FINAL
SITE SAFETY AND HEALTH PLAN

REMEDIAL INVESTIGATION
STRATFORD ARMY ENGINE PLANT
Stratford, Connecticut

March 2004

U.S. Army Assistant Chief Of Staff
For Installation Management
National Capital Region Field Office
Alexandria, Virginia

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1.0 INTRODUCTION

MACTEC Engineering and Consulting, Inc. (MACTEC) has been contracted by the U.S. Air Force Center for Environmental Excellence (AFCEE) to complete the Remedial Investigation (RI) at the Stratford Army Engine Plant (SAEP) under Task Order No. 012 of Contract No. F41624-03-D-8606. MACTEC is performing this work for U.S. Army Assistant Chief Of Staff for Installation Management (ACSIM), National Capital Region Field Office in Alexandria, Virginia. The objectives of this Task Order are to 1) complete additional field activities necessary to provide further characterization of chemical contamination at SAEP, 2) summarize the results of field activities in reports, 3) revise the RI Report based on regulatory agency comments, and 4) provide community relations support services for the environmental program at SAEP.

1.1 SCOPE AND PURPOSE

The purpose of the Site Safety and Health Plan (SSHP) is to govern the conduct of all RI field work activities to be completed at the SAEP. This SSHP includes health and safety requirements and procedures for chemical hazards at the SAEP and has been developed in conformance with, and is intended to meet the requirements found in, 29 CFR 1910.120. Compliance with this SSHP will be required of all Contractor personnel, subcontractor personnel, and third parties entering the work areas at the site.

This SSHP refers to MACTEC's Master Safety and Health Plan Manual (SSHP Part II). The SSHP Part II contains specific guidance and procedures developed and utilized by MACTEC for all projects requiring a SSHP. Selected appendices from the SSHP Part II are referenced in this document and included as Appendices. These referenced appendices are as follows:

Appendix B - Training Program
Appendix C - Medical Surveillance Programs
Appendix E - Personal Protective Equipment
Appendix F - Biological Hazards
Appendix K - Temperature Extremes
Appendix L - Decontamination
Appendix M - Emergency Planning
Appendix O - Respiratory Protection Program
Appendix T - Hearing Conservation Program

1.2 PROJECT IDENTIFICATION

SSHP Date:	October 2003
Owner:	U.S. Army
Site Location:	550 Main Street Stratford, Connecticut

Project:	Remedial Investigation
BRAC Environmental Coordinator:	Wes LaParl (203) 385-4316
SAEP Security Access:	(203) 385-6653
MACTEC Project Manager:	Nelson Walter (207) 775-5401 Ext. 3637 Redacted - Privacy Act (cell)
MACTEC Assistant Project Manager	Rod Pendleton (207) 775-5401 Ext. 3605 Redacted - Privacy Act (cell)
MACTEC Investigation Lead:	Thomas Longley (207) 775-5401 Ext. 3594
MACTEC Regional Safety and Health Manager:	Cindy Sundquist (207) 775-5401 Ext. 3309
MACTEC Quality Assurance/Data Management	Christian Ricardi (207) 775-5401 Ext. 3694
MACTEC Site Health and Safety Officer:	To be determined

1.3 HEALTH AND SAFETY PERSONNEL

The following subsections briefly describe the health and safety designations and general responsibilities that will be employed for the project.

1.3.1 Project Manager

The MACTEC Project Manager, Mr. Nelson Walter, is the individual with overall project management responsibilities. Those responsibilities as they relate to health and safety include provision for the development of this SSHP; the necessary resources to meet requirements of this SSHP; the coordination of staff assignments to ensure that personnel assigned to the project meet medical and training requirements; and the means and materials necessary to resolve any health and safety issues that are identified or that developed on the project.

1.3.2 MACTEC Regional Safety and Health Manager

The Regional Safety and Health Manager (RSHM) for the MACTEC Northeastern Region is Ms. Cindy Sundquist. The RSHM has final authority to resolve health and safety issues that are not resolved at the site or through the Site Safety and Health Officer (SSHO). The RSHM has overall responsibility for ensuring that the policies and procedures of this SSHP are implemented by the SSHO.

1.3.3 Site Safety and Health Officer

The MACTEC SSHO for the RI field activities will be determined prior to initiation of field investigations. The SSHO will: implement the SSHP in accordance with the MACTEC Health and Safety Program; conduct safety inspections and investigate all accidents, illnesses, and incidents occurring while at the site; conduct safety briefings and site-specific training for Site personnel; accompany all U.S. Environmental Protection Agency (USEPA), Occupational Safety and Health Administration (OSHA) or other governmental agency personnel visiting the Site in response to health and safety issues; and in consultation with the RSHM update and modify this SSHP as site or environmental conditions change.

The SSHO is vested with the authority to stop site operations (STOP WORK AUTHORITY) if the SSHO determines that an imminent health or safety hazard or other potentially dangerous situation exists. The SSHO is to immediately notify the RSHM and the SAEP Project Manager of any Stop Work Orders issued. The SSHO may also recommend to the RSHM that the downrange authorization of individual site personnel be restricted or eliminated for health and/or safety reasons.

The SSHO ensures that all personnel entering the work areas at the site are qualified in accordance with the requirements of 29 CFR 1910.120, this SSHP and applicable site safety procedures.

1.4 TRAINING

All personnel working on a MACTEC site who potentially may be exposed to toxic substances or hazardous materials will participate in initial and annual refresher training as well as site-specific training before commencement of the site assignment. Specific MACTEC personnel (at a minimum the SSHO) will have also received supervisory training before commencement of the site assignment. The initial health and safety training program consists of the 40-hour training program required and designated by the OSHA standard 29 CFR 1910.120. MACTEC supplements this initial training with 8-hour annual refresher and supervisory training elements as required under 29 CFR 1910.120. MACTEC also provides site-specific training for all personnel conducting work on a site. The site-specific training covers the hazards and specialized problems and protocols specific to the site. The site-specific training also covers major elements of the SSHP, site-specific safety procedures, as well as health and safety procedures regarding an individual's specific job responsibilities and tasks. The SSHO or health and safety designee will provide this training before an individual is permitted to work in the exclusion zone.

Additional site- or task-specific training may be needed as determined by the RSHM. This training may include additional refreshers on personal protective equipment (PPE), instrumentation, cardiopulmonary resuscitation (CPR), first aid, confined space entry training required by OSHA, substance-specific training or any other pertinent health- or safety-related subject.

Training such as that defined under MACTEC's Health and Safety Program and 29 CFR 1910.120 is required for all personnel entering work areas at the site. Personnel without the required training will not be permitted in any work area at the site. All personnel assigned to a MACTEC site must

participate in the site-specific training presentation which will cover major elements of the SSHP, as well as health and safety procedures regarding an individual's specific job responsibilities and tasks. The SSHO or health and safety designee will provide this training before an individual is permitted to work. See Appendix B for further information.

1.5 MEDICAL SURVEILLANCE

All personnel performing activities under the SAEP RI field programs must be medically qualified for the site assignment as determined by an acceptable medical surveillance program. This medical qualification includes the ability to wear respiratory protection. Personnel without medical clearance will not be permitted in work areas at the site. MACTEC personnel are enrolled in a Health Monitoring Program that is implemented through a contracted Medical Consultant (currently Health Resources). The Medical Consultant is a company consisting of a team of physicians and support personnel who specialize in occupational medicine.

The health monitoring program consists of an initial medical examination to establish the employee's general health profile which provides important baseline laboratory data for later comparative study and annual examinations. The health monitoring program is also consistent with the established site requirements and protocol. Follow-up examinations are completed annually for all personnel enrolled in the health monitoring program or more frequently if project assignments warrant testing before and/or following specific field activities. Additional examinations will be given upon termination of employment if the associate has not had a physical within the last six months, or if the RSHM believes an exit physical is warranted; if the associate exhibits signs and symptoms of an overexposure; or if the examining physician believes an additional physical is warranted. Other examinations and medical tests may be performed if warranted because of specific site conditions policies or procedures.

The baseline, annual, and exit examinations include, at a minimum: a complete (or updated) medical occupational and smoking history; a complete physical (with audiometry and visual acuity testing); blood and urine laboratory tests; chest X-ray (if medically necessary); pulmonary function test; and electrocardiogram for employees age 40 and above. Annual and exit examinations are essentially the same as the baseline. Annual and exit examinations may be supplemented by additional procedures or tests as warranted by an individual's potential exposures, stresses or applicable regulations. All examinations must include a physician's statement of qualification for fieldwork.

Symptoms of exposure to hazardous materials will be reviewed for each site to inform personnel of the recognized signs of possible exposure to those materials. This information will be supplemented with a discussion of the need for objectivity in the personal health assessment to account for normal reaction to stressful situations. The SSHO will watch for outward evidence of changes in worker health. Symptoms may include skin irritations, skin discoloration, eye irritation, muscular soreness, fatigue, nervousness or irritability, intolerance to heat or cold or loss of appetite. Employees will routinely be asked to assess their general state of health during the project. Special medical monitoring may be identified for certain sites.

All records will be maintained by the Medical Consultant and the RSHM. The Medical Consultant maintains each associate's original medical record which includes:

- Medical questionnaire;
- Physical examinations;
- Diagnostic tests (X-ray, electrocardiogram, pulmonary functions, audiometry, visual acuity, and other medical tests);
- Laboratory tests (blood count and chemistries and urinalysis);
- Physician's statements; and
- Other: requests for disclosure of information on monitoring results.

The RSHM receives and maintains only the medical information necessary to evaluate the individuals' qualifications for fieldwork their exposure records and training documentation.

As required by OSHA, associate medical records will be maintained for the duration of employment plus a minimum of 30 years. Should an associate desire copies of his or her complete medical records he/she can call the Medical Consultant directly or notify the RSHM. The RSHM may require this request in writing. Medical records will be sent directly to the associate's home unless an Authorization for Release of Medical Records form is completed, signed and sent to the Medical Consultant. Forms are available through the RSHM. The associate may review the files maintained by the RSHM at any time. See Appendix C for further information.

1.6 HAZARD COMMUNICATION

In 1986 OSHA began enforcing the Hazard Communication Standard (HCS) (29 CFR 1910.1200). This standard requires employers to make their associates aware of the hazards to which they may be exposed. This standard does not apply to exposures to hazardous waste. On hazardous waste sites, the only chemicals covered by the HCS are those MACTEC or their subcontractors bring onto the site such as for decontamination and sample preservation purposes. In 1987, when the Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) was first promulgated, most of the components of the HCS were incorporated into the new standard. Because of this, the only components of the HCS that need to be addressed separately at a hazardous waste site are labeling and Material Safety Data Sheets (MSDSs). The remainder of the standard has been included in 1910.120, or is part of the overall MACTEC Health and Safety Program. MSDSs for all chemicals brought to the site will be added to the MSDS section of this SSHP, processed in accordance with site safety procedures, and will be reviewed by affected employees and subcontractors working at the site.

MACTEC's policy is to minimize chemical storage by purchasing small sized containers that are transported or shipped directly to the site. This avoids the need to transfer bulk chemicals to smaller containers (e.g. sample jars purchased with the preservative already added). The original label will be kept on all containers. If the chemical needs to be transferred to a smaller container the new container will be labeled with the name of the contents and appropriate hazard warnings (e.g. any combination of words pictures or symbols that conveys the chemical hazard; for example,

a label will be affixed on the container with the word "flammable" with a picture of a flame) including target organ effects (e.g. irritates eyes) if required.

If the chemical has been transferred to a secondary container that is to be used that day, only by the person doing the transferring (e.g. tri-sodium phosphate added to water for decontamination or methyl alcohol added to a squeeze bottle), labeling is not required. Some labeling may be used to distinguish the contents of a container if similar containers are used (e.g., methyl alcohol or alcohol written on the squeeze bottle to distinguish its contents from deionized water).

2.0 SITE CHARACTERIZATION AND ANALYSIS

The following subsections describe the site, the proposed activities to be conducted, and the anticipated site hazards which may be encountered while conducting these proposed activities.

2.1 SITE LOCATION, DESCRIPTION, AND HISTORY

SAEP is located on approximately 124 acres in Stratford, Connecticut, on the Stratford Point peninsula in the southeast corner of Fairfield County (see Figure 2-1).

SAEP was formerly a government-owned, contractor-operated facility. The land and buildings are owned by the U.S. Army, and former plant equipment (removed in early 1998) was owned by both the U.S. Army and its contractor, AlliedSignal Engines. The U.S. Army-owned land, buildings, and equipment were formerly provided to AlliedSignal under a facilities contract for executing government contracts, including the manufacture and testing of turbine engines for the U.S Army. The SAEP property consists of 49 buildings, paved roadways and grounds, and five paved parking lots (see Figure 2-2).

Responsibility for the jurisdiction, control, and accountability of SAEP was transferred from the U.S. Army Aviation and Troop command to the U.S. Army Tank-Automotive and Armament Command (TACOM) in September 1995. In October 1995, SAEP was placed on the Base Closure and Realignment (BRAC) list, known as BRAC 95. Pursuant to the Defense Base Closure and Realignment Act of 1990, the BRAC Environmental Restoration Program mandates that environmental contamination on BRAC properties be investigated and remediated, as necessary, prior to disposal and reuse. In August 1998, SAEP was transitioned from an active production facility to caretaker status. In October of 2002, responsibility for operations and environmental restoration was transferred from TACOM to ACSIM.

The RI Work Plan contains additional information of the SAEP facility, including a full description of the site location and history (ACSIM, 2004).

2.2 SCOPE OF WORK (WORK PLAN)

This section summarizes the scope of work that will be implemented during the RI field program. The field effort will include implementation of the RI Work Plan, and is currently scheduled for winter 2003-2004.

The following tasks are scheduled for completion as part of investigation activities:

- Installation of monitoring points and wells to facilitate soil vapor sample collection, groundwater level measurement, and groundwater sample collection;
- Collection of water level measurements to evaluate tidal influences in groundwater, localized bedrock groundwater flow direction, and vertical hydraulic gradients;
- Indoor air sample collection and analysis for site-related contaminants;

- Soil vapor sample collection and analysis for site-related contaminants;
- Subsurface soil sample collection for visual identification, field screening, and off-site analysis;
- Groundwater sample collection and analysis for site-related contaminants and monitored natural attenuation (MNA) parameters;
- Measurement and visual observation of light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) contamination, as necessary;
- Completion of a location and elevation survey; and
- Investigation-derived waste (IDW) soil and water sampling and characterization analysis for off-site disposal.

2.3 SUMMARY OF SITE CONTAMINATION

Based on the results of previous investigations, volatile organic compounds (VOCs) are the primary contaminants of concern at the SAEP site. VOCs have been identified above Connecticut Department of Environmental Protection (CTDEP) Remediation Standard Regulation (RSR) criteria in indoor air, soil vapor, soil, and groundwater. Additional COCs include hexavalent and total chromium, cyanide, nickel, and lead. Table 2-1 summarizes the COCs identified during previous investigations at the SAEP site.

2.4 INITIAL SITE ENTRY AND MONITORING

Based on existing site information, initial field activities in work areas at this site will be conducted in modified Level D PPE. Monitoring of the breathing zone (BZ) will be conducted using a photoionization detector (PID). The exposure limits for COCs to be used at the site are summarized on Table 2-2, and are from OSHA standards and the American Conference of Governmental Industrial Hygienists recommended guidelines.

2.5 SITE RISKS

This section provides a general hazard assessment for hazards which may be encountered during RI activities. The following potential hazards have been identified:

- Inhalation of volatile organic compounds;
- Dermal (skin and eye) contact with contaminants;
- Ingestion of contaminants;
- Physical hazards associated with the use of heavy equipment;
- Noise exposure;
- Trip/fall hazards;
- Inhalation of dusts;
- Physical restrictions and burdens imposed by use of PPE;
- Heat stress (depending on season);
- Cold exposure (depending on season);

- Flammable hazards;
- Underground utilities; and
- Biological hazards.

2.5.1 Health Hazards

The health hazards at the site are principally associated potential inhalation and direct content with soils and water contaminated with VOCs and inorganics.

Exposure to these compounds through inhalation of vapors, inhalation of contaminated dust, ingestion, or dermal contact may constitute a potential health hazard during monitoring point installation and soil sampling activities.

2.5.1.1 Alcohols. In general, the lower aliphatic alcohols are low to moderately toxic. Because of their low vapor pressure, the acute inhalation toxicity of most alcohols is low. The vapors may be an irritant to the eyes and mucous membranes. Ingestion and absorption of liquids through the skin can be a major health hazard. Ethanol is a central nervous system depressant, causing narcosis, and high dosages may lead to death. Chronic intake may cause cirrhosis or liver damage. Other low aliphatic alcohols exhibit toxic actions similar to those of ethanol. Lower alcohols containing double or triple bonds exhibit a greater degree of toxicity and irritation; for example, methanol is highly toxic. Ingestion of methanol can cause blindness, acidosis, and death. Methanol will be used to preserve soil samples for VOC analysis during field investigations.

2.5.1.2 Halogenated Aliphatic Hydrocarbons. Exposure to halogenated hydrocarbons causes depression of the central nervous system, decreased alertness, headache, sleepiness and loss of consciousness. In addition, halogenated hydrocarbons can affect the kidneys, resulting in decreased urine flow, swelling (especially around the eye area) and anemia, and the liver causing fatigue, malaise, dark urine, liver enlargement, and jaundice. Vinyl chloride is one of the more toxic of the halogenated aliphatic hydrocarbons and is know to cause cancer in humans. Other hydrocarbons in this group are also potential carcinogens. Halogenated aliphatic hydrocarbons present at the site include: 1,1- dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethylene, trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, vinyl chloride.

2.5.1.3 Heavy Metals. Heavy metals are all toxic to the kidneys; however, each heavy metal has its own characteristic symptom cluster. Hexavalent chromium causes non-healing ulcerations of the skin or mucous membranes and may cause cancer. Allergic reactions may result along with skin rash. Ingestion may cause electrolyte disturbances (hyperkalemia). Exposure to chromium is relatively non-toxic, however chromium dust may result in damage to lungs. Lead causes degreased metal ability, weakness (especially in the hands), headaches, abdominal cramps, diarrhea, and anemia. Long-term exposure to small amounts of cyanide may cause loss of appetite, irritation of eyes and upper respiratory tract. Signs of over exposure include dizziness, confusion, headache, vomiting, loss of consciousness, or death. Pre-existing allergies related to the skin or respiratory tract may be aggravated by exposure. Exposure to nickel may result in skin irritation ("nickel itch"), irritation to the upper respiratory tract, and in some compounds may cause cancer.

2.5.2 Physical Hazards

Physical hazards include: heavy equipment operation; buried power lines; noise; slips, trips, and falls; heat and cold stress; and materials handling. Entry into confined spaces is not anticipated and will not be allowed without proper training and following appropriate health and safety procedures.

Due to the industrial character of this site, steps will be taken to protect employees and other site personnel. Actions that will be implemented include:

1. Identifying and marking the locations of underground utilities prior to conducting intrusive work activities. MACTEC will follow established SAEP procedures when appropriate.

2. Maintaining the work area in a clean and organized condition.

3. Securing all soil disturbance areas and mechanical equipment during working hours.

4. Establishing and appropriately marking any necessary exclusion zones.

5. Providing appropriate safeguards and security during non-working hours.

2.5.2.1 Heavy Equipment. There is a potential for physical injury resulting from contact with any equipment that may be operating in the project area. Workers must be made aware of the presence of these hazards and take steps to avoid them. Workers will remain clear of heavy equipment and their loads at all times and will also remain outside the radius of reach for articulated equipment such as backhoes, trackhoes, and cranes.

Workers will also take extra precautions when working around heavy equipment when wearing respiratory protection. This is due to the limited ability to communicate while respirators are being worn. Workers and equipment operators shall determine suitable hand signals for use in communicating with each other and these hand signals will be communicated to all site personnel during the initial site safety briefing and during the daily tool box meetings. Workers who operate the heavy equipment must be well trained in the use of their particular equipment.

2.5.2.2 Buried Utilities. As work operations involve intrusive activities, a potential for disturbance of underground utilities exists. In order to minimize the potential for accidents or interruption of utility service, all underground utilities will be identified prior to the start-up of intrusive activities.

At least three days prior to the start-up of intrusive activities, SAEP personnel and Dig Safe (if necessary) will be contacted in order to obtain clearance. The areas where intrusive activities will occur will be identified. The locator service and SAEP personnel will respond and mark the ground surface using the following guidelines:

Water	Blue outline
Natural Gas	Yellow outline
Electric	Red outline
Telephone	White outline - Initials of Telephone company or "YES" or "NO"
Cable	Green outline - Notation or "YES" or "NO"

MACTEC personnel will get written verification that all utilities have been identified prior to commencing intrusive activities.

2.5.2.3 Noise. Work will be conducted in areas with a potential for elevated noise levels. Hearing protection will be worn if noise levels exceed 85 decibels on a time-weighted-average. Potential noise sources at the site include the operation of drill rigs, generators, and other subsurface exploratory equipment (e.g., GeoProbe).

2.5.2.4 Slips, Trips, and Falls. Workers at the site may be exposed to slip, trip, and fall hazards due to uneven terrain, presence of debris, or slippery surfaces. Workers will ensure that the site is maintained in a neat orderly manner to minimize tripping hazards. Workers will take proper care when walking on uneven surfaces. Proper footwear with adequate traction will be worn by all personnel when walking on slippery surfaces.

2.5.2.5 Heat Stress. Heat stress is a potential hazard at the site due to warm or hot weather and the use of PPE. PPE places an added strain on the worker due to the impermeable nature of the protective clothing that reduces the body's ability to cool down as well as the added weight to be carried. See Appendix K of SSHP Part II for further information on Heat Stress.

2.5.2.6 Cold Stress. Cold stress is a potential at the site due to the cold weather anticipated during site operations. Fatal exposures have almost always resulted from accidental exposures, immersion in low temperature wate,r or failure to escape from low air temperatures. Appendix K of the SSHP Part II addresses the procedures that will be followed to protect workers from cold related injuries.

2.5.2.7 Materials Handling. At the SAEP site, the potential for materials handling related injuries will exist due to the handling of heavy items at the site (e.g., coolers, drums, heavy equipment, etc). Mechanical aids (e.g. handtruck, forklift, front end loader, back hoe, etc.) will be used wherever possible to handle the heavy items. If the use of mechanical aids is not possible, two persons, of approximately the same height, will be required to lift the object.

2.5.3 Biological Hazards

Workers may encounter poisonous insects, snakes, and plants while working in the field. In addition, workers may encounter ticks, mosquitos that can transmit West Nile Virus, and warm blooded animals, such as dogs, cats, raccoons, etc., that can transmit rabies or hantavirus.

Workers can protect themselves from biological hazards by wearing protective clothing, using insect repellent, avoiding contact with wildlife and stray animals. Workers should also know

how to identify poisonous plants and the symptoms of the associated diseases. Appendix F provides information on biological hazards at the SAEP site.

2.6 CONCLUSIONS/RISK ASSESSMENT

COCs at the Site include VOCs and inorganics. Exposure pathways to COCs include dermal contact, inhalation, and ingestion.

Physical hazards at this site include: heavy equipment operation; buried power lines; noise; slips, trips, and falls; heat and cold stress; and materials handling. Entry into confined spaces is not anticipated and will not be allowed without appropriate health and safety procedures and training.

Biological hazards at the site may include copperhead and rattle snakes, poisonous insects and spiders, ticks (Lyme disease), mosquitoes (West Nile virus), and poisonous plants, and contact with warm-blooded animals with rabies or hantavirus.

3.0 SITE CONTROL

Access to the SAEP facility is limited by security guard located at the main entrance. All personnel must enter and exit the facility through the main entrance and receive a security badge.

3.1 ZONATION

General zonation protocols employed at hazardous waste sites include the subdivision of a work site into three zones: 1) the Exclusion Zone; 2) the Contamination Reduction Zone (CRZ); and 3) the Support Zone.

3.1.1 Exclusion Zone

The Exclusion Zone isolates the area of subsurface investigation. The Exclusion Zone serves to restrict the spread of potential contamination from work areas of the Site to support areas and off-site locations. The Exclusion Zone is demarcated by a tape line or physical barrier. Personnel entering the Exclusion Zone must: (1) enter through the CRZ; (2) wear the prescribed level of protection; and (3) be otherwise authorized to enter the Exclusion Zone. Any personnel equipment or materials exiting the Exclusion Zone will be deemed to require decontamination. Equipment and materials will either be subject to decontamination or containerized in uncontaminated devices for decontamination at the designated off-site location.

Within the Exclusion Zone specific locations or restricted areas (clearly marked or identified) will be established as necessary for particular locations or around specific site operations. In the course of sampling requiring heavy equipment use, a restricted area will be established that includes an appropriate area for the heavy equipment operation. Other restricted areas will be designated as necessary. Specific access for emergency services to areas of site operations will be established.

Due to the caretaker status of the site, it is anticipated that delineation of an Exclusion Zone will not be necessary. However, care should be taken by site personnel to ensure non-essential workers remain a safe distance from investigation activities, in order to limit the potential for exposure to site contamination and other hazards. If necessary, caution tape will be used to prevent entry to work zones by unauthorized personnel.

3.1.2 Contamination Reduction Zone

The CRZ is a transition zone between the exclusion zone of the site and support areas. It is designated by a tape line between the Exclusion Zone and the beginning of the CRZ, and by a control line between the CRZ and the support areas. Field personnel, equipment or materials which leave the work area require decontamination. After undergoing the decontamination process or containerization, personnel equipment or materials will be permitted to exit the CRZ.

Within the CRZ is the Contamination Reduction Corridor (CRC). In the CRC, materials necessary for field personnel and portable equipment decontamination and certain safety equipment

associated with normal work-related incidents are staged. A separate area at the site facility will be designated for the decontamination of heavy equipment, such as drilling rigs.

Due to the caretaker status of the site (i.e., very limited site activity), it is anticipated that delineation of a CRZ will not be necessary. However, care will be taken by MACTEC personnel to ensure non-essential (i.e., SAEP) workers remain a safe distance from investigation activities, in order to limit the potential for exposure to site contamination and other hazards. If necessary, caution tape will be used to prevent entry to work zones by unauthorized personnel.

3.1.3 Support Zone

The MACTEC field office will be located in Building B-1. The field office will serve as the communications center and source of emergency assistance for operations. A log of all persons entering the work areas at the site will be maintained by the SSHO or his designee in the field office.

Necessary support facilities, including telephone, toilets, and drinking water, will be available in Buildings B-1 and B-12.

3.2 COMMUNICATIONS

Two-way radios and cell phones will be used to facilitate communication between site personnel. SAEP security personnel will provide MACTEC site personnel with a radio upon arrival to the facility each day. When radio communication is not used, the following air horn signals will be employed:

HELP	three short blasts	(. . .)
EVACUATION	three long blasts	(_ _ _)
ALL CLEAR	alternating long and short blasts	(_ . _ .)

These communication protocols will be shared with SAEP security staff.

3.3 OTHER CONTROLS

3.3.1 Illumination

Site operations will cease in time to permit personnel and equipment to exit the work zone and complete necessary decontamination before dusk. Conversely, operations will not be permitted to begin until lighting is adequate.

3.3.2 CONFINED SPACE ENTRY

Confined space entry is not anticipated at this site, and will not be conducted without notification of appropriate SAEP personnel and training of MACTEC employees.

4.0 MONITORING AND RISK REDUCTION

4.1 MONITORING

Monitoring of the work environment will be undertaken to ensure that Immediately Dangerous to Life or Health (IDLH) or other dangerous conditions are identified. At a minimum, this monitoring will include evaluations for hazardous concentrations of airborne contaminants, combustible atmospheres, oxygen-deficient environments, and radioactivity.

4.1.1 Air Sampling

The presence of airborne contaminants will be evaluated through the use of direct-reading instrumentation. Information gathered will be used to ensure the adequacy of the levels of protection being employed in work areas at the site. This information may be used as the basis for upgrading or downgrading levels of protection at the discretion of the SSHO. Table 4-1 presents the action levels for air monitoring activities. The following paragraphs provide information on the equipment that will be used to perform air monitoring during field investigations:

- HNU IS101 Thermo Environmental 580B and Photovac TIP Photoionization Detector (PID). The PID operates on the basis of ionization of the contaminant(s) that result in a meter deflection proportional to the concentration of the contaminant(s). In the PID, ionization is caused by an ultraviolet (UV) light source. The strength of the UV (measured in electron volts [eV]) determines which contaminants can be ionized. The HNU can use different strength UV sources including 10.0, 10.2 and 11.7 eV. The TIP operates using a UV light source of 10.6 eV. Calibration and maintenance will be performed in accordance with the manufacturer's instructions. Calibration is typically conducted using a gas standard which is equivalent to benzene. The 10.2 or 10.6 eV PID will be used during field work at the site.

- Detector Tubes (MSA and Drager). A colorimetric detector tube is a direct-reading instrument that consists of a glass tube impregnated with an indicating chemical that is connected to a piston cylinder or bellows-type pump. A known volume of air is drawn through the glass tube. The contaminant in the air reacts with the indicator chemical producing a stain. The length of the stain is proportional to the contaminant's concentration. Care must be taken when using the detector tubes because reliability of the results depends on proper calibration, the degree of stability of the reacting chemical and the ambient temperature. Interfering gases or vapors can also positively or negatively affect measured results. Calibration and maintenance will be performed in accordance with the manufacturer's instructions.

- ISC MX-241 Dual Detector. This meter monitors for combustible gases and oxygen. It can be used to determine (1) if an area contains concentrations of combustible gases with readings in percentage of the lower explosive limit (LEL), and (2) the percentage of oxygen. This equipment will be calibrated in accordance with the manufacturer's instructions. This instrument also is calibrated to methane and monitors combustible gases as a percentage of the lower explosive limit.

4.1.2 Personal Monitoring

Personal monitoring will be used to characterize the personal exposure of high risk employees to the hazardous substances they may encounter on-site. Personal monitoring will include PID monitoring of the breathing zone during field operations and participation of field personnel in MACTECs radiation monitoring program. Additional personal monitoring is not anticipated to be required.

4.2 GENERAL WORK PRACTICES

Workers will adhere to established safe work practices for their respective specialties (e.g., sampling or laboratory analysis). The need to exercise caution in the performance of specific work tasks is made more acute due to: (1) weather conditions; (2) restricted mobility and reduced peripheral vision caused by the protective gear itself; (3) the need to maintain the integrity of the protective gear; and (4) the increased difficulty in communicating caused by respirators. Work at the site will be conducted according to established protocols and guidelines for the safety and health of all involved. Among the most important of these principles for working at a potentially hazardous waste site are the following:

- In any unknown situation always assume the worst conditions and plan responses accordingly.

- Use the buddy system. Under no conditions will any person be permitted to enter the Exclusion Zone alone. Establish and maintain communication. In addition to radio communications, it is advisable to develop a set of hand signals in case conditions may impair verbal communications.

- Because no PPE is 100-percent effective, all personnel must minimize contact with excavated or contaminated materials. Work areas, decontamination areas and procedures must be planned accordingly. Do not place equipment on drums. Do not sit on drums or other materials. Avoid standing in or walking through puddles or stained soil.

- Smoking, eating or drinking in the work zones, including the Exclusion Zone and the CRZ, will not be allowed. Oral ingestion of contaminants is the second most likely means of introducing contaminated substances into the body (inhalation is the first).

- Manage heat and other work stresses related to wearing protective gear. Work breaks should be planned to prevent stress-related accidents or fatigue.

- In the unlikely event that containers of unknown origin are encountered during field work activities, every effort should be made to identify the contents of containers found at the Site before they are subject to material handling applications. Handling of contaminated materials should be done remotely to the extent feasible, particularly when drummed or other containerized waste materials are found on the site.

- Personnel must be cognizant of not only their own immediate surroundings, but also those of others. A team effort is required to notice and warn of impending dangerous situations. Extra precautions are necessary when working near heavy equipment and while utilizing personal protective gear because vision, hearing and communication can be restricted.

- Contingency planning and dissemination of plans to all personnel minimizes the impact of rapidly changing safety protocols in response to changing site conditions.

- Personnel must be aware that COCs may mimic or enhance symptoms of other illnesses or intoxication. Avoid working while ill during field investigation assignments.

- The SSHO and sampling personnel will maintain project records in a bound notebook (e.g., daily activities, meetings, incidents and data). Notebooks will remain on the Site for the duration of the project so that replacement personnel may add information; thereby maintaining continuity. These notebooks and daily records will become part of the permanent project file.

4.3 PERSONAL PROTECTIVE EQUIPMENT

The initial level of PPE selected for the site is modified Level D (see Section 2.4). Specific PPE for different levels of protection are presented in the following subsections. Refer to Appendices E and O for further information.

The following descriptions provide the basic composition of the generally recognized protective ensembles to be used for site operations. Specific components for any level of protection will be selected based on hazard assessment; additional elements will be added as necessary. Disposable protective clothing, gloves and other equipment (exclusive of respirators) should be used when feasible to minimize risks during decontamination and possible cross-contamination during sample handling.

Level A protection provides the highest level of protection for skin, eyes, and the respiratory system. It is appropriate for conditions where there are potential or actual high concentrations of atmospheric vapors, gases, or particulates. Level A is used primarily for emergency situations or when an IDLH situation exists. The fully encapsulating suit and the pressure-demand self-contained breathing apparatus (SCBA) or hoseline respirator are the key elements in Level A PPE.

Level B protection should be used when the type and atmospheric concentration of substances have been identified and require a high level of respiratory protection; however, the atmospheric contaminant, splashing liquid, or other direct contact will not adversely affect or be absorbed through any exposed skin. Level B has the same respiratory protection criteria as Level A; however, dermal exposure is not as severe.

Level C protection should be used when the atmospheric contaminant, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin. In addition, the oxygen levels must be such that a respirator can be used. Level C has the same splash protection as Level B; however, cartridge respirators are used instead of SCBAs.

Level D should only be used when the atmosphere contains no known hazard, all potential airborne contaminants can be monitored for, and work functions preclude splash, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemical. Protection includes coveralls, safety boots, and hard hats, and may include gloves and safety glasses at times. The atmosphere must contain at least 19.5 percent oxygen.

Modified Level D is essentially Level C PPE, but without the use of respiratory protection.

4.4 ENGINEERING CONTROLS

Work at the site includes the installation of monitoring points inside facility buildings using equipment operated with a combustible engine. Therefore, the potential exists for elevated levels of carbon monoxide in the atmosphere as well as an oxygen-deficient atmosphere. Additionally, the COCs at the site include high-concentrations of VOCs.

If air monitoring indicates a reduction in the oxygen concentration, an explosive environment, or consistent elevated reading on a PID, field personnel will stop work, withdraw from the work zone, and employ engineering controls, as necessary. Engineering controls may consist of the use of industrial-sized fans to blow hazardous vapors from the breathing zone when exposure is from a point source and a power source is available.

5.0 DECONTAMINATION AND DISPOSAL

All personnel and/or equipment leaving the site work areas are subject to decontamination to prevent the off-site transportation of site-related contaminants. Refer to Appendix L for further information.

5.1 HEAVY EQUIPMENT DECONTAMINATION

Drilling rigs and direct-push equipment will be cleaned with high-pressure water or steam at a pre-determined site location. Loose material will be removed with a brush. The person performing this activity will be provided the level of protection utilized by the personnel who operated the subject equipment.

A decontamination pad will be set up to allow collection and storage of contaminated decontamination fluids in Department of Transportation (DOT) approved 55-gallon drums. Containerized materials will be characterized and handled as investigation derived waste.

5.2 COLLECTION AND DISPOSAL OF CONTAMINATED MATERIALS

All protective gear, decontamination fluids (for both personnel and small equipment) and other disposable materials will be collected, properly containerized and stored at a designated site location. Decontamination fluids will be collected into DOT approved 55-gallon drums and stored at the designated site location. Disposable materials (e.g., gloves and Tyveks) will be collected into plastic trash bags and stored "as is" or placed into appropriate containers and stored at the designated site location. Materials and fluids will be disposed of pursuant to and in accordance with the Waste Management Plan detailed in the Work Plan (ACSIM, 2004).

6.0 EMERGENCY/CONTINGENCY PLAN

Most sections of this SSHP provide information that would be used under emergency conditions. General emergency planning information is addressed in Appendix M. The following subsections present site-specific emergency/contingency planning information.

6.1 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

The SSHO or the Health and Safety designee is the primary authority for directing operations at the site under emergency conditions. All communications both on- and off-site will be directed through the SSHO or designee. In an emergency situation, SAEP security (telephone 203-385-6653) should be contacted via a two-way radio or cell phone. Security personnel will call 911.

6.2 EVACUATION

Evidence gathered during prior investigations indicates that conditions requiring evacuation of the work areas on the site would be rare and that conditions requiring evacuation of the site are not expected to occur. However, intrusive site investigation activities in areas which contain buried utilities have the potential for creating situations requiring site evacuation. All emergency response at the site will be coordinated through SAEP security (telephone 203-385-6653) via a two-way radio or a cell phone.

6.2.1 Work Area Evacuation

When conditions warrant work area evacuation, workers will proceed out of the work area and notify SAEP security (telephone 203-385-6653) via two-way radio or via cell phone, the SSHO and the field office of the changing site conditions. Respirators will be obtained if circumstances warrant. The work crew will proceed to the field office to assess the situation. If instrumentation indicates an acceptable condition, respirators may be removed. As more information is received from the field crew, it will be relayed to the appropriate personnel. The advisability and type of further response action will be coordinated and carried out by the SSHO. In the event that work area evacuation becomes necessary, the work crew will immediately monitor the work area perimeter to ensure that other site personnel will not be adversely affected.

6.2.2 Evacuation of Surrounding Area

When the SSHO determines that conditions warrant site evacuation, he or she will notify SAEP security (telephone 203-385-6653) and provide assistance in notifying local agencies and requesting assistance. In the event of facility evacuation, personnel will exit facility buildings through the nearest exterior exit to the West Parking Lot. MACTEC field personnel will have access to a golf cart for rapid transport to the main facility entrance. Since personnel will be working in several different buildings and areas of the facility, evacuation routes and gathering points shall be discussed at safety meetings.

6.3 EMERGENCY MEDICAL TREATMENT/FIRST AID

Any personnel injured on-site will be rendered first aid as appropriate and transported to competent medical facilities for further examination and/or treatment. The preferred method of transport would be through professional emergency transportation means; however, when this is not readily available or would result in excessive delay, other transport will be authorized. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

When an injury occurs in a work area, provisions for decontamination of the victim will be made. Life-threatening conditions may preclude normal decontamination procedures. Arrangements will be made with the medical facility and transporter in advance to provide for the situation previously described.

All accidents will be reported initially to the MACTEC SSHO and RSHM, and SAEP security (telephone 203-385-5563) via two-way radio or cell phone. Accidents involving first-aid only will require a written report only. Injuries involving hospitalization or treatment beyond first aid will be reported to the RSHM by telephone followed up by the accident report. All OSHA recordable accidents will be recorded by the RSHM on the OSHA 300 Form for the office out of which the associate is based.

7.0 ADMINISTRATION

7.1 AUTHORIZED PERSONNEL

Personnel authorized to participate in Exclusion Zone activities at this site have been reviewed and certified for site operations by the Project Manager and the RSHM. Certification involves the completion of appropriate training, a medical examination, and a review of this SSHP. In addition, all MACTEC personnel working on-site must attend a safety briefing with the current facility caretaker prior to initiating any field activities. All persons entering the site must use the buddy system, and check in with the Site Manager and/or SSHO before entering the Exclusion Zone.

Certified MACTEC Team Personnel:

Thomas Longley* _____

Michael Lounsbury*+ _____

Ryan Belcher*+ _____

Bradley Laforest _____

Wolfgang Calicchio _____

Jerry Rawcliffe*+ _____

Other Certified Personnel:

Rod Pendleton _____

Nelson Walter _____

* FIRST-AID-TRAINED
\+ CPR-TRAINED

7.2 SSHP APPROVALS

By their signatures, the undersigned certify that this SSHP will be used for the protection of the health and safety of all persons entering this site. Signatures also serve as certification of completion of the Hazard Assessments as required by 29 CFR 1910.132.

MACTEC Regional Safety and Health Manager Cindy Sundquist	Date
MACTEC Project Manager Nelson Walter	Date
MACTEC Site Safety and Health Officer TBD	Date

7.3 FIELD TEAM REVIEW

Each member of the Field Team shall read and review the SSHP, and shall sign a statement confirming they have done so and agreeing to comply with the SSHP. An example statement is provided below.

I have read and reviewed the health and safety information in the SSHP. I understand the information and will comply with the requirements of the SSHP.

Name:

Date:

Site/Project: SAEP / Remedial Investigations 2003/2004

7.4 MEDICAL DATA SHEET

A Medical Data Sheet such as that provided below will be completed by all personnel working on the site and will be kept in the field office during site operations. It is not a substitute for the Medical Surveillance Program requirements consistent with the MACTEC Health and Safety Program for Hazardous Waste Sites. This data sheet will accompany any personnel when medical assistance or transport to hospital facilities is required. If more information is required, the back of the sheet may be used.

Project: _____

Name: _____

Address: _____

Home Phone: (_____) _____

DOB: _____ Height: _____ Weight: _____

In case of emergency contact:
Name: _____

Address: _____

Telephone: (_____) _____

Do you wear contacts? ( ) Yes ( ) No

Allergies: _____

List medication taken regularly: _____

Particular sensitivities: _____

Previous/recent illnesses or exposures to hazardous chemicals:

_____

Name of Personal Physician: _____

Telephone: (_____) _____

7.5 EMERGENCY TELEPHONE NUMBERS

SAEP Security	(203) 385-6653
Police Department	SAEP Site Security will call 911
Rescue Service	SAEP Site Security will call 911
Primary Hospital: Bridgeport, CT	(203) 384-3000
Fire Department	SAEP Site Security will call 911
Off-site Emergency Services	SAEP Site Security will call 911
Poison Control Center	(800) 962-1253
Health Resources	(800) 350-4511
National Response Center	(800) 424-8802
Site SSHO:	To Be Determined
BRAC Environmental Coordinator:	(203) 385-4316
Project Manager: N. Walter	(207) 775-5401 x3637 (work) Redacted - Privacy Act (home) (cell)
MACTEC RSHM: C.E. Sundquist	(207) 775-5401 x3309 (work) Redacted - Privacy Act (home) (cell)

7.6 ROUTES TO EMERGENCY MEDICAL FACILITIES

The primary source of medical assistance for the site is:

Bridgeport Hospital

Directions to primary medical assistance:

Follow Main Street north about 1.37 miles to West Broad Street.

Left on West Broad Street about 0.75 mile to Barnum Avenue.

Left on Barnum Avenue about 1.25 miles to Mill Hill Avenue.

Right on Mill Hill Avenue to Bridgeport Hospital on left.

See hospital route map (Figure 7-1) for more detail.

ACSIM	United States Army Assistant Chief of Staff for Installation Management
AFCEE	Air Force Center for Environmental Excellence
BZ	breathing zone
COC	contaminant of concern
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
CTDEP	Connecticut Department of Environmental Protection
DOT	Department of Transportation
DNAPL	dense non-aqueous phase liquid
eV	electron volt
HCS	Hazard Communication Standard
IDLH	immediately dangerous to life or health
IDW	investigation derived waste
LEL	lower explosive limit
LNAPL	light non-aqueous phase liquid
MACTEC	MACTEC Engineering and Consulting, Inc.
MNA	monitored natural attenuation
MSDS	Material Safety Data Sheets
OSHA	Occupational Safety and Health Administration
PPE	personal protection equipment
PID	photo ionization detector
RI	remedial investigation
RSHM	Regional Safety and Health Manager
RSRs	remediation standard regulations
SAEP	Stratford Army Engine Plant
SCBA	self contained breathing apparatus
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TACOM	U.S. Army Tank-Automotive and Armament Command
TLV	threshold limit value

USEPA	United States Environmental Protection Agency
UV	ultraviolet
VOCs	volatile organic compounds

U.S. Army Assistant Chief Of Staff for Installation Management. (ACSIM), 2004. "Sampling and Analysis Plan, Remedial Investigation, Stratford Army Engine Plant, Stratford Connecticut"; prepared by MACTEC Engineering and Consulting, Inc., March 9, 2004.

FIGURES

TABLES

APPENDIX B TRAINING PROGRAM

APPENDIX B - TRAINING PROGRAM

All personnel working on a MACTEC site who potentially may be exposed to toxic substances or hazardous materials will participate in an initial and an annual refresher and/or supervisory training (as appropriate), as well as site-specific training before commencement of the on-site assignment. The initial Health and Safety Training Program consists of the 40-hour training program required and designated by the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120. In addition to the initial training, MACTEC uses 8-hour annual refresher and supervisory training elements, which are augmented by site-specific training regarding site hazards and specialized problems and protocols.

B.1 INITIAL TRAINING

All site-assigned personnel who are potentially exposed to toxic substances or hazardous materials will be required to participate in a training course on hazardous waste site operations. This training is required under provisions of the OSHA standard, and must consist of 40 hours covering the following areas:

- familiarity with the regulations and implications of OSHA regulations in 29 CFR 1910.120;
- familiarity with the organizational structure responsible for site health and safety;
- explanation of the medial surveillance requirements, including recognition of health hazards;
- instruction in the use and maintenance of personal protective equipment;
- identification and analysis of site chemical and physical hazards;
- instruction regarding monitoring equipment, including personnel and environmental sampling instruments;
- site control and decontamination procedures;
- contingency planning; and
- confined-space entry procedures.

B.2 ANNUAL REFRESHER/SUPERVISORY TRAINING

Annually, all personnel required to participate in the initial training will take an 8-hour refresher training course. Those personnel with either site supervisory or health and safety responsibilities will also have an additional 8 hours of training beyond the initial 40 hours. The 8-hour supervisory training meets requirements of the annual refresher.

B.3 SITE-SPECIFIC TRAINING

All personnel assigned to a MACTEC site must participate in the site-specific training presentation, which will cover major elements of the site SSHP, as well as health and safety procedures regarding an individual's specific job responsibilities and tasks. The site SSHO or health and safety designee will provide this training before an individual is permitted to work in a downrange position.

B.4 OTHER TRAINING

Additional training will be provided as determined by the RHSM or the SSHO, and may include additional refreshers on personal protective equipment, instrumentation, CPR, first aid, or any other pertinent health- or safety-related subject.

APPENDIX C MEDICAL SURVEILLANCE PROGRAM

APPENDIX C - MEDICAL SURVEILLANCE PROGRAM

C.1 HEALTH MONITORING PROGRAM

All on-site MACTEC personnel and laboratory staff must be enrolled in the Health Monitoring Program, which is implemented through Health Resources, a company consisting of a team of physicians and support personnel who specialize in occupational medicine. The health monitoring program consists of an initial medical examination to establish the employee's general health profile, which provides important baseline laboratory data for later comparative study and annual examinations. The contents of the initial comprehensive physical examination and laboratory testing routine are listed in Table C-1. Follow-up examinations are completed annually for all personnel enrolled in the health monitoring program, or more frequently if project assignments warrant testing following specific field activities.

C.2 REVIEW OF EXPOSURE SYMPTOMS

Symptoms of exposure to hazardous materials will be reviewed for each site to indicate to personnel the recognized signs of possible exposure to those materials. This information will be supplemented with a discussion of the need for objectivity in the personal health assessment to account for normal reaction to stressful situations. The SSHO will watch for outward evidence of changes in worker health. Symptoms may include skin irritations, skin discoloration, eye irritation, muscular soreness, fatigue, nervousness or irritability, intolerance to heat or cold, or loss of appetite. Employees will routinely be asked to assess their general state of health during the project. Special medical monitoring may be identified for certain sites.

TABLE C-1
BASELINE HEALTH MONITORING PROGRAM

PHYSICAL EXAMINATION

medical history
medical examination
vision: -near/distant
- color
audiometry
chest x-ray
spirometry
electrocardiogram

LABORATORY ANALYSIS

Complete Blood Counts and Chemistries

white blood count
differential cell counts
methemoglobin
uric acid
lactic dehydrogenase
alkaline phosphatase
calcium
phosphorus
cholesterol
urea nitrogen
glucose
albumin
globulin
total protein
total bilirubin
serum glutamic oxalacetic transaminase
hemoglobin and/or hematocrit

Urine Analysis

color and character
specific gravity
pH
protein
acetone
glucose
microscopic examination

APPENDIX E PERSONAL PROTECTIVE EQUIPMENT

APPENDIX E - PERSONAL PROTECTIVE EQUIPMENT

E.1 PERSONAL PROTECTION LEVEL DETERMINATION

The level of personal protective equipment required will be determined by the type and levels of waste or spill material present at the site where project personnel may be exposed. In situations where the types of waste or spill material on-site are unknown, the hazards are not clearly established, or the situation changes during on-site activities, the SSHO must make a reasonable determination of the level of protection that will ensure the safety of investigators and response personnel until potential hazards have been determined through monitoring, sampling, informational assessment, laboratory analyses, or other reliable methods. Once the hazards have been determined, protective levels commensurate with the hazards will be used. Protection requirements will be evaluated on a continuous basis to reflect new information as it is acquired.

E.2 LEVELS OF PROTECTION

The following subsections describe the basic composition of the generally recognized protective ensembles to be used for site operations. Specific components for any level of protection will be selected based on hazard assessment; additional elements will be added as necessary. Disposable protective clothing, gloves, and other equipment, exclusive of respirators, should be used when feasible to minimize risks during decontamination and possible cross-contamination during sample handling.

E.2.1 Level A

Level A protection provides the highest level of protection for skin, eyes, and the respiratory system. It is appropriate for conditions where there are potential or actual high concentrations of atmospheric vapors, gases, or particulates. Level A should be used if site operations or work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to the skin or capable of being absorbed through the intact skin. Level A is used primarily for emergency situations or when the following conditions exist: (1) vapors or mists of strong acids; (2) known or probable immediately dangerous to life and health (IDLH) atmospheres with dermally active compounds; (3) high atmospheric concentrations of compounds that can be absorbed through the skin; and (4) operations that must be conducted in a confined, poorly ventilated area, where conditions requiring Level A have not yet been eliminated. The fully encapsulating suit and the pressure-demand self-contained breathing apparatus (SCBA) or hoseline respirator are the key elements in Level A personal protective equipment (PPE).

Level A equipment includes the following items:

- SCBA (pressure demand) OR supplied air respirator (pressure demand with escape mask)
- total encapsulating suit
- coveralls (optional)
- long underwear

- gloves (outer, chemical-resistant)
- gloves (inner, chemical-resistant)
- boots (chemical-resistant, steel-toed, steel shank)
- hardhat (optional)
- disposable protective suit, gloves, and boots (to be worn over or under encapsulating suit)
- two-way radios

E.2.2 Level B

Level B protection should be used when the type and atmospheric concentration of substances have been identified and require a high level of respiratory protection; however, the atmospheric contaminant, splashing liquid, or other direct contact will not adversely affect or be absorbed through any exposed skin. This includes atmospheres with IDLH concentrations of specific substances that do not (1) represent a severe skin hazard, or (2) meet the criteria for use of air-purifying respirators. Level B has the same respiratory protection criteria as Level A; however, dermal exposure is not as severe.

Level B equipment includes the following items:

- SCBA (pressure demand) OR supplied air respirator (pressure demand with escape SCBA)
- hooded chemical-resistant clothing (coated Tyvek)
- coveralls (optional)
- gloves (outer, chemical-resistant)
- gloves (inner, chemical-resistant)
- boots (chemical-resistant, steel-toed, steel shank)
- boot covers (chemical-resistant) (optional)
- hardhat (optional)
- two-way radio (to be worn under outside protective clothing)
- face shield (optional)

E.2.3 Level C

Level C protection should be used when the atmospheric contaminant, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin. In addition, the types of air contaminants must have been identified, the concentration measured, and an air-purifying respirator must be available that can remove the contaminants. An air-purifying respirator can only be used if the oxygen content in the air is at least 19.5 percent, the contaminant has adequate warning properties (e.g., odor, taste, and irritating effect thresholds within two times the Threshold Limit Value), the concentration of the contaminant does not exceed the IDLH, and the worker has been fit-tested. Level C has the same splash protection as Level B; however, cartridge respirators are used instead of SCBAs.

Level C equipment includes the following items:

- full-face respirator (cartridge)
- hooded chemical-resistant clothing (coated Tyvek)
- coveralls (optional)
- gloves (inner, chemical-resistant)
- gloves (outer, chemical-resistant)
- boots (chemical-resistant, steel-toed, steel shank)
- boot covers (chemical-resistant) (optional)
- hardhat (optional)
- escape mask (optional)
- two-way radios (worn under outside protective clothing)
- face shield (optional)

E.2.4 Level D

Level D is a work uniform affording minimal protection and is used for nuisance contaminants only. Level D protection should only be used when the atmosphere contains no known hazard, all potential airborne contaminants can be monitored for, and work functions preclude splash, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemical.

Level D equipment includes the following items:

- coveralls
- gloves (optional)
- boots (chemical-resistant, steel-toed, steel shank)
- boot covers (chemical-resistant) (optional)
- safety glasses or chemical splash goggles (optional)
- hardhat (optional)
- escape mask (optional)
- face shield (optional)

APPENDIX F BIOLOGICAL HAZARDS

APPENDIX F - BIOLOGICAL HAZARDS

F.1 POISONOUS INSECTS, SNAKES AND PLANTS

Workers may encounter poisonous insects, snakes and plants while working in the field. Stings from ants, bees, wasps, hornets, and yellow jackets usually cause localized pain. They may on occasion cause death. Death is usually due to the worker experiencing an acute allergic reaction to the poisons in the sting.

Workers may encounter ticks while working at the site. Ticks can transmit germs of several diseases including Rocky Mountain Spotted fever and Lyme disease. Ticks adhere tenaciously to the skin or scalp and evidence shows that the longer an infected tick remains attached the greater is the chance that it will transmit disease (it usually has to be attached 24 hours to transmit Lyme disease).

Workers may encounter mosquitoes while working at the site. West Nile virus is spread by the bite of an infected mosquito and can infect people, horses, many types of birds and some other animals. Human illness from West Nile virus is rare even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. You can further reduce your chances of becoming ill by protecting yourself from mosquito bites by wearing long-sleeved clothes and long pants.

Spiders in the US are generally harmless with two notable exceptions: the black widow spider and the brown recluse or violin spider. There is a potential for workers to encounter Black Widow/Recluse spiders at the Site. Equipment, clothing, brush, etc., should be checked for spiders prior to handling them.

In the US there are many types of poisonous snakes. Pit vipers (such as rattlesnakes, copperheads and water moccasins) typically have elliptical pupils and a pit between the eye and nostril on each side of the head. There is a potential for workers to encounter copperheads and rattlesnakes at the Site. The venom of the pit vipers affects the circulatory system. Non-poisonous snakes typically have round pupils and no fangs or pits.

Poisonous plants in the eastern US include poison ivy and poison sumac. Poison ivy is a small plant vine or a shrub with leaves consisting of three glossy leaflets. Poison sumac grows as a woody shrub or small tree from 5 to 25 feet tall. If contact with poison ivy or poison sumac is suspected, remove contaminated clothing and wash all exposed areas thoroughly with soap and water. Workers may potentially encounter Poison Ivy/Poison Sumac while working at the site.

Precautions will be taken to avoid poisonous insects, snakes and plants if at all possible. If working in an area known to contain poisonous plants workers will be instructed on how to identify the local variety. If the plants cannot be avoided, modified Level D PPE (uncoated white Tyveks are acceptable if no chemical contamination is present) will be used. Workers will

be instructed to wash exposed skin with soap and water as soon as possible after work is completed, and/or during breaks.

If working in areas with poisonous insects or snakes, workers will wear at least ankle high or calf high, rubber or leather boots, Tyveks or long sleeved shirts buttoned at the wrist, and long pants tucked into socks or boots. In addition insect repellent such as DEET should also be used for the insects.

In addition to poisonous plants, insects and snakes, workers may encounter warm blooded animals such as dogs, cats, raccoons, etc. that can transmit rabies and/or Hantavirus.

F.2 RABIES

Rabies is a disease that is transmitted to man through the bite of rabid domestic or wild animals. Exposure can also occur through contact with the saliva of an infected animal should it encounter broken skin or the eyes nose or mouth. In the US, the principal carrier which presents a threat to man consists of the skunk, the fox, the bat and the raccoon. Rabies is caused by a virus that requires an incubation period from a few weeks to several months. Prevention of the disease is through avoidance of animal bites and caves containing infected bats. Workers will avoid contact with wild life if at all possible. If a person is attacked and bitten by a wild animal that is suspected to be rabid, the individual will seek medical attention immediately. If it can be done safely, the animal in question will be collected and sent to the health department to determine if it is actually infected.

F.3 HANTAVIRUS

Hantavirus is a viral disease that is transmitted to man from exposure to rodents. Hantavirus does not cause illness in their carrier host. Infected rodents shed the virus in their saliva, urine and feces. Human infection may occur when infected saliva or excreta are inhaled as aerosols produced directly from the animal after only a few minutes of exposure to the animal. Transmission may also occur when dried material contaminated by rodent excreta is disturbed and directly introduced into broken skin, the eyes or possibly ingested in contaminated food or water. Workers in potentially high-risk settings should avoid contact with rodents and rodent burrows or disturbing dens. Workers should wear chemical protective gloves if there is a potential for contact with nesting material or excreta. Workers should wear SCBA when working in areas of the Site posted as areas impacted with rodent saliva, urine and feces. Gloves should be washed and disinfected before their removal. Wash hands and face with soap and water. Do not use cabins or enclosed shelters that are rodent infected. After working in such an area workers should monitor their health for 45 days after last possible exposure. If a temperature or respiratory illness occurs within that time frame, they should seek medical attention immediately and inform the attending physician of potential exposure.

F.4 LYME DISEASE

F.4.1 What Is Lyme Disease

Lyme disease is an illness caused by a corkscrew-shaped bacteria called a spirochete that is transmitted to humans, dogs, horses and other animals by the bite of an infected deer tick (ixodes dammini). While rarely life-threatening, if not treated, Lyme disease may lead to arthritis neurological or cardiac problems and possibly birth defects

F.4.2 Where Is Lyme Disease Found

Transmission of Lyme disease has been documented in many parts of the world, including the US. While sporadic cases have been reported in many states, the disease does tend to occur largely in specific geographic areas. There are three such areas in the US: 1) Wooded coastal portions of New York, Pennsylvania, New Jersey and New England; 2) Wisconsin and Minnesota; and 3) Wooded and coastal areas of Northern California and Southwest Oregon. It was first recognized in the U.S. in 1975 as the result of an investigation of a group of children with arthritis in Lyme, Connecticut.

F.4.3 How Is Lyme Disease Transmitted

The bacteria that cause Lyme disease are acquired by juvenile deer ticks (larvae) through feeding on an infected animal usually a mouse. At a subsequent stage in development (nymph), the ticks cling to vegetation in brushy wooded or grassy areas and transfer by direct contact to the skin of passing animals and humans. The bite of the infected tick can then transmit the bacteria to the new host. ***This transmission of the infectious organism appears to require that the tick be attached for at least 24 hours.***

The immature deer tick is very small, and when attached to the skin may not be immediately noticeable. During its complex two-year life cycle, the tick can infect a variety of hosts including white-footed mice deer and other wild and domestic animals as well as humans. Lyme disease is most commonly acquired in the summer months (June and July are peak) less often in early spring or late fall and only rarely during the winter.

It is important to note that not all ticks carry Lyme disease. The common dog tick for example does not transmit the infection. Even a deer tick bite does not necessarily mean that disease will follow because not all members of the species are infected. ***Prompt removal of a tick will greatly decrease the risk of disease transmission.***

F.4.4 What Are The Symptoms Of Lyme Disease

Early Symptoms: The first symptom of Lyme disease is usually but not always, a skin rash called Erthema Migranes (EM). While the tick may have gone undetected, the rash occurs at the site of the bite. It begins as a small red area 3 to 32 days after the bite, then gradually enlarges often with partial clearing at the center so that it resembles a doughnut. The expanding ring may exceed 6 inches in diameter and the individual may experience a burning rather than an itching

sensation at the site of the rash. Subsequent rings may appear inside the original ring so that the rash resembles a bulls-eye.

The rash may be accompanied by flu-like symptoms such as fever (100°-103°F) headache stiff neck sore and aching muscles and joints nausea and vomiting fatigue sore throat and swollen glands. There may be multiple rashes in other areas of the body that develop after the rash that occurs at the site of the bite. These symptoms may disappear over a period of weeks. However, the rash may reoccur in about 50% of untreated people and more serious problems may develop later. Treatment with appropriate antibiotics clears up the rash within days and may prevent complications.

Late Symptoms: Three major organ systems (the joints nervous system and heart) can be affected weeks to months after the initial tick bite although symptoms usually appear within four to six weeks. A large number of people with Lyme disease may develop symptoms during later stages without having had the early skin rash.

Arthritis in the large joints (primarily the knee elbow and wrist) occurs in more than 50% of untreated persons. The arthritis may move from joint to joint and can become chronic. Nervous system complications occur in 10% to 20% of infected persons. These complications may include: Bell's Palsy (facial muscles droop); pain and weakness usually in the shoulder and upper arms; and poor concentration depression seizures and temporary paralysis (resembling Cuillian-Barre disease. Heart symptoms occur in 6% to 10% of infected persons (slowing of heart rate irregular heart beat shortness of breath chest pains). Electrical conduction in the heart may be affected and the heart muscle may become inflamed. Treatment with intravenous antibiotics can be helpful.

F.4.5 How Is Lyme Disease Diagnosed

The only positive proof of disease is culturing the bacteria from the tissue in the vicinity of the bite. Most often diagnosis is based primarily on recognition of the typical symptoms of Lyme disease, especially the characteristic early rash and on the history of possible tick exposure such as outdoor activity in a high-risk area. Atypical cases or cases with only later stage complications can be difficult to diagnose. Lyme disease titer testing has become commercially available; however, this test is high in sensitivity but lacks specificity. As a result, the incidence of false positives is extremely high. There are may cross reactions of the test with other bacteria. Because of this the Center for Disease Control (CDC) does not recommend the procedure for general patient screening. The CDC's recommendation is that the Lyme titer be reserved for patients whose symptoms suggest Lyme disease. In that circumstance an acute serum should be collected and three weeks later a convalescent serum should be collected. Because of variability in the testing both samples should be done together at the laboratory in the same batch of specimens.

F.4.6 What Is The Treatment For Lyme Disease

Oral antibiotic treatment is beneficial early in the illness. Two commonly used medications in the setting are Tetracycline and Amoxicillin, although other antibiotics may be substituted. Prompt treatment of early Lyme disease may prevent later and more serious complications. Treatment of joint and nervous system complications are often accomplished with antibiotics given intravenously or by injection.

F.4.7 How Can Lyme Disease Be Prevented

The only known way to get Lyme disease is from the bite of an infected tick. Knowing where these ticks are found, avoiding such areas, and promptly removing the tick are the primary preventative measures. Persons living in or visiting high-risk areas should take the following precautions:

- Don't walk bare-legged in woods brush or tall grass where ticks may be found.

- If you do need to walk in such areas, wear a long-sleeved shirt long pants high socks (with pants tucked into socks) and closed shoes or boots. Light colors will help you spot ticks on clothing.

- Apply a commercial tick repellent on clothing shoes and socks after reading label instructions carefully. Avoid applying high concentration products to the skin particularly to children.

- Conduct daily "tick checks" on yourself , your children, companions and on pets when you get in from the field. Shower if possible. The ticks are often found on the thigh, flank, arms, underarms and legs and may be very small. Prompt removal of the tick will prevent infection.

- To remove an embedded tick use tweezers to grip its body as close to the skin as possible and pull gently but firmly until the tick lets go. If tweezers are unavailable grasp the tick with a piece of tissue. Do not handle the tick with bare hands. Do not squeeze the tick. Apply antiseptic. Common tick removal methods such as scorching with a match, using petroleum jelly or nail polish are not recommended because they may cause the tick to inject the spirochetes (that cause the disease) into your body.

- Know the symptoms of Lyme disease. If you have been in an area where ticks are found and you develop such symptoms particularly the skin rash and/or "flu" symptoms see a physician promptly for evaluation and treatment.

F.4.8 What Should You Do If You Find A Tick On You While At A MACTEC Site

If you find a tick on you and it has been on you less than 24 hours you probably did not get infected and remember it is only the deer tick (or the Black Legged tick in the western United States) that carries the disease. The dog tick (larger than the deer tick) has not been implicated.

If you were bitten by a deer tick and you either develop symptoms or are very concerned about being infected, go see a doctor and follow his/her recommendations. Fill out an accident report and turn it in to Cindy Sundquist (Portland) or your local Workers Compensation (WC) administrator. The claim and all bills should be submitted to your local WC insurance carrier. If for some reason the claim gets denied contact Cindy Sundquist Portland ext. 3309.

F.5 West Nile Virus

F.5.1 Who is at risk for getting West Nile virus?

All residents of or employees working in areas where virus activity has been identified are at risk of getting West Nile virus; persons over 50 years of age have the highest risk of severe disease.

F.5.2 Is the disease seasonal in its occurrence?

In the temperate zone of the world (i.e., between latitudes 23.5° and 66.5° north and south), West Nile encephalitis cases occur primarily in the late summer or early fall. In the southern climates where temperatures are milder, West Nile virus can be transmitted year round.

F.5.3 What are the symptoms of West Nile virus infection?

Most people who are infected with the West Nile virus (WNV)will not have any type of illness. It is estimated that 20% of the people who become infected will develop West Nile fever: mild symptoms, including fever, headache, and body aches, occasionally with a skin rash on the trunk of the body and swollen lymph glands.

When someone is infected with WNV they will typically have one of three outcomes: No symptoms (most likely), West Nile Fever (WNF in about 20% of people) or severe West Nile disease, such as meningitis or encephalitis (less than 1% of those who get infected).

The symptoms of severe infection (West Nile encephalitis or meningitis) include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that 1 in 150 persons infected with the West Nile virus will develop a more severe form of disease. If you develop a high fever with severe headache, consult your health care provider.

F.5.4 What is the incubation period in humans (i.e., time from infection to onset of disease symptoms) for West Nile encephalitis?

Usually 3 to 14 days.

F.5.5 How long do symptoms last?

Symptoms of mild disease will generally last a few days. Symptoms of severe disease may last several weeks, although neurological effects may be permanent.

F.5.6 What can I do to reduce my risk of becoming infected with West Nile virus?

Protect yourself from mosquito bites:

- Apply insect repellent sparingly to exposed skin. The more DEET a repellent contains the longer time it can protect you from mosquito bites. A higher percentage of DEET in a repellent does not mean that your protection is better—just that it will last longer. DEET concentrations higher than 50% do not increase the length of protection. Choose a repellent that provides protection for the amount of time that you will be outdoors.
- Spray clothing with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing. Do not apply repellents containing permethrin directly to exposed skin. If you spray your clothing, there is no need to spray repellent containing DEET on the skin under your clothing.
- When possible, wear long-sleeved shirts and long pants whenever you are outdoors.
- Consider staying indoors at dawn, dusk, and in the early evening, which are peak mosquito biting times.

Note: Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

F.5.7 Is there a vaccine against West Nile encephalitis?

No, but several companies are working towards developing a vaccine.

F.5.8 How do people get infected with West Nile virus (WNV)?

The main route of human infection with West Nile virus is through the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds, which may circulate the virus in their blood for a few days. The virus eventually gets into the mosquito's salivary glands. During later blood meals (when mosquitoes bite), the virus may be injected into humans and animals, where it can multiply and possibly cause illness.

F.5.9 If I live in an area where birds or mosquitoes with West Nile virus have been reported and a mosquito bites me, am I likely to get sick?

Even in areas where the virus is circulating, very few mosquitoes are infected with the virus. Even if the mosquito is infected, less than 1% of people who get bitten and become infected will get severely ill. The chances you will become severely ill from any one mosquito bite are extremely small.

F.5.10 If a person contracts West Nile virus, does that person develop a natural immunity to future infection by the virus?

It is assumed that immunity will be lifelong; however, it may wane in later years.

F.5.11 Is the disease seasonal in its occurrence?

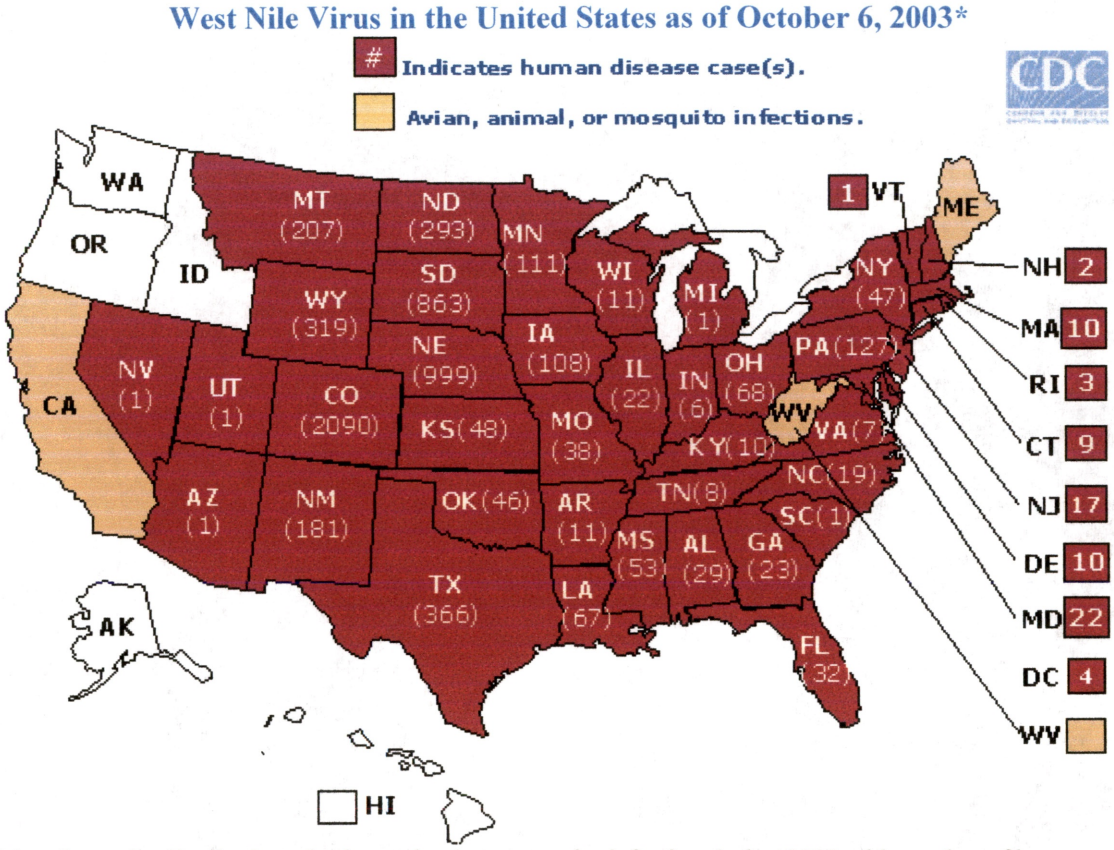
In the temperate zone of the world (i.e., between latitudes 23.5° and 66.5° north and south), West Nile encephalitis cases occur primarily in the late summer or early fall. In the southern climates where temperatures are milder, West Nile virus can be transmitted year round.

F.5.12 I think I have symptoms of West Nile virus. What should I do?

Contact your health care provider if you have concerns about your health. If you develop symptoms such as high fever, confusion, muscle weakness, and severe headaches, you should see your doctor immediately. Contact your Local Health and Safety Representative should it be determined that you have a confirmed case of West Nile virus that you feel is work related.

F.5.13 How do health care providers test for West Nile virus?

Your physician will first take a medical history to assess your risk for West Nile virus. People who live in or traveled to areas where West Nile virus activity has been identified are at risk of getting West Nile encephalitis; persons older than 50 years of age have the highest risk of severe disease. If you are determined to be at high risk and have symptoms of West Nile encephalitis, your provider will draw a blood sample and send it to a commercial or public health laboratory for confirmation.



*Map shows the distribution of avian, animal, or mosquito infection during 2003 with number of human cases if any, by state. If West Nile virus infection is reported to CDC Arbonet in any area of a state, that entire state is shaded accordingly.

F.5.14 How is West Nile encephalitis treated?

There is no specific treatment for West Nile virus infection. In more severe cases, intensive supportive therapy is indicated, often involving hospitalization, intravenous fluids, airway management, respiratory support (ventilator), prevention of secondary infections (pneumonia, urinary tract, etc.), and good nursing care.

APPENDIX K TEMPERATURE EXTREMES

APPENDIX K - TEMPERATURE EXTREMES

K.1 HEAT STRESS

Due to the increase in ambient air temperatures and the effects of protective outer wear decreasing body ventilation, there is increased potential for injury, specifically heat casualties. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim, and the prevention of heat stress casualties.

K.1.1 Identification and Treatment

K.1.1.1 Heat Exhaustion.

Symptoms. Heat exhaustion usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, the skin is clammy, and he or she may perspire profusely. The pulse is weak and fast; breathing is shallow. The victim may faint unless he or she lies down. This may pass; however, sometimes it persists and, while heat exhaustion is generally not considered life threatening, death could occur.

First Aid. Immediately remove the victim to the CRZ in a shady or cool area with good air circulation. Remove all protective outer wear. Call a physician. Treat the victim for shock (i.e., have the victim lie down, raise the feet 6 to 12 inches, and maintain body temperature but loosen all clothing). If the victim is conscious, it may be helpful to give sips of water. Transport the victim to a medical facility.

K.1.1.2 Heat Stroke.

Symptoms. This is the most serious of heat casualties because the body excessively overheats. Body temperatures often are between 107 and 110°F. The victim will have a red face and will not be sweating. First there is often pain in the head, dizziness, nausea, oppression, and dryness of the skin and mouth. Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly. Heat stroke is always serious.

First Aid. Immediately evacuate the victim to a cool and shady area in the CRZ. Remove all protective outer wear and all personal clothing. Lay the victim on his or her back with the head and shoulders slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels or ice bags to the head and groin. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place the victim in a tub of cool water. The main objective is to cool without chilling. Do not give stimulants. Transport the victim to a medical facility as soon as possible.

K.1.2 Prevention of Heat Stress

One of the major causes of heat casualties is the depletion of body fluids and salts through sweating. Fluids should be maintained in the Support Zone.

During warm weather, a work schedule will be established that allows most work to be conducted during the morning hours, before ambient air temperature levels reach highs.

A work/rest schedule will be implemented for personnel required to wear Level B or C protection (i.e., an impervious outer garment) with sufficient time allowed for personnel to "cool down" (this may require working in shifts). Two hours is the maximum time between breaks at Level B or C, regardless of temperature.

K.1.3 Heat Stress Monitoring

Monitoring of personnel wearing impervious clothing should commence when the ambient temperature reaches 70°F, with increased frequency if ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 85°F, workers should be monitored for heat stress after every work period. As a screening mechanism of the body's recuperative ability to excess heat, one or more of the following techniques should be used.

1. Measure the heart rate (HR) for 30 seconds, by radial pulse, as early in the resting period as possible. At the beginning of the rest period, the HR should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), with the length of the rest period staying the same. If the pulse rate is still above 110 beats per minute at the beginning of the next rest period, the following work cycle should again be shortened by 33 percent.

2. Measure oral body temperature with a clinical thermometer, as early as possible in the resting period. At the beginning of the rest period, oral temperature (OT) should not exceed 99°F. If OT exceeds 99°F, the next work period should be shortened by 10 minutes (or 33 percent), with the length of the rest period staying the same. If the OT again exceeds 99°F at the beginning of the next period, the following work cycle should be further shortened by 33 percent. OT should also be measured at the end of the rest period to ensure that it has dropped below 99°F.

3. Maintain good hygienic standards by changing clothes frequently, showering daily, and allowing clothing to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

K.2 COLD STRESS

Cold weather may often cause problems for personnel working outside, even at temperatures above freezing. As temperatures drop below freezing, the potential for cold weather injuries increases dramatically, as does the potential for equipment failure. Because of the considerable danger to personnel, outdoor work should be suspended if the ambient temperature drops below 0°F (-18°C) or if the windchill factor drops below -29°F (-34°C). These levels represent guidelines that should be used as an action level unless the SSHO determines and documents otherwise. Table K-1, which shows equivalent temperatures (i.e., windchill) for a range of ambient conditions, should also be referred to. Snow and ice increase the risks to personnel and operations through reduced visibility, increased potential for falling injuries, reduced on-site mobility, and the increased time required to access the site (or off-site support services).

In view of these factors, it is critical that the SSHO establish site-specific safety and operating protocols, and that all on-site personnel be made aware of the risks.

K.2.1 Local Cold Injuries

Local cold injuries affect specific areas of the body (e.g., fingers, ears, or toes), including the more commonly recognized injuries described in the following subsections.

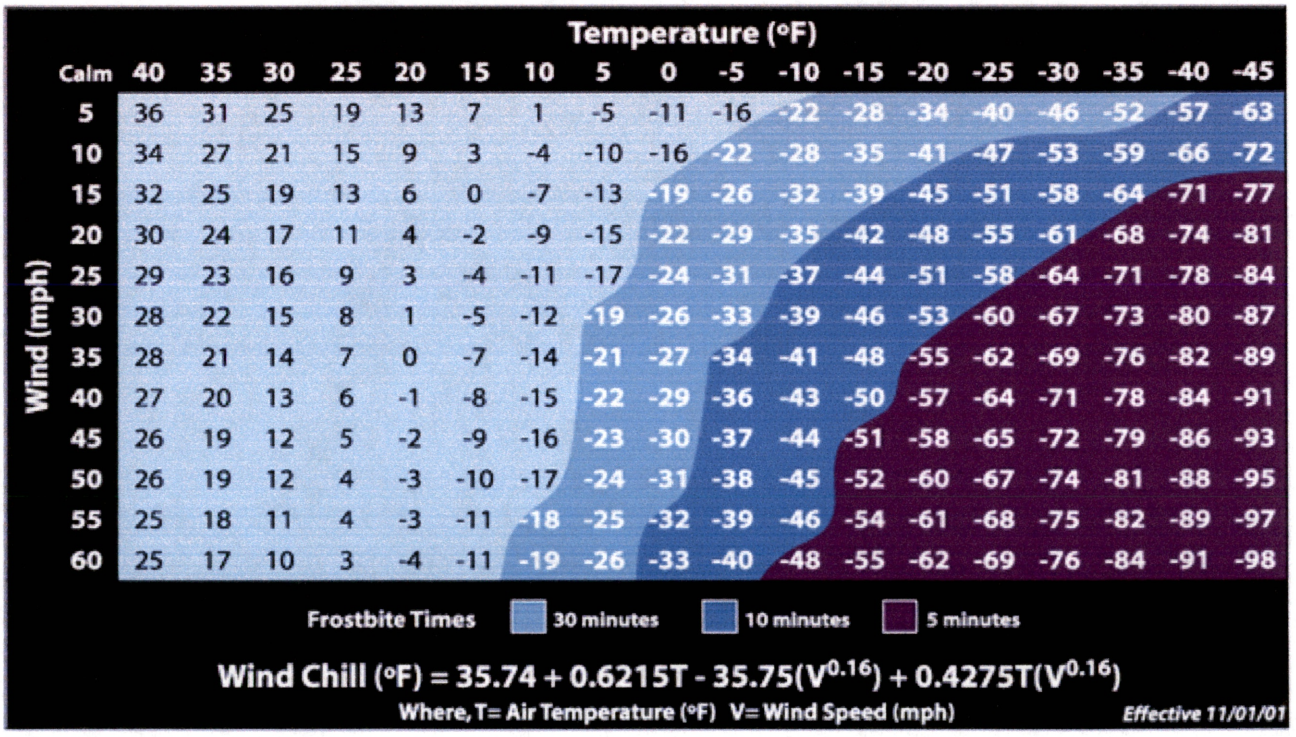
K.2.1.1 Chilblains. Chilblains is a chronic condition affecting the skin and peripheral capillary circulation, resulting from prolonged exposure of the bare skin, primarily in the extremities, to temperatures at or below 60°F. The best method of preventing and treating chilblains is to cover and protect the skin, thereby avoiding prolonged exposure to the cold.

K.2.1.2 Frostbite. Frostbite is freezing of the hands, feet, ears, and exposed parts of the face as a result of exposure to very low temperatures. Frostbite occurs when ice crystals form in the fluid in cells of the skin and tissue. As long as blood circulation remains good, frostbite will not occur.

There are three stages of frostbite: incipient frost bite (frostnip), superficial frostbite, and deep frostbite. The classification depends on severity and can range from incipient frostbite (frostnip), which affects the skin; to superficial frostbite, which involves the skin and the tissues immediately beneath it; to deep frostbite, which is much more serious with damage that may affect deeper tissue and even bone.

Symptoms. Symptoms for each of the three stages of frostbite are described as follows.

TABLE K-1
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS AN EQUIVALENT TEMPERATURE



- Frostnip. Skin first turns red and then later becomes pale or waxy white. There may be tingling, stinging, aching, an uncomfortable sensation of coldness or numbness, or no noticeable symptoms.

- Superficial Frostbite. The skin turns white or gray-white and is waxy in appearance. It is firm to touch (i.e., does not move easily) and the tissue beneath the skin is soft and resilient. There is a lack of sensation in the area.

- Deep Frostbite. The tissue is pale, cold, and solid with possible blisters and swelling. The hands and feet are especially susceptible to deep frostbite.

Emergency Treatment of Frostbite. Frostnip is easily treated in the field by the application of body heat, which should be applied before the affected area becomes numb. If frostnip affects your fingers and hands, place them against the skin of your chest or in your armpits. To warm your face, hold a mitten or scarf over the lower part of your face and breathe into it. Thaw frozen spots immediately. Do not rub affected areas.

Superficial frostbite usually responds to the application of body heat, as described previously. If the skin does not respond to body heat or if it resembles the early stages of deep frostbite, follow the emergency treatments listed in the following paragraphs. DO NOT rub affected areas.

For deep frostbite, if possible, the injured person should be taken to a heated shelter to avoid further frostbite. If it can be done without the danger of further frostbite, remove all constricting items (e.g., boots, gloves, and socks) from the injured area. RAPID REWARMING WILL MINIMIZE TISSUE LOSS. If possible, warm the extremities in a carefully controlled water bath (104 to 106°F) until tips of the fingers or toes turn pink and feeling is restored. If a water bath is not available, either apply wet packs (100 to 112°F) to the person's body, or gently wrap frostbitten area in blankets or some other warm material.

DO NOT attempt to thaw the affected parts by exercising them or heating them in front of an open fire, heat lamp, radiator, or stove. The person could receive a heat injury as a result of sensation loss.

DO NOT use snow to thaw frostbite. DO NOT rub, massage, or use pressure on the affected areas. Keep the frostbitten parts elevated if possible. Watch to see if CPR is necessary. Give the victim warm drinks such as tea, coffee, or soup. DO NOT GIVE ALCOHOLIC BEVERAGES. Have the victim exercise fingers or toes as soon as possible, but only after they are warmed. DO NOT allow a person with frostbitten feet to walk; walking may cause additional damage.

Medical Treatment of Frostbite.

- Frostnip. Usually does not require medical care.
- Superficial Frostbite. Blisters may require medical care.

- Deep Frostbite. EARLY MEDICAL TREATMENT IS URGENT! Transport the victim to medical care facilities at once.

Prevention of Frostbite. It is far easier to prevent or stop frostbite in earlier stages than to thaw and take care of badly frozen flesh. To protect the body against frostbite, the following precautions should be taken:

- Wear enough clothing to protect against the cold and wind.
- Wear warm gloves and boots.
- Pull a scarf or jacket flap over the lower part of the face or pull a hood tightly around the face.
- Occasionally exercise the face, fingers, and toes to keep them warm and to detect any areas that may have become numb.
- Crew members should watch each other closely, especially the face, for signs of frostbite.

K.2.1.3 Immersion Foot. Immersion foot (formerly called trenchfoot) is a cold injury resulting from prolonged exposure to near-freezing temperatures when standing or walking on wet or swampy ground.

Symptoms. In the early stages, the feet and toes are pale, cold, numb, and stiff, and walking is difficult. If preventive action is not taken, the feet will swell and ache; in extreme cases, this may result in irreversible damage to the tissues of the foot or leg.

Emergency Treatment of Immersion Foot. Handle feet very gently. DO NOT rub or massage. If necessary, clean feet carefully with soap and warm water, then dry, elevate, and expose to warm but not hot air.

Prevention of Immersion Foot. Because the early stages of immersion foot are not painful, crew members must be constantly on the alert and check feet often when working in cold, wet conditions. Keep feet dry by wearing waterproof footgear and changing socks frequently because perspiration, trapped inside waterproof boots or heavy footgear, can contribute to immersion foot symptoms. Avoid standing in wet areas. If feet get wet, dry them as soon as possible, warm them with your hands, then use foot powder, and change to dry socks. If you cannot change wet boots and socks, exercise your feet frequently by wriggling your toes and moving your ankles. Never wear tight boots.

K.2.2 Systemic Cold Injuries

Systemic injuries are those that affect the entire body system. Severe body cooling, known as systemic hypothermia, can occur at temperatures well above freezing. Hypothermia, which can be fatal, is the progressive lowering of body temperature accompanied by rapid, progressive mental and physical collapse. A large percentage of wilderness deaths are the result of hypothermia.

Hypothermia is caused by exposure to cold, and is aggravated by moisture, cold winds, fatigue, hunger, inadequate clothing or shelter, and excessive perspiration from strenuous exercise followed by too rapid cooling.

Hypothermia often occurs between temperatures of 30 to 50°F, which most people believe are not dangerous. Crew members should be alert for symptoms of hypothermia, especially when temperatures are dropping rapidly or when they must work in rain, snow, or ice.

Hypothermia may occur on land or following submersion in even moderately cold water (i.e., 65°F or lower). On land, hypothermia may take a full day or more of exposure to develop; however, if the conditions are extremely severe, death may occur within a few hours of initial symptoms.

In cold water, death may seem to be from drowning; in reality, it is usually the result of hypothermia. In water, skin and nearby tissues chill very fast; in 10 to 15 minutes, the temperature of the heart and brain may drop. When the core (i.e., internal body) temperature reaches 90°F, unconsciousness may occur; when body temperature drops to 80°F, heart failure is possible.

K.2.2.1 Symptoms. In the early stages of hypothermia, the body begins to lose heat faster than it can be produced, making an effort to stay warm by shivering. When the body can no longer generate enough heat to overcome heat loss and the energy reserves of the body become exhausted, body temperature begins to drop. This affects the ability of the brain to make judgments and also results in loss of muscular control. As the body temperature drops, hypothermia symptoms become increasingly severe, as shown in the following table:

SYMPTOMS OF HYPOTHERMIA	APPROXIMATE CORE TEMPERATURE
Person is conscious, alert with increased respiration. Shivering may become uncontrollable as core temperature nears 95°F.	Above 95°
Person is conscious but disoriented and apathetic. Shivering is present but diminishes as temperature drops. Below 92°F, respiratory rate gradually diminishes and pupils being to dilate.	95° to 90°F
Person is semiconscious. Shivering is replaced by muscular rigidity. Pupils are fully dilated at about 86°F.	90° to 86°F
Unconscious; diminished respiration.	Below 86°F
Barely detectable or nondetectable respiration.	Below 80°F

K.2.2.2 Emergency Treatment of Hypothermia. Move hypothermia victim to shelter and warmth as rapidly as possible. In very mild cases, dry clothing and shelter may be all that is needed. Gently remove all of the victim's wet clothing (so energy is not expended by warming and drying wet clothing) and replace it with a dry set. Give the person something warm to drink. DO NOT GIVE ALCOHOLIC BEVERAGES.

ALL OTHER HYPOTHERMIA CASES SHOULD BE CONSIDERED MEDICAL EMERGENCIES. PROVIDE EXTERNAL HEAT IN ANY WAY POSSIBLE! A warm bath (with the water kept between 105° and 110°F) is the most effective way of warming a victim of hypothermia. NEVER put an UNCONSCIOUS VICTIM in a bathtub.

If it is not possible to give the person a warm bath, use one of the following ALTERNATE METHODS:

- Wrap warm moist towels (or other fabric) around the victim's head, neck, sides, and groin. As the packs cool, rewarm them by adding warm water (approximately 105°F). Check the temperature of the water with your elbow or the inside of your arm; it should be warm but not hot.

- If you are at a remote outdoor location and cannot use the other method, make a "human sandwich" by placing the unclothed victim in a sleeping bag (or between blankets) with two other undressed persons to provide body-to-body heat transfer. THIS WILL SAVE LIVES. Additional sleeping bags or blankets can be placed over and under the victim.

DO NOT wrap a hypothermia victim in a blanket without an auxiliary source of heat unless it is to protect against any further heat loss before treatment can begin, or you need to go for help and there is no other alternative.

Continue treatment once the victim has stabilized. Give warm liquids and nourishing food if the person is conscious. Check the person for symptoms of frostbite and if necessary, give treatment.

Handle the patient gently and do not allow him or her to walk. Exertion can circulate cold stagnant blood from extremities to the central body and cause "after-drop," in which the patient's core temperature drops below the level that will sustain life. ALCOHOL CONTRIBUTES TO AFTER-DROP.

K.2.2.3 Medical Care for Hypothermia. HYPOTHERMIA IS A SEVERE EMERGENCY. GET MEDICAL TREATMENT AS SOON AS POSSIBLE. Even persons with mild hypothermia should see a doctor.

K.2.2.4 Prevention of Hypothermia. In cold weather, never go into the field without wearing adequate clothing. Take a complete change of warm clothes and one or two extra pairs of socks (in plastic bags). Wear or carry a windproof, water-resistant outer jacket and, in rain or snow, wear adequate raingear.

Stay dry. If your clothing becomes wet from perspiration, rain, snow, or immersion in water, change it as soon as possible. If you start to shiver in a prolonged or violent way, seek shelter at once. Shivering may produce heat but it also uses up energy. Violent shivering may be an early sign of hypothermia.

Avoid accidental immersion in water. Practice boat safety and learn cold water survival techniques. If you fall into water and you are not very close to shore, remain quiet. Keep your head out of

water, climb onto the boat, or hold or climb onto any other object that will support you and keep you up out of the water.

K.2.3 Safety/First Aid Equipment

In view of the causes, results, and appropriate treatment of cold weather injuries discussed previously, as a minimum, the following safety equipment should be included during cold weather operations:

- extra clothing for all personnel
- blankets and/or sleeping bag
- high-energy food and drinking water supply
- toboggan
- tow ropes

In extreme cold conditions, add the following safety items:

- electric blanket (if an electrical source is available)
- portable emergency generator (with fuel, oil, and cords)
- space heater and fuel

K.2.4 General Winter Operations

Cold weather conditions can severely affect winter operations. The Site Manager and SSHO must plan work schedules and project tasks accordingly.

K.2.4.1 Preliminary Assessment. If you will be working outdoors in cold weather, assess the local weather conditions through the news media (i.e., radio, television, and newspapers) to determine whether work should progress and/or the amount of preparation needed. Carefully consider questions such as the following:

- What are the typical wind and weather conditions for the period in which you will be working?
- Are the areas in which you will work sheltered or open to the wind?
- Is there a place nearby for periodic warming breaks? Can you obtain or heat warm food and beverages there? Is there a source of drinking water?
- Are there ways to minimize the length of time that crew members will have to work outdoors in the cold?
- If you use a vehicle for a warming area or will use a heater in a closed room, how can you ensure there is adequate ventilation to prevent carbon monoxide poisoning?

K.2.4.2 Scheduling. Wherever possible, try to schedule work during the least severe weather. Rotate crew members to keep cold exposures short and allow sufficient time for frequent warming breaks. Remember that workers in heavy clothing often need more time to complete the tasks and

may become fatigued more easily. Be aware that operations may have to be discontinued if winds increase or the temperature drops.

Because winter days are short, scheduling should allow time for taking care of equipment and supplies before nightfall. Once it becomes dark, it is more difficult to gauge terrain, and temperatures are likely to drop.

K.2.4.3 Site Access. Snow and ice could make travel on site access roads impossible, or treacherous at best. Personnel should not be allowed to work on-site if conditions could severely hamper the arrival or departure of emergency vehicles. If the route to off-site medical facilities is blocked by snow or ice, an otherwise minor injury could result in a major medical emergency. If conditions warrant, the following provisions should be made:

- snow removal/plowing services for site access roads
- a dependable, four-wheel-drive vehicle available to on-site personnel for transporting an injured person to an off-site medical facility
- sleeping bags, blankets, a food supply, and water kept on-site in the event a sudden storm requires personnel to remain overnight

The SSHO is responsible for deciding when weather conditions make site access unsafe, thereby requiring work to stop until conditions improve.

K.2.4.4 Equipment and Supplies. Obtain equipment and supplies that will help prevent cold stress and will help in the treatment of cold stress disorders. Required equipment includes a reliable ambient temperature thermometer, a wind gauge, and a windchill chart. If the site is potentially windy due to a lack of natural or manmade windbreaks (e.g., trees, valleys, and structures), try to provide means of shielding workers from the wind. If working at a remote location, carry extra food and water because hunger and dehydration contribute to cold stress. If possible, make provisions for hot food and beverages. Ensure that emergency communication equipment is available and operational for crew members working in the cold, at heights, or in remote locations.

Close attention must be given to the effects of cold weather on field equipment. Batteries can be severely affected by cold resulting in disabled radios, air monitoring equipment, sampling pumps, and vehicles. A supply of fresh batteries, a sufficient number of charging units, and a set of automotive jumper cables should be maintained on-site. In addition, the electronics in many field instruments such as PI, LEL, and oxygen meters, as well as the chemical reactions in detector tubes (e.g., Draeger tubes) can also be adversely affected by the cold. The manufacturers' literature must be consulted for minimum operating temperatures.

If at all possible, monitoring well sampling tasks should not be scheduled during cold weather. These tasks generally require the use of relatively delicate pumps; long, uninsulated stretches of tubing; and significant quantities of decontamination solutions. Unless considerable effort is expended to prevent pumps, hoses, decontamination solutions, and sample containers from freezing, attempting to sample monitoring wells in cold weather may be counter- productive. Portable shelters should be considered if cold weather sampling is necessary.

APPENDIX M EMERGENCY PLANNING

APPENDIX M - EMERGENCY PLANNING

M.1 EMERGENCY MEDICAL SERVICES

Prior to site investigation or activity on hazardous sites, nearby health facilities will be evaluated to determine their ability to provide for the needs of on-site project staff. Criteria such as emergency department physician coverage, decontamination capabilities, and available medical specialists will be evaluated.

M.1.1 On-site First Aid

An industrial first-aid kit will be provided at the work site; contents of the kit will be checked weekly and restocked as necessary. Other equipment may include oxygen, backboard and straps, splints, and a cervical collar.

At least one person qualified to perform first aid will be present on-site at all times during work activity. This person will have earned a certificate in first-aid training from the American Red Cross or will have received equivalent training. Designated first aides will receive regular review training from the American Red Cross or the equivalent.

An eye-wash station will be provided at the work site, as well as flushing water for decontamination of boots, gloves, clothing, and tools.

M.1.2 Transportation to Emergency Treatment

A vehicle will be available at all times to transport personnel to the hospital (in the event an ambulance is unnecessary or unavailable). Stretchers will be located at the work site to transport personnel to the vehicle. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

M.2 CONTINGENCY PLANNING

Prior to commencement of on-site activities, the SSHO will review safety considerations with the field crew. The SSHO has overall responsibility for adherence to the designated safety precautions and assumes the role of on-site coordinator in an emergency response situation.

All on-site personnel will be familiarized with both the primary and secondary route to the nearest hospital (which may be shown on a figure or a local map), as well as the location of the nearest working telephone or radio communication device. A list of emergency telephone numbers will be posted in the trailer.

The local hospital and emergency response team will be advised in advance of the work to be performed. The hospital will also be briefed on the availability of personnel health data and technical support through Environmental Medicine Resources, Inc.

Emergency communication will be required to ensure positive preplanned notification of emergency authorities in the event of episodes requiring initiation of contingency plans. Emergency communication will include all or parts of the following:

- Coordinate with local agencies, fire and police departments, the ambulance service, and the hospital emergency room.
- Establish two-way radio communication and a site alarm capable of warning site personnel and summoning assistance (i.e., airhorn).
- Design an emergency evacuation plan for residents of nearby homes. Although evacuation is an unlikely event, as a contingency, the SSHO will be designated as on-site coordinator and will be responsible for implementing the plan. The SSHO will be made aware of the total number of households within a 2,000-foot radius. The Health and Safety Plan will provide the emergency contacts required and a table will provide a list of residences and identifiable operations in the area in the event that evacuation is deemed a possibility for a particular site.
- Investigate possible routes of evacuation prior to any activity.
- If an accident occurs, a copy of an accident report form, provided in Appendix N, should be filled out by the SSHO and filed with the individual's supervisor, the HSM or HSS, and Human Resources. A copy should also be retained in the project records.

M.3 POTENTIAL HAZARDS

The most common hazards associated with hazardous waste site investigation include (1) accidents; (2) inhalation, contact, or ingestion of hazardous materials; (3) explosion; and (4) fire.

M.3.1 Accidents

Accidents must be handled on a case-by-case basis. Minor cuts, bruises, muscle pulls, and the like will still allow the injured person to undergo reasonably normal decontamination procedures before receiving direct first aid. More serious injuries may not permit complete decontamination procedures to be undertaken, particularly if the nature of the injury is such that the victim should not be moved. In these cases, arrangements will be made with the medical facility and transporter to allow them to take proper precautions. The nature and degree of surface contamination at a site is generally low enough that emergency vehicles could reach the victim on-site without undue hazard. However, if on-site access is limited, accident victims may be transported by MACTEC personnel trained for this response to a point accessible by an ambulance.

M.3.2 Contact and/or Ingestion of Hazardous Materials

Properly prescribed and maintained protective clothing and adherence to established safety procedures are designed to minimize this hazard. However, it is still possible that contact or ingestion of materials may occur. For example, puncture of a buried drum of liquid during drilling operations might cause the drum contents to contact personnel. Standard first-aid procedures should be followed. The drilling rig will have a tank of water that may be useful in some circumstances, particularly to flush contaminants from any exposed skin areas. Eye-wash bottles will also be maintained at the site for emergencies. In cases of ingestion or anything other than minor contact with known substances, the local Poison Control Center and hospital should be notified and the victim taken there immediately for further treatment and observation.

M.3.3 Explosion

The drilling crew should be keenly aware of combustible gas meter readings and should withdraw at any indication of imminently hazardous conditions (i.e., greater than 20 percent LEL). The detection of such conditions will be reported to local agencies for potential execution of the evacuation plan, if the situation is assessed to warrant such response.

M.3.4 Fire

The combustible gas meter also warns of imminent fire hazards at borings. The greatest fire hazard at the site should be recognized as handling the fluids (e.g., methanol and acetone) used for certain decontamination procedures. No smoking or open flames are allowed on-site. Carbon dioxide fire extinguishers will be kept at the drilling rig and in the decontamination area/field office. The fire department, previously informed of site activities, will be called as needed.

M.4 EVACUATION RESPONSE LEVELS

Evacuation responses will occur at three levels: (1) withdrawal from immediate work area (100 feet or more upwind), (2) site evacuation, and (3) evacuation of surrounding area. Anticipated conditions that require these responses are described in the following subsections.

M.4.1 Withdrawal Upwind (100 Feet or More)

Withdrawing upwind (100 feet or more) will be required when (1) ambient air conditions contain greater contaminant concentrations than guidelines allow for the type of respiratory protection being worn (the work crew may return after donning greater respiratory protection and/or assessing the situation as transient and past); (2) a breach in protective clothing or minor accident occurs (the work crew may return when the tear or other malfunction is repaired and first aid or decontamination has been administered); or (3) the respirator malfunctions requiring replacement.

M.4.2 Site Evacuation

Evacuation of the site will be required when (1) ambient air conditions contain explosive and persistent levels of combustible gas or excessive levels of toxic gases; (2) a fire or major accident occurs; or (3) explosion is imminent or has occurred.

M.4.3 Surrounding Area Evacuation

The area surrounding the site will be evacuated when persistent, unsuppressable toxic or explosive vapors from test pits or borings (e.g., pressure release from punctured drum) are released, or air quality monitored at several points downwind assess danger to the surrounding area.

M.5 EVACUATION PROCEDURES

M.5.1 Withdrawal Upwind

The work crew will continually observe general wind directions while on-site. (A simple wind sock may be set up near the work site for visual determinations.) Upon observing conditions that warrant moving away from the work site, the crew will relocate upwind a distance of approximately 100 feet or farther, as indicated by the site monitoring instruments. Donning SCBA and a safety harness and line, the SSHO and a member of the crew may return to the work site to determine whether the conditions noted were transient or persistent. If persistent, an alarm should be raised to notify on-site personnel of the situation and the need to leave the site or don SCBA. An attempt should be made to decrease emissions only if greater respiratory protection is donned. The HSM, HSS, and client will be notified of conditions. When access to the site is restricted and escape is thereby hindered, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes.

M.5.2 Site Evacuation

After determining that site evacuation is warranted, the work crew will proceed upwind of the work site and notify the security force, SSHO, and field office of site conditions. If the decontamination area is upwind and more than 500 feet from the work site, the crew will pass quickly through decontamination to remove contaminated outer suits. If the hazard is toxic gas, respirators will be retained. The crew will proceed to the field office to assess the situation, where the respirators may be removed (if instrumentation indicates an acceptable condition). As more facts are determined from the field crew, they will be relayed to the appropriate agencies. The advisability and type of further response action will be coordinated and implemented by the SSHO.

M.5.3 Evacuation of Surrounding Area

When the SSHO determines that conditions warrant evacuation of downwind residences and commercial operations, the local agencies will be notified and assistance requested. Designated on-site personnel will initiate evacuation of the immediate off-site area without delay.

M.6 SPILL CONTROL PLAN

When working around containers of bulk chemicals (e.g., drums or tanks), every effort should obviously be made to avoid damaging the container, which would discharge the contents and further contaminate the area. However, in the unlikely event that an accident does occur, a Spill Control Plan must be developed based on site contaminants and conditions, and the precautions that need to be taken to control and minimize the effects of the spill. Personnel must be trained and have adequate equipment to be able to contain or control a spill, plus be able to decontaminate previously uncontaminated structures, equipment, or material. In addition, spilled materials and contaminated soils and/or water must be collected, containerized, and disposed of properly.

Some equipment that may be needed in addition to personal protective equipment include: sand, "kitty litter," or some other absorbent material; sandbags; a front-end loader; DOT-approved 55-gallon drums or salvage drums; shovels; drum repair kit; chemicals to neutralize acids or bases; or decontamination equipment. The choice of equipment needed for the site is based on the amount and type of contaminants known or suspected to be at the site, as well as the work to be conducted.

M.6.1 Personal Protective Equipment

In the event of a spill or leak, the work crew must back off until adequate personal protective equipment can be donned. In most cases, Level B personal protective equipment will be required; however, there may be incidences where Level C or D is acceptable. The SSHO will determine the level of protection based on the contaminant, amount spilled, and levels monitored in the air.

M.6.2 Control Measures

Once the work crew is adequately protected, immediate measures should be taken to control and contain the spill within site boundaries. The hazardous area should be isolated and all unnecessary personnel kept away and upwind of the spill. Do not allow any flares, smoking, or open flames into the area and, if possible, avoid allowing combustible materials to come in contact with the spill.

Small Spills. If the spilled material is a solid, shovel contaminated material directly into a container, then cover, label, and dispose of it properly. If the spilled material is a liquid, absorb with sand, "kitty litter," or some other noncombustible absorbent material first, then shovel it into a container, and cover, label, and dispose of it properly.

Large Spills. For large liquid spills, install a dike using sandbags, absorbent pillows, soil, or any other available, noncombustible material. Ensure that the dike is large enough to contain the spill. Pump off and containerize any standing liquid. Recycle it if possible, or solidify it with an absorbent material, then cover, label, and dispose of it properly. Collect and containerize all contaminated soil, then cover, label, and dispose of it properly. For large solid spills, collect, containerize, cover, label, and dispose of it properly.

M.6.3 Reporting

If the amount spilled is reportable under Resource Conservation and Recovery Act (RCRA) requirements and goes off-site, or if there is a threat to human health or the environment, the proper authorities must be notified. The SSHP will list the agencies to be notified in the event of an emergency.

APPENDIX O RESPIRATORY PROTECTION PROGRAM

APPENDIX T HEARING CONSERVATION PROGRAM