation and Contamination Surveys*. The surveys will be performed in areas adjacent to the areas of concern that are not expected to be impacted and are of similar geological characteristics. Ten (10) static measurements will be performed using a Ludlum Model 19 NaI (sodium iodide) gamma scintillation detector (or equivalent). The mean and standard deviation will be calculated and used for comparison in the areas of concern.

2. The expected field conditions indicate that Level D PPE is appropriate. However, if field conditions change, SOP 5, *Radiological Protective Clothing Selection, Monitoring, and Decontamination*, provides instruction for selection of PPE.

3. Non munitions-related metallic debris identified by the UXO Technician during the initial surface survey will be placed in a bag for subsequent screening by the RCT. All locations where this debris is located will be flagged and identified so that surface

radiological investigation can be performed in the event that the debris is deemed to be radioactive material.

4. A preliminary surface scan of the locations proposed for excavation will be performed. The ambient gamma radiation exposure rate will be measured using a portable Ludlum Model 19 NaI gamma scintillation detector (or equivalent). If surface readings in excess of 500 μR/hr are detected, work will stop, the area will be secured and the Radiological Affairs Support Office (RASO) will be notified. Work will not resume until authorized by RASO.

5. As test pits are installed, each bucket of material will be removed and spread over plastic sheeting to a thickness of no more than 6 inches. Individual buckets will not be scanned prior to placement on the plastic. Multiple buckets may be removed before investigation of the material. However, no personnel may approach the excavated soil until cleared for MEC by the UXO technician. The screening action level is twice the established background and not in excess of 20 μR/hr, whichever is lower.

6. The material from the test pits will be investigated in the following sequence.

   a. The UXO technician will evaluate the material for munitions.

   b. Once cleared by the UXO technician, the material will be screened using a Ludlum Model 19 NaI gamma scintillation detector (or equivalent). The screening action level is twice the established background and not in excess of 20 μR/hr, whichever is lower. Screened soil with radiation levels exceeding the action level will be packaged in a 55-gallon drum and controlled as radioactive material. If a device is identified, it will be placed in a poly bag and the bag will be labeled with contact and 30 cm dose level readings and be placed into a separate container than the soil.

   c. The material will be inspected for metal debris. Debris will be surveyed for alpha (α) and beta (β) radiation using a Ludlum Model 2360 survey meter with Ludlum 43-89 detector (or equivalent). If activity above background is detected, transferrable contamination surveys will be performed. These surveys will be performed IAW SOP 1.

   d. If either the fixed or transferrable contamination values exceed the values listed in Table 1, the debris will be packaged and placed in a 55-gallon drum for disposition by the Navy Low Level Radioactive Waste Program. All dirt within 6 inches of the debris location will be removed and placed in a separate 55-gallon drum for disposition. All materials will be secured under the NRC Licensee's control until arrangements can be made to have the LLRW broker characterize and dispose of the LLRW. Debris that is determined to be non-radioactive will be included with the backfill, if practical.

e. If screening does not indicate readings above the action level, the material can be considered clean and the next bucket of material may be processed.

7. Soil sampling activities will be screened in the following manner:

a. All sample locations will be surface scanned prior to commencing sampling operations. If surface readings in excess of the investigation criteria are detected, an alternate location will be used and the location of the elevated readings noted for future reference. If surface readings in excess of 500 μR/hr are detected work will stop, the area will be secured and the Radiological Affairs Support Office (RASO) will be notified. Work will not resume until authorized by RASO.

b. For surface soil samples, soil will be placed in stainless steel mixing bowls. This material will be scanned using a Ludlum model 19. The screening action level is twice the established background and not in excess of 20 μR/hr, whichever is lower.

c. If the action level is exceeded, the sample will be processed for shipment and gamma spectroscopy will be requested. Otherwise the sample will be processed as usual.

d. For DPT cores, the acetate sleeve containing the core will be scanned using a Ludlum model 19. The screening action level is twice the established background and not in excess of 20 μR/hr, whichever is lower.

e. If the action level is exceeded, the sample will be processed for shipment and gamma spectroscopy will be requested. Otherwise the sample will be processed as usual.

8. General area radiation surveys will be performed IAW SOP 1. Radiological dosimetry will be issued to and used by personnel involved in radiological work in accordance with TtEC RPG 2-2, Radiological Monitoring of Individuals and Areas.

9. If radioactive items are identified, the RCT will notify the TtEC Radiation Safety Officer (RSO) who in turn will notify RASO.

10. Positive control of any identified radioactive material will be maintained at all times. The material will be controlled by the RCT during field activities and stored in a locked location when field activities are not occurring.

11. Tools and equipment will be periodically monitored for fixed and transferrable contamination IAW SOP 1 and SOP 6, *Release of Materials and Equipment.* Unconditional release surveys will be performed on tools and equipment prior to removal from the work area.

(CFR) 20.1502. If elevated dose rates or contamination levels are encountered, the need for air sampling will be re-evaluated.

15. Soil samples will be taken IAW the applicable Sampling and Analysis Plans. Samples will be collected, packaged and shipped IAW SOP3, *Sampling Procedures for Radiological Surveys.*

Table 1. Release Limits for Materials and Equipment

Radiation Type	Release Limits[1/] (Fixed) (dpm per 100 cm^2)	Release Limits[1/] (Removable) (dpm per 100 cm^2)
Alpha (α)	100	20
Beta-Gamma (β-γ)	1000	200

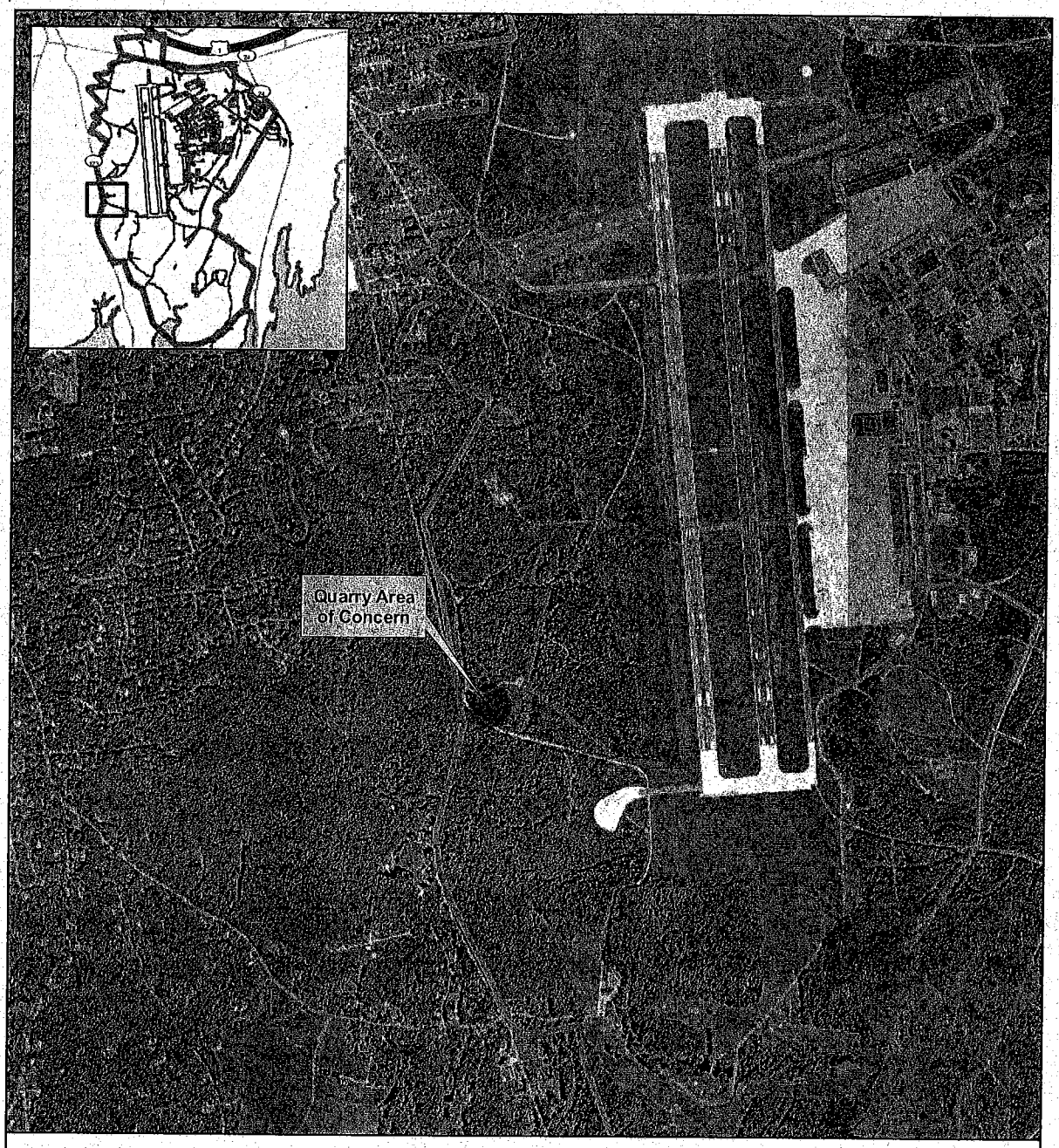
Notes:

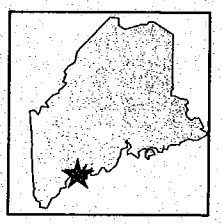
[1/] These limits are based on AEC Regulatory Guide 1.86 (AEC 1974)

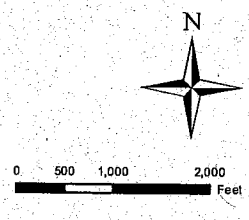
AEC – Atomic Energy Commission

cm^2 – square centimeters

dpm – disintegrations per minute







Legend

- Impacted Sites
- NAS Brunswick

Naval Air Station Brunswick, Maine
Figure 1

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-08-D-8823
CTO NO. 0003

FINAL

RADIATION PROTECTION PLAN

April 26, 2010

DCN: EMAC-8823-0003-0010

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APPENDICES

Appendix A Radiation Protection Plan Acknowledgement Form

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ABBREVIATIONS AND ACRONYMS

ALARA	as low as reasonably achievable
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
CHPM	Corporate Health Physics Manager
DAC	derived air concentration
DOT	U.S. Department of Transportation
EHS	environmental health and safety
HRA	Historical Radiological Assessment
MOU	Memorandum of Understanding
NRC	U.S. Nuclear Regulatory Commission
PjM	Project Manager
PPE	personal protective equipment
QC	quality control
^{226}Ra	Radium
RASO	Radiological Affairs Support Office
RCA	Radiologically Controlled Area
RCT	Radiological Control Technician
RMA	Radioactive Materials Area
RML	Radioactive Material License
RPD	relative percent difference
RPP	Radiological Protection Plan
RSO	Radiation Safety Officer
RSOR	Radiation Safety Officer Representative
RTS	Radiological Task Supervisor
RWP	Radiation Work Permit
SOP	Standard Operating Procedure
SSHP	Site Safety and Health Plan
TEDE	total effective dose equivalent
TIP	Task Initiation Procedure
TtEC	Tetra Tech EC, Inc.
VPESQ	Vice President for Environmental Safety and Quality Services

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1.0 PURPOSE/INTRODUCTION

The purpose of this Radiation Protection Plan (RPP) is to detail Tetra Tech EC, Inc's. (TtEC's) requirements for activities conducted under Radioactive Material License (RML) No. 29-31396-01, issued and subject to regulatory enforcement by the United States Nuclear Regulatory Commission (NRC). The following activities are subject to this RPP: project activities that involve the use and/or handling of licensed by-product, source, and/or special nuclear material (hereafter referred to as radioactive material); tasks with the potential for radioactive material to be present based on available data and historical records; and work in locations posted and controlled because of radioactive material. Project activities will incorporate the requirements within to maintain compliance in parallel with the current version of corporate procedure RP1-1, Radiological Protection Program.

Project activity performance steps are detailed in site-specific Work Plans, Standard Operating Procedures (SOPs), Work Instructions, Task-Specific Plans, etc. (Agencies that may have jurisdiction or an interest in project activities are also identified in such documents.) Project staff tasked to perform assignments involving the presence of radioactive material (e.g., those identified in the applicable portions of Section 2.0) will complete a review of this document and indicate an understanding of all requirements by completing a Radiation Protection Plan Acknowledgement Form (Appendix A).

1.1 POLICY

It is TtEC's policy that work with radioactive material be purposeful and performed in a manner that protects project staff, members of the general public, and the environment. Radiologically oriented work may not begin unless it can be performed in a safe and reliable manner that is compliant with the exposure reduction rules, regulations, and principles described in Section 1.3.

1.2 PROJECT-SPECIFIC RADIATION PROTECTION PLAN

Corporate procedure RP1-1, Radiological Protection Program, provides the foundation for the RPP and its use for any project or activity that involves the possession or use of radioactive materials, including the subsequent potential for exposure to ionizing radiation. Content provided within this RPP reflects corporate policy and provides the guidance needed for project management to execute the scope of work in a safe manner. Site-specific guidance for radiological safety and control is further detailed in SOPs. SOPs are subject to approval by the Radiation Safety Officer (RSO) or designee and authorized for use as indicated on a Radiation Protection Program SOP Crossover Document. This document may be revised separately from the RPP. A current copy for each viable project is available upon request. The RSO is also the company's Corporate Health Physics Manager (CHPM).

1.3 AS LOW AS REASONABLY ACHIEVABLE

Work involving radioactive material and any corresponding exposure to ionizing radiation must be purposeful and performed in a manner sufficient to ensure the protection of staff, members of the public, and the environment. TtEC applies industry recognized principles to radiological work so that exposure to ionizing radiation is maintained in accordance with corporate procedure NLP-01, As Low As Reasonably Achievable (ALARA) Program.

1.4 AUTHORIZATION TO STOP WORK

In accordance with corporate procedure RP1-1, Radiological Protection Program, and as detailed in Section 2.9, employees are authorized to stop work if an unsafe condition exists or safety protocol is being violated, and immediately report the condition to project management.

Work performed under a Radiation Work Permit (RWP) will stop, and the Radiological Affairs Support Office (RASO) will be notified if any of the following atypical work site conditions are encountered:

- An individual total effective dose equivalent (TEDE) exceeding 500 millirems
- The collective TEDE for the job exceeding 1 rem
- Individual airborne exposures exceeding 10 derived air concentration (DAC) hours in a 7-day period
- General area exposure rates exceeding limits of current radiological posting
- Contamination levels exceeding 100 times the limits requiring classification of an area as a Contaminated Area

In cases where the RASO must be notified, the license RSO, with concurrence from the RASO, must approve the RWP prior to restarting work.

1.5 SCOPE OF WORK

The project-specific scope of work involves the following activities:

- Task-specific training of personnel
- Site controls and establishment of work zones at sites with, or having the potential for, radioactive commodities or contaminants
- Handling and management of collected radioactive commodities, radiologically contaminated soil, or other radiologically contaminated material
- Site investigation and remediation including characterization surveys and sampling, excavation, screening for and removal of commodities, and surveys and sampling to document final conditions

1.6 QUALITY CONTROL AND AUDITING

To maintain continued compliance and evaluate overall RPP effectiveness, quality control (QC) measures including self-assessment and management reviews will be used. Formal audits, including those conducted at field projects, will be coordinated and tracked to completion by the RSO as will any need for adjustments to audit frequencies.

1.61 Self-Assessment, Management Reviews, and Audits

A self-assessment and management review of RPP use, as detailed in corporate procedure NLP-08, Radiation Protection Program Audits, will be conducted. Project personnel including the Project Manager (PjM), project Radiation Safety Officer Representative (RSOR), and on-site personnel will support and cooperate with any audit conducted.

1.6.2 Responses and Corrective Actions

Radiological deficiencies must be responded to in a timely fashion. Deficiencies that represent an imminent threat to radiological control or safety (e.g., compromise of procedural protocol, etc.) will be immediately reported to the RSOR, RSO, and PjM or designee(s). Subsequent corrective actions will be tracked to completion by the RSO or designee. Radiological deficiencies, including corrective actions, will be promptly reported by the RSO to the project client (e.g., the Navy; for the purposes of this RPP, Navy means U.S. Department of the Navy, Naval Facilities Engineering Command Southwest; U.S. Department of the Navy, Base Realignment and Closure, Program Management Office; and Naval Sea Systems Command Detachment, RASO). Responses to findings will be submitted to the RSO or designee for review, approval, and final disposition.

1.6.3 Daily Instrumentation Check

As addressed in Section 3.16, survey instruments procured for field use will have proof of current calibrations in accordance with the manufacturers' procedures, employing applicable standards and sources traceable to the National Institute of Standards and Technology. Copies of instrument calibration certificates will be maintained on-site for reference. Instruments will be response-checked daily in accordance with applicable SOPs. (In addition to the manufacturers' instruction manuals, typical project instruments and their performance characteristics are identified in site-specific controlling documents such as a Site-Specific Radiological Work Plan.)

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2.0 RADIATION PROTECTION PERSONNEL

This section details the radiological safety responsibilities vested with key personnel within the project. (Nonradiological safety responsibilities will be detailed in a separate project-specific Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP). Reporting relationships between TtEC support personnel and the client (e.g., the Navy) will be referenced in a site-specific controlling document as well (e.g., Site-specific Radiological Plan).

2.1 VICE PRESIDENT FOR ENVIRONMENTAL SAFETY AND QUALITY SERVICES

The Vice President for Environmental Safety and Quality Services (VPESQ) has overall responsibility for TtEC's safety operations. The VPESQ is responsible for:

- Ensuring proper maintenance of the RPP consistent with applicable regulatory mandates, TtEC corporate policy, and recognized industry practice
- Establishing and maintaining all necessary management oversight specific to the RPP
- Implementing a management review process to ensure applicable use of RPP requirements

2.2 LICENSE RADIATION SAFETY OFFICER (CORPORATE HEALTH PHYSICS MANAGER)

The CHPM (also referred to as the RSO) is appointed by the VPESQ as the senior health physicist and the Health Physics Resource Manager for TtEC. The CHPM is responsible for:

- Reviewing and making recommended revisions to:

The RPP, RML procedures, radiation protection guidelines, and supporting documents
Project plans involving the use or handling of radioactive materials, or access to areas of radiological concern to ensure compliance with RPP requirements and supporting guidelines

- Acting as the Health Physics Resource Manager, also referred to as the corporate-level or license RSO
- Designating a Project Health Physicist, also referred to as the project-level RSOR, to provide day-to-day guidance on radiological protection issues
- Compliance as the license RSO, with RML No. 29-31396-01, including:
  - Primary point of contact for all communications to the NRC
  - Identification and training of RML authorized users
  - Assignment of project RSORs
  - Coordination of investigations involving radiological occurrences to include review and approval of a resulting Corrective Action Plan
  - Advance NRC notification in writing at least 14 days before initiating at a temporary job site under TtEC RML jurisdiction any activity, or change to scope involving new activities, in areas of radiological concern (excluding routine packaging or repackaging for purposes of transporting and not requiring a job- or

site-specific work package, and characterization and/or final surveys where radioactive materials and/or radiation are not likely to be detected)

- Refrain from taking ownership of licensed materials in excess of possession limits without prior notification and written NRC approval
- Advance NRC notification in writing within 30 days of the temporary job site completion status involving decontamination and decommissioning activities, and disposition of any licensed material as related to RML jurisdiction
- Placement of reciprocity request with applicable Agreement States when necessary
- Maintenance of radiological exposure records
- Development and/or approval of radiation safety training materials and/or courses
- Performance of program audits as detailed in corporate procedure NLP-08, Radiation Protection Program Audits
- Providing guidance on radiological protection issues
- Identification of appropriate project staffing needs to implement RPP requirements
- Assistance with the development of site Environmental Health and Safety (EHS) plans and approval of EHS plans for projects that involve the use or handling of radioactive materials or access to areas of radiological concern
- Resource Specialist review for Task Initiation Procedures (TIPs) for proposed projects involving exposure to radiation or radioactive materials

Delegating project responsibilities to other company health physicists (also referred to as RSORs), as necessary

2.3 PROJECT RADIATION SAFETY OFFICER REPRESENTATIVE (PROJECT HEALTH PHYSICIST)

The project RSOR, also referred to as the Project Health Physicist, is assigned by the RSO and vested with corporate-level authority to implement the RPP and the TtEC RML at a project site. Whenever radiological work is actively ongoing under the TtEC RML, the RSOR or designee identified as an authorized user will be present at the project site. The RSOR is vested with the following responsibilities at projects subject to jurisdiction involving the TtEC RML:

- Providing health physics guidance on an as-needed basis
- Conducting required radiological safety training
- Reviewing and approving project field procedures that involve the handling of radioactive materials or access to areas of radiological concern
- Conducting radiation incident investigations and project inspections

- Maintaining a project site file that details radiological protection training provided, dosimetry records generated, radiological surveys performed, and other documentation pertinent to the RPP, RML procedures, radiation protection guidelines, and supporting documents; copies of these will be provided to the CHPM at the conclusion of the project
- Arranging for and assisting in program radiation protection audits as detailed in the most current version of corporate procedure NLP-08, Radiation Protection Program Audits
- Assisting in the development and approval of the site EHS plan
- Helping in the identification of project radiological analysis needs and selection of analytical support contractors
- Coordinating required ALARA reviews
- Ensuring appropriate staff work practices are employed to maintain occupational radiation exposures ALARA
- Ensuring items needed to perform work in accordance with the RPP, RML, and supporting documents are available, such as appropriate instrumentation, protective devices, dosimetry, etc.
- Directing the preparation of, and performing the review and approval of, RWPs
- Stopping work if necessary to ensure radiological safety
- Communicating with the PjM and RSO as needed to ensure the RPP is implemented correctly
- Ensuring proper operation of radiation-measuring equipment, including the performance of daily function and QC tests, and removing out-of-compliance instruments from service
- Maintaining radiation-measuring equipment in accordance with manufacturers' recommendations
- Directing and supervising the performance of radiological surveys and sampling in accordance with the most current version of this RPP and supporting TtEC SOPs
- Reviewing survey reports and instrument performance data for accuracy, completeness, and compliance with project, procedural, and regulatory requirements

- Ensuring work is performed in accordance with current versions of project plans, procedures, and the RPP

The project RSOR reports to and receives technical direction from the RSO, advises the PjM on radiation protection and radiological operation matters, coordinates with the PjM on day-to-day project activities, and communicates and coordinates radiation protection and radiological operation activities with the RSO and the client. Company Health Physicists (also referred to as RSORs) may delegate project responsibilities to other staff members deemed qualified for the task assigned.

2.4 PROJECT MANAGER

The PjM is responsible for:

- Ensuring implementation of and compliance with the RPP requirements and current versions of the following support documents applicable to the project:
  - TtEC RML procedures (i.e., applicable NRC License Procedures)
  - TtEC Radiation Protection Guidance (NRP) documents
- Forwarding any TIP or modified TIP involving exposure to ionizing radiation or radioactive material to the RSO or designee for input and review (involvement includes the use of subcontractors who may use radioactive materials or radiation-generating devices in the course of corresponding work such as field radiography, soil density gauges, well logging, etc.)
- Determining with the assistance of the RSO or designee if the project is required to use the TtEC RML or if activities will fall under a Department of Energy, NRC, Agreement State, or other license
- Working with the license RSO in accordance with corporate procedure RP1-1, Radiological Protection Program, to identify applicable NRC and Agreement State requirements for projects that will not use the TtEC RML
- The safe conduct of work in compliance with all permits, client contracts, and other controlling documents that apply
- Exposure to radiation ALARA by project staff
- Adequate resources and staffing to develop and implement this RPP in compliance with applicable regulations and requirements

The PjM reports to the TtEC Program Manager.

2.5 CONSTRUCTION MANAGER/PROJECT SUPERINTENDENT

Responsibilities for the Construction Manager/Project Superintendent include:

- Ensuring assigned personnel comply with radiological requirements
- Supplying relevant information to the RSOR regarding planned work activities and proposed applications necessary to maintain occupational radiation exposures ALARA

- Timely RSOR and PjM notification of radiological problems or issues encountered
- Verifying staff is sufficiently prepared for assigned tasks (e.g., appropriate tools and equipment needed to minimize the time spent in areas of radiological concern)
- Confirming that escorted visitors accessing areas of radiological concern are properly supervised and exhibiting safe work practices in accordance with RPP protocol

The Project Superintendent/Construction Manager reports to the PjM.

2.6 RADIOLOGICAL TASK SUPERVISOR

The Radiological Task Supervisor (RTS) is the TtEC representative responsible for Radiological Control Technician (RCT) oversight and corresponding field operations conducted in areas of radiological concern. Designated as an authorized user at projects subject to jurisdiction under the TtEC RML, the RTS is vested with the following responsibilities:

- Supporting required ALARA reviews
- Coordinating plans for field activities with the Construction Manager/Project Superintendent to ensure exposure to radiation is maintained ALARA and in accordance with corresponding RWPs
- Supervising the preparation of, and performing review of, RWPs
- Stopping work if necessary to ensure radiation safety
- Maintaining communication with the RSO, RSOR, PjM, Construction Manager, and Project Superintendent as needed to ensure the RPP is fully implemented
- Confirming proper operation of radiation survey instruments, including the validation of daily function and QC checks, and removing noncompliant instruments from service
- Ensuring radiation survey instruments are maintained in a way that complies with manufacturer instructions and recommendations
- Directing and supervising the performance of radiological survey and sampling practices in accordance with the RPP, current versions of applicable SOPs, and corresponding RWPs
- Validating field survey reports and instrument performance data for accuracy, completeness, and compliance with the RPP, applicable SOPs, and corresponding RWPs
- Participating in periodic internal and external reviews of RPP content and implementation
- Supporting self-assessments and management reviews as needed and correcting identified deficiencies within the allotted time frame

The RTS reports to and receives technical direction from the RSOR.

2.7 RADIOLOGICAL CONTROL TECHNICIANS

The RCTs are responsible for:

- Ensuring occupational exposure to radiation is maintained ALARA
- RWP preparation, use, and adherence
- Stopping work if necessary to ensure radiological safety
- Performing radiation surveys and other radiological safety tasks in accordance with the RPP, applicable SOPs, and corresponding RWPs
- Confirming proper operation of assigned radiation survey instruments prior to field use to include verification of daily function and QC performance checks, and removing noncompliant instruments from service
- Using radiation survey instruments in accordance with the RPP, applicable SOPs, and corresponding RWPs and maintaining the instruments in a way that complies with manufacturers' instructions and recommendations

The RCTs report to and receive technical direction from the RTS.

2.8 RADIATION WORKERS (FIELD PERSONNEL)

Project staff (including the general labor force associated with the Company and subcontractors) who have the potential to receive occupational exposure to radiation while on the job site, and who are expected to work under the requirements of this RPP as radiation workers, will:

- Receive sufficient training, prior to beginning work, in accordance with the most current version of corporate document RPG 2-5, Radiation Safety Training.
- Report to the RTS or RCT non-occupational radiation exposures that result from the use of medical or dental applications more aggressive than a standard X-ray.
- Comply with requirements of all procedures and guidelines applicable to the project.
- As required, exercise stop work authority and report radiological safety issues or concerns, including incidents and unplanned events, immediately to project management and Environmental Safety and Quality staff in writing, verbally, or with a Zero Incident Performance® slip; respond promptly to any stop-work and/or evacuate orders.
- Display use of industry recognized radiological work practices when inside areas of radiological concern, and conform promptly to instructions when provided by RCTs.
- Strictly adhere to radiological control procedures, guidelines, and postings including information provided in RWPs.
- Immediately report lost dosimetry devices to the RCT.
- Report planned medical radiation treatments in advance to supervision and the project RSOR and prior to entering areas of radiological concern or wearing dosimetry.
- Periodically confirm personal radiation exposure status and ensure that administrative dose guidelines are not exceeded.
- Notify the RCT of faulty or alarming radiological protection equipment.

When in areas of radiological concern, workers report to the RTS.

2.9 STOP WORK AUTHORITY

Company and subcontractor personnel will have the responsibility and authority to stop work when controls are inadequate or imminent danger exists.

In any situation in which stop work authority is used, the following requirements will apply:

- Exercise stop work authority in a justifiable and responsible manner.
- Once work is stopped, do NOT resume until proper controls have been established.
- Resumption of work will require concurrence by the PjM or designee.

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3.0 TASK-SPECIFIC HAZARD ANALYSIS/CONTROLS

A task-specific hazard analysis is performed on a daily basis to allow for risk identification associated with site work, including physical, chemical, and radiological components. (Radiation exposures that result from naturally occurring background sources and medical applications conducted under the care of a physician are examples of dose that is independent of occupational monitoring requirements but considered when planning task assignments. In instances of verifiable therapeutic applications, employee-furnished notifications will be used as an informational reference and included as part of a corresponding radiation exposure file.) Risk-based hazards and controls are defined in a site-specific Activity Hazard Analysis. Anticipated physical and chemical risks are described in detail in the project-specific APP/SSHP. Radiological risk controls are categorized in the sections to follow, and protective measures apply as defined in task-specific RWPs and corresponding SOPs.

3.1 IDENTIFICATION OF RADIATION RISKS

Project tasks subject to RPP protocol indicate a known or suspected likelihood of activities occurring in radiologically impacted areas (e.g., locations with sources of radium-226 [^{226}Ra], areas with similar radionuclides of concern as identified in a site-specific Historical Radiological Assessment [HRA]).

3.2 CONTROLLING DOCUMENTS

Unless indicated otherwise in Section 1.0, work conducted under the RPP will be subject to requirements detailed in TtEC RML No. 29-31396-01 and in accordance with any project-specific Memorandum of Understanding (MOU) criteria and applicable radiological control work documents (e.g., site-specific Base-wide Radiological Plan, SOPs). TtEC will incorporate site-specific versions of SOPs as needed to implement and satisfy license commitments. Title 10 of the *Code of Federal Regulations* (CFR) Section 20 applies to the RPP standards used. In parallel, industrial safety requirements and U.S. Environmental Protection Agency regulations detailed in 29 and 40 CFR also have applicability for a variety of regulatory subjects including Comprehensive Environmental Response, Compensation, and Liability Act; the Resource Conservation and Recovery Act; and the National Emission Standards for Hazardous Air Pollutants.

3.3 EVALUATION OF POTENTIAL EXPOSURE TO WORKERS

RPP dose limits for the control of occupational exposure to ionizing radiation are listed in 10 CFR 20.1201–1208. Dose limits for individual members of the pubic are detailed in 10 CFR 20.1301–1302. In accordance with company policy, all exposures will be minimized to the extent practical. Administrative guidelines, established below the federal limits, will be used as

detailed in the current version of corporate procedure NLP-01, As Low As Reasonably Achievable Program. Occupational exposures for project personnel will be maintained below TtEC administrative values for annual TEDE.

Occupational dose, if any, is expected to originate from external sources (e.g., ^{226}Ra, cesium-137, or strontium-90 or similar known radionuclides of concern as listed in a site-specific reference document [e.g., HRA]). Dose resulting from internal exposures are not anticipated. External exposure controls are addressed in Section 3.8, and controls to prevent or limit internal exposures are detailed in Section 3.9. Dose rates for general area work sites are expected to reflect naturally occurring background values.

3.4 EVALUATION OF PUBLIC DOSE

Based on the scope of planned work, the limited activity of radionuclides expected, and low concentration of naturally occurring radioactive material anticipated, public dose associated with tasks performed under this RPP is not projected. To validate the maintenance of public dose goals, TtEC will implement necessary survey and sampling protocol in areas of intrusive work, conspicuously post and restrict access to intrusive work locations that require monitoring (e.g., areas where soil excavations and/or handling, etc., may disturb sources of radioactive material), and validate survey and sampling results and frequencies with the client (e.g., RASO), RSO, RSOR, and RTS representatives to ensure established controls are effective.

3.5 TRAINING PROGRAM

Site personnel tasked to conduct project-oriented activities must satisfy corresponding AAP/SSHP training requirements. Persons subject to assignments involving a known or suspected potential for occupational radiation dose will receive additional training commensurate with radiological awareness requirements as defined in 10 CFR 19.12, Instructions to Workers. Visitors and escorted persons must receive a site briefing and will be assigned to a qualified radiation worker aide when in an area of radiological concern.

3.5.1 Site Briefing

An RPP site briefing is designed for an escorted person and is presented when access is needed to radiologically impacted locations. Specific to the area(s) of concern where access is needed, the RPP brief will cover at a minimum:

- Applicable portions of 10 CFR 19, 10 CFR 20, the RPP, RWPs, site-specific reference documents (e.g., HRA), and supporting SOPs
- A description of radiation exposure risks and monitoring requirements
- Access and egress protocol specific to the radiologically impacted location(s) requiring entry

- Radiation exposure reduction techniques for an embryo/fetus
- Completion of applicable briefing/exposure monitoring documentation
- Notification of contacts as needed to complete training requirements

3.5.2 Radiation Worker Training

RPP training for the radiation worker is provided when unescorted access is needed to impacted site locations subject to radiological control. Inclusive of material that may be required by project-specific Work Plans and documents (e.g., APP/SSHP, Task-Specific Plans), training may be presented in the form of a group overview, video presentation, etc., with use of printed handouts approved by the RSOR. Training will address at a minimum:

- Applicable portions of 10 CFR 19, 10 CFR 20, the RPP, site-specific reference documents (e.g., Hunters Point HRA), and supporting SOPs specific to task performance
- A description of radiation exposure risks, monitoring requirements, and techniques
- Access and egress protocol specific to radiologically impacted locations
- Required contacts and expected actions in the event of an emergency (in accordance with the current version of corporate procedure NLP-06, Managing Radiological Emergencies)
- Expected actions and contacts if radioactive material is discovered in an area where it is not expected
- Understanding "hands and feet" and "whole body" monitoring requirements
- Risks with radioactive material and radiation-producing devices unique to the site
- ALARA work principles and techniques
- Understanding the requirements for and compliance with RWPs including protocol for dosimetry and personal protective equipment (PPE)
- Radiation exposure reduction techniques for the embryo/fetus
- Completion of applicable training and exposure monitoring documentation
- Notification of contacts as needed to complete training requirements

3.5.3Radiological Control Technician Training Qualification

As coordinated between the RSO and RSOR, TtEC will evaluate and ensure acceptable qualification of RCTs. When selected for project assignment, RCT qualifications are evaluated between the RSO and RSOR in accordance with the requirements detailed in NRC License No. 29-31396-01. Project-specific training is provided to RCTs commensurate with anticipated duties and assignments.

3.6 DECLARED PREGNANT FEMALE WORKER

To maintain embryo/fetus radiation exposure ALARA, female employees who are pregnant or attempting to become pregnant are encouraged to declare this information to project management in writing to allow for criteria to be exercised as detailed in:

- 10 CFR 20.1208, Dose Equivalent to an Embryo/Fetus

- NRC Regulatory Guide 8.13, Instruction Concerning Prenatal Radiation Exposure, Revision 3, Washington, DC (NRC 1999)
- NRC Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure, Revision 1, Washington, DC (NRC 1996)

Because of the small anticipated annual dose for workers associated with project activities (i.e., less than 10 millirems/year) it is unlikely in instances of pregnancy that separate dose tracking for the embryo/fetus will be necessary. Managing occupational exposures for all staff within annual TtEC administrative TEDE guidelines is expected to satisfy parallel maintenance of less than 500 millirems total dose for any pregnant female worker over the course of an entire gestation period.

3.7 AS LOW AS REASONABLY ACHIEVABLE PROGRAM

TtEC is committed to maintaining radiation exposure to workers and the public as far below company guidelines and regulatory limits as practical. RPP requirements are established for field operations in an effort to meet that commitment in accordance with the current version of corporate procedure NLP-01, As Low As Reasonably Achievable Program.

3.8 EXTERNAL EXPOSURE CONTROL

The following steps will be taken to control external radiation exposure to levels that are ALARA:

- Employ basic dose reduction strategies as detailed in corporate procedures and site-specific SOPs using the ALARA concepts of time, distance, and shielding.
- Use instruments at frequencies sufficient to accurately determine the level and extent of radiation fields.
- Present adequate staff training to ensure the ability to recognize situations involving objects that might be radioactive, to be wary of objects that are unfamiliar, and to rely on valid instrument readings to limit and safely manage external exposure.

3.9 INTERNAL EXPOSURE CONTROL

Internal exposure is expected to be below all the recognized DAC values as specified in 10 CFR 20. Should the potential for internal dose be confirmed during fieldwork (e.g., due to the nature of the planned activity such as remediation efforts), the activity will be temporarily suspended and the work area secured pending determination and use of corrective protocol as decided among the RSO, RSOR, and PjM.

3.10 MONITORING AND MEASURING EXTERNAL EXPOSURE

A vendor accredited by the National Voluntary Laboratory Accreditation Program will be used to provide project-related dosimetry services. Dosimetry applications and considerations will apply to field staff designated as radiation workers (i.e., personnel needing unescorted access to

impacted site locations subject to radiological control). Prior to dosimetry issue, a radiation worker will have satisfactorily completed requirements as detailed in Section 3.5.2.

3.11 MONITORING AND MEASURING INTERNAL EXPOSURE

The monitoring of work practices conducted in areas of radiological concern will be coordinated among the RCTs, RTSs, and members of project management designated as radiation workers using frequencies necessary to confirm the application of correct techniques and PPE to minimize potential transfer of external contaminants inside the body.

Air sampling will be performed during intrusive activities conducted in areas of radiological concern. Air sample results will be reviewed and tracked among the RSO, RSOR, RTS, and designated RCTs to determine whether trends (e.g., concentrations greater than 10 percent of DAC) exist that require work stoppage and/or re-engineering of task-specific contamination controls.

3.12 SURVEYS AND MONITORING

A project-based summary of historic survey and monitoring information is typically available in site-specific documentation (e.g., an HRA manual or Base-wide Radiological Work Plan). Protection of workers, the public, and the environment depends on accurate assessment and interpretation of past historic information as compared to present-day survey data collected in accordance with prescribed procedures and project support documents.

In situations subject to this RPP, guidance for determining survey frequency and technique is detailed in applicable portions of corporate procedures NLP-04, Radiological Entry Control Program, NLP-05, Radioactive Contamination Control, and RPG 2-9, Radiological Surveys and Operational Checks. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.12.1 Surveys of Equipment and Materials

Equipment and material passing through areas controlled for radiological concern will be subject to survey criteria and techniques detailed in applicable portions of corporate procedure NLP-05, Radioactive Contamination Control. In parallel, supplemental site-specific documentation may be authorized for use by the RSO if indicated on a Radiation Protection Program SOP Crossover Document.

3.13 ACTION LEVELS

Action levels represent transition points at which concentrations of radioactivity require additional response and/or investigation (e.g., PPE upgrades or increased work technique controls). Action levels for radiological controls are detailed in corporate procedure NLP-01, As Low As Reasonably Achievable Program, and NLP-04, Radiological Entry Control Program. In

parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document. Modification to project-specific action levels requires client (e.g., Navy) concurrence.

3.14 RADIOLOGICALLY CONTROLLED AREAS AND POSTING

Site structures, outdoor locations, and/or perimeter boundaries posted with yellow and magenta markings are established to identify areas designated for radiological control, prevent (to the extent practical) access by unauthorized persons, and protect members of the public from exposure to radiation. A description of scenarios and postings employed for control purposes are detailed in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.14.1 Controlled Area

A Controlled Area may be established where access to impacted portions of a work site requires specialized qualification and approval. A Controlled Area (which may also be called a Restricted Area) is intended to serve as the outermost boundary around planned and established work zones.

Controlled Area access requires prior authorization and use of PPE as defined in a project specific APP/SSHP. Visitors must have requisite training as specified in an SSHP. Personnel who enter a Controlled Area may not cross into more restrictive areas posted within unless prior authorization is obtained.

Where the perimeter to a Controlled Area is first encountered for radiological purposes, posting applications will have the wording "Caution Controlled Area" (or Restricted Area) and provide a contact phone number. (Supplemental information as specified by the RSOR or designee may also be included as magenta [preferred], purple, or black markings on a yellow [preferred] or white background). A minimum of one sign will be posted on each straight run of the Controlled Area (or Restricted Area) boundary. Note that areas not typically accessed by pedestrians (e.g., windows) need not be posted. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.2 Access Control Point

When used, an Access Control Point is part of a Controlled Area (or Restricted Area) boundary. Intended to serve as a transition corridor, an Access Control Point allows for the accountability of personnel, tools, and equipment that pass through. When established as a radiological control mechanism, an Access Control Point RCT will be present any time activities within are ongoing. During periods of inactivity, control point gates (part of the contiguous area boundary) are closed and locked.

3.14.3 Radiologically Controlled Area

A Radiologically Controlled Area (RCA) represents an area in which a person who works for 1 year might receive a whole body dose in excess of 100 millirems from all pathways (excluding natural background and medical exposures). For external sources, the RCA is typically posted when the dose rate of 30 centimeters exceeds 50 microrems per hour, although this may be modified at the discretion of the license RSO based on accurately assessed occupancy factors. Intended to include (for posting purposes) the nearest boundary or perimeter associated with the affected area, RCA restrictions and corresponding access protocol can be located in supplemental site-specific documentation (e.g., Hunters Point Shipyard SOP HPO-Tt-010, Radiologically Restricted Areas – Posting and Access Control) and authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the RCA boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary. For waterfront areas, signs should be posted at areas accessible by watercraft.

3.14.3.1 Radioactive Materials Area

A Radioactive Materials Area (RMA) identifies any area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in Appendix C, Title 10 Part 20 of the CFR. Intended to warn of the potential for occupational dose, a description of RMA scenarios and postings employed for control purposes can be located in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the RMA boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.4 Contaminated Area

A Contaminated Area is any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed the removable surface contamination values specified in Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors (AEC 1974), but do not exceed 100 times those values. Contamination is radioactive material that is deposited on a surface where it is unwanted. Subject to license control, a description of Contaminated Area scenarios and postings employed for control purposes can be located in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the RCA boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.5 High Contamination Area

A High Contamination Area is any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in Regulatory Guide 1.86 (AEC 1974). High Contamination Area scenarios and postings employed for control purposes are detailed in applicable portions of supplemental site-specific documentation (e.g., Department of Energy Procedures for Radiologically Restricted Areas – Posting and Access Control per 10 CFR 835) and may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the High Contamination Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.6 Radiation Area

A Radiation Area means any area accessible to individuals in which radiation levels could result in an individual receiving a deep dose equivalent in excess of 0.005 rem (0.05 millisievert) in 1 hour at 30 centimeters from the source or from any surface that the radiation penetrates. A description of Radiation Area scenarios and postings employed for control purposes can be located in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the Radiation Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.7 High Radiation Area

A High Radiation Area means any area, accessible to individuals, in which radiation levels could result in an individual receiving a deep dose equivalent in excess of 0.1 rem (0.001 sievert) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates. A description of High Radiation Area scenarios and postings employed for control purposes can be located in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the High Radiation Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.8 Airborne Radioactivity Area

An Airborne Radioactivity Area is a room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations:

- In excess of the DACs specified in Appendix B to 10 CFR 20.1001–20.2401, or
- To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake or 12 DAC hours.

As an example, for ^{226}Ra, the most likely airborne contaminant at Navy radiological remediation projects, the applicable DAC value is 3.0E-10 microcuries/milliliter. A description of Airborne Radioactivity Area scenarios and postings employed for control purposes can be located in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized for use by the RSO if indicated on a Radiation Protection Program SOP Crossover Document.

When used, a minimum of one sign will be posted on each straight run of the Airborne Radioactivity Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.15 CONTAMINATION CONTROL

Contamination control practices are established to preclude the spread of contaminants into uncontrolled areas. Recognized applications are detailed in corporate procedure NLP-05, Radioactive Contamination Control.

In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.15.1 Physical Boundary

A physical boundary will be established using criteria referenced in Section 3.14.4 to fully enclose a location established as a Contaminated Area.

3.15.2 Entry

Entry into a Contaminated Area will be compliant with pre-established requirements as detailed on a job-specific RWP. In such instances, an RCT will be present to assist in radiological control and support. (See Section 3.17.1 for details related to RWP use.)

3.15.3 Exit

Exit from a Contaminated Area will be compliant with pre-established requirements as detailed on a job-specific RWP. In such instances, an RCT will be present to assist in radiological control and support. (See Section 3.17.1 for details related to RWP use.)

3.15.4 Limitations on Entry

Personnel with open wounds or sores are not generally granted access into a Contaminated Area. Entry may be authorized by the RSOR or designee, on a case-by-case basis, if appropriate protection of the wound or sore is verified, planned work activities are unlikely to compromise the protection, and there is no other medical reason to restrict entry.

Jewelry and personal items are not allowed in Contaminated Areas; only project furnished tools, materials, and equipment necessary to accomplish the planned task are acceptable. Container wrappings, packing, and similar materials must be segregated from essential items prior to entry.

3.15.5 Control of Items

Items such as equipment and tools to be removed from a Contaminated Area must meet unconditional release criteria as detailed in applicable portions of corporate procedure NLP-05, Radioactive Contamination Control. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.16 INSTRUMENTATION

As detailed in applicable portions of corporate procedure RPG 2-9, Radiological Surveys and Operational Checks, field survey instruments will be calibrated annually at a minimum in accordance with the manufacturers' specifications. Instruments will be removed from service on or before calibration due dates and returned to the supplier for recalibration. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.17 CONTROL OF RADIOLOGICAL WORK

All radiological work activities will be planned in consultation with the RSOR, the PjM, and other project personnel tasked with oversight responsibilities. Work performed in areas of radiological concern require establishment of an RWP, which details radiologically based requirements and protective measures.

3.17.1 Radiation Work Permits

RWPs detail the protective measures and controls needed to perform tasks in areas of radiological concern. Information considered during RWP development is detailed in applicable

portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.17.2 Task-specific Work Instructions

Task-specific work instructions are used to supplement RWP requirements and address in greater detail corresponding activities planned while personnel are inside areas of radiological concern. These instructions are required for tasks scheduled to occur in locations as determined by the PjM, RSO, RSOR, or the Construction Manager. The RSO or designee will finalize, control, and issue radiologically based work instructions.

3.18 CREDENTIALING OF STAFF

Qualification and training requirements for RCTs are provided in NRC License No. 29-31396-01 and as detailed in applicable portions of corporate procedure RPG 2-5, Radiation Safety Training. The RSO verifies qualifications and conducts required license-specific training with any RSOR designated on the license as an authorized user.

To supplement and validate the correct use and implementation of this RPP and NRC License No. 29-31396-01, a Health Physicist certified by the American Board of Health Physicists provides support to active field projects.

3.19 PROCUREMENT, RECEIPT, AND INVENTORY OF SEALED RADIOACTIVE SOURCES

It is not anticipated that field projects will receive radioactive material shipments other than exempt-quantity radioactive check sources. As detailed in corporate procedures NLP-02, Radioactive Material Accountability, and NLP-03, Sealed Radioactive Source Control, check sources are controlled, stored, posted, and managed as radioactive material.

3.19.1 Leak Testing

Radioactive sealed sources with quantities exceeding the licensable threshold will be leak-tested as detailed in applicable portions of corporate procedures NLP-02, Radioactive Material Accountability and NLP-03, Sealed Radioactive Source Control. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.19.2 Transport of Sources

Check sources will be used on field projects only for the period of time necessary to execute planned work, will not be introduced onto a project location prior to project initiation, and will be returned to the provider immediately following the completion of planned field activities.

Check sources will be maintained as detailed in applicable portions of corporate procedures NLP-02, Radioactive Material Accountability, and NLP-03, Sealed Radioactive Source Control. In parallel, supplemental site-specific documentation may be authorized for use by the RSO if indicated on a Radiation Protection Program SOP Crossover Document.

3.19.3 Reporting Lost, Damaged, or Stolen Sources

As detailed in applicable portions of corporate procedures NLP-02, Radioactive Material Accountability, and NLP-03, Sealed Radioactive Source Control, if a check source is lost, damaged, or stolen, the event will be reported immediately to the RSOR or designee. The RSOR will immediately notify the RSO, the PjM, and the client (e.g., the Navy) and initiate appropriate recovery actions. In consultation with the client, a report will be filed by the RSO or designee with the appropriate law enforcement agency if it is determined that radioactive material was stolen. The RSO will make any necessary notifications to the NRC.

Supplemental site-specific documentation may be authorized for use by the RSO if indicated on a Radiation Protection Program SOP Crossover Document.

3.20 SHIPPING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

Off-site shipment of radioactive materials other than exempt-quantity radioactive check sources by TtEC is not anticipated. Information pertinent to an authorized shipper for a field project is provided in Section 6.0.

3.20.1 CONTROL OF RADIOACTIVE WASTE

Radioactive waste will be minimized by compliance with contamination control practices (Section 3.15) combined with segregation and survey practices. A waste shipment provider contracted to the client (e.g., the Navy through the Army Joint Munitions Command) will provide brokerage services including waste characterization sampling, waste containers, and transportation of radioactive materials/waste generated from a field project. Soil and used PPE will typically be processed for final disposition in disposal bins. When filled, bins will be transferred to the custody and control of the authorized shipper. As detailed in corporate procedure NLP-02, Radioactive Material Accountability, commodities are stored in a locked radioactive materials storage area, controlled by the RSOR or designee, and will periodically be packaged and transferred to the authorized shipper for disposal. Radioactive material will be packaged, stored, shipped, and disposed of as required by U.S. Department of Transportation (DOT) regulations.

In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

3.20.2 RADIATION PROTECTION RECORDS

As detailed in the applicable portions of corporate procedure NLP-07, Radiological Protection Records, the RSO or designee is responsible for ensuring that airborne monitoring, contamination surveys, and exposure/dose rate surveys are reviewed for accuracy and completeness as an on-going process. Individual exposure records including dosimetry and bioassay reports for personnel are reviewed for results as generated.

3.20.3 REPORTS AND NOTIFICATIONS

Workers who have previous occupational work history with radiological environments will supply the RSO or designee with prior estimated or reported dose histories on an NRC Form 4 or equivalent as defined in 10 CFR 20.2104.

Records of radiation exposures to workers who have been issued external dosimetry monitoring devices will be maintained. Dosimetry monitoring results for workers will be reported to the RSO annually at a minimum. Annual occupational exposure greater than or equal to 100 millirems for the previous calendar year, or otherwise when requested, requires a summary of individual exposure to be reported to the employee monitored.

3.20.4 LICENSES

Entities subject to the use of this RPP will conduct radiological-based tasks with use of TtEC/ NRC License No. 29-31396-01. TtEC will ensure that the Radiological Control Program and work practices are implemented and performed in accordance with the NRC license requirements and the RPP. (Any client-designated waste shipment provider may implement their NRC-issued license to conduct waste characterization sampling of waste material in support of low-level radioactive waste shipment and disposal. An MOU between TtEC and a waste shipment provider will be developed, identifying interfaces and commitments for the transfer of radioactive materials. Active MOUs will be maintained by the RSO or designee.)

3.20.5 REVIEW AND APPROVALS OF RADIATION PROTECTION PLANS

The RSO or designee will prepare the RPP, which will then be reviewed for approval with subject matter experts (e.g., the PjM, RSOR). In addition, the client (e.g., the Navy) will have an opportunity to review the draft content, provide input, and indicate acceptance of the plan. Changes to the RPP will be reviewed and accepted following the same process.

3.20.6 PLANNED SPECIAL EXPOSURES

No anticipated event within work scopes subject to this RPP will require use of a planned special exposure. In the event it is necessary to initiate such a need, an activity-specific work instruction including a formal ALARA review and an RWP will be prepared and submitted for acceptance following the same process as the RPP submittal in Section 3.25.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Minimum PPE requirements based on chemical contaminants are established by the Health and Safety Manager (in a project-/task-specific APP/SSHP). This primary level of PPE, Modified Level D, is historically sufficient for radiological work activities and is supplemented by activity-specific RWPs based on the radiological conditions and field tasks required to perform planned activities. Information considered for PPE during RWP development is detailed in applicable portions of corporate procedure NLP-04, Radiological Entry Control Program. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

4.1 SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

Personnel must wear PPE commensurate with contamination hazards associated with both the work area and the planned activity. Activities that require heavy physical effort or that have an increased potential for damage to PPE may require additional layers or different PPE materials, even in areas of low contamination. Site- or task-specific PPE requirements beyond the minimum traditionally used will be detailed in a corresponding RWP.

In parallel, supplemental site-specific documentation may be authorized for use by the RSO if indicated on a Radiation Protection Program SOP Crossover Document.

4.2 DONNING AND DOFFING PPE

To prevent contamination of personnel or the spread of contamination, PPE must be donned and doffed in a specific manner. Directions for donning and doffing standard PPE ensembles are provided in the applicable sections of corporate procedure NLP-05, Radioactive Contamination Control. In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document. Additional instructions for non-standard site- or task-specific PPE requirements will be provided in the applicable RWP.

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5.0 DECONTAMINATION PROCEDURES

Following details identified in applicable portions of corporate procedure NLP-05, Radioactive Contamination Control, decontamination will be performed at a dedicated location (e.g., decontamination pad, room). In parallel, supplemental site-specific documentation may be authorized by the RSO for use if indicated on a Radiation Protection Program SOP Crossover Document.

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6.0 SHIPPING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

Field projects subject to the use of this RPP will conduct radiological-based activities with use of TtEC NRC License No. 29-31396-01. The client-designated waste shipment provider associated with a field project (e.g., Environmental Management Services, Inc. for the Navy) may implement their NRC-issued license to conduct waste characterization sampling of waste material in support of low-level radioactive waste shipment and disposal. An MOU between TtEC and a waste shipment provider will be used, identifying interfaces and commitments for the transfer of radioactive materials. In such instances, a current MOU will be maintained by the project RSOR for projects subject to the requirements of the RPP.

Environmental samples shipped for off-site analysis and exempt-quantity radioactive check sources are packaged and shipped in accordance with DOT regulations via commercial carriers.

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7.0 REFERENCES

AEC (Atomic Energy Commission). 1974. Regulatory Guide 1.86. Termination of Operating Licenses for Nuclear Reactors. June.

Code of Federal Regulations, Title 10, Part 20, Standards for Protection Against Radiation, U.S. Government Printing Office via GPO Access, Washington DC, January 1, 2003, <http://www.gpoaccess.gov/cfr/index.html>, May 2007.

————. Title 29, Part 1910, Occupational Safety and Health Standards, U.S. Government Printing Office, Washington, DC, July 1, 2003, <http://www.gpoaccess.gov/cfr/index.html>, May 2007.

————. Title 49, Volume 2, Transportation, U.S. Government Printing Office via GPO Access, Washington D.C., April 1, 2006, <http://www.gpoaccess.gov/cfr/index.html>, May 2007.

EPA (U.S. Environmental Protection Agency). 2000. Radionuclides Notice of Data Availability Technical Support Document, Office of Ground Water and Drinking Water, March.

NRC (U.S. Nuclear Regulatory Commission). 1996. Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure, Revision 1, Washington, DC. February.

————. 1999. Regulatory Guide 8.13, Instruction Concerning Prenatal Radiation Exposure, Revision 3, Washington, DC. June.

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RPR APPENDIX A

RADIATION PROTECTION PLAN ACKNOWLEDGEMENT FORM

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Radiation Protection Plan Acknowledgment Form

I have reviewed, understand, and agree to follow the Radiation Protection Plan for the Hunters Point Shipyard project. Additionally, I understand that there are additional nonradiological health and safety requirements, which are presented in the Site Safety and Health Plan. I agree to abide by the requirements of the Radiation Protection Plan for the work that I will perform.

Printed Name	Signature	Representing	Date

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STANDARD OPERATING PROCEDURE

FOR

RADIATION AND CONTAMINATION SURVEYS

SOP 1

SOIL INVESTIGATIONS
IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK
BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to conduct radiation and contamination screening surveys to monitor personnel and equipment during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to conduct radiation and contamination surveys.

Erik J. Abkemeier — October 19, 2010

Erik Abkemeier — Date

Corporate Health Physics Manager

(757) 944-0921

Amy Stanford — October 19, 2010

Amy Stanford — Date

Senior Health Physicist

(706) 832-7394

SUPERVISOR'S STATEMENT

I have read and understand this SOP. To the best of my knowledge, the radiation and contamination surveys described in this SOP can be performed in a safe, healthful, and environmentally sound manner. I have confirmed that all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker's statement for this purpose. I will ensure the SOP contains current procedures. If a major change to the SOP is necessary, I will ensure that active processes are suspended until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are identified, I will ensure the process is stopped until the hazards have been eliminated.

Amy Stanford
Senior Health Physicist

October 19, 2010
Date

WORKER'S STATEMENT

I have read this SOP and received the training necessary to perform the procedures addressed in the SOP. If I identify a hazard not addressed in the SOP, or encounter an operation I cannot perform in accordance with the SOP, I will stop the process and notify my immediate supervisor.

Worker's Name	Date	Supervisor's Name	Date

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ATTACHMENT 1 RADIATION/CONTAMINATION SURVEY FORM
ATTACHMENT 2 RADIATION/CONTAMINATION SURVEY SUPPLEMENT FORM
ATTACHMENT 3 SURVEY LOG

PURPOSE

The purpose of this SOP is to specify methods and requirements for radiation and contamination screening surveys and documentation of acquired data to be implemented at NASB.

Adherence to this SOP will provide reasonable assurance that the surveys performed have reproducible results. The guidance for control of radiation exposures provided in this SOP is in accordance with the as low as reasonably achievable (ALARA) philosophy.

SCOPE

This SOP shall be implemented by Tetra Tech EC, Inc. (TtEC) staff and subcontractor personnel when conducting radiation or contamination screening surveys to monitor personnel and equipment during test pit activities at NAS Brunswick (NASB).

NOTIFICATION/COORDINATION PROCESS

Coordination with all personnel at NASB site will be vital for a safe and efficient radiation and contamination survey process.

The Senior Radiological Control Technician (RCT) will coordinate the field teams and supervise all on-site radiological survey activities.

TRAINING REQUIREMENTS

All field personnel will meet the qualification and general training requirements presented in the project Health and Safety Plan. Project-specific training requirements are presented in this section. The topics to be covered are listed below. Attendance sheets with attached curriculums will be used to document completion of each orientation session.

Training Schedule

1. Project summary and approach
2. Health and Safety Plan (HASP) review
3. SOP review – Radiation and Contamination Survey approach and goals
4. Schedule and work hours
5. Site rules
6. Munitions and explosives of concern (MEC)/material potentially presenting and explosives hazards (MPPEH) finds and scrap metal procedure (for Quarry Area of Concern)
7. Work teams and goals
8. Safety
   a. NASB munitions types (for Quarry Area of Concern)
   b. MEC/MPPEH hazards and identification (for Quarry Area of Concern)
   c. First aid/cardiopulmonary resuscitation (CPR)
   d. Review of emergency response equipment
   e. Talk/walk-through of emergency procedures
   f. Emergency drill
   g. Daily health and safety briefing
   h. Daily site-specific munitions training

GENERAL REQUIREMENTS FOR RADIATION AND CONTAMINATION SURVEYS

Radiation and contamination surveys at NASB shall be performed as detailed in the Survey Work Instructions. Radiation surveys will be performed to identify radiologically-impacted areas, measure exposure rates, and assess the intensity and shape of those areas to verify control requirements are not required at the worksite. Contamination surveys will be performed to verify the absence of loose surface contamination and fixed contamination. Loose surface contamination is normally detected indirectly by a swipe sample or wipe performed on the item or surface of interest. Fixed contamination levels are measured directly from the item or surface of interest.

Survey results, locations, and any unusual conditions shall be documented on Attachments 1, 2, and 3, NASB Radiation/Contamination Survey form, NASB Radiation/Contamination Survey Supplement Form, and Navy/DRI Site Radiation/Contamination Survey Log, respectively. When performing surveys, readings shall be expressed as the actual observed number (i.e., do not report "<MDA" or "<Bkg").

Instruments used to perform radiation and contamination surveys at NASB shall be operated in accordance with their operation procedure. Steps to be completed during the pre-job planning phase include the following:

Obtain appropriate survey instruments and prepare the instruments for use

- Obtain the necessary forms, swipes, and applicable protective clothing that will be used during the survey

Prior to performing a survey at NASB, each radiation detection instrument shall be:

Battery checked

Checked for obvious physical damage

Quantitatively response-checked daily, prior to initial use of the day

- Checked to ensure that the instrument calibration is current

The procedures for performing the above checks are detailed in SOP 2. If any of the above conditions are unsatisfactory, the instrument shall be tagged as out of service and will not be used.

PROCEDURE PROCESS

Background Reference Surveys

Suitable background reference areas have not been identified, therefore background reference surveys will not be performed.

Exposure Rate Surveys

A Ludlum Model-19 or equivalent will be used for performing exposure rate surveys for gamma radiation. The instrument will be operated in accordance with the manufacturer-supplied operations manual and any applicable requirements from the Survey Work Instruction. Care shall be taken to ensure that the instrument has been allowed to stabilize between individual measurements.

When performing general area exposure rate surveys at NASB, the RCT should:

Attempt to determine the source of radiation fields

Record the highest level as the general area exposure rate

Perform contact exposure rate measurements with the detector within 2.5 centimeters (1 inch) of the surface to be surveyed

- Verify the exposure rates of known hot spots

Removable Contamination Swipe Surveys

The following guidance will be used at NASB.

1. Label or number swipes, as necessary, to identify each swipe.
2. Wipe the swipes over approximately 100 square centimeters (cm^2) (16 square inches), or determined in the field by the RCT, of the surface to be sampled.

3. Apply moderate pressure.
4. Exercise care on rough surfaces so as not to tear the swipes.
5. Exercise care on wet surfaces so as not to degrade the swipes. Ensure that surfaces are not submerged in water and that cloth swipes or similar are used on wet/damp surfaces.

When surveying equipment:

1. Obtain swipes on large surfaces.
2. Obtain swipes in cracks or crevices where contamination may have settled.
3. Obtain swipes on openings to internal surfaces.
4. Handle swipes in a manner that will prevent cross-contamination, such as by placing each swipe in a separate envelope.

Counting Swipes

A Ludlum Model 2929 scaler with a Model 43-10-1 ZnS(Ag) scintillation probe (or equivalent), will be used at NASB for counting swipes.

1. Count the swipes in accordance with the operating procedure for the instrument.
2. Record swipe results in disintegrations per minute per 100 square centimeter (dpm/100 cm²)
3. Store/archive used swipes exceeding unconditional release limits (20 dpm/100cm^2 - alpha) as radioactive material until disposal is approved by RASO.

Large-area Wipes

At NASB, large-area contamination surveys using large-area wipes (LAWs) will be used for monitoring the radiological cleanliness of non-contaminated areas or equipment, to track area decontamination progress, or for initially verifying that surfaces are free from contamination.

There are no specific requirements concerning the amount of area to be wiped when performing LAWs. The area wiped shall be determined based on the use of the survey data and the dust loading of the LAW material.

Masslin, oil-impregnated cloths, or equivalent media will be used to perform LAWs. The appropriate collection material and method will be based on the survey conditions such as wet surfaces, rough surfaces, heavily soiled area, and oily and greasy surfaces.

1. Label or number the cloths, as necessary, to assist in determining the location of the sample.
2. Determine the size of the area to be sampled based on the results of the survey.
3. Wipe the collection media over the surface using moderate pressure by hand, with a masslin mop, or other approved techniques.

Large–area wipes will be evaluated as detailed below:

1. Allow wet swipe to dry prior to counting.
2. Scan the swipe with an appropriate field instrument (a Ludlum Model 43-89 detector with a Ludlum Model 2360 data logger, or equivalent), in an area with a low background.

3. Hold the detector within ½ inch of the swipe and move the detector over the swipe at a maximum rate of 1 inch per second.
4. If any indication of an increased count rate is noted, pause to allow the meter reading to stabilize.
5. If the swipe reading is indistinguishable from background, consider the surveyed surface to be free from contamination. If the LAW reading is distinguishable from background, conduct further surveys to isolate the boundaries of the contamination.
6. Dispose of used LAW media with detectable activity as radioactive waste.

Surveys for Fixed Alpha/Beta Contamination

Fixed contamination surveys at NASB are used to obtain indications of fixed contamination levels on surface areas, pieces of equipment, or tools for characterization and/or release surveys. A Ludlum Model 43-89 detector with a Ludlum Model 2360 data logger (or equivalent) shall be used for performing fixed alpha/beta contamination surveys.

Scans

1. When surveying, the probe shall be held within ¼ inch or less from the surface being surveyed. The movement rate of the detector probe shall be 1 inch per second or slower.
2. Whenever practical, 100 percent of accessible areas being surveyed shall be direct-scan surveyed.
3. Scan ranges are documented as the range from the lowest measurement to the highest measurement observed.

Static

1. Count time for conducting static measurements will be dependent on the isotope of concern (i.e., uranium) and the Minimum Detectable Activity (MDA) for the instrument being used.
2. When taking a static measurement, the probe shall be held within ¼ inch or less from the surface being surveyed.
3. Results shall be reported in units of net counts per minute (cpm) above background or dpm/100 cm^2.

The following formula shall be used for converting direct probe readings in cpm to dpm/100 cm^2:

$$A_S = \frac{R_{S+B} - R_B}{\varepsilon_i \varepsilon_s \frac{W_A}{100\ cm^2}}$$

Where:

A_S = total surface activity (dpm/100 cm^2)

R_{S+B} = the gross count rate of the measurement in cpm

R_B = the background count rate in cpm

ε_i = the instrument efficiency (counts per particle)

ε_s = the contaminated surface efficiency (particles per disintegration)

W_A = the physical area of the detector window (cm^2)

In the absence of experimentally determined surface efficiencies, ISO-7503-1 and NUREG-1507, provide conservative recommendations for surface efficiencies. ISO-7503-1 recommends a surface efficiency of 0.25 for alpha emitters. NUREG-1507 provides surface efficiencies based on studies performed primarily at Oak Ridge Institute for Science and Education. A surface efficiency of 0.25 will be used for alpha/beta emitters.

Gamma Surveys

A Ludlum Model 19 scintillation detector, or equivalent will be used for gamma radiation surveys at NASB. Manufacturer's operating procedures for the specific equipment to be used on site will be followed . The general steps listed below for scan and static surveys will also be followed.

Scans

1. Set the audio response switch to the "on" position.
2. Obtain background radiation levels (dose rates) for the area(s) of interest when taking μR/hr readings.
3. General area surveys are normally conducted with the instrument held at waist level.
4. When surveying items, dose rate measurements are taken at 30 cm (~ 1 ft).
5. When screening the backhoe bucket during test pit installation, survey with the detector approximately 1 inch from the exterior bucket surface or the exposed soil surface.
6. Measurement results are recorded in μR/hr.

Static

1. Static measurements are performed by holding the detector over the item and waiting for the readings to stabilize.
2. Record results in μR/hr.

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ATTACHMENT 1
RADIATION/CONTAMINATION SURVEY FORM

NASB Radiation/Contamination Survey Form[1/]

DATE: TIME:	INSTRUMENTATION USED					
SURVEY NUMBER:	Model Inst/Det.	Serial Number	Calibration Due Date	% Efficiency	MDC/MDA (dpm/100cm^2)	Background (dpm/100cm^2)
LOCATION:						
SURVEYOR (Print Name/ Signature):						
REVIEWED BY (Print Name / Signature):						
RCT:						
Isotopes of Concern:						
Description or drawing:						
Survey Fingdings[2/]						

Routine (Daily / Weekly / Monthly) ☐ Non-routine ☐

All radiation readings in μr/hr unless otherwise noted.

(#)....denotes swipe location or fixed α/β readings.

#.....denotes G/A radiation readings.

#/#...denotes contact / 1 meter radiation readings.

*.....denotes highest radiation reading on contact.

Δ.....denotes static location.

1/ All blanks to be completed or lined out as "not applicable"

2/ Include scan range in cpm, static measurements associated with grid surveys in cpm, instrument settings, and locations exceeding the project action level

ATTACHMENT 2
Radiation/contamination survey supplement form

NASB Radiation/Contamination Survey Supplement Form

SURVEY NUMBER:

SURVEYOR: | LOCATION:

Location	Exposure Rate (μR/hr)		Fixed + Removable			Removable		Comments
	Contact	1 Meter	Gamma (cpm)	Alpha dpm/probe	Beta/Gamma dpm/probe	Alpha dpm/100cm^2	Beta/Gamma dpm/100cm^2	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Reviewer	Date/Time:	PHP	Date/Time:

ATTACHMENT 3
sURVEY IOG

NaSB Survey Log

Survey Number			Date	Survey Description	Surveyor
Project	#	Year			(Init.)

Reviewed/Approved By:

RCT Date

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STANDARD OPERATING PROCEDURE
FOR
PREPARATION OF PORTABLE RADIATION AND
CONTAMINATION SURVEY METERS AND
INSTRUMENTS FOR FIELD USE

SOP 2

SOIL INVESTIGATIONS
IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK
BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to conduct radiation and contamination screening surveys to monitor personnel and equipment during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to conduct radiation and contamination surveys.

Erik J. Abkemeier

Erik Abkemeier
Corporate Health Physics Manager
(757) 944-0921

October 19, 2010
Date

Amy Stanford

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Senior Health Physicist
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SUPERVISOR'S STATEMENT

I have read and understand this SOP. To the best of my knowledge, the radiation and contamination surveys described in this SOP can be performed in a safe, healthful, and environmentally sound manner. I have confirmed that all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker's statement for this purpose. I will ensure the SOP contains current procedures. If a major change to the SOP is necessary, I will ensure that active processes are suspended until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are identified, I will ensure the process is stopped until the hazards have been eliminated.

Amy Stanford
Senior Health Physicist

October 19, 2010
Date

WORKER'S STATEMENT

I have read this SOP and received the training necessary to perform the procedures addressed in the SOP. If I identify a hazard not addressed in the SOP, or encounter an operation I cannot perform in accordance with the SOP, I will stop the process and notify my immediate supervisor.

Worker's Name	Date	Supervisor's Name	Date

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Table 3-1. Suggested Geometries for Background Measurements and Source Checks 3

PURPOSE

This procedure is used to specify the general requirements for preparing portable radiation and contamination survey meters and instruments for use at Naval Air Station Brunswick (NASB) field locations. The procedures presented below will be supplemented by the specific instrument operation manuals and the Survey Work Instruction.

SCOPE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors for preparation of portable radiation and contamination survey instrumentation used on site. This procedure is intended to provide general instructions for preparing radiation and contamination instrumentation for NASB site field operations.

In certain instances, the requirements of this procedure may need to be modified due to unexpected field condition changes, etc. If this occurs, a Design Change Notice (DCN) will be generated and will be subject to the same review process as this document, and will have precedence over the guidelines in this document as appropriate.

PROCEDURES

OFF-SITE CALIBRATION

TtEC will retain the services of a radiological instrumentation supplier that uses industry approved measuring and test equipment and National Institute of Standards and Technology (NIST) traceable sources for calibration of the radiological instrumentation.

The Ludlum Model 19 NaI gamma detector will be calibrated with a Cs-137 source.

The Ludlum Model 2360 data logger or equivalent portable survey meter with Ludlum 43-89 or equivalent detector will be calibrated with Th-230 (α) and Tc.99 (β) sources.

The supplier will include certificates of calibration and calibration data with each instrument. Calibrations will correspond to an accredited calibration laboratory and will be performed in accordance with the equipment manufacturers' manuals. TtEC will verify instrument calibration and only accept instruments calibrated within the past 12 months. The Project Health Physicist (PHP) or his designee will review/validate calibration documentation prior to instrumentation release to the field.

In addition to the routine frequency of performance, calibration shall be performed under the following conditions:

- Prior to placing a new instrument into service
- After any major repair or alteration to the instrument or detector

ON-SITE CALIBRATIONS AND EQUIPMENT CHECKS

To ensure the radiological and contamination survey instrumentation used at NASB is operating properly during performance of the surveys, the instrumentation will be subject to instrument background and response checks, chi-square testing, and determination of instrument efficiency prior to use on site. Determination of instrument background, response checks, chi-square testing, and instrument efficiency shall be conducted in a controlled environment at NASB. The controlled environment will consist of a secured area within the project trailer located in a non-impacted area and which is known to be free of contamination. Testing jigs or apparatus may be employed as necessary to ensure that consistent, reproducible geometries are used, particularly during repeated measurements.

Table 3-1 provides suggested geometries for the most common instrument types to be used at NASB. Alternate geometries can be used provided they are appropriate for the intended usage of the instrument.

Table 3-1. Suggested Geometries for Background Measurements and Source Checks

Measurement	Instrument/Detector Combinations	Probe Location
Exposure Rate	Ludlum Model 19 or equivalent with integral tissue equivalent plastic or sodium iodide (NaI) 1"x1" detector	1 meter[1/]
Swipe	Ludlum Model 2929 Alpha/Beta counter or equivalent	N/A
Alpha/Beta	Ludlum Model 2360 data logger or equivalent portable survey meter with Ludlum 43-9 or equivalent detector	¼ inch from surface/source

Notes:

[1/] Field readings and background determination with exposure rate instruments are conducted at 1 meter; chi-square test, and operational checks are typically performed at contact. Geometry should be documented as appropriate on the relevant data forms and logs.

Determination of instrument Background

The instrument's operations manual shall be followed for determining equipment background. Instrument background determination shall consist of a series of repeated background measurements that are statistically analyzed to obtain an expected range of valid background values. The established background range will be used as a means of performing daily operation checks.

Background determinations at NASB are considered valid for as long as the instrument has been properly maintained per the requirements of this procedure. If an instrument is taken out of service, a new background determination shall be performed prior to returning the instrument into service.

When determining background, the requirements specified in this SOP and the instrument's operations manual shall be followed; however, this SOP shall have precedence.

Background determinations will be documented on an approved subcontractor form that contains the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector
- Conditions used for determination (geometry, radiation type, operating voltage, etc.)
- Date and time of determination
- Identification and signature or initials of Radiological Control Technician (RCT)
- Identification and signature of reviewer

The end result of a background determination shall obtain an acceptance range for subsequent background checks.

Response check

A response check range will be established when the instruments (e.g., Ludlum Model 2360 data logger data logger with a Ludlum Model 43-89 alpha/beta detector and the Ludlum Model 19 NaI gamma scintillation detector) are received. NIST traceable check sources, radioactive sources of known activity used to verify the functionality of radiation detectors and instruments as a unit, or stable artifacts will be maintained by TtEC. Check sources will be used at the start of each shift, and as necessary thereafter, to confirm instrument operability as related to survey performance (i.e., response check) as described below.

The check source will be placed in a standard geometry (i.e., centered 4 inches below the surface of the applicable detector while the detector is attached to its corresponding data logger in a controlled environment) by the RCT prior to use, and the reading obtained on the instrument will be verified to be within ±20 percent of the expected value established by the check source. If the instrument does not respond within this tolerance (the response check range), the instrument will not be used for any radiation surveys, shall be tagged as inoperable, and sent for repair and calibration. If the instrument responds within the tolerance, the radiation data logger and detector combination is considered to be valid for use in the radiation surveys conducted that day.

Alternate geometries can be used provided they are appropriate for the intended usage of the instrument.

Chi-Square Test

Chi-square tests shall be performed once prior to initial use of the instrument at NASB, before an instrument is returned to service after maintenance or calibration, or if there is reason to suspect that the instrument calibration may no longer be valid (i.e., failure to pass the daily response check [i.e., reading does not fall within the ±20 percent of the expected value established by the check source]).

Chi-square tests shall be performed with NIST traceable sources with isotopic content appropriate to the detector being evaluated. The source should be of sufficient activity to yield a counting rate of 1,000 to 50,000 counts per minute (cpm). The source should not exceed 50,000 cpm.

Chi-square tests shall be documented on the attached form (see Attachment 1) form. The form shall include the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector
- Conditions used for the test (geometry, radiation type, operating voltage, etc.)
- Source identification number
- Date and time of determination

Identification and signature or initials of RCT

Identification and signature of reviewer

The chi-square test procedure will produce a chi-squared value (χ^2), which should be between 10.11 and 30.14. Failure to obtain a chi-squared value in this range indicates a problem with either the instrument or the methodology used to perform the chi-square test and requires further investigation. The PHP should be notified of the failure to assist in planning a course of action.

Instrument Efficiency for Portable Instruments

Instrument efficiency (ε_i), the ratio between the net count rate (in cpm) of the instrument and the surface emission rate of the efficiency check source for a specified geometry, shall be determined for all instruments and radiation and contamination survey meters that are to be used for alpha and beta surveys prior to use for field operations. The surface emission rate is the 2π particle fluence that is affected by both the attenuation and backscatter of the radiation emitted from the efficiency check source. Instrument efficiency is dependent upon energy of the incident radiation. The procedures in the operations manual shall be followed to determine the instrument efficiency for those instruments for which it is required.

The following equation is used to calculate the instrument efficiency in counts per particle:

$$\varepsilon_i = \frac{R_{S+B} - R_B}{q_{2\pi}\left(W_A / S_A\right)}$$

Where:

R_{S+B} = the gross count rate of the efficiency check source, measured in cpm

R_B = the background count rate in cpm

$q_{2\pi}$ = the 2 π surface emission rate of the calibration source (NIST traceable)

W_A = the active area of the probe window in square centimeters (cm^2)

S_A = the area of the source in cm^2

Note: This equation assumes that the dimensions of the efficiency check source are sufficient to cover the window of the instrument detector. If the dimensions of the efficiency check source are smaller than the detector's window, set W_A equal to the dimensions of the efficiency source (i.e., set the quotient of W_A and S_A equal to 1).

All instrument efficiency determinations shall be documented on the attached form (see Attachment 2). The form shall include the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector
- Conditions used for determination (geometry, radiation type, operating voltage, etc.)

- Source-specific information (identification number, surface emission rate, area)
- Detector window area
- Date and time of determination
- Identification and signature or initials of RCT
- Identification and signature of reviewer (typically the PHP)

The resulting instrument efficiency shall be reported in units of counts per particle.

DAILY OPERATION CHECK

An operation check for each instrument should be performed at the beginning of each workday that a particular instrument is used at NASB. The specified checks should be performed every day and documented on a new line of the check log (Attachment 3). A separate check log shall be maintained for each instrument. The operation checks shall include the following at a minimum:

- Check that instrument calibration is still valid (date on sticker not yet passed)
- Inspect the instrument (including the probe) for physical defects (loose, damaged knobs, buttons, cables, connectors, broken/damaged meter movements/displays, dented or corroded instrument cases, punctured/deformed probe/probe window(s), cables, Mylar windows, and any other physical impairments that may affect the proper operation of the instrument or detector.)
- Perform instrument battery check in accordance with manufacturers' instructions to ensure that there is sufficient voltage being supplied to the detector and instrument circuitry for proper operation.
- Perform response check using a check source (as described in Section 3.2.2) to verify the instrument responds within the ±20 percent functional range, as established during the initial response check
- Identification information (i.e., model and serial numbers) for the instrumentation used on site
- Date of operational check
- Signature or initials of RCT
- Identification and signature of reviewer

Failure of any of the above checks shall result in the instrument being removed from active service until the condition can be addressed. The PHP should be notified of any instrument failing an operations check for reasons other than failure of a battery check. In cases of battery check failure, the battery should be replaced and the check repeated.

Of the required information given above, only the verifications, date, and signature or initials need to be completed on a daily basis. A copy of the Daily Operational Check Log is provided in Attachment 3. The remaining information can be completed once and kept in the check log with the additional pages for daily checks, provided that none of the information changes. If the information changes, then a new check log should be started.

MAINTENANCE

Instruments shall be stored in areas at NASB which prevent damage by movement and accumulation of moisture or dust. Detector covers shall be used for storage when practical.

Instrument maintenance (except external adjustments and cable or Mylar window replacements) shall be performed by the manufacturer or an approved vendor.

ATTACHMENT 1
NASB CHI-SQUARED CALCULATION FORM

NASB Chi-Squared Calculation Form

MODEL NUMBER		INSTRUMENT SERIAL NUMBER		CALIBRATION DUE DATE	
SOURCE ID NUMBER		DATE/TIME			
RCT SIGNATURE		PHP SIGNATURE			

CHI – SQUARED

	X	$(X-X_A)$	$(X - X_A)^2$
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
SUM			

X_A = Sum (X)/20

Chi-Squared = Sum $[(X - X_A)^2]$ / X_A

Chi-Squared =

If Chi-Squared value is between 10.12 and 30.14, then instrument is good.

If Chi-Squared value does not fall between 10.12 and 30.14, remove the instrument from use, investigate possible equipment malfunction, and perform/request maintenance as necessary.

CONDITIONS OF TEST:

Radiation Type:

Detector to Source Distance:

X..... COUNT

X_A..... AVERAGE OF 20 COUNTS

Sum (X)..... SUM OF COUNTS

Sum $[(X - X_A)^2]$... SUM OF SQUARES

ATTACHMENT 2
nASB instrument efficiency determination form

Navy/DRI Site Instrument Efficiency Determination Form

Page ____ of ____

Project:	Dates Covered From: To:	ESID Number:

Instrument/Probe Information

Instrument Serial Number:	Instrument Type:	Calibration Date:	Calibration Due Date:		
Probe Serial Number:	Probe Type/Model:	Calibration Date:	Calibration Due Date:	Alpha Eff:	Beta/Gamma Eff:

Alpha Source Information

Source Number:	Source Isotope:	Source Activity:	Assay Date:

Beta/Gamma Source Information

Source Number:	Source Isotope:	Source Activity:	Assay Date:

Instrument Response Check

Date:	Time:	RCT Name/Signature:	
Alpha Background ( ):	Alpha Count Time: (min):	Beta/Gamma Background ( ):	Beta/Gamma Count Time (min):

Count Number	Alpha Source Count Rate (net _____)	Beta Sources Count Rate (net _____)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Mean Alpha Source Net Measurement (net)	Alpha Upper Bound (average + 20%)	Alpha Lower Bound (average – 20%)
Mean Beta Source Net Measurement (net)	Beta/Gamma Upper Bound (average + 20%)	Beta/Gamma Lower Bound (average – 20%)

Reviewed By (print and sign)	Date

ATTACHMENT 3
naSB daily operational check log

NASB Daily Operational Check Log

Page ____ of ____

Project:	Dates Covered From: To:	ESID Number:	Probe Serial Number:

		Alpha			Beta/Gamma			
Date	Time	Background ( )	Source Check (net)	P/F*	Background ( )	Source Check (net)	P/F*	RCT Initials

Reviewed By (print and sign)	Date

* P= pass; F=fail

STANDARD OPERATING PROCEDURE

FOR

SAMPLING PROCEDURES FOR RADIOLOGICAL SURVEYS

SOP 3

SOIL INVESTIGATIONS

IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK

BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to radiation and contamination screening surveys to monitor personnel and equipment during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to sample during the radiological survey.

Erik J. Abkemeier

Erik Abkemeier
Corporate Health Physics Manager
(757) 944-0921

October 19, 2010
Date

Amy Stanford

Amy Stanford
Senior Health Physicist
(706) 832-7394

October 19, 2010
Date

SUPERVISOR'S STATEMENT

I have read and understand this SOP. To the best of my knowledge, the radiation and contamination surveys described in this SOP can be performed in a safe, healthful, and environmentally sound manner. I have confirmed that all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker's statement for this purpose. I will ensure the SOP contains current procedures. If a major change to the SOP is necessary, I will ensure that active processes are suspended until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are identified, I will ensure the process is stopped until the hazards have been eliminated.

Amy Stanford
Senior Health Physicist

October 19, 2010
Date

WORKER'S STATEMENT

I have read this SOP and I have received adequate training to perform the procedures addressed in the SOP. If I identify a hazard not addressed in the SOP, or encounter an operation I cannot perform in accordance with the SOP, I will stop the process and notify my immediate supervisor.

Worker's Name	Date	Supervisor's Name	Date

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1. PURPOSE 1
2. SCOPE 1
3. PROCEDURES 1
3.1 GENERAL PROCEDURES 1
3.2 SAMPLING PROCEDURE PROCESS 1
3.3 SAMPLE PACKAGING AND TRANSPORT 2

PURPOSE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors to perform swipe sampling and sampling of various types of media including soil, solid material (such as concrete, brick, porcelain, and wood), and water at Naval Air Station Brunswick. This procedure also details sample packaging and transport of samples to the laboratory.

SCOPE

This procedure shall be implemented by TtEC staff and subcontractor personnel when collecting samples at NASB related to radiological surveys.

PROCEDURES

GENERAL PROCEDURES

Field instruments used for measurements required by this procedure shall be checked with standards and verified to have current calibration (see SOP 2).

Any time this procedure is in effect at NASB, the Project Health Physicist (PHP) (or qualified designee) should ensure, by periodic personal observation, that samples are appropriately collected and controlled.

Surface scan surveys are to be performed at each location before initiating sampling at NASB. This will identify the presence of gross contamination which, if present, will require that samples and equipment be treated as radiologically contaminated and managed accordingly (see SOP 6). Samples will be recorded on chain-of-custody (COC) documentation.

SAMPLING PROCEDURE PROCESS

Sample activities will be recorded in NASB field logbook. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples at each location.

Swipe Sampling

Swipe samples will be obtained in accordance with SOP 1, Radiation and Contamination Surveys. Swipe samples will be documented in NASB sample logbook as applicable.

Soil Sampling

The sampling protocol described herein is based on obtaining "samples of convenience" during test pit installation. Samples may be collected at any elevation in the test pit. Samples will be collected with a hand-auger, disposable scoop, or equivalent. The soil removed for sampling

must be sufficient to yield a sample of sufficient volume for the sample container provided by the analytical laboratory. Soil samples will be collected and handled as follows:

- Loosen the soil at the selected sampling location using a trowel or other digging instrument
- Remove large rocks, vegetation and foreign objects. In some cases, however, these objects may be the source of contamination and may be collected as separate samples for characterization
- Place as much soil as practical into a 250-milliliter (mL) wide-mouth plastic bottle or plastic 500-mL Marinelli container, unless other glassware is provided by the analytical laboratory
- If sample containers are not readily available, samples may be placed in a plastic bag (e.g., Ziploc™) for subsequent transport to the laboratory
- Tape the cap of the container in place or seal the Ziploc™ plastic bag
- Label the sample container
- Document all samples collected in the sample logbook as applicable. Sample COC records shall be completed
- Sample packaging and shipment procedures for transporting samples to an off-site laboratory are described in Section 3.3 of this procedure
- Clean or decontaminated tools will be used at each sampling location

Water Sampling

Wastewater sampling is not anticipated to be required at NASB. If required, however, the following methods will be implemented for collecting water samples.

- Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting wastewater samples
- Wastewater samples will be collected using a disposable bailer or similar device
- Samples will be transferred from the bailers to pre-preserved, pre-cleaned sample containers provided by the analytical laboratory.
- Follow steps 5 through 9 of Section 3.2.2 to complete sample collection

SAMPLE PACKAGING AND TRANSPORT

NASB site samples will be delivered for analysis to the designated laboratory in a box, cooler, or similar container (ice is not required if only radiological analysis will be performed) along with the completed COC.

Samples will be packaged in accordance with applicable Department of Transportation (DOT) and International Air Transport Association (IATA) procedures. At a minimum, sample containers will be placed in a box, cooler, or similar container for shipment and packaged with bubble wrap or other materials as necessary to prevent container breakage. The appropriate section(s) of the COC will be completed by the assigned courier. The box/cooler and the top two copies (white and pink) of the COC will then be released to the courier for transportation to the laboratory.

For samples shipped via a commercial carrier, the COC will include the airbill number, and the "Received By" box will be labeled with the commercial courier's name. The top two copies (white and pink) of the COC will be sealed in a resealable bag and then taped to the inside of the sample cooler lid or placed inside the box. The yellow copy of the COC will be maintained by the on-site laboratory, and the manila copy will be maintained in the project files. The box/cooler will be taped shut with strapping tape as necessary. Two custody seals will be taped across the lid: one seal in the front and one seal in the back. The pouch for the airbill will be placed on the box/cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple boxes/coolers are being shipped, then the original airbill will be placed on the box/cooler with the COC, and copies of the airbill will be placed on the other boxes/coolers. The number of packages should be included on each airbill (e.g., 1 of 2, 2 of 2). Saturday deliveries should be coordinated in advance with the designated off-site laboratory and placement of "Saturday Delivery" stickers on each box and/or cooler to be shipped should be confirmed with the commercial courier prior to release. Prepared packages will also be surveyed prior to shipment.

STANDARD OPERATING PROCEDURE

FOR

AIR SAMPLING AND SAMPLE ANALYSIS

SOP 4

SOIL INVESTIGATIONS

IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK

BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to conduct air sampling and sample analysis during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to conduct air sampling and sample analysis.

Erik Abkemeier — October 19, 2010
Erik Abkemeier — Date
Corporate Health Physics Manager
(757) 944-0921

Amy Stanford — October 19, 2010
Amy Stanford — Date
Senior Health Physicist
(706) 832-7394

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Amy Stanford
Amy Stanford
Senior Health Physicist

October 19, 2010
Date

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Worker's Name	Date	Supervisor's Name	Date

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ATTACHMENT 1 AIR SAMPLE IDENTIFICATION RECORD

ATTACHMENT 2 PERSONNEL AIR MONITORING LOG

PURPOSE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors to perform air sampling and document the results during the radiological survey at NASB. Results will be used to determine what respiratory protection, if any, is required for the work area.

Air sample analysis will be performed by trained personnel using approved procedures specific to the alpha and beta radiation counting equipment. Further discussion of sample analysis is not within the scope of this procedure.

SCOPE

This procedure will be used for all TtEC and subcontractor radiological air sampling activities supporting the radiological survey, regardless of the organization performing the work at NASB. Results will be used to determine respiratory protection requirements, and assign dose to workers from inhalation and/or ingestion when necessary.

PROCEDURES

Air samples at NASB will be taken if the Project Health Physicist (PHP) determines that there is the possibility particulate airborne radioactivity.

If required, ambient air monitoring equipment will be placed in locations at NASB representative of the airborne contamination in the work location.

Data obtained from air monitoring shall be used for assessing the control of airborne radioactivity in the workplace and to evaluate the dose equivalent to radiation workers from internal sources.

Process or other engineering controls (e.g., water mist, wind breaks) shall be used, to the extent practicable, to control the concentration of radioactive material in the air, if required.

Air samplers shall be operated in accordance with the manufacturers' operation and calibration procedures.

Filters of different air samples shall be placed in a separate envelope, polybag, or other suitable container to ensure that there is no possibility of cross-contamination.

During collection and handling of air samples, caution must be used to prevent the samples from being contaminated by other sources of radioactive material.

PRECAUTIONS

Avoid unnecessary contamination of air sampling equipment through the use of plastic coverings and care in handling. Do not cover the air intakes or exhausts on air samplers.

Avoid unnecessary exposure when conducting air monitoring surveys by using as low as reasonably achievable (ALARA) practices.

Samples should be taken in such a manner as not to contaminate the sample filter with materials that are not airborne or by sucking up loose contamination from surfaces near the sampling head. Caution should be used to minimize producing airborne material by the sampler exhaust.

When air sample results exceed 10 percent of the derived air concentration (DAC) value, report this information to the PHP (or qualified designee) immediately. Also, consideration should be given to isotopic analysis and area access restriction/posting.

TYPE OF AIR SAMPLES

General Area Air Samples

General area air samples at NASB provide data representative of the work area. Samples are normally taken over a short period of time ranging from 1 hour up to 1 or more days. This type of sample:

- Is taken on a routine basis at predetermined times and locations, as determined by the PHP
- Uses a low-volume air sampler
- Consists of a minimum of 100 cubic feet (ft^3) (2,832 liters) of air passed through the sample filter
- Is collected at between 3 and 6 feet above ground level, in the vicinity of the workers performing the fieldwork
- Is analyzed for alpha and beta activity using the Ludlum Model 2929 alpha/beta counter

Grab Samples

Grab air samples are taken at NASB to evaluate the concentration of airborne radioactive radionuclides during the relatively short sampling period. This type of sample is useful for estimating the instantaneous or peak concentration of airborne contamination. This type of sample:

- Is taken as needed during radiological work coverage at the discretion of the Radiological Control Technician (RCT), or as directed by the PHP
- Uses a high-volume air sampler
- Consists of a minimum of 100 ft^3 (2,832 liters) of air passed through the sample filter
- Is collected in the vicinity of the workers performing the fieldwork
- Is analyzed for alpha and beta activity using the Ludlum Model 2929 alpha/beta counter

Breathing Zone Air Samples

Breathing zone air samples at NASB provide data representative of the concentration of airborne radioactive material that a worker would be breathing during a particular task. This type of sample:

- Is used during the work activities with widely varying airborne contamination concentrations across the work area
- Uses a small portable air sampler with sample head attached on the worker's collar, which is usually positioned within 12 inches of the worker's face
- Consists of a minimum of 50 ft^3 (1,416 liters) of air passed through the sample filter
- Is analyzed for alpha and beta activity using the Ludlum Model 2929 alpha/beta counter

AIR SAMPLING PROCEDURES

General

Sample types, number, locations, and volumes will be collected as specified in the PHP.

Samples will be surveyed with a portable alpha/beta survey meter before placing in envelope or plastic bag (e.g., Ziploc™). If the survey indicates the presence of contamination that is equal to or greater than three sigma plus background mean criteria, appropriate steps will be taken to determine source of contamination and secure the area.

Samples will be analyzed on site for gross alpha and beta, and determination (if any) of the DAC.

If sample analysis indicates airborne contamination exceeding 10 percent of the DAC, notify the PHP and take appropriate steps to determine source of contamination and secure the area. The PHP will notify Radiological Affairs Support Office (RASO) upon validation of the air sample analysis.

The Air Sample Identification Record (Attachment 1) and Personal Air Monitoring Log (Attachment 2) provide examples of air sampling record sheets. Equivalent or electronic forms, which provide, at a minimum, the information on these forms, may be used.

Air samples will be preserved and archived after analysis.

General Area Air Sampling

1. Determine the requirements for air sampling prior to initiating any work activities. This will be done through discussion with the PHP (or designee), Field Operations Lead (FOL), and/or workers assigned to the task.

2. Test the functionality of the air sampling equipment prior to entering the work area. Check for current dates on calibration tags and recent calibration of the sampler flow meter. Any equipment not functioning properly, or with calibrations out of date, will not be used. Notify the PHP (or designee) of any equipment that does not function properly.

3. Gather essential supplies before entering the work area. This will include:

- Extension cords
- Air sample filters
- Tongs (if necessary)
- Additional gloves
- Air sample envelopes
- Pen or marker
- Backup air sample equipment

4. Record the following information on the air sample envelope:

- Sample identification number
- Date
- Location
- Air sampler identification number
- Start time

5. Place the air sampler on a stable surface 3 to 6 feet from the ground, in the vicinity of the workers performing the field activities.

6. Place an unused sample filter into the sample holder using care not to contaminate the filter with material on the tongs or gloves used to hold the filter while placing it into the holder. If the sampler has been in the contaminated area for some time, it is good practice to clean any visible debris or dust from around the sampler filter holder housing before placing the unused filter into the holder.

7. Operate the air sampler for the predetermined time. Verify the sampler flow rate, if a flow meter is provided on the sampler. Record any deviation from the predetermined flow rate.

8. If not provided with an automatic shut-off timer, turn the air sampler off as soon as practical after the predetermined sampling time has elapsed.

9. Prior to removing the sample from the holder, survey the sample using a hand-held alpha and beta contamination survey meter. Note the activity observed on the outside of the sample envelope.

10. If the sample survey indicates the presence of radioactive contamination and the area is not already controlled as an airborne radiation area, stop work, notify the PHP (or designee), and implement appropriate controls, including postings. Record sample information on the sample envelope.

11. Using caution not to knock debris or dust from the sample filter holder housing onto the air sample, remove the air sample from the holder using clean gloved hands or clean tongs.

12. Place the sample into the sample envelope using caution not to scrape or remove contamination from the surface of the sample.

13. Record the following information on the air sample envelope:

- Stop time
- Sample volume
- Sample pump flow rate

14. Send the sample for on-site analysis and percent DAC determination.

15. On Attachment 1, Air Sample Identification Record (or equivalent, including electronic), note the sample analysis information as soon as the data is available, including:

- Alpha count results (microCuries per millliliters [µCi/mL])
- Beta count results (µCi/mL)
- Percent DAC

16. Complete Attachment 1 by transcribing the information from the sample envelope to Attachment 1 and initialing.

17. Report any higher than normal, higher than expected, greater than 10 percent of the DAC, or trending upward results to the PHP (or designee) immediately.

Breathing Zone Air Sampling

The following steps will be taken for breathing zone air sampling:

1. Determine the requirements for breathing zone air sampling prior to initiating any work activities. This will be done through discussion with the PHP, FOL, and/or workers assigned to the task.

2. Assemble the individual breathing zone air sampler sets. Ensure that all hoses are firmly seated in the hose connectors found on the sample head and sample pump. Make sure that the sample head is not cracked or damaged in any way. Set any damaged or unusable equipment aside and notify the PHP (or designee).

3. Note the relative size of the individual to whom the sampler will be issued. It may be necessary to replace the standard length belt with a longer belt, or chain two belts together to achieve the required length. Make sure that the belt buckle is not damaged and will function properly to restrain the sampler around the worker. Set any damaged or unusable equipment aside and notify the PHP (or designee).

4. Test the functionality of the air sampling equipment prior to entering the work area. Check for current dates on calibration tags and recent calibration of the sampler flow meter. Any equipment not functioning properly, or with calibrations out of date will not be used. Notify the PHP (or designee) of any equipment that does not function properly.

   Note: Only use a sample pump containing a battery that is known to be fully charged.

5. Insert a new, unused sample filter paper into the sample head and tighten the sample head. Take care not to damage the filter paper or the sample head during this operation.

6. Prior to issuing any equipment to a worker, instruct the worker to:

- Refrain from touching or tampering with the pump or the sample head;
- Leave the work area if the sampler fails and note the stop time; and
- Contact the RCT for assistance when leaving the work area and at completion of work.

7. Prior to issuing any equipment to a worker, enter the following information on Attachment 2, Personal Air Monitoring Log:

- Wearers' Name
- Wearers' social security number
- Sampler identification number
- Date

8. Attach the personal breathing zone air sampler to the worker. Make sure that the belt is tight, but not uncomfortable.

9. Attach the sample head to the worker. Make sure that the sample head is clipped securely to the worker's lapel or other piece of clothing close to the worker's face. Make sure that opening in the end of the sample head is unobstructed.

10. Check the hose connecting the sample head to the sample pump. Make sure that the hose is not kinked, crimped, or folded; or can become so, or otherwise interfere with routine work. If any of these conditions are found, reorient the hose. It may be necessary to find alternate places to position the sample head or sample pump so the hose is unobstructed.

11. Upon arrival at the work location, turn the pump ON. Note the START TIME and flow rate on Attachment 2, Personal Air Monitoring Log.

    Note: Make sure to note whether flow rate is in units of cubic feet per minute (cfm) or liters per minute (lpm).

12. Every time a worker leaves the work area, turn the sample pump OFF and note the stop time. Upon re-entering the work area, turn the sample pump back ON and make a new notation of the re-start time.

13. At the end of the sampling period (end of task or end of shift), turn the pump OFF and note the stop time on Attachment 2, Personal Air Monitoring Log.

14. Calculate the total time that the sample pump was operating by adding together the operating periods of time.

15. Calculate the total sample volume by multiplying the operating time by sampler flow rate. The result may be in units of cfm or lpm.

16. Record the total sample volume on Attachment 2, Personal Air Monitoring Log. Note the appropriate units (cfm or lpm) on Attachment 2, Personal Air Monitoring Log.

17. Select a clean, unused sample envelope. Label the envelope with the following information:

- Sample identification number
- Date
- Location
- Worker name
- Total sample volume (use the appropriate units – cfm or lpm)

18. Open the sample holder using caution not to remove or add to the contamination on the sample.

19. Prior to removing the sample from the holder, survey the sample using a hand-held alpha and beta contamination survey meter. Note the activity observed on the outside of the sample envelope.

20. If the sample survey indicates the presence of radioactive contamination, and the area is not already controlled as an airborne radiation area, stop work, notify the PHP, and implement appropriate controls, including postings.

21. Using caution not to knock debris or dust from the sample filter holder housing onto the air sample, remove the air sample from the holder using clean gloved hands or clean tongs.

22. Place the sample into the sample envelope, using caution not to scrape or remove contamination from the surface of the sample.

23. Confirm that the information on the sample envelope matches the information in Attachment 2, Personal Air Monitoring Log.

24. Immediately send the sample for onsite analysis and percent DAC determination.

25. On Attachment 2, Personal Air Monitoring Log, note the sample analysis information as soon as the data is available, including:

- Alpha count results (μCi/ml)
- Beta count results (μCi/ml)
- Percent DAC

26. Complete Attachment 2, Personal Air Monitoring Log.

27. Report any higher than normal, higher than expected, or trending upward results to the PHP (or designee) immediately.

Documentation

Air samples shall be documented using either an Air Sample Identification Record or Personal Air Monitoring Log (or equivalent).

ATTACHMENT 1
Air sample identification record

NASB AIR SAMPLE IDENTIFICATION RECORD

Project/Location:_____ Page ____ of ____

Sample ID	Date	Location	Start Time	Stop Time	Air Sampler ID	Sample Volume	Count Results α (μCi/ml)	Count Results β (μCi/ml)	%DAC	Counter ID

DAC derived air concentration
μCi/ml microcurie per milliliter
ID identification number
α alpha
β beta

ATTACHMENT 2
PersonAl air monitoring log

NASB PERSONAL AIR MONITORING LOG

Name of Wearer	Social Security Number	Sampler ID Number	Date	Time On / Time Off	Flow Rate (cfm/lpm)	Total Volume (ft^3/liters)	Activity α (μCi/ml)	Activity β (μCi/ml)	Percent DAC

cfm cubic feet per minute
DAC derived air concentration
ft^3 cubic feet
ID identification number
lpm liters per minute
μCi/ml microcurie per milliliter
α alpha
β beta

STANDARD OPERATING PROCEDURE

FOR

RADIOLOGICAL PROTECTIVE CLOTHING SELECTION, MONITORING, AND DECONTAMINATION

SOP 5

SOIL INVESTIGATIONS

IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK

BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to conduct conduct radiation and contamination screening surveys to monitor personnel and equipment during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to conduct radiological clothing selection, monitoring, and decontamination.

Erik J. Abkemeier

Erik Abkemeier
Corporate Health Physics Manager
(747) 944-0921

October 19, 2010
Date

Amy Stanford

Amy Stanford
Senior Health Physicist
(706) 832-7394

October 19, 2010
Date

SUPERVISOR'S STATEMENT

I have read and understand this SOP. To the best of my knowledge, the radiation and contamination surveys described in this SOP can be performed in a safe, healthful, and environmentally sound manner. I have confirmed that all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker's statement for this purpose. I will ensure the SOP contains current procedures. If a major change to the SOP is necessary, I will ensure that active processes are suspended until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are identified, I will ensure the process is stopped until the hazards have been eliminated.

Amy Stanford

Amy Stanford
Senior Health Physicist

October 19, 2010
Date

WORKER'S STATEMENT

I have read this SOP and I have received adequate training to perform the procedures addressed in the SOP. If I identify a hazard not addressed in the SOP, or encounter an operation I cannot perform in accordance with the SOP, I will stop the process and notify my immediate supervisor.

Worker's Name	Date	Supervisor's Name	Date

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ATTACHMENT 1 PERSONNEL CONTAMINATION REPORT

TABLES

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PURPOSE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors to select protective clothing, perform personnel surveys (monitoring), and decontaminate personnel at NASB.

SCOPE

This procedure will be used by TtEC personnel and its subcontractors while performing activities in known or suspected areas with radiological contamination at NASB.

PROCEDURES

SELECTION OF PROTECTIVE CLOTHING

The following factors should be considered when selecting protective clothing (PC):

- The levels and types of radiological material present or expected in the work area
- The presence of chemical hazards
- The base in which the contamination is carried (dry, wet, oily)
- The work to be performed or work in progress
- The location of the contamination (e.g., floor, walls, overhead, air handling systems, sewer systems)
- The physical configuration of the work area
- Environmental conditions such as heat and humidity
- Exposure situation (vapor, pressured splash, liquid splash, intermittent liquid contact, and continuous liquid contact)
- Toxicity of the radioactive materials and/or chemical(s) (ability to permeate the skin and systemic toxicity)
- Physical properties of the contaminant (vapor pressure, molecular weight, and polarity)
- Functional requirements of the task (dexterity, thermal protection, fire protection, and mechanical durability requirements)

Table 3-1 provides guidance for the selection of PC when radiological hazards are present or suspected.

The guidelines specified in Table 3-1 for PC selection may be modified as detailed below. The following are examples:

- Wet areas – Where splashing water or spray is present, use rain suits in addition to the protective clothing listed in Table 3-1. A second set of coveralls may not be necessary when a rain suit is worn
- Standing water – In addition to the clothing requirements for wet areas, use hip boots or waders for deep standing water areas
- Face shields – Consider for use when there is significant beta radiation or a likelihood of water splashing where respirators are not required
- High temperature areas – Consult with the Project Health Physicist (PHP) and Site Safety Officer (SSO)

Table 3-1. Guide for the Selection of Radiological Protective Clothing

Removable Contamination Levels	Clothing for Access Only No Work[1/]	Clothing for Work or Access During Work[1/]
General contamination levels < 1,000 dpm/100 cm^2	Level D PPE	Level D PPE
General contamination levels > 1,000 dpm/100 cm^2, but ≤ 10,000 dpm/100 cm^2	Glove liners Gloves Booties, cloth or PVC Tyvek Rubber shoe covers[2/]	Glove liners Gloves Booties, cloth or PVC Tyvek Rubber shoe covers[2/]
General contamination levels > 10,000 dpm/ 100 cm^2, but ≤ 100,000 dpm/100 cm^2	Glove liners Gloves Booties, cloth or PVC Tyvek Cap (or hood) Rubber shoe covers[2/]	Glove liners Gloves Booties, cloth or PVC Tyvek Cap (optional) Hood Rubber shoe covers[2/]
General contamination levels > 100,000 dpm/100 cm^2	Glove liners Gloves (2 pair) Booties, cloth or PVC Tyvek Cap (optional) Hood Rubber shoe covers[2/]	Glove liners Gloves (2 pair) Booties (2 pair), cloth or PVC Tyvek (2 pair) Cap Hood Rubber shoe covers[2/]

Notes:

[1/] Plastics or partial plastics may be required any time water or liquid chemicals are present, such as when handling wet components.

[2/] Composition of rubber shoe covers will be selected based on work area conditions and presence of any chemical hazards.

cm^2 – square centimeter PPE – personal protective equipment
dpm – disintegration per minute PVC – polyvinyl chloride

PROCEDURE PROCESS

Donning Protective Clothing

28. Select the appropriate PC.

29. Inspect the clothing for holes, tears, or other indications of damage. If damaged, remove PC from service.

30. Don clothing.

Removal of Protective Clothing

31. Remove any tape and place in the designated collection receptacle.

32. Remove outer gloves, if worn.

33. Remove coveralls, if worn, by peeling off inside out and rolling downward over the shoes or inner booties.

34. Remove booties.

35. Carefully place coveralls in the designated collection receptacle.

> **CAUTION**: Pushing clothing or trash into an already full collection container to compress the contents is forbidden as the act can result in the potential for airborne radioactivity.

36. Have the Radiological Control Technician (RCT) perform a personnel exit survey.

The sequence for protective clothing removal may vary from that described above as follows:

- At the discretion of the RCT, providing job coverage
- Dependent on radiological and hazardous material conditions encountered during the work evolution

Monitoring

Exit Surveys

> **Note:** Site conditions may merit only a hand and foot survey. If this is the case, only the hands and shoe bottom are surveyed by the RCT.

1. Use the portable instrument staged for the area of concern, which should have both a visual and an audible response.
2. Ensure that the instrument is set on slow response, if available, and operating with an audible response.
3. Verify that the instrument is operational on the lowest scale and that the area background count rate is acceptable.
4. Hold the detector with the window at approximately ½ inch from the surface being monitored.
5. Move the detector over the surface being monitored at a rate not to exceed 2 to 3 inches per second.
6. If an increase in the audible response is noted, then cease detector movement and allow the meter 5 to 10 seconds to stabilize.
7. Pause (approximately 5 seconds) at the nose and mouth area to check for indications of inhalation/ingestion of radioactive material.
8. Pay particular attention to hands, feet (shoes), elbows, knees, or other areas with a high potential for contamination.
9. If no contamination can be detected as indicated by an alarm or by an audible or visual response distinguishable from background, then exit the area.
10. If an audible or visual response distinguishable from background is noted, then the RCT will further investigate to verify if contamination is present.
11. If personnel are found to be contaminated, proceed to the procedures outlined in Section 3.2.3.2.

Contaminated Personnel

1. Notify the PHP of any individual with known or suspected contamination.
2. If the contamination is on a personal article of clothing, then perform the following:
   - Survey the inside surface, which was against the skin
   - Verify that no contamination was transferred to the skin
3. If the contamination is on the skin, then determine if the contamination is in the form of a hot particle.
4. If the contamination is a hot particle, then:

- Quickly evaluate the:
  - Particle size
  - Radiation type
  - Visible characteristics
- Attempt to collect and retain the particle for subsequent evaluation
- Decontaminate the individual in accordance with Section 3.2.4

5. If the contamination is not a particle, then:
   - Evaluate the contamination levels
   - Decontaminate the individual in accordance with Section 3.2.4
6. Complete the applicable parts of the Personnel Contamination Report (Attachment 1)

Personnel Decontamination

> **NOTE:** First aid measures take precedence over decontamination efforts. The RCT shall request support from qualified medical personnel when an injured person requires decontamination.

1. Perform personnel decontamination in a manner that prevents the spread of contamination to other body parts or the ingestion or inhalation of radioactive material.
2. Take appropriate precautions to minimize the spread of contamination when proceeding from the control point or step-off pad to the decontamination area.
3. **Personnel will not be released if detectable skin contamination is present, unless authorized by the PHP.**
4. When performing skin decontamination:
   - Exercise care to avoid damaging the skin
   - If skin irritation becomes apparent, then discontinue the decontamination and notify the PHP
   - Record results after each decontamination attempt
   - Indicate the method of decontamination used (see Table 3-2)

- Decontamination of ears, eyes, and mouth shall be limited to damp swabs, water, or saline solution rinses conducted by the individual. Further decontamination shall be performed under the direction of qualified medical personnel
- Decontamination of nasal passages shall be limited to repeated nose blowing by the individual. Supplemental nasal irrigations shall be performed under the direction of qualified medical personnel, as required
- Use of decontamination processes or materials other than those listed in Table 3-2 will only be performed under the specific direction of qualified medical personnel
- Immediately report incidents of individual contamination to the PHP
- Note the final survey results and time of survey
- Record the area of the skin contaminated in cm^2 on the Personnel Contamination Report (Attachment 1)
- For contamination distributed over an area greater than or equal to the area of the probe, the measured activity may be assumed to be distributed over the probe area (area of typical pancake probe is 15.5 cm^2)
- If the area of contamination is less than the area of the probe but greater than 1 cm^2, the actual area of the activity must be determined
- If the contamination area is less than or equal to 1 cm^2, assume an area of 1 cm^2
- When skin decontamination has been successfully completed, obtain the information needed to complete the Personnel Contamination Report (Attachment 1)
- Complete the applicable parts of the Personnel Contamination Report (Attachment 1)

Table 3-2. Personnel Decontamination Methods

Method	Effective for	Instructions
Masking Tape	Dry contamination, hot particles	Apply tape to skin by lightly patting. Remove carefully.
Waterless Hand Cleaner	All skin contamination	Apply to affected area and allow it to melt onto the skin. Remove with cotton or soft disposable towel.
Soap and Tepid Water	All skin contamination except tritium	Wash area with soap and lukewarm water. Repeat until further attempts do not reduce the level. A cloth or surgical hand brush may be used with moderate pressure.
Soap and Cool Water	Tritium contamination	Wash area with soap and cool water. Repeat until further attempts do not reduce the level. A cloth may be used with moderate pressure.
Carbonated Water	All skin contamination	Apply to affected area with cotton or soft disposable towel and wipe with dry towel.
Cornmeal Detergent Paste	All skin contamination	Mix cornmeal and powder detergent in equal parts with enough water to form a paste. Rub onto affected area for 5 minutes. Remove with cotton or disposable towel. Rinse skin.
Shampoo	Hair contamination	Wash hair and rinse. Repeat as necessary.
Parafilm	All particulate contamination	Apply to affected area of skin. Remove.
Sweating	All skin contamination	Cover affected area with impermeable cover (plastic, glove, Parafilm) to cause sweating. Remove after sweating has occurred and wipe area.

Radiological Follow-up

The RCT shall:

37. Ensure that the Personnel Contamination Report (Attachment 1) has been completed.
38. Check the location of the contamination event – Contaminated Area, Hot Particle Area, clean area inside a radiologically controlled area (RCA), or clean area outside RCA.
39. Enter any additional information considered pertinent.
40. Complete the "Contamination Event Description and Cause" sections of Attachment 1.
41. If the event was directly related to wearing PC, then complete Section A, "Event Directly Related to Wearing PC."
    - Check the appropriate Contamination Event Description

- Check the appropriate Basic Cause

6. If the contamination occurred while removing PC, then complete Section B, "Event Occurred While Removing PC."
   - Check the appropriate "Contaminating Event Description"
   - Check the appropriate "Basic Cause"
7. If the contamination event was not related to wearing PC, then complete Section C, "Event Not Directly Related to Using PC"
   - Check the appropriate "Contaminating Event Description"
   - Check the appropriate "Basic Cause"
8. Review the report with the individual and have individual sign and date the form.
9. Sign and date the form.

The PHP shall:

42. Review the Personnel Contamination Report to verify that all required information has been accurately recorded.
43. Complete the "Health Physics Supervisor" section.
    - Check the appropriate brackets ([ ]) to indicate actions taken
    - Enter any comments
44. Sign and date the form.
45. Request support from the qualified medical personnel when:
    - The personnel decontamination methods provided in this procedure are ineffective; or
    - Injured personnel require decontamination.
46. Determine reimbursements and disposition of personal property that cannot be decontaminated.
47. Forward the completed Personnel Contamination Report to the SSO for review.

The SSO shall:

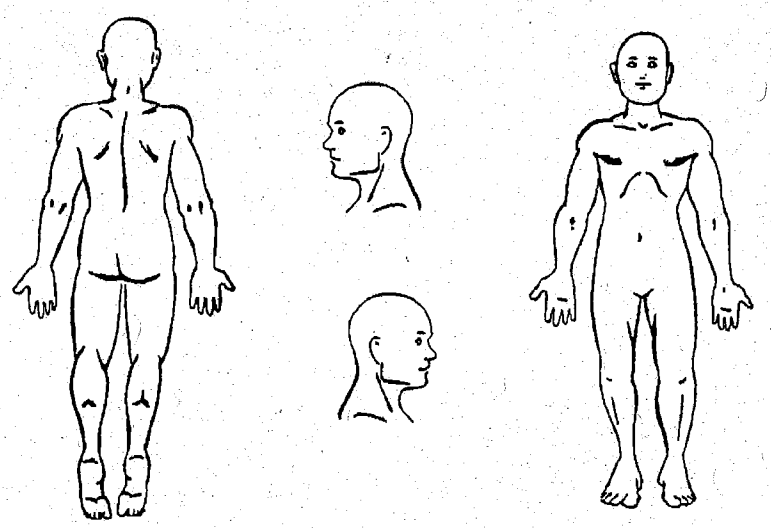
1. Review and sign the Personnel Contamination Report (Attachment 1).
2. Conduct an investigation into the cause of the contamination.
3. Conduct training on the cause of the contamination, lessons learned, and preventive measures.

Sign and transmit the Personnel Contamination Report (Attachment 1) to the PHP for review.

ATTACHMENT 1
PERSONNEL CONTAMINATION REPORT

NASB PERSONNEL CONTAMINATION REPORT

Name		Company	Date	Time
EID	Dosimeter#	Dept.	Supervisor	
Instrument		Serial #	Cal. Due Date	
Probe		Serial #	Cal. Due Date	
Location of Personnel Contamination			RWP # Survey #	



Contamination Levels (Use # to reference drawing)					
Number	Time	Initial Count Rate	Size of Area (cm^2)	Time	Final Count Rate
Decontamination Methods	__ Wash __ Number of washes			__ Other:	

	__ Shower __ Number of showers	
Radiological Control Technician Signature:		Date
I acknowledge the above information represents the contamination event.		
Individual Signature:		Date

Name EID

CLOTHING CONTAMINATION			
Item:	Max cpm	[ ] Decon/Return	[ ] Contaminated/Retained
Item:	Max cpm	[ ] Decon/Return	[ ] Contaminated/Retained
Item:	Max cpm	[ ] Decon/Return	[ ] Contaminated/Retained

RADIOLOGICAL FOLLOW-UP			
Location of Event:	[ ] Contamination Area	[ ] Clean area inside RCA	[ ] Clean area outside RCA
Follow-up actions:			
Additional information:			

CONTAMINATION EVENT DESCRIPTION and CAUSE

A - Event Directly Related To Wearing PC

Contaminating Event Description	Basic Cause
[ ] Contaminated by physical compromise of PC (tear, etc.)	[ ] Improper donning of PC
[ ] Contamination penetration of intact PC	[ ] Improper PC use related to worker knowledge/experience
[ ] Contamination came from PC	[ ] Work area not deconned to extent practicable
[ ] Contaminated skin by touching contaminated item	[ ] Practical limitation of available alternatives
[ ] Contamination came from contaminated liquid	[ ] Improper PC requirement on RWP
[ ] Contamination came from airborne radioactivity	[ ] Improper control by RCT of worker activity in PC
	[ ] Improper laundry/monitoring of PC

B - Event Occurred While Removing PC

Contaminating Event Description	Basic Cause
[ ] Contaminated during removal of hood	[ ] Lack of knowledge in proper methods to remove PC
[ ] Contaminated during removal of respiratory equipment	[ ] Lack of knowledge in proper methods to remove respirator
[ ] Contaminated during removal of outer PC	[ ] [ ] Worker actions while removing PC - accident
[ ] Contaminated during removal of inner PC	[ ] RCT technician actions
[ ] Contaminated during removal of plastics	[ ] [ ] Improper monitoring of PC
[ ] Contamination came from airborne radioactivity	

C - Event Not Directly Related To Using PC

Contaminating Event Description	Basic Cause
[ ] Contaminated while in area designated as clean RCA	[ ] Noncompliance with postings/rad controls
[ ] Contaminated while in area designated clean non - RCA	[ ] Improper monitoring/control of rad material by worker
[ ] Contaminated by liquid	[ ] Improper actions at work area (sitting, lying)
[ ] Contamination spread to area and not identified	[ ] Accidental contact with contamination beyond worker control
[ ] Improper control of airborne radioactive material	[ ] Surveys not appropriate for existing conditions

Health Physics Supervisor

[ ] Interview with job coverage RCT	[ ] Released with residual contamination
[ ] Exclude individual from further RCA access	[ ] Initiated skin dose calculation
[ ] Discussed with individual and supervisor	[ ] No further action required, routine close out

PHP /

Print Sign Date

STANDARD OPERATING PROCEDURE

FOR

RELEASE OF MATERIALS AND EQUIPMENT

SOP 6

SOIL INVESTIGATIONS

IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK

BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to release materials and equipment from a radiologically controlled area during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to release materials and equipment from a radiologically controlled area.

Erik J. Abkemeier

Erik Abkemeier
Corporate Health Physics Manager
(757) 944-0921

October 19, 2010
Date

Amy Stanford

Amy Stanford
Senior Health Physicist
(706) 832-7394

October 19, 2010
Date

SUPERVISOR'S STATEMENT

I have read and understand this SOP. To the best of my knowledge, the radiation and contamination surveys described in this SOP can be performed in a safe, healthful, and environmentally sound manner. I have confirmed that all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker's statement for this purpose. I will ensure the SOP contains current procedures. If a major change to the SOP is necessary, I will ensure that active processes are suspended until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are identified, I will ensure the process is stopped until the hazards have been eliminated.

Amy Stanford

Amy Stanford
Senior Health Physicist

October 19, 2010
Date

WORKER'S STATEMENT

I have read this SOP and I have received adequate training to perform the procedures addressed in the SOP. If I identify a hazard not addressed in the SOP, or encounter an operation I cannot perform in accordance with the SOP, I will stop the process and notify my immediate supervisor.

Worker's Name	Date	Supervisor's Name	Date

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ATTACHMENT 1 UNCONDITIONAL RELEASE OF EQUIPMENT OR MATERIALS FORM

TABLES

Table 3-1. Release Limits for Materials and Equipment 4

PURPOSE

The purpose of this procedure is to specify the radiological survey requirements for releasing materials and equipment used for collecting potential radioactive contamination during soil sample collection at NASB.

SCOPE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors to release materials from RCAs at NASB.

PROCEDURES

GENERAL

Surveys for fixed and removable surface contamination shall be conducted and documented in accordance with SOP 1, Radiation and Contamination Surveys.

Items presented for release shall be surveyed in an area of relatively low background at NASB.

LIMITATIONS

This procedure shall not be used for personnel surveys. Personnel will be surveyed in accordance with SOP 5, Radiological Protective Clothing Selection, Monitoring, and Decontamination.

RELEASE PROCEDURE

Material History

Upon receipt of an item presented for release from radioactive contamination at NASB, the history of the item should be determined. This determination should include the following if possible:

- The current and past use of the item
- The location(s) in which the item was used or stored
- Whether the item was in an area where radioactive material was used or stored

This history will be used, if applicable, to evaluate the potential for contamination to be present on inaccessible surfaces of the item.

Contamination Surveys

All accessible surfaces will be surveyed for removable and fixed surface contamination in accordance with SOP 1.

Swipes collected for removable surface contamination shall be analyzed with a Ludlum Model 2929 scaler with a Model 43-10-1 ZnS(Ag) scintillation probe (or equivalent).

Following the scan survey, the number of static survey measurements to be collected shall be determined by the following:

- Size and history of the item
- Preliminary results of the swipe and scan surveys
- Whether an increase in the audible and/or digital/analog count rate was detected
- Whether, during the survey, the Radiological Control Technician determines that there may be fixed activity present

Inaccessible Surfaces

Items with inaccessible surfaces that may have been exposed to contamination, or it is unknown if they have been exposed to contamination, should be disassembled as completely as possible to facilitate release surveys. Items with inaccessible surfaces will not be released from an RCA, unless evaluated and documented by the Project Health Physicist (PHP) or designee in conjunction with the Radiological Affairs Support Office (RASO).

Release of Material and Equipment

The following steps shall be taken for release of material and equipment:

48. If the results of the swipe, scan, and static surveys do not exceed the limits of Table 3-1, then the material may be released for unrestricted use.

49. If the swipe, scan, or static survey results indicate contamination which exceeds the limits of Table 3-1, the material shall not be released for unrestricted use. Material and equipment that cannot be released for unrestricted use will be evaluated for decontamination in accordance with SOP 7, Decontamination of Equipment and Tools, or packaged for disposal.

50. Results of the swipe, scan, and static surveys shall be documented in accordance with SOP 1.

51. If the equipment and/or materials are being returned to a vendor or removed from NASB, a completed Attachment 1 – Unconditional Release of Equipment or Materials Form – will accompany the equipment and/or material.

Table 3-1. Release Limits for Materials and Equipment

Radiation Type	Release Limits[1/] (Fixed) (dpm per 100 cm^2)	Release Limits[1/] (Removable) (dpm per 100 cm^2)
Alpha (α)	100	20

Notes:
[1/] These limits are based on AEC Regulatory Guide 1.86 (AEC 1974)
AEC – Atomic Energy Commission
cm^2 – square centimeters
dpm – disintegrations per minute

REFERENCES

AEC. 1974. US Atomic Energy Commission, Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors." June 1974.

ATTACHMENT 1
Unconditional release of equipment or materials form

NASB UNCONDITIONAL RELEASE OF EQUIPMENT OR MATERIALS FORM

Survey #:	Date:

Description of equipment or materials:

SURVEY EQUIPMENT:

Model No:	S/N:	Background:	Eff:	Cal Due Date:
Model No:	S/N:	Background:	Eff:	Cal Due Date:
Model No:	S/N:	Background:	Eff:	Cal Due Date:

CONTAMINATION LEVELS:

	dpm/100 cm^2 $\beta\gamma$	Removable
	dpm/100 cm^2 α	Removable
	dpm/100 cm $\beta\gamma$	Fixed
	dpm/100 cm^2 α	Fixed

This is to certify that the above described equipment or materials have been surveyed and found to be within acceptable surface contamination levels for unconditional release as required by AEC Regulatory Guide 1.86.

Radiological Control Technician:	Date/Time:

Disposition of equipment or materials:

Reviewed By:	Date:

STANDARD OPERATING PROCEDURE

FOR

DECONTAMINATION OF EQUIPMENT AND TOOLS

SOP 7

SOIL INVESTIGATIONS

IRP SITE 9 & QUARRY AREA OF CONCERN

NAS BRUNSWICK

BRUNSWICK, MAINE

TETRA TECH EC, INC.

OCTOBER 18, 2010

APPROVALS

This Standard Operating Procedure (SOP) contains the procedures and other information that will be needed by Tetra Tech EC, Inc. (TtEC) field staff to conduct the decontamination of equipment and tools during the radiological survey activities performed during test pit activities at Naval Air Station Brunswick (NASB). By their signatures, the undersigned certify this SOP is approved for implementation at NASB and will be used to decontaminate equipment and tools.

Erik J. Abkemeier

Erik Abkemeier
Corporate Health Physics Manager
(757) 944-0921

October 19, 2010
Date

Amy Stanford

Amy Stanford
Senior Health Physicist
(706) 832-7394

October 19, 2010
Date

SUPERVISOR'S STATEMENT

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Amy Stanford
Senior Health Physicist

October 19, 2010
Date

WORKER'S STATEMENT

I have read this SOP and have received the training necessary to perform the procedures addressed in the SOP. If I identify a hazard not addressed in the SOP, or encounter an operation I cannot perform in accordance with the SOP, I will stop the process and notify my immediate supervisor.

Worker's Name	Date	Supervisor's Name	Date

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PURPOSE

This procedure provides instruction and methods for the decontamination of equipment and tools that are contaminated with radioactive material at NASB.

SCOPE

This procedure provides the methods Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors will use for decontamination of equipment and tools that are contaminated with radioactive material at NASB.

PROCEDURES

GENERAL

Precautions

The following precautions shall be observed during decontamination activities during the performance of the radiological survey activities at NASB:

- Decontamination of contaminated tools or equipment shall be performed under the supervision of the Radiological Control Technician (RCT) providing the job coverage
- Controls to contain the spread of loose contamination during the decontamination activity shall be planned and established prior to the decontamination of equipment, material, and tools
- Use of chemicals or solvents for decontamination purposes that have the potential to produce mixed waste shall be avoided whenever possible. Use of these chemicals or solvents requires the prior approval of the Project Health Physicist (PHP) and Radiological Affairs Support Office (RASO)
- Survey instruments that will be used to survey suspected contaminated equipment or tools should be protected (wrapped in plastic, etc.) against possible contamination before use
- Abrasive measures should only be applied to surfaces that are not critical for operation of devices being returned to working condition
- Electric power tools should not be used on a wet working surface. Liquids will be kept away from electric power tools

Limitations

The following limitations apply to decontamination activities during performance of the radiological survey activities at NASB:

- Decontamination cleaning solvents/solutions shall only be used in accordance with the directions and limitations listed on the manufacturer-supplied Material Safety Data Sheets (MSDS)
- Contamination controls shall be observed throughout a decontamination operation
- Radiation and contamination surveys shall be performed in accordance with the provisions of SOP 1, Radiation and Contamination Surveys
- Release of equipment and tools from the decontamination area shall be performed in accordance with SOP 6, Release of Materials and Equipment

PRE-DECONTAMINATION PREPARATION

The following steps shall be used for pre-decontamination preparation during the performance of the radiological survey activities at NASB:

52. The PHP, or designee, shall review available data regarding the item(s) requiring decontamination and develop a decontamination approach based on conditions specified in the Survey Work Instruction and on the cost-effectiveness of the operation versus disposal costs.

53. A radiological survey shall be performed to identify the level of radioactive contamination that may be present by an RCT on objects that are to be removed from survey area.

ESTABLISHMENT OF THE DECONTAMINATION AREA

The PHP, working with the Field Operations Lead, shall determine a location for setup of the decontamination area. As applicable to the specific decontamination activity being performed, the decontamination area may consist of one or more of the following (as needed):

Covered ground surfaces. A double-layer of HERCULITE (or equivalent) may be laid on the ground at the direction of the RCT

Engineering controls (high-efficiency particulate air [HEPA] ventilation, vacuum cleaners, containment tent walls, glove bags, etc.). Engineering controls shall be determined on the basis of the as low as reasonably achievable (ALARA) philosophy

Safe, sturdy work stations with contamination-resistant surfaces that will support decontamination attempts on heavy pieces of equipment

Adequate lighting, and electrical and compressed air supply for the operation of electrical and/or pneumatic-driven equipment

Overhead lifting equipment

Adequate supply of approved cleaning solutions and solvents; adequate supply of decontamination equipment such as:

- **Light-duty decontamination equipment such as paper wipes, paper towels, masslin towels, etc.**
- **Medium- to heavy-duty decontamination equipment such as scrub pads, wire brushes, steel wool, files, sandpaper, etc.**
- **Fully stocked hand tool kit for disassembly of contaminated equipment**
- **Power tools, such as drills, saws, needle-guns, electric screwdrivers, etc.**
- **Radioactive material storage bags and stickers**
- **Buckets, barrels, or drums for the storage of contaminated liquids, sludges, or slurries**
- **Blotter paper or sorbent**
- **Approved absorbent material such as oil dry**
- **Storage drums/bags for the storage of contaminated protective clothing**
- **Proper surveillance instruments (air monitor/sampler, contamination monitor, friskers, exposure rate meter, etc.)**
- **Adequate supply of personal protective clothing, gloves, respiratory equipment**
- **A designated area within the decontamination area for the segregation of radioactive waste**
- **Fire extinguisher(s)**

ITEM PREPARATION FOR DECONTAMINATION

Contaminated or controlled items should always be escorted under the direction of a RCT to the decontamination area at NASB.

If an item is wrapped, position it so that the written information on the wrapping is visible, and then perform the following:

The RCT shall direct the removal of the item from the wrapping in such a manner (rolling plastic wrapping inside-out, etc.) to control the spread of contamination

An item that is highly contaminated with removable contamination may need to be misted with an approved liquid to minimize the possibility of creating airborne contamination

Once the item has been removed from the wrapping and has been properly positioned, discard the wrapping as indicated by survey results.

The following conditions shall be considered for the decontamination of equipment and tools during the performance of the radiological survey activities at NASB:

Any equipment with inaccessible areas shall be dismantled so that all surfaces are accessible for decontamination and survey

Decontamination shall be performed in a safe, effective manner

The RCT shall be notified immediately if the job conditions change (e.g., suspected asbestos is found, the presence of mercury in a switch or a light bulb, a fluid leak, or any other special circumstances)

A fire watch shall be assigned to watch if any spark-producing decontamination techniques (grinding, etc.) are used. There shall be a dedicated fire extinguisher located within the decontamination area

The decontamination area shall remain organized and free of debris. The Radiological Control/Decontamination Technicians shall "clean as they go"

Air monitoring for airborne radioactivity shall be conducted as needed or directed by the PHP

A HEPA vacuum cleaner may be used during the decontamination operation

DECONTAMINATION OF REMOVABLE CONTAMINATION

When an item is properly positioned for decontamination and the preparation activities have been completed, the RCT will perform one or more of the following activities in accordance with the decontamination action approach approved by the PHP:

Moisten the surface of the item with an approved liquid

Fold a paper or cloth wipe into sections. Using one surface of the wipe, gently wipe contamination off in one direction away from the user's body to reduce the possibility of personnel contamination

Re-fold the paper or cloth wipe so that a clean surface is available to prevent cross-contamination and continue until item is ready for survey

For some equipment or tools, duct tape will effectively remove removable contamination. Wrap the duct tape loosely around the gloved hand, adhesive side out. Roll the tape over the contaminated area

DECONTAMINATION OF FIXED CONTAMINATION

There are many techniques that can be used to remove fixed contamination. The general idea is to remove the material that is fixing the activity to the surface, or remove a very thin layer of the surface material. It is very important to note that fixed contamination decontamination methods can and do result in the creation of removable surface contamination. This creates a condition that may generate airborne radioactive materials. The activities should be controlled in such a manner that airborne radioactivity is minimized. Air sampling shall be performed during these operations to properly evaluate any resultant airborne radioactivity.

For the purposes of this procedure, the potential removal techniques have been divided into the following two categories:

Abrasive hand decontamination

Power tool decontamination

In addition, the following methods could be used, but are not defined in this procedure and would require the development of a Task-specific Work Instruction:

Machine decontamination (use of abrasive bead blasters, grit blasters, high-pressure water wash systems, etc.)

Cleaning solutions/solvents (use of ultrasonic cleaners, acid baths, electropolishing, etc.)

The actual method or combination of methods applied will be in accordance with the decontamination approach approved by the PHP

Abrasive Hand Decontamination

Abrasive hand decontamination shall be performed in the following manner:

54. Remove as much removable contamination as possible as indicated in Section 3.5.

55. Moisten the surface of the item(s) to help contain contamination.

56. Use an abrasive cleaning tool (e.g., sandpaper, steel wool, steel brush, hand grinder, etc.) to loosen fixed contamination. Clean in one direction only, away from the body to prevent personnel contamination.

57. Continue to moisten the surface of the item(s) to contain contamination.

58. Remove as much of the loosened contamination as possible as per Section 3.5.

Power Tool Decontamination

Power tool decontamination shall be performed under the direction of the RCT, with concurrence from the PHP.

Electric Power Tools

Electric power tools that may be used in decontamination operations are:

Drills – used to drill out contaminated areas, to disassemble contaminated components, and when used with grinding wheels or disks, may be used as an abrasive tool

Saws – used to separate contaminated pieces from clean pieces

Grinders – used to grind fixed contamination from surfaces

Electric screwdrivers – used in the disassembly of component parts

Air-powered Tools

Air-powered tools that may be used in decontamination operations are:

Needle gun – a pneumatic tool that can remove contamination from concrete and/or steel surfaces

Socket tools or impact hammer – used in disassembly of component parts

Jackhammer/rotary hammer – a pneumatic tool which can remove contamination from concrete and/or steel surfaces

Decontamination of Power Tools

Power tool decontamination shall be performed in the following manner:

59. Remove as much removable contamination as possible as per Section 3.5.
60. Moisten the surface of the item lightly to help contain contamination. Use a spray bottle for moistening.
61. Whenever feasible, the use of containment devices (e.g., glove box, etc.) should be used to contain the spread of contamination when using power tools for decontamination operations.
62. Use the power tool to remove fixed contamination. Clean in one direction only and away from the body to prevent personnel contamination.

POST-DECONTAMINATION

Following decontamination procedures, the RCT shall perform a release survey. The survey will include the work area and any tools, equipment, and materials used during decontamination activities and shall be conducted in accordance with SOP 6. Post-decontamination release shall be performed as follows:

63. If the item satisfies the criteria for release, remove the item to a holding area and document results.

64. If the item remains contaminated, inform the PHP and repeat the decontamination.

65. If the item remains contaminated, attempt a third decontamination only by direction of the PHP.

If an item cannot be effectively or economically decontaminated, the PHP may direct the crew to volume-reduce (reduce to component parts) the equipment, material, or tools as much as possible. If the item is expendable, the individual parts may be surveyed and released.

Any tools, equipment, or materials that cannot be decontaminated will be packaged in an appropriate waste container for subsequent disposal as radioactive waste as discussed in the Survey Work Instruction. The waste containers will be staged in an area agreed upon by RASO and the Department of the Navy.

After decontamination operations have been completed, an RCT shall perform a release survey of the decontamination area in accordance with SOPs 1 and 6.

ATTACHMENT III

MEDICAL DATA SHEET

MEDICAL DATA SHEET

This Medical Data Sheet must be completed by on-site personnel and kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Person to notify in the event of an emergency: Name: _____

Phone: _____

Drug or other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

What medications are you presently using? _____

_____

Name, Address, and Phone Number of personal physician: _____

_____

_____

Note: Health Insurance Portability and Accountability Act (HIPAA) Requirements

HIPAA took effect April 14, 2003. Loosely interpreted, HIPAA regulates the disclosure of Protected Health Information (PHI) by the entity collecting that information. PHI is any information about health status (such as that you may report on this Medical Data Sheet), provision of health care, or other information. HIPAA also requires Tetra Tech to ensure the confidentiality of PHI. This Act can affect the ability of the Medical Data Sheet to contain and convey information you would want a Doctor to know if you were incapacitated. So before you complete the Medical Data Sheet understand that this form will not be maintained in a secure location. It will be maintained in a file box or binder accessible to other members of the field crew so that the can accompany an injured party to the hospital.

DO NOT include information that you do not wish others to know, only information that may be pertinent in an emergency situation or treatment.

_____ _____ _____

Name (Print clearly) Signature Date

ATTACHMENT IV

FIRE DEPARTMENT PROTOCOL FOR MEC TREATMENT

FIRE PROTOCOL FOR MEC TREATMENT

When treating MEC in place, keep in mind the potential for fires. Notify the Fire Department at least 24 hours in advance of the treatment. Inform them of the place and time they will be needed to stand by. As water is the most effective extinguishing agent on grass and brush fires the presence of an Engine or Tanker Company is important. The SUXOS will coordinate with the Fire Department Officer-in-Charge explaining the type and amount of treatment to take place. In order to better understand what the Fire Department will be looking for the following information is presented.

Fire Prevention Methods

In an effort to prevent fires from planned detonations, the Tetra Tech field personnel will take the following precautions:

- Clear the vegetation surrounding the item slated for detonation.
- The amount of vegetation cleared will depend on the material that is to be detonated.
- Use sandbags around the item (as described in the ESS).
- Have the Fire Department wet the grass and brush in the area surrounding the detonation.

NOTE: Fire extinguishers are limited in the rate of discharge, range of discharge, and the amount of extinguishing agent they contain. Portable fire extinguishers are useful in putting out small fires. However, dry chemical/multi class portable fire extinguishers are inefficient on Class A combustible material fires which include grass and brush fires. Water is the best fire suppressant for Class A fires.

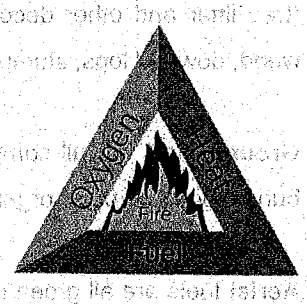
Understanding Fire Behavior

Understanding fire behavior may help if a situation escalates. For fire to exist three elements must be in place. Remove any one of these elements and the fire cannot exist. Remember the fire triangle.

HEAT: Remove heat by applying water or dirt.

FUEL: Remove fuel by constructing fire lines or burning out fuels.

OXYGEN: Remove oxygen by smothering my liquids or dirt.



Key Factors

There are three main factors that influence grass and brush fires.

Weather - Wind events directly affect the spread and direction on fire. Wind contributes to the drying and pre-heating fuels by radiation moving warmer and dryer airs through the fuels. Precipitation can greatly reduce the fire behavior and rate of spread. Hot and dry conditions produce extremely rapid fire spread. A slight decrease in relative humidity will cause a significant increase in fire intensity. During extreme days surface-wetted fuel will dry in a few minutes.

Terrain - Fire burns uphill much more rapidly than downhill. On an uphill slope, the fire will tend to crown over the top and start spot fires a considerable distance down the receding slope. A large free-burning fire will tend to create its own convection currents and spot fires may be started.

Access is often the most serious problem with topography. The SUXO should size up the area with the Fire Department with regard to fuel, topography and extent of exposure to structures.

Particular attention should be paid to access roads and accessible areas where apparatus may travel. They should note natural firebreaks and potential exposure problems.

Fuels - There are three basic fuels that should be evaluated.

- Grass will exchange moisture quickly and will burn faster when it is dry.
- Brush is slower on moisture exchange whether it is dead or alive however it burns hotter than grass.
- Trees are slow to absorb and dissipate moisture but will burn hotter and they are harder to extinguish.

The following areas will be surveyed and the type of fuel noted prior the treating in place event. The type of fuel that is in the immediate vicinity of the treatment location will determine how the Fire Department will attack a fire:

Surface fuels are all materials lying on or immediately above the ground including needles or leaves, duff (tree litter and other decomposing vegetation on the ground under a tree canopy), grass, small dead wood, downed logs, stumps, large limbs, and low shrubs.

Ground fuels are all combustible materials lying beneath the surface including deep duff, roots, rotten buried logs and other organic material.

Aerial fuels are all green and dead materials located in the upper forest canopy, including tree branches and crowns, snags, moss and high shrubs.

Tactics and Strategy

Grass and brush fires often present a large area of rapidly spreading fire. The critical decision is often where to attack the fire to the best advantage. The basic grass and brush fire philosophy is to aggressively stop the forward progress of fire whenever possible. A direct water attack is the fastest control evolution available to counteract a grass/brush fire spread. When a direct water attack is not possible, due to terrain limitations, the Fire Department may utilize portable backpacks and hand firefighting tools to control the fire spread.

Remember that the perimeter fire control only contains the fire, it is not out until every ember is cold. Embers can be blown over the perimeter and quickly start a spot fire.

ATTACHMENT V

TETRA TECH INCIDENT REPORTING PROCEDURE FORMS

TETRA TECH, INC.

Safety Excellence

TETRA TECH, INC. INCIDENT REPORT

Report Date	Report Prepared By	Incident Report Number

INSTRUCTIONS:

All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.

Complete any additional parts to this form as indicated below for the type of incident selected.

TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	☐ Complete IR Form Only
Injury or Illness	☐ Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	☐ Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	☐ Complete Form IR-C; Motor Vehicle

INFORMATION ABOUT THE INCIDENT

Description of Incident	
Date of Incident	**Time of Incident**
	AM ☐ PM ☐ *OR* Cannot be determined ☐
Weather conditions at the time of the incident	**Was there adequate lighting?**
	Yes ☐ No ☐
Location of Incident	
	Was location of incident within the employer's work environment? Yes ☐ No ☐
Street Address	**City, State, Zip Code and Country**
Project Name/Number	**Client**
Tt Supervisor or Project Manager	**Was supervisor on the scene?**
	Yes ☐ No ☐

WITNESS INFORMATION (attach additional sheets if necessary)

Name	Company
Street Address	**City, State and Zip Code**
Telephone Number(s)	

TETRA TECH, INC.

Safety Excellence

TETRA TECH, INC. INCIDENT REPORT

CORRECTIVE ACTIONS

Corrective action(s) immediately taken by unit reporting the incident:

Corrective action(s) still to be taken (by whom and when):

ROOT CAUSE ANALYSIS LEVEL REQUIRED

Root Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐

Root Cause Analysis Level Definitions

Level - 1	**Definition:** A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office. The following events may trigger a Level 1 RCA: ▪ Work related fatality ▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability ▪ Property damage in excess of $75,000 ▪ When requested by senior management
Level - 2	**Definition:** A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided. The following events will require a Level 2 RCA: ▪ OSHA recordable lost time incident ▪ Near miss incident that could have triggered a Level 1 RCA ▪ When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

INSTRUCTIONS:

Complete all sections below for incidents involving injury or illness.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

EMPLOYEE INFORMATION

Company Affiliation

Tetra Tech Employee? ☐ TetraTech subcontractor employee (directly supervised by Tt personnel)? ☐

Full Name	Company (if not Tt employee)

Street Address, City, State and Zip Code	Address Type
_____	Home address (for Tt employees) ☐
_____	Business address (for subcontractors) ☐

Telephone Numbers

Work: _____ Home: _____ Cell: _____

Occupation (regular job title)	Department

Was the individual performing regular job duties?	Time individual began work
Yes ☐ No ☐	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐

Safety equipment

Provided? Yes ☐ No ☐

Used? Yes ☐ No ☐ If no, explain why

_____

Type(s) provided:

- ☐ Hard hat
- ☐ Protective clothing
- ☐ Gloves
- ☐ High visibility vest
- ☐ Eye protection
- ☐ Fall protection
- ☐ Safety shoes
- ☐ Machine guarding
- ☐ Respirator
- ☐ Other (list)

NOTIFICATIONS

Name of Tt employee to whom the injury or illness was first reported	Was H&S notified within one hour of injury or illness?
	Yes ☐ No ☐
Date of report	**H&S Personnel Notified**
Time of report	**Time of Report**

If subcontractor injury, did subcontractor's firm perform their own incident investigation?

Yes ☐ No ☐ If yes, request a copy of their completed investigation form/report and attach it to this report.

INJURY / ILLNESS DETAILS

What was the individual doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry".

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; Worker developed soreness in wrist over time".

Describe the object or substance that directly harmed the individual. Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes ☐ No ☐ If yes, describe the type of first aid administered and by whom?

Was treatment provided away from the site: Yes ☐ No ☐ If yes, provide the information below.

Name of physician or health care professional	Facility Name
Street Address, City State and Zip Code	**Type of Care?**
	Was individual treated in emergency room? Yes ☐ No ☐
	Was individual hospitalized overnight as an in-patient? Yes ☐ No ☐
Telephone Number	Did the individual die? Yes ☐ No ☐ If yes, date:
	Will a worker's compensation claim be filed? Yes ☐ No ☐

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

SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	Affected individual (signature)	Telephone Number	Date

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

INSTRUCTIONS:

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

TYPE OF INCIDENT (Check all that apply)

Property Damage ☐ Equipment Damage ☐ Fire or Explosion ☐ Spill or Release ☐

INCIDENT DETAILS

Results of Incident: Fully describe damages, losses, etc.

Response Actions Taken:

Responding Agency(s) (i.e. police, fire department, etc.)	Agency(s) Contact Name(s)

DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)

Item:	Extent of damage:	Estimated repair cost:

SPILLS / RELEASES (Provide information for spilled/released materials)

Substance	Estimated quantity and duration	Specify Reportable Quantity (RQ)
		_____ Exceeded? Yes ☐ No ☐ NA ☐

FIRES / EXPLOSIONS (Provide information related to fires/explosions)

Fire fighting equipment used? Yes ☐ No ☐ If yes, type of equipment: _____

NOTIFICATIONS

Required notifications	Name of person notified	By whom	Date / Time
Client: _____ Yes ☐ No ☐			
Agency: _____ Yes ☐ No ☐			
Other: _____ Yes ☐ No ☐			

Who is responsible for reporting incident to outside agency(s)? Tt ☐ Client ☐ Other ☐ Name: _____

Was an additional written report on this incident generated? Yes ☐ No ☐ If yes, place in project file.

INSTRUCTIONS:

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

INCIDENT DETAILS

Name of road, street, highway or location where accident occurred		Name of intersecting road, street or highway if applicable
County	**City**	**State**

Did police respond to the accident?	Did ambulance respond to the accident?
Yes ☐ No ☐	Yes ☐ No ☐
Name and location of responding police department	**Ambulance company name and location**
Officer's name/badge #	

Did police complete an incident report? Yes ☐ No ☐ If yes, police report number: _____
Request a copy of completed investigation report and attach to this form.

VEHICLE INFORMATION

How many vehicles were involved in the accident? _____ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Vehicle Owner / Contact Information		**Vehicle Owner / Contact Information**	
Color		**Color**	
Make		**Make**	
Model		**Model**	
Year		**Year**	
License Plate #		**License Plate #**	
Identification #		**Identification #**	
Describe damage to vehicle number 1		**Describe damage to vehicle number 2**	
Insurance Company Name and Address		**Insurance Company Name and Address**	
Agent Name		**Agent Name**	
Agent Phone No.		**Agent Phone No.**	
Policy Number		**Policy Number**	

DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		Driver's Name	
Driver's Address		Driver's Address	
Phone Number		Phone Number	
Date of Birth		Date of Birth	
Driver's License #		Driver's License #	
Licensing State		Licensing State	
Gender	Male ☐ Female ☐	Gender	Male ☐ Female ☐
Was traffic citation issued to Tetra Tech driver? Yes ☐ No ☐		Was traffic citation issued to driver of other vehicle? Yes ☐ No ☐	
Citation #		Citation #	
Citation Description		Citation Description	

PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.
Driver information is captured in the preceding section.
Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.
Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? ____		How many passengers (excluding driver) in the vehicle? ____	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	

INJURIES TO NON-TETRATECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	Gender	Car No.	Location in Car	Seat Belt Used?	Ejected from car?	Injury or Fatality?
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐
Name of injured person 2				Address of injured person 2		
Age	Gender	Car No.	Location in Car	Seat Belt Used?	Ejected from car?	Injury or Fatality?
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐

OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	Property Owner's Address

COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

ATTACHMENT VI

UNEXPLODED ORDNANCE AND CHEMICAL WARFARE AGENTS ACTIVITIES OPERATING PROCEDURES

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1.0 GENERAL

This Standard Operating Procedure (SOP) was prepared in accordance with applicable U.S. Army Corps of Engineers procedures and policies governing field activities requiring Unexploded Ordnance (UXO) and Chemical Warfare Material (CWM) operations. All personnel conducting operations under this SOP must read and understand applicable parts of references listed in paragraph 9.1 below prior to commencing any work described within this SOP. Other documents supporting this SOP include project-specific Work Plans and Health and Safety Plans which are prepared for the purpose of accomplishing work that contain a UXO or CWM component.

2.0 PURPOSE

This SOP applies to all operations involving UXO and/or CWM support during field operations at various sites where Tetra Tech NUS (TtNUS) personnel are present. It provides procedural requirements for any activity involving UXO and CWM, as well as detailed procedures for the location, identification, documentation, and emergency response actions pertaining to UXO/CWM activities.

3.0 APPLICABILITY

This SOP applies to persons who may visit any site where TtNUS is performing work that involve some UXO or CWM component. Compliance the content of this SOP is mandatory for all TtNUS personnel, subcontractors, and visitors to any site where UXO/CWM activities are in progress.

4.0 RESPONSIBILITIES

Project Manager

Effective implementation of this SOP at the project level will be the ultimate responsibility of the assigned TtNUS Project Manager. The Project Manager is responsible for ensuring that all applicable rules and regulations are complied with, and that all necessary safety precautions are taken to conduct operations in accordance with this SOP. To fulfill this responsibility, the assigned Project Manager is required to ensure that appropriately-qualified technical staff are involved in all stages of project planning and field work, as well as for ensuring that appropriate resources are marshaled and used on his/her assigned projects. For projects involving UXO and/or CWM, this will involve ensuring that a suitably qualified and experienced UXO technician and a site Health and Safety Officers are part of the project team. In some cases, the assigned UXO Technician may also serve as the project site Health and Safety Officer.

It is also the responsibility of the Project Manager to ensure that all personnel conducting field activities in accordance with this SOP have proper training (including hazard control briefings) and, if required, the proper certifications for the job being performed.

UXO Technician

A suitably qualified and experienced UXO Technician will be included as part of the project team where these types of concern are known or suspected to exist. The UXO Technician will be primarily responsible for advising the Project Manager on all UXO/CWM matters, including on the measures that will be necessary to effectively implement and adhere to this SOP. Other specific duties will include:

- Providing technical expertise and input into project planning activities and documents such as the project-specific Work Plan and Health and Safety Plan
- Clearing worksite areas of UXO/CWM concerns prior to the initiation of any other onsite activities

- Participating in the development and conductance of site specific training sessions and daily tailgate meetings to communicate UXO/CWM matters to the field personnel
- Maintaining a sound familiarity with the contents of this SOP, the contents of the references listed in section 9.1, and keeping current with new information and technology pertinent to UXO/CWM matters

Site Health and Safety Officer
A suitably qualified and experienced health and safety professional will be assigned to all projects that involve fieldwork. Project-specific responsibilities will include:

- Effectively implementing the requirements and restrictions specified in the project-specific Health and Safety Plan
- Ensuring that all personnel participating in onsite activities have satisfied all appropriate medical and training qualifications prior to participating in any onsite intrusive activities.
- Conduct initial site-specific health and safety training for all personnel participating in onsite activities prior to their participation in any onsite intrusive activities.
- Conduct tail-gate safety briefings prior to the initiation of all tasks, but not less than daily.
- On certain projects, these duties may be assigned to the UXO Technician. This would be considered acceptable on field projects where the predominant concern is contact with UXO and/or CWM, and minimal health concerns or requirements (e.g., chemical exposures or monitoring) exist.

Corporate Health and Safety Manager
Perform periodic project audits and evaluations to determine the ongoing effectiveness of this SOP to address UXO/CWM concerns, and review and evaluate this SOP to determine any revisions that are appropriate.

5.0 LOCATION OF OPERATIONS

Activities where UXO and/or CWM concerns may exist may be encountered in support of various TtNUS contracts, with potential project sites located throughout the continental United States and abroad. Wherever the installation/site is located, it will be necessary to ensure that project planning activities include collecting available historical information that may be pertinent to these issues, as well as identifying and addressing contract/client-specific requirements and any location-specific requirements (e.g., State, local-level, or host-nation requirements). A detailed site description, discussion of known and/or suspected contamination sources, and results of previous studies will be provided to field personnel as part of their field mobilization and initial site-specific training activities.

The initial project evaluation must involve the performance of a preliminary risk assessment, including the investigation of probable contaminants, potential transport pathways, the identification of potential receptors, and a preliminary evaluation of human health and environmental concerns. Preliminary identification of applicable or relevant and appropriate requirements (ARARs) will also be made available to field personnel conducting activities at the installation.

6.0 PERSONNEL QUALIFICATIONS AND REQUIREMENTS

6.1 Personnel Qualifications: Qualifications of those personnel actively involved in UXO/CWM operations shall be as follows:

a. UXO personnel shall be graduates an accredited Explosive Ordnance Disposal (EOD) School such as Indian Head or Eglin Air Force Base.

b. The Senior UXO Supervisor (SUXOS) for the operation will have been awarded the Master EOD Badge and have served at least 15 years in military EOD assignments, of which more than 10 years were in a supervisory position.

c. UXO personnel are responsible for maintaining current status with training and medical surveillance requirements, as specified in the project-specifc Health and Safety Plans and OSHA 29 CFR 1010.120, paragraphs (e) and (f).

6.2 Personnel Requirements: During any activity where the possibility that UXO and or CWM may be encountered (no matter how remote), the following requirements will be met:

a. One UXO-qualified technician will be required to support each field team engaged in operations in areas that might contain UXO/CWM.

b. One UXO-qualified technician will be present at the site during all activities to provide UXO/CWM support in the event their services are required.

7.0 PERSONNEL LIMITS

The activities to be conducted under most contracts will not normally be conducted in areas requiring maximum personnel limitations except for intrusive UXO activities. Work will not be permitted unless at least two persons are present in the work area. The provisions of 29 CFR 1910.120 concerning personnel qualifications and requirements will be followed while working on-site. Any additional personnel limitation requirements specified by the client or the project work location (e.g., state, local ordnance, host nation, etc.) will also be identified and adhered to at all times.

7.1 Personnel Limits for UXO Operations:

a. UXO Avoidance Operations – Two UXO Technicians (one UXO Technician III and one UXO Technician II)

b. UXO Intrusive Operations - Three UXO Technicians (one UXO Technician III and two UXO Technician II)

8.0 MATERIAL LIMITS

The properties and configurations of specific explosive materials are not addressed in this SOP. That level of detail is required to be addressed in project-specific Work Plans and Health and Safety Plans. This SOP must be maintained onsite along with these project-specific documents to aid in appropriate communication and implementation activities. Bulk liquids to be used for decontamination of equipment will be maintained in 2-gallon containers or less. Material Safety Data Sheets (MSDSs) will be kept on file in the TtNUS Command Post for any chemical substances brought to the project site by TtNUS and TtNUS subcontractor personnel. This is addressed in greater detail in section 5. of the TtNUS Health and Safety Guidance Manual.

9.0 SAFETY REQUIREMENTS

9.1 Referenced Safety Requirements: The safety requirements that apply to the UXO/CWM operations covered under this SOP are:

a. OSHA 29 CFR 1910.120 and 1926.65 – Hazardous Waste Operations and Emergency Response (HAZWOPER). Available online at: http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=0&p_keyvalue=OSHA_Std_toc.html

b. US Army Corps of Engineers Engineering Regulation 385-1-92, *Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OE) Activities.*

c. US Army Corps of Engineers Engineering Regulation (ER) 385-1-96, *Safety and Health Requirements.* Available on line at: http://www.usace.army.mil/publications/eng-manuals/em385-1-1/toc.htm.

d. US Army Corps of Engineers Engineering Pamphlet (EP) 1110-1-18, *Ordnance and Explosive (OE) Response.*

e. US Army Corps of Engineers Engineering Pamphlet (EP) 75-1-2, *Unexploded Ordnance Support for Hazardous, Toxic and Radioactive Waste and Construction Activities.*

f. US Army Corps of Engineers Engineering Pamphlet (EP) 75-1-3, *Chemical Warfare Material Response.*

g. US Army Technical Manual 9-1300-206 (TM 9-1300-206), *Ammunition and Explosive Hazards.*

h. Technical Manual 60A-1-1-31, *Explosive Ordnance Disposal Procedures, General Information on EOD Disposal Procedures.*

9.2 Specific Safety Requirements:

a. All site operations will be suspended if any site worker encounters an item of suspected UXO/CWM. Site work will remain suspended until the item is inspected and cleared by the UXO Technician.

b. All site operations will be suspended if so ordered by an authorized client representative (i.e., Installation Range Control and/or Safety Office).

c. A minimum of two UXO-qualified technicians will be present during all UXO-related activities.

d. Standard work practices as outlined in project-specific Health and Safety Plans and/or Work Plans will be observed.

9.3 Inherent UXO/CWM Hazards: UXO/CWM operations have inherent safety and health risks associated with the various field activities conducted. All planned activities will be conducted in accordance with the requirements of the references listed in Section 9.1 above, as safety is the primary consideration in all UXO/CWM activities. Every effort should be made to determine all hazards associated with the site through a thorough research of archives, past site/range uses, and any other available information. Some of the hazards to consider are:

a. Propellant, Explosives, and Pyrotechnics (PEP)
b. Depleted Uranium (DU)
c. White Phosphorus (WP)
d. Corrosive chemicals (acids and bases) and decontamination agents
e. Toxic gases, liquids and solids
f. Corroded and damaged containers, munitions bodies, drums, etc.
g. Fuze conditions
h. Etiological agents

10.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Task-specific PPE will be identified in project-specific Health and Safety Plans. Typical PPE for project sites where the principle concern is for UXO/CWM will include the items listed below. Items marked with an asterisk (*) will be available and will be used as specified in the Health and Safety Plan and/or as determined by the TtNUS Site Health and Safety Officer.

a. Safety glasses

b. Safety shoes (and protective over boots or steel-toed rubber boots). NOTE: During geophysical survey operations, the UXO technicians will not wear steel-toed boots as they interfere with the magnetometer survey; however, around heavy equipment and activities where foot and overhead hazards may exist, steel-toed boots and hard hats will be worn.

c. Cotton clothing (with protective coveralls*)

d. Gloves (type to be specified for each project task in the Health and Safety Plan and/or by the site Health and Safety Officer)

e. Respiratory protection equipment* (29CFR1910.134)

f. Hearing protection*

g. Hard hats*

11.0 EMERGENCY RESPONSE AND CONTINGENCY PLANS

11. Emergency Contacts: The identification of (and means to communicate with) appropriate local emergency response agencies must be identified as part of project planning/mobilization activities, and these agencies must be contacted prior to the initiation of any onsite work. These initial communications must determine the capabilitities of these agencies to respond to foreseeable emergency situations, their willingness to respond, and their locations/driving directions/phone numbers. These details must be specified in the project-specific Health and Safety Plan and posted in the site Command Center/Field office.

At a minimum, the names and means of communication (phone number, radio frequency, etc.) of the following parties must be included in the project-specific Emergency Contacts procedure:

a. Local Emergency Fire Response that will respond (i.e., local Fire Department)

b. Emergency Medical Assistance (Hospital, Emergency Room, and ambulance service that will respond)

c. Installation Safety Office or other client safety/emergency response contact

d. Installation EOD Office/Detachment

e. Installation Environmental Office

The senior TtNUS managing employee onsite (Project Manager, Site Manager, Site Supervisor, Field Operations Leader) is responsible for initiating these calls in the event of an emergency where such support is needed. If the Project Manager is not onsite at the time of an emergency event, he/she must be added to the above list of contacts.

In the event of an emergency, all site personnel will be evacuated to a predetermined location away from the work place. Emergency Response Planning will be addressed in the project-specific Health and Safety Plan and will be in accordance with either 29 CFR 1910.38(a) or 1910.120(l). TtNUS will utilize the Installations Base Fire Protection and Emergency Services in emergencies or potential emergencies.

11.2 Contingency Plans: The following contingency plans will be implemented:

a. Pre-Planning – Upon arrival at the site/installation, the TtNUS Field Operations Leader (FOL) and/or the Site Safety Officer will meet with the Base or local Fire Protection Department, Base Security Personnel or local Police Department, and onsite and/or offsite Emergency services to notify them of the activities that are to be undertaken, when, and where. All site personnel will be required to follow established base/local emergency procedures and will rely on base/local services to handle emergency calls when needed.

b. Emergency Escape Procedures and Assignments – Upon notification of a site emergency that requires evacuation, all site personnel will proceed to predetermined locations based on emergency location and wind direction. An alternate assembly point will be designated in case personnel cannot reach these locations without danger to their lives and health. These primary and alternate escape routes and meeting places will be designated during the daily hazard control briefing. Personnel will be trained to remain at the assembly points until directed to either resume work or to leave the site.

c. Procedures to Account for Site Personnel – The site work force is typically small enough that accounting for personnel will not be a problem via visual head counting. On projects with larger field team sizes, roll calls will be taken using the daily sign in logs, logbook entries, or the tail-gate briefing sheets. Accounting for personnel will be the Field Operations Leader's responsibility.

d. Rescue and Medical Duties – TtNUS personnel will not be authorized to participate in emergency rescue operations. Typical first aid response equipment that is to be on hand at a project site includes suitable first aid kit, an emergency eye wash station, and Class ABC fire extinguishers.

e. Activation of Emergency Response Procedures - Should an emergency occur which requires the support of outside services, the appropriate contacts will be made by the senior TtNUS managing employee onsite (Project Manager, Site Manager, Site Supervisor, Field Operations Leader). A list of appropriate contacts will be posted at the Command Post. Cellular phones, land-line phones, or hand-held radios will be the primary means of communication.

f. Airborne Chemical Release Contingency Plan –

(1) Chemical Release Monitoring – every member of the site team will be responsible for observing and reporting any gross chemical releases or conditions that could lead to releases. Air monitoring will be performed as described in the project-specific Work Plans and Health and Safety Plans.

(2) Responses to Measured Airborne Chemical Releases – the readings on monitoring instrumentation will be compared to the action levels specified in the project-specific Work Plans and Health and Safety Plans. The primary purpose of appropriate real-time monitoring instruments will be monitor worker breathing zone areas for the protection of employee health. The project-specific Health and Safety Plan will specify actions that are to be taken in the event that monitoring instrument readings indicate that detected

concentrations may represent a health threat to onsite workers. Area and perimeter monitoring as well as sample screening activities may also be called for in the Work Plan or Health and Safety Plan, but these are *secondary* purposes for the use of these instruments.

Unless otherwise specified in a project-specific Health and Safety Plan, the following monitoring instrument action levels and response measures will be observed on UXO/CWA sites:

Parameter	Action Level
Total Organic Vapors	Any sustained level above background
Airborne particulates	Readings >2.5 mg/m^3
Flammable Vapors	10% of the Lower Explosive Limit (LEL)

If such levels are noted at site perimeters or adjacent to neighboring residential or commercial property, the TtNUS Field Operations Leader and/or the Site Safety Officer will notify the appropriate client or base contacts.

g. Liquid Release Monitoring – All field team members will be responsible for observing and reporting any liquid chemical releases or conditions that could lead to a release. If field operations on site result in a release of liquid chemicals in the absence of vapors, field personnel will attempt to contain the liquid by means of berms constructed with available equipment. If the work team cannot control the spill, they will leave the area for the assembly point quickly, without panic. The TtNUS Field Operations Leader and/or the Site Safety Officer will notify the appropriate client/base contact. This is not considered to be a significant probability during operations. However, in the unlikely instance that it should occur, field personnel may effect these types of defensive efforts, providing that such a response does not appear to present a chemical overexposure or other personal health or safety threat.

12.0 TYPICAL CLIENT/FACILITY SAFETY POINTS OF CONTACT

The following positions are typically encountered on UXO/CWA projects. Communication and coordination with these positions should be implemented and maintained throughout all project activities (from pre-field operations planning through to project close-out).

a. Installation Safety Management Office

b. Installation Ordnance Officer and/or EOD Officer

c. Installation Radiation Officer

d. Installation Environmental Office

13.0 TOOLS AND EQUIPMENT

Tools and equipment necessary to safely and effectively accomplish the objectives of a project will be detailed in the project-specific Work Plans and Health and Safety Plans. Items commonly required for UXO/CWM operations are presented below:

13.1 Personal Protective Equipment

a. Respiratory Protective Equipment (i.e., air purifying or air supplied devices)

b. Dermal (chemical resistant) protective equipment (e.g., coveralls, gloves, eye and face protection)

c. Physical safety PPE (hard hats, hearing protection, safety glasses, safety shoes, etc.)

13.2 Air Monitoring Equipment

a. Explosive/O_2 Meter (Combustible Gas Indicator)

b. Direct reading Organic Vapor Analyzer (PID or FID)

c. Direct reading particulate meter

d. Radiation Survey Meters and TLD Badges

13.3 Geophysical/Hydrology Survey Instrumentation

a. Magnetometers (Cesium Vapor, Schonstedt)

b. Electromagnetic Terrain Conductivity Meter (EM-31)

c. Time-Domain Electromagnetic All-Metals Detector (EM-61)

d. Water Level Indicator/Recorder

e. pH/Temperature/Conductivity Meter for water samples (Horiba, etc.

f. Survey Equipment (transit, tripod, level, etc.) as required

13.4 UXO Support Equipment

a. Schonstedt Magnetic Locators (GA-52Cx or equivalent passive instrument) will be used for UXO surface survey during UXO activities. The GA-52Cx detects the magnetic field of any ferromagnetic object.

b. Schonstedt MG-220 Magnetic Gradiometer (Down-Hole Magnetometer or equivalent will be used to conduct down hole UXO checks. The MG-220 detects the magnetic field of any ferromagnetic object as it is lowered into a borehole.

c. Marking tape, pin flags, stakes, utility spray paints, etc.

13.5 CWM Support Equipment

a. Chemical Agent Identification Kits (M18A2 Kit)

b. ICAMs (Individual Chemical Agent Monitor)

13.6 Decontamination Equipment

As required by the level of protection for each site. See Site Health and Safety Plan for specifics.

13.7 Hand Tools/ Miscellaneous Equipment

As may be required.

14.0 ENVIRONMENTAL CONCERNS

The field operations covered by this SOP will be performed in such a manner as to minimize the effects of pollution of air, water, or land and to control noise and dust emissions within reasonable limits.

Every effort will be made to:

a. Protect the land areas and to preserve them in their existing condition.

b. Protect water resources, including measures for run-off or run-off controls if applicable.

c. Implement sediment control measures, where warranted. These measures will also be implemented to control erosion.

Usually, field operations will generate solid and liquid waste (Investigative Derived Waste – IDW) requiring onsite handling and possible offsite disposal. The major types of waste to be generated, their environmental concerns, and their handling and disposition are summarized below:

a. Personal and equipment decontamination containers disposed offsite following a thorough decontamination. Liquid waste will be included with well purging and development fluids.

b. Personal Protective Equipment (PPE) will be double-bagged and will be the responsibility of TtNUS to dispose of according to applicable regulations. Disposal will normally be offsite.

It is not anticipated that any chemical releases will occur during the field activities.

The MSDSs for chemicals being brought onto the installation for use in field operations will be listed on a site-specific Chemical Inventory and maintained at the TtNUS Field Command Post. Copies of these documents are to be made available to client and offsite representatives who may be called upon to respond to an emergency event.

15.0 UXO/CWM PROCEDURES FOR FIELD OPERATIONS

15.1 General – field procedures for work on any installation can include any or all of the following tasks:

a. Initial entry into suspect areas

b. CWM operations

c. Surface and subsurface sampling

d. Monitoring well installation

e. Exploratory trenching

f. Geophysical surveys

g. Other miscellaneous operations

15.2 Initial Entry – initial entry into suspect areas require an UXO-qualified technician with a magnetometer (GA-52Cx) to screen a path into the area. The screened area is marked with lanes using either pin flags with plastic pins or marking tape. Suspect items on the surface and subsurface magnetic anomalies will be marked, usually with a different color tape or flag, and will be avoided by team members. The site where the work is to be conducted will be thoroughly screened for UXO/CWM contamination prior to any work commencing. All personnel will stay within the cleared areas and not venture out into areas not screened. If an area that has magnetic anomalies cannot be avoided, the UXO-qualified technician will hand excavate down to the anomaly to check to see if a hazard exists. Before excavation begins, the immediate area will be cleared of non-essential personnel outside of what could be a fragmentation zone (as determined by the UXO Technician). If the excavation reveals a hazard, the emergency notification procedures in paragraph 11.0 will apply.

15.3 CWM Operations - prior to conducting CWM operations, an Emergency Response Plan as required by 29CFR1910.120 and DA Pam 50-6 will be developed and implemented. Most of the information required to develop this plan should be obtained from the installation safety office; however, as a minimum, the following elements will be addressed:

a. Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposure, person injuries, fire/explosions, environmental spills and releases, and discovery of radioactive materials.
b. Personnel roles, lines of authority, communications.
c. Posted instructions and list of emergency contacts: physicians, nearby notified medical facility, fire and police departments, ambulance service, state/local/federal environmental agencies, Certified Industrial Hygienist (CIH), and installation commander.
d. Emergency recognition and prevention.
e. Site topography, layout and prevailing weather conditions.
f. Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distance, place of refuge (assembly area), evacuation routes, site security and control).
g. Specific procedures for decontamination and medical treatment of injured personnel.
h. Route maps to nearest pre-notified medical facility.
i. Criteria for initiating community alert program, contacts and responsibilities.
j. Critique of emergency responses and follow-up.
k. Material Safety Data Sheets (MSDS) for each hazardous substance anticipated to be encountered on site would be made accessible to site personnel at all times.

15.4 Sampling – sampling will be conducted in accordance with established protocols and methodologies. Site-specific sampling requirements will be presented in the project-specific Work Plans and/or in other project-specific documents such as Field Sampling and Analysis Plans and Quality Assurance Plans.

Prior to initiating any sampling activities, an UXO-qualified technician will screen sites potentially contaminated with UXO/CWM. A magnetometer will be used to screen entry into a suspect area as in paragraph 15.2 above. Lanes will be marked and suspect items and subsurface anomalies will be identified and avoided. The immediate sampling area will be surface-screened prior to the introduction of the sampling team into the area.

Prior to any subsurface intrusive sampling, another check with a magnetometer needs to be accomplished. The GA-52Cx Magnetic Locator (magnetometer) can be used for collecting

subsurface samples not greater than 0.5 feet. If excavation of a borehole or hand auguring hole is to exceed this depth, a MG-220 Magnetic Gradiometer (down hole magnetometer) shall be utilized with readings taken at two feet depth intervals.

If an anomaly is detected, the location will be marked and avoided. If appropriate and acceptable, an alternate sampling location (in a cleared area) will be designated. If the sampling location cannot be relocated them the UXO-qualified technician will hand excavate down to the anomaly to determine if it is hazardous. If it is not hazardous, the object will be set aside and the sampling event will continue. If the object has been determined to be hazardous or suspect, the sampling team will move out of the area and the emergency procedures listed in paragraph 11.0 will be implemented.

15.5 Monitoring Well Installation – the area within a 50-foot radius of the borehole and the off- road access path will be screened with the GA-52Cx magnetometer and be cleared of all metal objects. Once this is accomplished, the areas around borehole sites will be marked using colored marking tape and/or pin flags. Heavy equipment such as front-end loaders, backhoes, and bulldozers will not be used to develop or establish drill sites. The following action will be followed:

a. The GA-52Cx magnetometer will be used directly over the borehole site to check for buried items down to 0.5 feet. After a surface check, the UXO-qualified technician will hand auger down to a depth of two feet and check down the hole using the MG-220 magnetometer.

b. Once the hand-auguring hole has been cleared, the drill rig will be positioned over the proposed borehole. Drilling will commence to a depth of four feet, the drill auger will be removed from the borehole, the drill crew chief and UXO personnel will make observations of the soil from the core barrel and the soil removed from the hole by hand auger (if needed). The drilling log and lithologic log will be maintained in accordance with standard practices, noting any metal objects that may be found.

c. The drilling derrick will be secured and drill rig moved to a position at least 20 feet from the borehole.

d. The borehole will be checked again with the MG-220 magnetometer.

e. If UXO or magnetic anomaly is present, the borehole will be abandoned and another location selected. The new borehole should be at least six feet from the original borehole. If a UXO or anomaly is not detected and the clearance is given, the drill rig shall be positioned back over the borehole, and drilling will proceed to the next depth (6 feet).

f. Repeat above steps at intervals of 2 feet, until a depth of ten feet is reached. At the ten-foot interval, a magnetometer reading shall be taken with the MG-220 set on the maximum sensitivity. The instrument will detect larger objects (approaching 100 lbs.) that could be expected to penetrate to depths of 10 feet or more.

g. After reaching the depth of ten feet, the above steps will be repeated at intervals of 4 feet, until the desired depth is reached.

15.6 Exploratory Trenching and Excavation – at times, exploratory trenching may be required to determine the lateral extent of a landfill, burial pit, or subsurface geophysical anomaly. Trenching and excavation to uncover a subsurface area will be conducted using a backhoe, an excavator, or sometimes a front-end loader. **Any trenching or excavation activities (regardless of depth) must be done in accordance with OSHA 29 Subpart P requirements, which must be considered and addressed in the project-specific Health and Safety Plan.**

On project sites where excavation activities are within the scope of work *and* a UXO/CWM concern exists, the following additional procedures will be utilized to conduct these operations:

a. The surface of the area to be trenched or excavated will first be swept with the GA-52Cx magnetometer. Anomalies will be hand excavated to determine if hazardous.

b. No more than 0.5 feet of surface soil will then be gingerly removed (scraped) from the area of concern.

c. The heavy equipment will be removed at least 20 feet away from the area, and the area will be checked with the MG-220 magnetometer. If the area is a trench, the entire length of the trench will be checked with the MG-220 and the excavation can continue two feet at a time. If the area is a wide-open area, it can once again be checked with the GA-52Cx, but only 0.5 feet of soil removal can be excavated at a time.

d. Anomalies will continue to be uncovered by hand excavation until the desired results are obtained and the trench/area is abandoned and refilled.

e. Excavation will continue another 2 feet if using the MG220 or 0.5 feet if using the GA-52Cx magnetometer. Once again after the proper depth of soil is excavated, the heavy equipment is removed from the area (>20 feet) and the area is rechecked with the magnetometer. If excavation depths reach 4 feet, suitable means of access/egress must be provided (e.g., ladders) and atmospheric monitoring must be performed prior to any entries.

f. The above procedures are followed until the desired depth is reached and/or the desired results are obtained.

Once the area or trench has been cleared, excavation can continue to the proper depth before the equipment is again moved away (at least 20 feet) and the area/trench.

15.7 Geophysical Surveys – there are several instruments that can be used to conduct geophysical surveys. The GA-52Cx (Schonstedt) and the MG-220 are magnetometers and are passive instruments. The Geonics Terrain Conductivity Meter (EM-31) is an active instrument and is commonly used to measure subsurface terrain conductivity. This information can be used geophysical surveys, as well as for locating voids, discontinuities in soil structures such as boundaries of disposal pits and buried conducting objects. An Ordnance Safety Analysis of the Geonics Model EM-61 Non-Contacting Terrain Conductivity Meter was conducted by the Naval Surface Warfare Center at the request of TtNUS in April 1993. The analysis concluded, in summary, that the "Geonics EM-61 poses no ordnance safety hazard when operated in the normal survey mode, where the device is held at hip height." However, the Geonics EM-61 should not be used with the boom on the ground if ordnance is present or suspected.

When using the magnetometer or the EM-61, a UXO-qualified technician will conduct a surface sweep of the area to be surveyed to ensure that no surface ordnance or other hazards exist. The magnetometer is a passive instrument; therefore, no special ordnance safety precautions are required.

Manufacture recommended procedures for the EM-61 must be followed to ensure safe operation during the geophysical survey. Standard survey protocols and quality assurance methods will also be required during survey operations.

15.8 Miscellaneous Operations – due to the potential of UXO/CWM materials being encountered during field activities, UXO support will be provided at all site locations. UXO support will be

provided for any and all field activities that are in areas suspected to contain UXO and/or CWM. These areas also include those areas covered with water and creeks, canals, etc.

Operations that involve the inspection, hazard classification, segregation, and final disposal of UXO and UXO-related scrap will not be covered in this SOP. The demilitarization of UXO and UXO-related scrap is not authorized unless specific work plans, SOPs, health and safety plans and other established procedures are written and approved addressing these operations.

16.0 HAZARD CONTROL BRIEF

A Health and Safety Hazard Control Briefing (i.e., tailgate meetings) will be conducted daily prior to the start of onsite activities. The briefing will be detailed and will cover the information in the Safe Work Permits for the anticipated tasks for the day, as well as applicable portions of this SOP. Additional briefings will be conducted as necessary for tasks that become necessary during the course of a workday, if they were not covered in the morning briefing. These briefings are in addition to (not in place of) the site-specific health and safety training that is required for all onsite personnel prior to their participation in any onsite, intrusive activities.

The following information will be given during the daily briefings:

a. Overview of task(s) to be performed and review of appropriate Safe Work Permits with task participants.

b. Overview of the day's objectives, as well as general site hazards

- Unexploded Ordnance Hazards
- Chemical Warfare Agents and Materials
- Physical Hazards

c. Overview of Standard Work Practices pertinent to the day's planned activities

d. Review of any worker incidents or near-miss events, including a review of corrective/preventive measures to prevent recurrence

e. Overview of Emergency Response Actions, evacuation routes and assembly points

17.0 SECURITY

Field activities under various TtNUS contracts are typically unclassified and normal security measures apply in accordance with above references (paragraph 9.1 above). TtNUS personnel and their subcontractors will check in with the appropriate client/installation's security office and may be issued security badges for entry into certain work areas. This SOP will not cover special security requirements for projects involving UXO/CWM as most installations have established policies and procedures on reporting and securing recovered items that are UXO and/or CWM. The TtNUS Project Manager will incorporate all security procedures required by the installation into the site work plan.

ATTACHMENT VII

EQUIPMENT INSPECTION CHECKLIST

Equipment Inspection Checklist

Company:_____ **Unit/Serial No#:**_____

Inspection Date: ____/____/____ **Time:**____:____ **Equipment Type:**_____

Project Name:_____ **Project No#:**_____

Yes	No	NA	Requirement	Comments
			Emergency Stop Devices	
☐	☐	☐	• Emergency Stop Devices (At points of operation)	
☐	☐	☐	• Have all emergency shut offs identified been communicated to the field crew?	
☐	☐	☐	• Has a person been designated as the Emergency Stop Device Operator?	
			Highway Use	
☐	☐	☐	• Cab, mirrors, safety glass?	
☐	☐	☐	• Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	
☐	☐	☐	• Seat Belts?	
☐	☐	☐	• Is the equipment equipped with audible back-up alarms and back-up lights?	
☐	☐	☐	• Horn and gauges	
☐	☐	☐	• Brake condition (dynamic, park, etc.)	
☐	☐	☐	• Tires (Tread) or tracks	
☐	☐	☐	• Windshield wipers	
☐	☐	☐	• Exhaust system	
☐	☐	☐	• Steering (standard and emergency)	
☐	☐	☐	• Wheel Chocks?	
☐	☐	☐	• Are tools and material secured to prevent movement during transport? Especially those within the cab?	
☐	☐	☐	• Are there flammables or solvents or other prohibited substances stored within the cab?	
☐	☐	☐	• Are tools or debris in the cab that may adversely influence operation of the vehicle (in and around brakes, clutch, gas pedals)	

Equipment Inspection Checklist

Yes	No	NA	Requirement	Comments
☐	☐	☐	Fluid Levels: • Engine oil	
☐	☐	☐	• Transmission fluid	
☐	☐	☐	• Brake fluid	
☐	☐	☐	• Cooling system fluid	
☐	☐	☐	• Hoses and belts	
☐	☐	☐	• Hydraulic oil	
☐	☐	☐	High Pressure Hydraulic Lines • Obvious damage	
☐	☐	☐	• Operator protected from accidental release	
☐	☐	☐	• Coupling devices, connectors, retention cables/pins are in good condition and in place	
☐	☐	☐	Mast Condition • Structural components/tubing	
☐	☐	☐	• Connection points	
☐	☐	☐	• Pins	
☐	☐	☐	• Welds	
☐	☐	☐	• Outriggers	
☐	☐	☐	• Operational	
☐	☐	☐	• Plumb (when raised)	
☐	☐	☐	Hooks • Are the hooks equipped with Safety Latches?	
☐	☐	☐	• Does it appear that the hook is showing signs of wear in excess of 10% original dimension?	
☐	☐	☐	• Is there a bend or twist exceeding 10% from the plane of an unbent hook?	
☐	☐	☐	• Increase in throat opening exceeding 15% from new condition	
☐	☐	☐	• Excessive nicks and/or gouges	
☐	☐	☐	• Clips	
☐	☐	☐	• Number of U-Type (Crosby) Clips (cable size 5/16 – 5/8 = 3 clips minimum) (cable size 3/4 – 1 inch = 4 clips minimum) (cable size 1 1/8 – 1 3/8 inch = 5 clips minimum)	

Equipment Inspection Checklist

Yes	No	NA	Requirement	Comments
			Power cable and/or hoist cable	
☐	☐	☐	• Reduction in Rope diameter π (5/16 wire rope>1/64 reduction nominal size -replace) (3/8 to 1/2 wire rope>1/32 reduction nominal size-replace) (9/16 to 3/4 wire rope>3/64 reduction nominal size-replace)	
☐	☐	☐	• Number of broken wires (6 randomly broken wires in one rope lay) (3 broken wires in one strand)	
☐	☐	☐	• Number of wire rope wraps left on the Running Drum at nominal use (≥3 required)	
☐	☐	☐	- Lead (primary) sheave is centered on the running drum	
☐	☐	☐	• Lubrication of wire rope (adequate?)	
☐	☐	☐	• Kinks, bends – Flattened to > 50% diameter	
			Hemp/Fiber rope (Cathead/Split Spoon Hammer)	
☐	☐	☐	• Minimum ¾; maximum 1 inch rope diameter (Inspect for physical damage)	
☐	☐	☐	• Rope to hammer is securely fastened	
			Safety Guards –	
☐	☐	☐	• Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?	
☐	☐	☐	• Hot pipes and surfaces exposed to accidental contact?	
☐	☐	☐	• High pressure lines	
☐	☐	☐	• Nip/pinch points	
			Operator Qualifications	
☐	☐	☐	• Does the operator have proper licensing where applicable, (e.g., CDL)?	
☐	☐	☐	• Does the operator, understand the equipment's operating instructions?	
☐	☐	☐	• Is the operator experienced with this equipment?	
☐	☐	☐	• Is the operator 21 years of age or more?	

Equipment Inspection Checklist

Yes	No	NA	Requirement	Comments
			PPE Required for Drill Rig Exclusion Zone	
☐	☐	☐	• Hardhat	
☐	☐	☐	• Safety glasses	
☐	☐	☐	• Work gloves	
☐	☐	☐	• Chemical resistant gloves_____	
☐	☐	☐	• Steel toed Work Boots	
☐	☐	☐	• Chemical resistant Boot Covers	
☐	☐	☐	• Apron	
☐	☐	☐	• Coveralls Tyvek, Saranex, cotton)_____	
			Other Hazards	
☐	☐	☐	• Excessive Noise Levels? _____dBA	
☐	☐	☐	• Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.)	
☐	☐	☐	- MSDSs available?	
☐	☐	☐	• Will On-site fueling occur	
☐	☐	☐	- Safety cans available?	
☐	☐	☐	- Fire extinguisher (Type/Rating_____)	

Approved for Use ☐ Yes ☐ No ☐ See Comments

_____

Site Health and Safety Officer Operator

Tetra Tech, Inc.
Hand and Power Tool Checklist

Hand Tools	
Requirement	**Comments**
Are tools and equipment (both company and employee owned) used by employees at their workplace in good condition? Any loose parts? Missing pins and/or bolts?	
Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?	
Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?	
Are worn or bent wrenches replaced regularly?	
Are appropriate handles used on files and similar tools?	
Are employees made aware of the hazards caused by faulty or improperly used hand tools?	
Are jacks checked periodically to ensure they are in good operating condition?	
Are tool handles wedged tightly in the head of all tools?	
Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?	
Are tools stored in dry, secure locations where they won't be tampered with?	
Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breaking?	

Tetra Tech, Inc.
Hand and Power Tool Checklist

Power Tools	
Requirement	**Comments**
Are grinders, saws and similar equipment provided with appropriate safety guards?	
Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?	
Are portable circular saws equipped with guards above and below the base shoe? Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded?	
Are rotating or moving parts of equipment guarded to prevent physical contact?	
Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?	
Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, and air compressors?	
Are portable fans provided with full guards or screens having openings ½ inch or less?	
Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?	
Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?	
Are pneumatic and hydraulic hoses on power operated tools checked regularly for deterioration or damage?	
Air compressor: • Is the air compressor equipped with a Surge Check Valve? • Pressure regulator gauge and valve? • Pressure relief valve? • Water trap and filter?	

Tetra Tech, Inc.
Hand and Power Tool Checklist

Chainsaws	
Requirement	**Comments**
Is the chain sharp, well oiled, and properly adjusted (Chain tension)?	
Is the Bar straight? Are there indications of excessive wear?	
Does the chain brake lever move freely? Does chain brake stop the chain when applied?	
Does the chain move when idling?	
Are the cans used to fuel the chainsaw safety cans?	
Does the on/off switch function properly?	
Does the throttle lock function properly? Is the chainsaw equipped with continuous pressure throttle control?	
Is the following PPE in serviceable condition: Hardhat with mesh visor and ear muffs? Safety glasses? Chainsaw chaps? Gloves with protection also on the hack of the hands?	
Emergency Equipment: Is a Fire extinguisher (3A:B:C) available for immediate use? Is a First-Aid Kit immediately available for use? Does it contain the minimum content as required in the HASP?	
Communication – Is an acceptable means of communication available (Hand signals, radios, air horns, etc.) that will support communication over the engine noise? Type?	
Are MSDSs available for the fuels, fuel additives, and lubricating oils?	
Is the operator trained in proper operation of the chainsaw? Does the operator demonstrate knowledgeable operation?	

ATTACHMENT VIII

OSHA POSTER

Job Safety and Health

It's the law!

OSHA

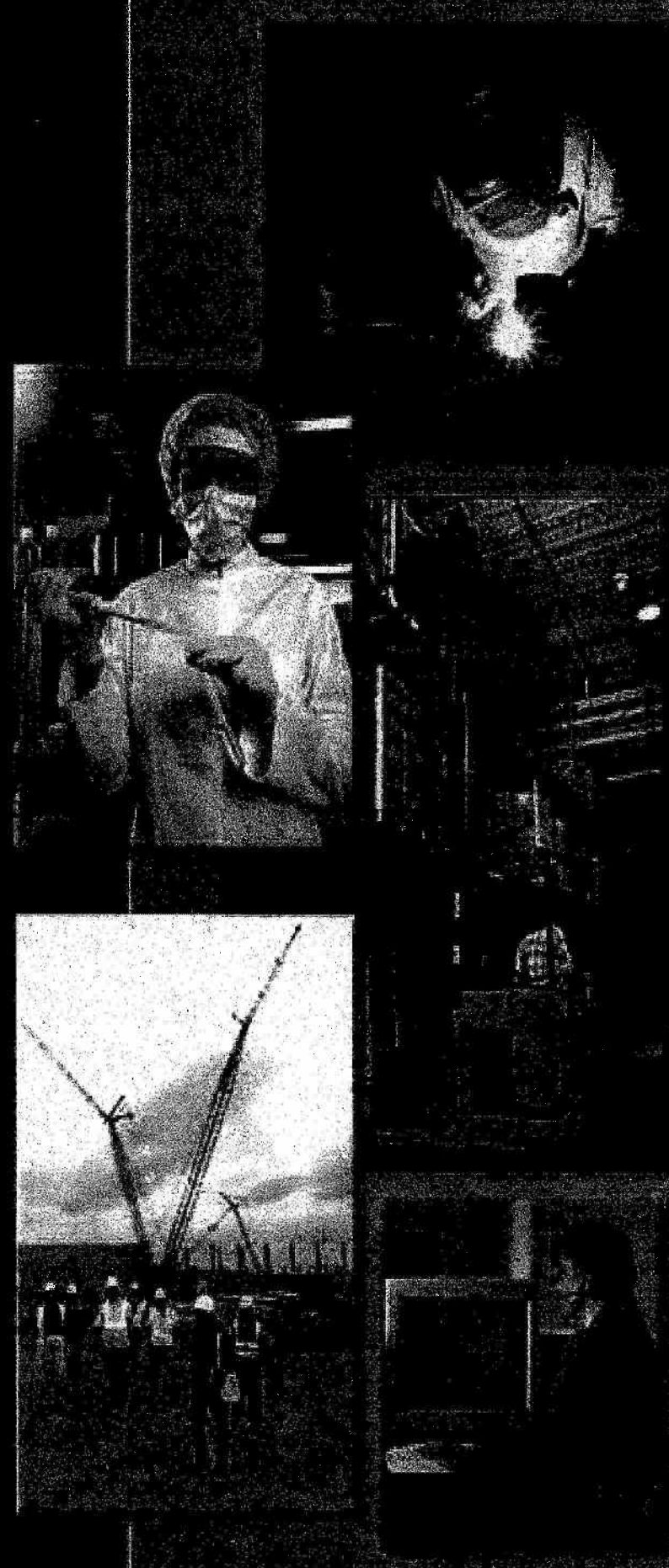
Occupational Safety and Health Administration
U.S. Department of Labor

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.



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