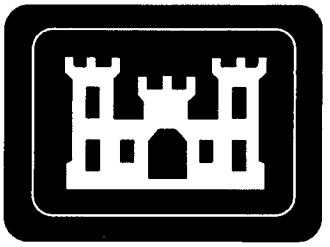
REVISION 1

SAIC SITE SAFETY AND HEALTH PLAN ST. LOUIS - FUSRAP ACTIVITIES

ST. LOUIS, MISSOURI

April 2008



U.S. Army Corps of Engineers
St. Louis District Office
Formerly Utilized Sites Remedial Action Program

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and
should not be considered an eligible contractor for its review.

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ACRONYMS/ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AE	air effluent
AEC	Atomic Energy Commission
AHA	activity hazard analysis
ALARA	as low as reasonably achievable
ALI	Annual Limits on Intake
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
BZ	breathing zone
CEDE	Committed Effective Dose Equivalent
CDE	Committed Dose Equivalent
COC	contaminant of concern
CPR	cardiopulmonary resuscitation
CRF	Code of Federal Regulations
DAC	Derived Air Concentration
DOT	Department of Transportation
EC&HS	Environmental Compliance and Health and Safety (program)
E&I	Engineering and Infrastructure Business Unit
EMS	Emergency Medical Service
EPA	U.S. Environmental Protection Agency
FID	flame ionization detector
FM	Field Manager
FP	flash point
FS	Feasibility Study
FUSRAP	Formerly Utilized Sites Remedial Action Program
Futura	Futura Coatins Company
GFCI	Ground Fault Circuit Interrupter
GM	Geiger-Mueller
HAZWOPER	Hazardous Waste Operations and Emergency Response
HISS	Hazelwood Interim Storage Site
HP	Hcalth Physics
HPT	Health Physics Technician
HSWPs	Health and Safety Work Permits
HTRW	hazardous, toxic, and radioactive waste
IDLH	immediately dangerous to life and health
IAs	Investigation Areas
IP	ionization potential
LEL	Lower Explosive Limit
MED	Manhattan Engineering District
mrem	millirem
MSDS	Material Safety Data Sheets
MSL	mean sea level
NRC	Nuclear Regulatory Commission
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standard and Technology
NPL	Superfund National Priorities List
NVLAP	National Voluntary Laboratory Accreditation Program

ACRONYMS/ABBREVIATIONS (CONT'D)

OJT	On-the-Job Training
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PID	photo ionization detector
PPE	personal protective equipment
PPM	parts per million
Ra	Radium
RME	radiation monitoring equipment
ROD	Record of Decision
RPM	Radiation Protection Manager
RSO	Radiation Safety Officer
SAIC	Science Applications International Corporation
SHAW E&I	Shaw Engineering & Infrastructure
SLAPS	St. Louis Airport Site
SLDS	St. Louis Downtown Site
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
TEDE	Total Effective Dose Equivalent
TERC	Total Environmental Restoration Contractor
TES	Training Evaluation Standard
Th	Thorium
TLD	thermoluminescent dosimeter
TLV	threshold limit value
TSD	Treatment, Storage, and Disposal
TWA	time-weighted average
U	Uranium
USACE	United States Army Corps of Engineers
UXO	Unexploded Ordnance
VP	vapor pressure
VPs	Vicinity Properties

1.0 INTRODUCTION

1.1 OBJECTIVE

The purpose of this Site Safety and Health Plan (SSHP) is to provide a written assessment of potential safety and health hazards associated with performance of work at the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) sites, to specify minimum acceptable protective equipment that will be used, and procedures that shall be followed, during the performance of work. The requirements of this plan are applicable to all Science Applications International Corporation (SAIC) personnel and SAIC subcontractors. In cases where another contractor (i.e., Total Environmental Restoration Contractor (TERC)) is responsible for access and control of a site where SAIC is required to work, the SSHP requirements of the TERC will be implemented in addition to the requirements of this SSHP. In the event that there are conflicts between SSHP requirements, the more restrictive of the two will be implemented in work documents prepared for the activity in that area.

SAIC personnel and subcontractors are required to be trained on the contents of this plan prior to on-site project participation. SAIC subcontractors are further required to verify that the hazard controls contained in this plan are sufficient to protect their employees, and, if not, to supplement this plan with additional, sufficient controls. Whenever possible, standard procedures will be used to minimize the potential for personnel injury or illness. These will include site-specific training requirements, routine inspections, visual and instrument surveillance for hazards, selection and use of personal protective equipment (PPE), and enforcement of the health and safety requirements by project management. SAIC's Environmental Compliance and Health and Safety (EC&HS) Program procedures, SAIC-Engineering and Infrastructure Business Unit (E&I) Health and Safety procedures, and St Louis Health Physics procedures (under separate cover), together with this SSHP, provide the requirements for safely performing fieldwork at St. Louis District FUSRAP Sites. These documents also establish practices to protect the public and the immediate environment from hazards caused by on-site work. This SSHP must be on site during field work and accessible to employees and subcontractors.

1.2 WORK SCOPE AND POLICY STATEMENT

1.2.1 Project Work Scope Overview

The St. Louis FUSRAP activities will comprise a variety of operations, including field and office work. Field operations will include tasks such as gamma walk over surveys, surface water sampling, and ground water sampling. Sampling may involve the use of drill rigs and geophysical locating, as well as brush clearing to access sampling locations. Decontamination of equipment and personnel will be conducted as needed. The laboratory will analyze the various types of samples taken in the field. Health physics and safety support will be provided for field operations and will also ensure that required procedures are developed and followed.

1.2.2 Policy Statement

It is the policy of SAIC to require its employees and SAIC subcontractors to take every reasonable precaution to protect the health and safety of employees, the public, and the environment. All SAIC and subcontractor organizational components must not only comply with applicable local, state, and federal environmental, health, and safety regulations, but shall do so

in a proactive fashion. Ultimate responsibility for compliance with EC&HS requirements lies with each organization's line managers.

The operating philosophy of SAIC is that no job is too important or too small that we cannot devote the time and resources to protect its most important asset, the employee, and to meet, or exceed, local, state, and federal standards. SAIC, and subcontractor, line managers are responsible for the health and safety of their employees and must comply with local, state, and federal regulations. Any SAIC employee, or SAIC subcontractor employee, found to be non-compliant with this document, the SAIC EC&HS program, or other safety documents, shall be subject to disciplinary action up to and including termination.

All SAIC employees, and subcontractor employees, shall promptly report any environmental, health, and safety concerns to their line management. SAIC and its subcontractors shall not reprimand or otherwise take disciplinary action against their employees for reporting such concerns.

1.3 SITE DESCRIPTIONS/HISTORIES

The St. Louis FUSRAP Sites are two separated geographical areas, which are located in metropolitan St. Louis, Missouri. These two areas are comprised of multiple properties and are located in two distinct areas: north St. Louis County and St. Louis City (See Figure 1-1). The designations assigned to these two sites are the North St. Louis County sites and the St. Louis Downtown Site (SLDS), respectively.

1.3.1 North St. Louis County Sites

The North St. Louis County sites consist of the St. Louis Airport Site (SLAPS), the SLAPS Vicinity Properties (VPs), and the Latty Avenue Properties. The SLAPS is the property near the St. Louis airport which was originally used to store waste materials from uranium processing activities at SLDS. The SLAPS VPs include Coldwater Creek and properties near the SLAPS and along Coldwater Creek. The Latty Avenue Properties include the Hazelwood Interim Storage Site (HISS), the Futura Coatings Company (Futura), and Latty Avenue VPs. In October 1989, the U.S. Environmental Protection Agency (EPA) placed three of the North St. Louis County sites properties [SLAPS, HISS, and Futura] on the Superfund National Priorities List (NPL) (*CERCLIS No. MOD980633176).*

1.3.1.1 The St. Louis Airport Site (SLAPS)

Manhattan Engineering District (MED) acquired the SLAPS in 1946 and used the site to store uranium-bearing residues from the SLDS from 1946 until 1966. In 1966, Continental Mining and Milling Company of Chicago purchased these residues. By 1967, the stored residues had been moved by Continental Mining and Milling from SLAPS to HISS. After most of the residuals had been removed from SLAPS, site structures were demolished and buried on the property along with approximately 60 truckloads of scrap metal and a vehicle that had become contaminated. Clean fill material was spread over the disposal area from 0.3 to 1.0 meters (1 to 3 feet) to achieve surface radioactivity levels acceptable at that time. In 1973, the U.S. Government and the City of St. Louis agreed to transfer ownership of SLAPS by quitclaim deed from the Atomic Energy Commission (AEC) to the St. Louis Airport Authority.

SLAPS is located in St. Louis, Missouri, approximately 17 miles from downtown St. Louis. Between 1946 and 1966, SLAPS was used to store MED AEC residue material generated by

uranium separation processes at Mallinckrodt Chemical Works. These residues included solids from the neutralization and filtration of ore raffinate, which was stored on the ground, and radium-bearing residues, which were stored in drums. Barium cake residue was also stored on the ground at the site. Other wastes brought to SLAPS included used dolomite liner and recycled magnesium fluoride liner, tailings from a process to recover uranium from magnesium fluoride slag, 50,000 empty drums, 3,500 tons of radioactively contaminated metal scrap, 2,400 drums containing miscellaneous residues, uranium-containing sand, and radioactive scrap materials. Some of these materials were buried in pits dug on the site.

SLAPS covers 8.8 hectares (ha) (22 acres) and is surrounded by security fencing. A water line runs along the northern boundary of SLAPS, and a gas line crosses the northwest corner of SLAPS and runs parallel to the property on the north. There are overhead utility lines on the western end of SLAPS.

The elevation at SLAPS varies from approximately 155 to 161 meters (m) (530 to 510 feet (ft)) from east to west, and its land surface ranges from 4.5 to 6 m (15 to 20 ft) above Coldwater Creek. Generally, the property surface is flat; however, because the fill placed over the property in the early 1970s was not spread evenly, compaction, revegetation, differential settling, and erosion have created an irregular surface. The 100-year flood level at SLAPS is 159 m (522 ft) above mean sea level (MSL). The ball fields (note: what ball fields? This is first time they are mentioned) cover approximately 32 ha (80 acres) of an abandoned former recreational area. This area was constructed on former lowlands which were filled with up to eight ft of various fill material.

Radiological contamination at SLAPS was encountered at depths of up to 5.4 m (18 ft) during the soil investigation, but the contamination was generally found at 1.2 to 2.4 m (4 to 8 ft). Uranium (U)-238, radium (Ra)-226, thorium (Th)-230, and Th-232 were found at elevated concentrations over the majority of the property.

Coldwater Creek flows for 153 m (500 ft) along the western border of SLAPS. The creek originates 5.8 kilometers (km) (3.6 miles) to the south of SLAPS and continues for 24 km (15 miles) in a northeasterly direction through Hazelwood, Florissant, and unincorporated areas of the county, and along the northern edge of the unincorporated community of Black Jack, until it discharges into the Missouri River. The creek, except the 1.2 miles it travels under the airport, is accessible to the public.

Access and control of the SLAPS site is the responsibility of Shaw Engineering & Infrastructure (Shaw E&I). SAIC activities that are conducted on the SLAPS and the associated work plans are required to meet the requirements of the Shaw E&I SSHP. In 2007, cleanup of the SLAPS site was completed. However, the site is still used as a base of operations for Shaw E&I, and a railcar load out station remains on site for potential future use.

1.3.1.2 SLAPS Vicinity Properties

The SLAPS VPs consist of approximately 78 properties, including properties along former haul routes between the SLAPS and the HISS, Coldwater Creek, the open fields (former ball field area) immediately north of the SLAPS, and other SLAPS contiguous properties. The impacted properties are located along haul routes between the SLAPS and the HISS. These routes include Eva Avenue, Frost Avenue, Hazelwood Avenue, McDonnell Boulevard, and Pershall Road. The SLAPS VPs are primarily located within the City of Berkeley; however, Pershall Road, the north side of McDonnell Boulevard, and a portion of Hazelwood Avenue are within the City of Hazelwood. Coldwater Creek flows for 500 ft (153 m) along the western border of the SLAPS.

(note: this is repeated from above paragraph) The creek originates 5.8 km (3.6 miles) to the south of SLAPS and continues for 24 km (15 miles) in a northeasterly direction through Hazelwood, Florissant, and unincorporated areas of the county, and along the northern edge of the unincorporated community of Black Jack, until it discharges into the Missouri River. The creek, except for 1.2 mi (1.9 km) under the Lambert-St. Louis International Airport, is generally accessible to the public. The contiguous properties surrounding the SLAPS were designated as Investigation Areas (IAs) 8 through 13, as shown on Figure 1-3. These properties are located within the City of Hazelwood, the City of Berkeley, and the airfield owned by the City of St. Louis.

1.3.1.3 Latty Avenue Properties HISS

The Latty Avenue Properties are shown in Figure 1-2 and include HISS and Futura, and eight VPs designated as 1(L) through 6(L), 40A, and 10k530087. The majority of the VPs are located along Latty Avenue. The Latty Avenue Properties are 1.2 km (0.75 miles) northeast of the SLAPS. Key features of HISS and Futura, located at 9170 and 9200 Latty Avenue (respectively) are shown on Figure 1-4. These properties cover a 4.5 ha (11-acre) tract of land. HISS and Futura are in the City of Hazelwood. The VPs are located predominately within the City of Berkeley.

By 1967, the residues stored at the SLAPS had been moved by Continental Mining and Milling to the HISS Site, for subsequent shipment to Canon City, Colorado. Some barium sulfate material remaining at 9200 Latty Avenue was taken to a landfill in western St. Louis County. In support of a series of property development projects at the Latty Avenue Properties between 1977 and 1986, the HISS was used for the interim storage of contaminated soils and materials that had been removed from the Futura property and nearby VPs. Approximately 41,000 cubic yards of material were consolidated into interim storage piles at HISS and on adjacent Latty Avenue vicinity property (VP-2L). These piles were subsequently removed.

Based on analysis of characterization soil samples at HISS after the piles were removed, Th-230 was identified as the contaminant present in the highest concentration; elevated levels of Ra-226 and U-238 were also found. Th-232 was found at concentrations up to 8 pCi/g, Ra-226 was found at concentrations of up to 1260 pCi/g, and U-238 concentrations ranged up to 340 pCi/g. Concentrations of Th-230 ranged up to 19,800 pCi/g in the selected samples analyzed.

Access and control of the HISS site is currently the responsibility of Shaw E&I. SAIC activities that are conducted on the HISS, and the associated work plans, are required to meet the requirements of the Shaw E&I SSHP. The HISS property includes a decontamination pad, a storage building, and a railcar load out area for shipment of radioactively contaminated soils.

1.3.2 The St. Louis Downtown Site (SLDS)

From 1942 to 1957, the former Mallinckrodt Chemical Works performed work at the SLDS under contract with the MED and AEC. The work included development of uranium-processing techniques, production of forms of uranium compounds and metal, and recovery of uranium metal from residues and scrap. This work included the processing of uranium ore to produce uranium metal. The process included digestion of uranium ore in acid, solvent extraction, treatment with hydrofluoric acid, and treatment with magnesium. Following completion of these contracts, the site grounds and buildings were remediated to meet the AEC requirements in effect at that time. Many of the buildings used during the 1942 to 1957 activities have since been removed and replaced by other buildings. Mallinckrodt Inc. has continued to operate a chemical processing business at this facility.

SLDS is located in St. Louis, Missouri, in an industrial area immediately west of the Mississippi River and south of the McKinley Bridge. SLDS consists of the Mallinckrodt property and adjacent commercial and city owned properties, collectively referred to as the VPs. The Mallinckrodt property covers approximately 45 acres (18.2 ha) and contains many buildings that house Mallinckrodt offices and chemical processing operations. The major VPs surrounding the Mallinckrodt facility include a large metals recycling company to the north, and the Mississippi River (behind a levee) and City of St. Louis property to the east. A lumberyard and a large salt producer/distributor to the south, and North Broadway and small businesses to the west, also surround the VPs. Several active rail lines cross the property. The entire area is heavily industrialized and is crossed by overhead process piping and electrical lines, as well as buried utilities, including sewer, sprinkler, water, and natural gas.

SLDS is in the original floodplain of the Mississippi River. A levee along the eastern boundary of the site provides protection against flooding. Industrial fill has been placed on top of the original soils during site development to attain a generally level surface. Manufacturing plants, support facilities, and other structures cover a large portion of the site. Much of the remainder of the site is covered with asphalt and concrete.

The Mallinckrodt property and some of the surrounding properties are known to be contaminated with radium, thorium, and uranium. In addition, arsenic and cadmium are also present. Other chemicals, including copper, nickel, trichloroethylene, toluene, and hexane are present, but are not in sufficient quantities to be contaminants of concern according to the SLDS Record of Decision (USACE 1998) (ROD).

Several characterization studies have been performed at SLDS. Characterization results are described in several reports (DOE 1990, DOE 1991, and DOE 1995). These results identify uranium (processed natural uranium), Th-230, Ra-226, and Th-232 as major radiological contaminants. Although relative ratios of these radionuclides vary by specific location, with some exceptions uranium is the predominant radioactive material present at SLDS. Smaller, although potentially significant, quantities of members of the naturally occurring actinium decay series have also been reported in some samples.

The depth of contaminated soil varies. Most of the contamination is in the upper 3 to 6 ft (1 to 2 m) of soil. However, at some locations contamination extends as deep as 14 ft (5 m). Subsurface characterization data for inaccessible soils (e.g., beneath buildings and under the levee on City property) at SLDS is limited.

Access and control of the SLDS site is the responsibility of Shaw E&I. SAIC activities that are conducted on the SLDS site are required to meet the requirements of Shaw E&I SSHP.

2.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

This section presents the lines of authority, responsibilities, and communication procedures concerning site safety and health and emergency response. All fieldwork will be conducted under the supervision of the SAIC Site Safety and Health Officer (SSHO) or Field Manager (FM). The SAIC SSHO will oversee normal and emergency work and will perform any required emergency notification. Figure 2-1 shows the SAIC St. Louis FUSRAP EC&HS Organization Chart.

2.1 SAIC PROGRAM MANAGER

The SAIC Program Manager is responsible for ensuring conformance with SAIC Corporate, SAIC E&I, SAIC local, and the United States Army Corps of Engineers (USACE) policies and procedures. Specific responsibilities of the Program Manager include:

- ensuring that project/task managers satisfy SAIC and USACE health and safety requirements;
- ensuring that project staff implement the project SSHP;
- ensuring that projects have the necessary resources to operate safely;
- ensuring an approved SSHP is issued prior to commencement of field activities; and
- ensuring that a qualified SSHO is designated.

2.2 SAIC CORPORATE HEALTH AND SAFETY MANAGER

The SAIC corporate Health and Safety Manager manages the E&I health and safety program. This includes establishing health and safety policies and procedures, supporting project and office activities, and verifying safe work practices and conditions. The specific responsibilities of the corporate Health and Safety Manager include:

- monitoring the effectiveness of SAIC-St. Louis EC&HS programs.
- coordinating with the SAIC Program Manager and local SAIC Health and Safety Manager for the appointment of the SAIC SSHO.
- serving as a communication link between the SAIC SSHO and Corporate EC&HS Officials.
- reporting to the SAIC Program Manager on program status.

2.3 SAIC RADIATION PROTECTION MANAGER

The SAIC Radiation Protection Manager (RPM) will address radiological hazards associated with the project. Specific responsibilities include:

- ensuring compliance with 10 Code of Federal Regulations (CFR) 20, other applicable federal and state regulations, and the SAIC St. Louis Health Physics (HP) procedures;
- providing or reviewing radiation safety standards and controls presented in the SSHP;
- conducting site training and audits as needed;

- assessing site radiological conditions and radiological exposure measurements, and
- reviewing and approving Health and Safety Work Permits (HSWPs) on an annual basis.
- maintaining on-site auditable documentation of all required records, including but not limited to:
  - training for site workers and visitors,
  - calibration/maintenance of field instruments such as radiation monitoring equipment, etc.,
  - environmental and personal radiological exposure monitoring results, and
  - notification of radiological accidents/incidents.

2.4 FIELD MANAGER

The SAIC FM will oversee the field activities associated with the project and will be responsible for site accessibility, safety, and radiological controls. He/she is responsible for enforcing the field requirements of this SSHP. Specific responsibilities of the FM are listed below:

- coordinating on-site operations, including subcontractor activities;
- ensuring that field personnel and subcontractors follow the requirements of this SSHP and applicable HSWPs;
- conducting and recording worksite inspections when applicable;
- stopping work or upgrading protective measures (including protective clothing) if uncontrolled health and safety hazards are encountered;
- The FM and the SSHO must also authorize resumption of work following correction of the adverse condition(s); and
- May change protective measures, including (PPE), with concurrence from the SSHO and RPM.

2.5 SITE SAFETY AND IIEALTH OFFICER (SSHO)

The SAIC SSHO is responsible for making health and safety decisions for specific health and safety activities, and for verifying the effectiveness of the health and safety program. The SSHO has primary responsibility for the following:

- completing the health and safety debrief in EC&HS Procedure 20;
- maintaining current copies of the project SSHP, and the SAIC EC&HS Manual;
- stopping work or upgrading protective measures (i.e., PPE) if uncontrolled health and safety hazards are encountered;
- may change protective measures, including PPE, with concurrence from the Field Manager and RPM;
- implementing, enforcing, and verifying compliance with this SSHP and other applicable federal and state regulations;

- documenting deficiencies identified in inspections or surveillances, designating responsible parties, procedures, and timetables for correction;
- approving upgrades and downgrades in PPE;
- ensuring that a site-specific pre-entry health and safety briefing covering potential chemical and physical hazards, safe work practices, and emergency procedures is conducted and documented for site workers;
- maintaining on-site auditable documentation of all required records, including but not limited to:
  - Material Safety Data Sheets (MSDSs) for applicable materials utilized at the site,
  - training for site workers and visitors,
  - calibration/maintenance of field instruments such as photoionization detectors (PIDs), flame ionization detectors (FIDs), combustible gas indicators, etc.,
  - environmental and personal exposure monitoring results,
  - notification of accidents/incidents,
  - reports of any chemical overexposure or excessive levels,
  - notification of employees of chemical exposure data, and
  - medical surveillance;
- maintaining a current copy of the Occupational Safety and Health Administration (OSHA) 3165-09R (formerly 2203) poster in the field office or break area;
- confirming that all on-site personnel have received the training listed in the Training Requirements section (Section 4.0) of this SSHP;
- issuing respirators, as necessary, and ensuring that all respirator users have received medical clearance within the last year, have been properly trained, and have been successfully fitted for respiratory protection;
- verifying that the project SSHPs emergency points of contact are correct;
- ensuring monitoring for potential on-site exposures is conducted in accordance with this SSHP;
- conducting and recording weekly worksite safety inspections;
- ensuring that daily worksite safety inspections are conducted by him/herself, the FM, or qualified technicians;
- updating the project SSHP (field changes) to ensure that it adequately identifies all tasks and significant hazards at the site and notifying project personnel of changes;
- investigating incidents and near incidents and reporting same in accordance with Procedure, E&I EC&HS 4.1, "Incident Reporting and Investigation" to the Program Manager and corporate Health and Safety Manager;
- coordinating with USACE Health and Safety personnel, including reporting incidents immediatcly and submitting written reports within two working days;
- reviewing industrial hygiene data; and

- recommending changes to engineering controls, work practices, and PPE.

2.6 HEALTH PHYSICS TECHNICIAN

Health Physics Technicians (HPT)s are responsible for assessing radiological exposures, verifying that radiological control practices are being implemented, and stopping work if controls are insufficient. The HPT will be trained to at least the requirements at EM 385-1-1 Section 6 and SAIC HP-04 "Qualifications and Training". Specific duties include:

2.6.1 Responsibilities of the Senior HPT are Described Below:

- conducting routine radiation, contamination, and airborne radioactivity surveys,
- establishing protective barriers and posting appropriate radiological signs,
- implementing Contractor's PPE and respiratory protection program for the purposes of keeping radiation exposure as low as reasonably achievable (ALARA),
- performing operability checks of radiation monitors and survey meters,
- performing unconditional release surveys of materials from radiation areas and suspected radiation areas, as required,
- conducting gamma walkover surveys,
- evaluating the results of routine radiation, contamination, and airborne radioactivity surveys,
- evaluating airborne concentrations and determining derived air concentration (DAC)-hr exposures for individuals,
- performing shipping and receipt surveys of radioactive material,
- performing job coverage surveys and directing activities to ensure compliance with applicable regulations,
- performing and documenting personnel decontamination,
- implementing the Contractor's radiation protection program,
- conducting insitu gamma spectroscopy measurements, and
- developing, approving, and issuing HSWPs.

2.6.2 Responsibilities of the Junior HPT are Described Below:

Junior HPT(s), depending on their level of qualification, have the same responsibilities and perform the same types of activities as senior HPT(s). However, a junior HPT shall not perform job coverage, equipment or material release surveys, radioactive material receipt or shipping surveys, personnel decontamination, or approve RWPs/HSWPs or radioactive effluent release permits unless under the direct supervision of a fully qualified senior HP technician, RPM, or the radiation safety officer (RSO).

2.7 SUBCONTRACTOR FIELD MANAGER

The Subcontractor FM will oversee the field activities of his/her employees. He/she is responsible for enforcing the field requirements of this SSHP and the subcontractor SSHP. Specific responsibilities are listed below:

- ensuring that his/her personnel on site follow the requirements of the project SSHP and any other applicable health and safety requirements (OSHA, equipment-specific controls, state requirements, most current USACE Safety and Health Requirements Manual);
- verifying that this SSHP adequately addresses the hazards and controls of the subcontracted work, and supplementing the information in the SSHP, if necessary;
- ensuring the safe operation of any subcontractor equipment;
- coordinating on-site operations of his/her personnel; and
- maintaining any required documentation (for example, drill rig manual) specific to his/her operations.

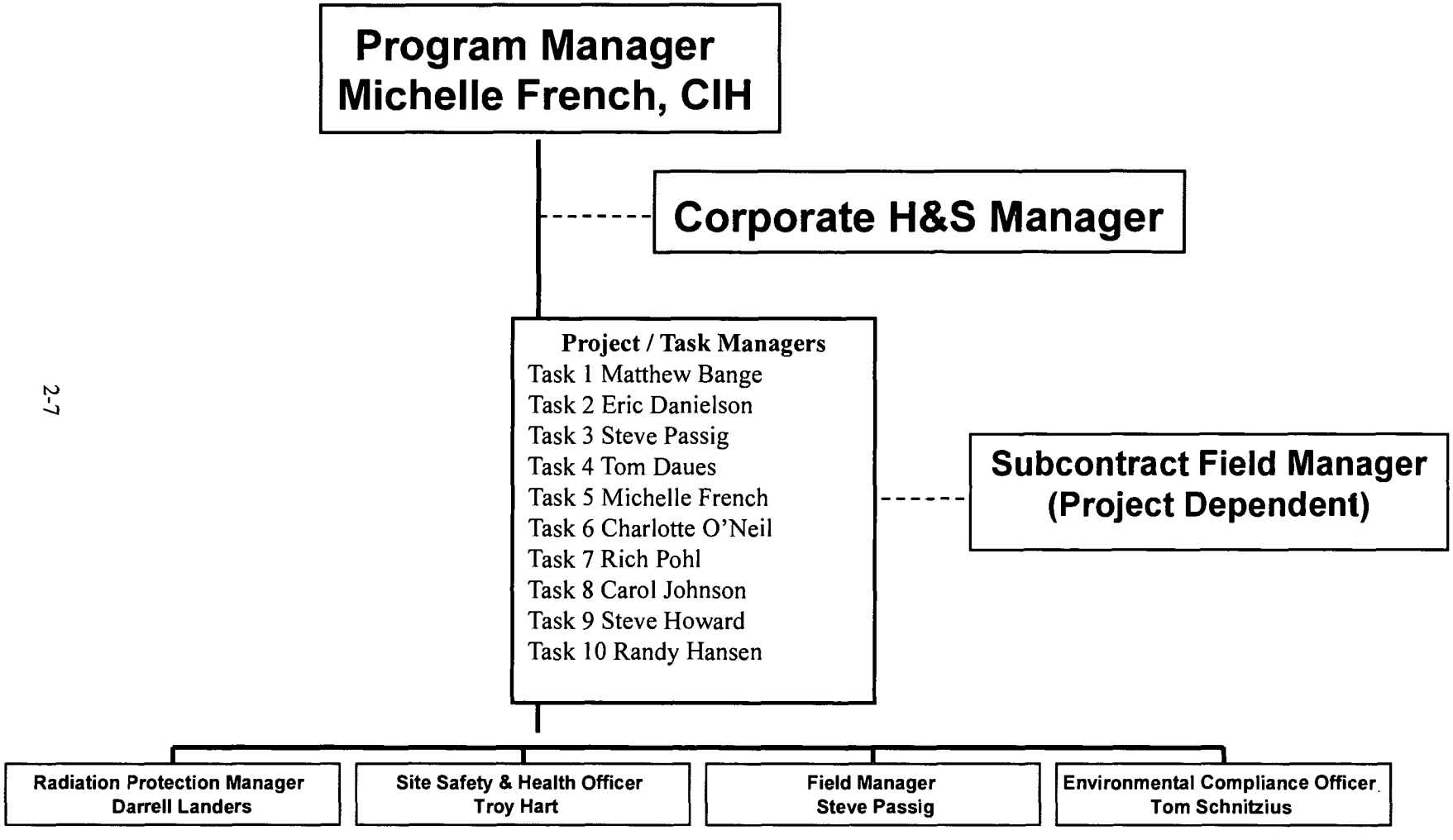
2.8 EMPLOYEES

Each employee is responsible for:

- complying with the requirements of this SSHP;
- completing his or her work assignment in a safe and effective manner;
- accepting an assignment or beginning a task only after understanding the risks and hazards associated with that activity;
- completing the training, medical evaluations, respirator fit testing, wearing protective clothing, etc., as specified in the SSHP, before beginning any job;
- maintaining and providing to the SSHO, a copy of medical correspondence, training certificate(s), and documentation of supervised field experience needed to gain access to field sites. (Note: employees not possessing certificates of training/medical clearance will be denied access to operations requiring training/medical clearance.);
- using the buddy system, i.e., not working alone at a field location, without prior approval. The FM may designate tasks where two-way radios may be used in lieu of the buddy system;
- having thorough knowledge of specific emergency response procedures for their specific work site(s);
- reporting immediately any near miss and/or any occupational illness or injury to the appropriate supervisor/FM, including any potential exposure to hazardous substances for which protection was not provided (NOTE: a near miss is an incident that has the potential to, but does not, result in injury, illness, or property damage);
- wearing and maintaining personal protective equipment PPE, as specified in the SSHP and associated HSWPs;
- reporting to the SSHO any hazards not documented in the SSHP or inadequately controlled by procedures contained in the SSHP and associated HSWPs;

- implementing assigned responsibilities in accordance with the SSHP, EC&HS procedures, Health Physics procedures, and other applicable documents (e.g., work plans, sampling and analysis plans, laboratory procedures, etc.);
- observing work in radiologically controlled areas to verify compliance with radiological controls;
- reporting all findings and activities to the FM or SSHO.

Figure 2-1. SAIC Staff EC&HS Organization



3.0 CONTAMINANT AND HAZARD DESCRIPTION

Site tasks will include, but are not limited to, conducting radiological surveys, collection and analysis of air, soil, surface water, groundwater, and sediment samples to determine the extent of radiological/chemical contamination at the site and its impact on the environment. Because surface and subsurface soil is contaminated with radioisotopes, there is some potential for exposure to ionizing radiation in contaminated soil and the spread of contamination to previously uncontaminated areas. Exposure to chemical contaminants is also possible, but less likely. Site tasks present a variety of possible physical hazards, with drilling operations and excavation offering the greatest potential for significant injury. Physical hazards include, but are not limited to, entanglement with rotating equipment, being struck by moving equipment or other objects, vehicle accidents, inclement weather, and electrocution caused by contact of equipment with energized power transfer systems. Changes (i.e., upgrades and downgrades) in protective measures require prior approval of the SSHO and RPM. Field upgrades will be made as needed, with subsequent approval of the SSHO.

An activity hazard analysis (AHA) shall be prepared as described below before beginning each activity involving a type of work presenting hazards not experienced in previous project operations,. Every potential hazard associated with work at the St. Louis FUSRAP sites should be considered when generating AHAs and when writing HSWPs. Examples of hazards may include, but are not limited to the following:

Table 3-1. Hazards Inventory

Biological hazards	Heavy equipment impact
Chemical hazards	Improperly secured loads during lifting or rigging
Confined space entry	Noise
Drowning	Operation of power tools or equipment
Electrocution	Radiation or radioactive contamination
Excavation hazards	Slips, trips, and falls
Fire	Environmental temperature extremes
Inclement weather	Vehicle traffic hazards
Heavy/awkward lifting	Handling hot/cold material (e.g., oven samples, liquid nitrogen)

3.1 ACTIVITY HAZARD ANALYSES

An AHA shall be prepared and documented for each SAIC activity as warranted by the hazards associated with the activity. Generally, an AHA shall be prepared for all field operations other than routine surveillance and inspection of field activities. In developing the analysis for a particular activity, the SSHO should draw upon the knowledge and experience of employees in that activity. An HSWP will be written to prescribe the necessary controls for the activity, based on the results of the AHA.

Analyses shall define the activities being performed, identify the sequences of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not begin until the SSHO or designee has approved the AHA.

A number of intrusive and non-intrusive activities are planned. The activities associated with FUSRAP may include the following:

- perimeter air monitoring,
- radiological monitoring,

- drum/container sampling and waste management activities (i.e., labeling, inspecting, etc.)
- geophysical survey,
- drilling of soil boreholes with hollow-stem auger and air rotary drill rig,
- shallow soil sampling with hand augers or scoops,
- collection of soil samples from boreholes,
- groundwater monitoring well installation and abandonment,
- collection of groundwater samples from wells,
- surface water sampling,
- passive soil gas survey,
- radiological walkover surveys,
- sediment sampling,
- excavations,
- in situ gamma spectroscopy,
- equipment decontamination,
- preparation, radiochemistry, and analysis of potentially contaminated samples in the analytical laboratory,
- radiological support of field activities, and
- storm-water sampling.

The non-intrusive tasks, such as civil surveying, geophysical surveying, and walkover radiological surveying, and minimally intrusive tasks, such as passive soil gas sampling, surface water sampling, and groundwater sampling, pose a very limited potential for external radiation exposure and radiological and chemical contamination. Some water samples will be preserved with corrosive materials, posing a skin and eye contact hazard. Physical hazards for such tasks will be minor since the tasks will not involve heavy equipment, power tools, or other physical hazards beyond slip/trip hazards. These examples of activities and hazards should be considered when developing HSWPs.

Intrusive tasks utilizing heavy equipment (soil boring with hollow stem auger rigs, soil boring with air rotary rigs, groundwater well installation and abandonment, excavation) pose more significant physical hazards. Contact with moving equipment, being struck by falling equipment, excavation cave-in, and noise are all hazards associated with heavy equipment use. Surface soil sampling and equipment decontamination pose significantly lesser physical hazards. The intrusive tasks also pose a greater probability of radiological and chemical contamination because potentially contaminated soils will be uncovered and handled.

Analytical laboratory tasks, such as radiochemistry and handling/analysis of potentially contaminated samples, pose a very limited potential for external radiation exposure and radiological and chemical contamination from samples. However, there are chemicals stored and used in the lab during radiochemistry procedures that may pose a significant hazard. Also, some water samples will be preserved with corrosive materials, posing a skin and eye contact hazard. Physical hazards for such tasks will be minor since the tasks will not involve heavy equipment, working at heights, or other physical hazards beyond slip/trip hazards. These examples of activities and hazards should be considered when developing HSWPs. Additional information regarding health and safety requirements for the analytical laboratory is found in the HISS Radioanalytical Laboratory Chemical Hygiene Plan and Laboratory Safety Program for the FUSRAP St. Louis Radioanalytical Laboratory.

AHAs for the expected activities listed above will be maintained with the applicable HSWP. When a task not described in this document is encountered, the SSHO will conduct a task-

specific AHA to evaluate the requirements necessary to perform the task safely. The task-specific AHA will be documented on the AHA form provided in **Appendix F**, or an equivalent form.

3.2 POTENTIAL EXPOSURES

3.2.1 Site Contaminants

Neither the North St. Louis County nor SLDS sites are sufficiently contaminated to pose a significant short term or long term hazard to site personnel, as long as reasonable standard procedures are followed.

Information on the significant contaminants at North St. Louis County and SLDS Sites are contained in applicable ROD and Feasibility Studies (FS) for each site. The radiological contaminants of concern (COC) for both North St. Louis County and SLDS sites include Actinium-227, Protactinium-231, Lead-210, Radium-226, Radium-228, Thorium-228, Thorium-230, Thorium-232, Uranium-234, Uranium-235, and Uranium-238. The chemical COCs for SLDS include arsenic and cadmium. The chemical COCs for North St. Louis County include Antimony, Arsenic, Barium, Cadmium, Chromium, Molybdenum, Nickel, Selenium, Thallium, Uranium, and Vanadium.

3.2.2 Radiological Hazards

Portions of the St. Louis FUSRAP sites contain above background concentrations of radioactivity. The primary radiological contaminants are natural uranium and thorium, and their associated decay products. External exposure hazards are generally not significant, because uranium and thorium are weak gamma emitters and the gamma emitting decay products are at lesser concentrations. Internal exposure, through inhalation, ingestion, or injection through open wounds, is the primary hazard associated with these contaminants. Since the inception of the project, many of the sites have been cleaned and remediated in accordance with the ROD. Although not all areas have been completely remediated, the source term has been markedly reduced.

3.2.2.1 Airborne Radioactive Contamination

Radioactive airborne particulates may be present in active work areas or may be produced as a result of disturbance of contaminated soils, debris, concrete or asphalt pads, or any other material that has fixed or removable contamination. Airborne radioactive contamination may include particulates, and radon and thoron gases. Areas with radioactive airborne particulates in excess of 10 *CFR* 20 Appendix B, Table 1, Column 3 concentrations, or where an individual present without respiratory protection in the area could exceed an intake of 0.6% of the Annual Limits on Intake (ALI) per week (12 DAC-hrs/week), must be posted "Caution – Airborne Radioactivity Area." Respiratory protection may be required in these areas based on measured or expected concentrations and/or duration of activity. Airborne Radioactivity Areas are not anticipated on the St. Louis FUSRAP. The RPM will establish a schedule for conducting breathing zone (BZ) sampling to confirm that airborne radioactive contamination does not become a substantial hazard. Additionally, BZ sampling should be conducted more often during tasks that may generate airborne radioactive contamination.

3.2.2.2 Health Effects Associated with Radiation Exposure

The health effects of potential radiological hazards associated with radiological contaminants identified in Section 3.2.1 are included in Table 3-2, "Potential Exposures."

At the St. Louis FUSRAP Sites, inhalation of radioactive airborne particulates presents the greatest concern, because radioactive material may be deposited inside the body where tissues are more sensitive to the types of radiation (especially alpha) emitted by uranium, thorium, and their decay products. In addition, internal radiation exposure continues until the material has been eliminated from the body. Chronic exposure to radiation is associated with an increased risk of cancer. Soluble uranium in high concentrations is also associated with toxic kidney effects.

Provided that effective engineering and administrative controls, dust controls, respiratory protection (as applicable), and protective clothing measures are implemented and strictly adhered to, radiation exposures due to inhalation and ingestion of airborne radioactive contamination will be maintained well below USACE and SAIC administrative limits.

3.2.3 Nonradiological Hazards

The health effects of potential chemical hazards associated with non-radiological contaminants identified in Section 3.2.1 and other chemical contaminants that may be introduced because they are needed to perform the required work (e.g., sample preservatives, gasoline, etc.) are included in Table 3-2, "Potential Exposures." If not listed in one of these tables, a specific AHA evaluation will be done by the SSHO or designee. The health effects, hazards, and hazard controls associated with chemicals used at the radioanalytical laboratory will be addressed in a separate Laboratory Chemical Hygiene Plan.

The contaminants are listed by common name. The lower of the published exposure limits [i.e., threshold limit value (TLV) or permissible exposure limit (PEL)] is listed along with applicable short-term exposure limit (STEL) and immediately dangerous to life and health (IDLH) values. Field crews shall utilize engineering and administrative controls as the primary means of maintaining employee exposures below these levels and ALARA.

Table 3-2. Site Contaminant Potential Exposures

Chemical	Exposure Limits [a]	Health Effects/ Potential Hazards[b]	Chemical and Physical Properties[b]	Exposure Route(s)[b]
Arsenic	PEL/TWA: 0.01 mg/m^3 IDLH: Ca [5 mg/m^3]	Dermatitis, nasal tissue damage, stomach upset, potential cancer	Solid; VP: 0 mm; FP: NA	Inhalation Ingestion Absorption Contact
Toluene	TLV: 50 PPM, A4 Skin notation	Fatigue; dizziness	Liquid with aromatic odor; VP: 20 mm; FP: 40°F; IP: 8.82 eV; flammable liquid	Inhalation Ingestion Absorption Contact
Gasoline (fuel)	TLV/TWA: 300 PPM IDLH: NA	Dizziness, eye irritation, dermatitis; flammable liquid	Liquid with aromatic odor; FP: -45°F	Inhalation Ingestion Contact
Isopropyl alcohol (used for equipment decontamination)	TLV/TWA: 400 PPM STEL: 500 PPM	Irritation of eyes, skin, respiratory system; headache, drowsiness; flammable liquid	Colorless liquid; VP: 33 mm; IP: 10.10 eV; FP: 53°F	Inhalation Ingestion
Liquinox (used for decontamination)	TLV/TWA: NA	May cause local irritation to mucus membranes	Aqueous liquid, odorless, nonflammable	Ingestion Contact
Nitric acid (used to preserve water samples)	PEL/TWA: 2 PPM IDLH: 25 PPM	Eye, skin, respiratory system irritation/burns; delayed pulmonary edema	Liquid with acrid odor; VP: 48 mm; IP: 11.95 eV; FP: none	Inhalation Ingestion Contact
Hydrochloric acid (used to preserve water samples)	TLV: 0.5 mg/m^3 IDLH: 50 PPM	Eye, skin, respiratory system irritation/burns	Liquid with irritating odor; FP: none	Inhalation Ingestion Contact
Lead	TLV/TWA: 0.05 mg/m^3, PEL/TWA: 0.05 mg/m^3 IDLH: 100 mg/m^3	Weakness, anorexia, abdominal pain, anemia	Solid metal; VP: 0 mm; FP: NA; IP; NA	Inhalation Ingestion Contact
Barium	PEL/TWA: 0.5 mg/m^3 IDLH: 50 mg/m^3	Irritation of eyes, skin, lungs; muscle spasm	Solid; VP: Low; FP: NA	Inhalation Ingestion Contact
Cadmium	PEL/TWA: 0.005 mg/m^3 IDLH: 9 mg/m^3	Breathing difficulty, cough, chest tightness, pain beneath the sternum, headache, chills, aches, vomiting	Solid; VP: 0 mm; FP: NA	Inhalation Ingestion Contact
Thorium 230 (Class Y)	DAC: 6×10^{-12} µCi/mL	Potential carcinogen	Solid; VP: NA; FP: NA	Inhalation Ingestion Contact

Table 3-2. Site Contaminant Potential Exposures (Cont'd)

Chemical	Exposure Limits [a]	Health Effects/ Potential Hazards[b]	Chemical and Physical Properties[b]	Exposure Route(s)[b]
Thorium 232 (Class Y)	DAC: 1×10^{-12} µCi/mL No PEL/TLV established	Potential carcinogen. Irritation of eyes, skin, respiratory tract. Pernicious anemia.	Solid; VP: NA; FP: NA	Inhalation Ingestion Contact
Radium 226 (Class W)	DAC: 3×10^{-10} µCi/mL No PEL/TLV established	Potential carcinogen	Solid: VP: NA; FP: NA	Inhalation Ingestion Contact
Uranium 238 (Class D) (Class W) (Class Y)	DAC: 6×10^{-10}µCi/mL DAC: 3×10^{-10}µCi/mL DAC: 2×10^{-11} µCi/mL PEL/TWA: 0.05 mg/m^3	Potential carcinogen Lacrimation, conjunctivitis; shortness of breath, cough, chest rates; nausea	Solid; VP: NA; FP: NA	Inhalation Ingestion Contact
Trichloroethylene (TCE)	PEL 100PPM C 200PPM STEL 300PPM (5-min. max peak in any 2 hrs) Ca [1000PPM] REL 25PPM (10 hr TWA)	Potential carcinogen Irritation of eyes, skin, headache, vertigo, visual disturbance, fatigue, giddiness, tremor, somnolence, nausea, vomiting, dermatitis, cardiac arrhythmias, paresthesia, liver injury	Colorless liquid with a chloroform like odor. VP: 58mm, FP: NA, IP: 9.45eV	Inhalation Absorption Ingestion Contact
Selenium	REL/PEL = 0.2 mg/m^3 IDLH = 1 mg/m^3 (as Se)	Irritation of eyes, nose and throat; visual disturbance; headache, chills, fever; difficulty breathing, bronchitis, metallic taste, garlic breath, GI disturbances, dermatitis, eye and skin burns	Amorphous or crystalline, red to gray solid (Note: occurs as an impurity in most sulfide ores) FP: NA, IP: NA, VP: 0 mm (approx)	Inhalation Ingestion Contact

NOTE: The St. Louis FUSRAP Laboratory Chemical Hygiene Plan includes all information as shown above.

[a] From 1999 Threshold Limit Values, NIOSH Pocket Guide to Chemical Hazards, or 10 *CFR* 20.

[b] From NIOSH Pocket Guide to Chemical Hazards.

PPM = parts per million
NA = not available
PEL = permissible exposure limit
TLV = threshold limit value
IDLH = immediately dangerous to life and health
VP = vapor pressure
FP = flash point
TWA = time-weighted average
DAC = derived air concentration

4.0 TRAINING

Personnel who participate in field activities associated with this project and who will be exposed to contaminant related health and safety hazards are subject to the training requirements presented in Table 4-1. Field activities include all the tasks specified in Section 3.1 of this plan as well as any other unspecified tasks that take place within Restricted Areas. Examples of such other tasks include conveying sampling equipment to field crews, observing field crews, transporting samples within the confines of the site, etc. Any entry to a Controlled Area shall require worker training, except as outlined in Section 4.3. Personnel driving or walking on paved roads that are not within potentially contaminated areas are not subject to the training requirements in Table 4-1. Paperwork, meetings, or similar activities inside routinely occupied buildings or office trailers are not field activities and are not subject to these training requirements. Visitors who will enter controlled areas must have site visitor training per Section 4.3. Visitors, such as individuals that will be on site but who will not enter Controlled Areas are not required to have the Site Visitor Training listed in Table 4-1. Delivery, service/repair, and administration personnel who only access the office or staging areas of the support zone are not subject to these training requirements.

Table 4-1. Training Requirements

Training	Worker	Supervisor
Hazardous Waste Operations (40 hour, 3 day OJT)	√	√
Hazardous Waste Operations Annual Refresher (8 hour)	√	√
SAIC Radiological Worker Annual Training (or RPM approved equivalent)	√	√
Hazardous Waste Operations Supervisors Training (8 hour)	×	√
General Hazard Communication Training (Contained in 40-hour and 8-hour courses)	√	√
Respiratory Protection Training (required only if respirators are worn)	√	√
Hearing Conservation Training (for workers in hearing conservation program; contained in 40-hour and 8-hour courses)	√	√
Lockout-Tagout Training (for authorized and affected employees in the HISS lab)	√	√
Site Worker Training	√	√
Site Specific Hazard Communication (contained in HSWP pre-job briefings, as applicable)	√	√
Safety Briefing (daily when field work is being conducted and whenever conditions or tasks change)	√	√
Site Visitor Training	×	×
First Aid/CPR (Red Cross or Equivalent) [if medical services >5 min. away]	≥2 workers	×

√ = Required
× = Not required
OJT = on-the-job training

4.1 HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE TRAINING REQUIREMENTS

All personnel involved with hazardous, toxic, or radiological waste (HTRW) activities under the FUSRAP sites (e.g., fieldwork) and who will be exposed to contaminant related health and safety hazards are required to have 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training, as well as a current 8-hr Annual HAZWOPER Refresher and SAIC's

current Radiological Worker training. In addition to this training, three days of relevant field experience [i.e., OJT- is required and must be documented by the SSHO or FM.

The 8-hour HAZWOPER Refresher course is required annually to be current in the 40-hour course. An extension may be granted for up to 90 days by the SSHO if the refresher course has not been taken, but has been scheduled to be completed within the extension period.

If an employee that received the 40-hour initial training is temporarily removed from hazardous waste operations and more than 13 months has elapsed between 8-hour refresher training, an evaluation will be made to determine whether the individual is required to receive the initial 40-hour training again or may be re-certified after an 8-hour refresher course. In all cases, a lapse period of 3 years will require that an employee complete the initial 40-hour course again.

The HAZWOPER Manager/Supervisor Training is required for the SSHO and personnel who directly supervise hazardous waste site workers. This is an 8-hour course that must be taken once. Note that the initial 40-hour HAZWOPER course is a prerequisite.

The SAIC Radiological Worker training is required annually for employees that perform field and lab work. The content of the Radiological Worker training includes, at a minimum; the health effects of ionizing radiation, exposure limits (including those for declared pregnant workers), use of dosimetry and instruments, effects of radiation on the embryo/fetus, employee rights and responsibilities, site contaminants and probability of exposure, required monitoring, and exposure control methods. Current Radiological Worker training, other than that provided by SAIC, may be approved by the RPM if course content can be verified as having met the minimum requirements. Radiological Worker training may be waived by the RPM for visitors who are escorted by a fully trained individual as outlined in Section 4.3, "Site Visitor Training".

General Hazard Communication Training is required for all site workers. This training must communicate the risks and protective measures for chemicals that employees may encounter. This requirement is met by taking the 40-hour HAZWOPER course, annual refreshers, and site-specific training.

Respiratory Protection Training is required for all individuals who wear respirators. This requirement is met by taking the 40-hour HAZWOPER course, annual refreshers, and site-specific training. Additionally, a fit test and doctor approval are required.

Hearing Conservation Training is required on an annual basis by 29 *CFR* 1910.95 for all employees enrolled in a hearing conservation program. This will include all employees exposed to occupational noise in excess of 85 dBA for an 8-hour time-weighted average. This annual training is provided as part of the 40-hour HAZWOPER course, annual refreshers, and site specific training.

Lockout-tagout training is required for all authorized and affected employees who work in the lab where energy control procedures may be utilized. Training must meet the requirements of 29 *CFR* 1910.147 and SAIC procedure EC&HS 11.

4.2 SITE WORKER TRAINING

Personnel on site must receive site-specific safety training. Signatures of those attending and the contents of the training must be entered into project documentation before site access to controlled areas will be granted. The site-specific training will include the following site-specific information, as appropriate:

- names of site health and safety personnel and alternates;
- contents of the project SSHP;
- hazards and symptoms of contaminant exposure (chemical and radiological)
  - names of contaminants
  - exposure limits
  - monitoring
  - pregnancy concerns
- hazards and symptoms of chemicals used on site;
- physical hazards in the workplace;
- location and availability of written hazard communication program;
- site- and task-specific PPE including purpose, activity description, donning, doffing, and proper use;
- safe work practices to minimize risks;
- safe use of engineering controls and equipment;
- medical surveillance requirements and employee medical/exposure records access;
- site control measures;
- reporting requirements for spills and emergencies;
- decontamination procedures to prevent the spread of chemical and radiological contamination;
- contingency plans (e.g., communications, phone numbers, emergency exits, assembly point, etc.);
- hearing conservation (e.g., for noisy work if worker does not have documented hearing conservation training);
- spill containment and other emergency procedures (e.g., reporting, clean-up methods, etc.); and
- emergency equipment locations and use (e.g., fire extinguishers, spill kits, etc.).

Safety briefings will be held daily and when conditions or tasks change. These briefings will be conducted by the SSHO, FM, or designee and will be attended by personnel involved in the work. These briefings will address site-specific safety issues and will be used as an opportunity to refresh workers on specific procedures and to address new hazards and controls. Documentation of safety briefings will be in log books, morning meeting logs, or similar documents (e.g., training attendance sheets).

Training on the SAIC HP and EC&HS programs and their associate procedures is accomplished through required reading of applicable documents and procedures. Program and procedural training is assigned by the SSHO and RPM in coordination with the FM or Personnel Manager and is documented on the Training Assignment Record (QAAP 2.1) or equivalent (i.e., I-Track).

4.3 SITE VISITOR TRAINING

All site visitors required to perform hands-on work, inspections, or surveillance activities will receive a briefing specific to hazards and controls associated with their intended site tasks. The visitor briefing shall include, at a minimum:

- a review of site specific hazards and controls applicable to their intended task,
- procedures applicable to the task, and
- the applicable requirements of this SSHP.

A site visitor requiring access to a controlled area must be escorted 100 percent of the time while in the controlled area. Training requirements outlined in previous sections may be waived if the visitor's task does not involve hands-on work (i.e., the task is an inspection or surveillance) and is no greater than 8 hours in duration. However, the visitor will be required to be escorted 100% of the time while in controlled areas.

Any site visitor requiring access to controlled areas to conduct hands on work or requiring greater than 8 hours access will be required to complete Site Worker Training and other applicable training as outlined in Sections 4.1 and 4.2. Site visitors are not allowed to enter Radiation Areas or Airborne Radioactivity Areas under any circumstance.

4.4 HEALTH PHYSICS TECHNICIAN TRAINING

HPTs are required to complete appropriate Health Physics Training prior to assuming responsibility for radiation safety activities. HPTs shall be qualified to perform certain tasks by the training and evaluation of the task performance being documented on the Training Evaluation Standard (TES) by a qualified trainer/evaluator for the task. Completion of a TES shall be documented on the SAIC HPT Qualifications Status Form (**HP 04 – Attachment 1** or equivalent).

Training on the SAIC HP and EC&HS programs and their associate procedures is accomplished through required reading of applicable documents and procedures. Program and procedural training is assigned by the SSHO and RPM in coordination with the FM or Section Manager and is documented on the Training Assignment Record (QAAP 2.1) or equivalent.

4.5 DOCUMENTATION

Documentation of the required training will be maintained in the on-site project files. This documentation will include copies of 40-hour and 3-day OJT, 8-hour refresher and supervisor training certificates, SAIC Radiological Worker training records, copies of first aid/cardiopulmonary resuscitation (CPR) certificates, and records showing the topics covered, trainer, and signatures of those attending on-site training.

5.0 MEDICAL SURVEILLANCE

All employees performing on-site work will be enrolled in a medical surveillance program to meet the requirements of 29 *CFR* 1910.120(f), 1910.134(e), and 1910.1020, and SAIC EC&HS Procedures 12 (Medical Surveillance) and 20 (Hazardous Waste Operations), to assess and monitor workers' health and fitness for employment in the field. Employees are provided with summaries of medical examination results following each examination and are provided more detailed information upon written request. Documentation of medical clearance will be maintained on site during the project.

The frequency of employee medical exams shall be as follows:

- prior to assignment;
- once every 12 months for each employee covered unless the attending physician believes a shorter or longer interval (not to exceed 2 years) is appropriate;
- at termination of employment or reassignment to an area where the employee would not be covered, if the employee has performed field work since his/her last examination and has not had an examination within the last 6 months; or
- as soon as possible upon notification by an employee that he/she has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the PEL or published exposure levels in an emergency situation.

6.0 EXPOSURE MONITORING

Assessment of employee exposures will be performed, as appropriate, to ensure that exposures do not exceed acceptable levels. Action levels, with appropriate actions, have been established for this monitoring. In addition to the specified monitoring, the SSHO may perform, or require, additional monitoring, such as organic vapor monitoring in the equipment decontamination area, personnel exposure sampling for specific chemicals, etc. The deployment of monitoring equipment will depend on the activities being conducted and the potential exposures. All personal exposure monitoring records will be maintained in accordance with 29 *CFR* 1910.1020. Table 6-1 establishes minimum standards for on-site work. These, as well as additional requirements, will be communicated through AHAs and HSWPs.

Overexposure to airborne organic contaminants is very unlikely, however, the FM, SSHO, or designees may require that air monitoring be conducted using a PID, FID, or equivalent instrument. Although not all volatile organic chemicals can be detected in this fashion, many potential site contaminants can be detected and will serve as indicators of potential exposures. If breathing zone concentrations of total organic vapors exceed 5 parts per million (PPM) for more than 5 minutes, the activity will be stopped and the FM will notify the SSHO. Following assessment of the situation, appropriate actions will be taken. These may include identification of the airborne contaminant(s), measures to reduce airborne concentrations, and consideration of the use of respiratory protection. If breathing zone readings decrease to less than the action levels (5 PPM for total organic vapors), the activity will be resumed without respiratory protection. The instrument used to monitor for organic vapors will be calibrated daily, using the technique specified by the manufacturer.

Air monitoring for combustible gases and oxygen will be conducted using a combustible gas indicator if site conditions suggest the potential for flammable concentrations of solvents or other airborne gases or vapors. Indications of such potential include elevated (>100 PPM) total organic concentration at the source (borehole) or indication that methane may be present, such as a landfill or buried organic material. This monitoring will be conducted close to the source (2-12" from borehole or auger) to reflect worst-case conditions. If used, the combustible gas indicator will be calibrated daily using the technique set forth by the manufacturer.

Historical external gamma radiation exposure monitoring results for personnel has indicated that no individual has received a quarterly whole body dose greater than the minimum detectable dose of 10 mrem/quarter for the thermoluminescent dosimeter (TLDs) used for monitoring. Moreover, the historical monitoring indicates that personnel do not require gamma exposure monitoring for occupational radiation exposure at the FUSRAP sites. It is unlikely that personnel will require monitoring based on the continued reduction of the source term at the various FUSRAP sites. Therefore, TLDs for monitoring occupational radiation exposure will not be issued unless conditions change that would trigger the requirement. However, declared pregnant women who require entry into radiological restricted areas will be monitored for external radiation exposure.

Monitoring for radiological contamination will be conducted using radiation monitoring equipment (RME). RME will be used in accordance with SAIC St. Louis Procedures:

HP-11, "Radiological Monitoring," and
HP-30, "Radiological Instrumentation."

Time-integrated air sampling will be conducted to determine the exposures of representative employees if direct-reading monitoring or other indicators suggest the potential for exposures

greater than one-half the TLV, PEL, or 5 percent of a DAC. Exposure assessments will be reported as required in 10 *CFR* 20 and 29 *CFR* 1910.

Area or perimeter sampling will also be conducted to assess the potential for off-site exposure. This sampling will be conducted in accordance with the approved Environmental Monitoring Implementation Plan for a specific fiscal year .

Entry and routine bioassay samples are no longer required in accordance with the Memorandum "St Louis FUSRAP Policy concerning DAC and Air Effluent (AE) Values of 11/6/2002 However, routine bioassay samples will be collected monthly for any personnel who perform hands on work in restricted areas and are likely to exceed 100 mrem/yr committed effective dose equivalent (CEDE) or 5000 mrem/yr committed dose equivalent (CDE) from intake of radioactive materials. Hands on work is defined primarily as intrusive work, but may include any work which produces a realistic probability of exposure to radiological contaminants. Any individual suspected of sustaining significant acute intake of radioactive contaminants would have special samples collected. Also, if an individual accumulates intakes exceeding 40 DAC-hrs cumulative exposure (based on routine air sampling), the individual is required to submit a special bioassay sample. These special bioassay samples may include both urine and fecal samples. A laboratory meeting the requirements of American National Standards Institute (ANSI) N13.30 will analyze these samples. Because Thorium intakes may not be detectable by the normal urine bioassay methods, air sampling will be conducted to assess employee exposure to thorium isotopes.

SAIC has conducted noise monitoring of standard types of site equipment at previous projects and has established basic hearing protection requirements. Drill rigs, portable drilling devices, and generators will be assumed to generate sound levels in excess of 85 dBA (requiring hearing protection) unless site-specific sound level measurements are conducted and indicate otherwise. If used, sound level meters will be calibrated daily (each day of use).

Table 6-1. Monitoring Requirements and Action Limits

Hazard or Measured Parameter	Area	Interval	Limit	Action	Tasks
Airborne organics with 10.2 eV PID or equivalent	Breathing zone (2-3 feet from source or 14 inches in front of employee's shoulder) or near borehole and any area where flammable gases are suspected	Intermittently during intrusive activities; continuously during elevated readings	<5 PPM >5 PPM	Level D – Withdraw and evaluate – identify contaminants – notify SSHO and Field Manager – implement control measures, potentially including Level C PPE	Drilling and confined space entry
Airborne chemical concentrations (detector tubes)	Breathing zone (2-3 feet from source or 14 inches in front of employee's shoulder) or near borehole and any area where flammable gases are suspected	Screening with detector tubes will be conducted in an attempt to identify airborne contaminants if breathing zone PID readings exceed 5 PPM. The types of tubes to be used will be based on current conditions.	½ of PEL or ½ of TLV	Variable, may include engineering, administrative, or personal protective measures	Any indicated by organic vapor instrument readings
External ionizing radiation with TLDs	Worn between waist and neck of employee	Continuously when in the radiological restricted area for declared pregnant workers.	100 mrem for the entire pregnancy (TEDE)	Notify RPM and SSHO. Additional controls may include engineering or administrative controls	Entry into radiological restricted areas
Radiological contamination with survey instrument. alpha & beta sensitive plastic scintillation /count rate system, or equivalent.	Areas of intrusive work, drill cuttings, when personnel leave contaminated areas, when equipment is removed from contaminated areas, clean areas on a routine basis to verify non-contamination	Upon exit from controlled areas. At least once per week in break areas and monthly in office areas.	Radionuclide specific Surface Radioactivity Limits outlined in Table 8-2 of this SSHP.	Notify SSHO and RPM. Additional controls may include changes to PPE, decontamination procedures, or engineering controls	All on-site tasks in radiological areas
Time weighted sampling for airborne radionuclides	Breathing zone in areas of intrusive work and area samples nearby to establish potential for off-site migration, as applicable.	Representative personnel and areas at job start and intermittently thereafter for personnel working in areas where air concentrations may exceed 5% of the DAC.	5 percent of DAC	Variables may include engineering, administrative, or personal protective measures. Known or suspected intakes may require bioassay sampling.	Intrusive tasks

Table 6-1. Monitoring Requirements and Action Limits (Cont'd)

Hazard or Measured Parameter	Area	Interval	Limit	Action	Tasks
Flammability and oxygen concentration with combustible gas indicator	Near borehole and any area where flammable gases are suspected	Intermittently during intrusive activities; Continuously if elevated readings are observed.	<10 percent LEL >10 percent LEL <19.5 percent O_2 >23.5 percent O_2	Continue and evaluate source Withdraw and allow area to ventilate for a minimum of 30 minutes; notify SSHO	Drilling
Temperature	In or near work area	Periodic measurements when protective clothing is required in areas greater than 85 degrees	>85°F <40°F	Administrative controls (See Section 8.18)	All tasks
Noise	Exclusion zone around drilling equipment, and electrical generators.	Note that this monitoring is optional, if monitoring is not performed, the areas will be assumed to exceed 85 dBA	>85 dBA	Require the use of hearing protection	Drilling, generator use, weed wacking, or anytime noise levels >85 dBA
Bioassay for internal radiological exposure	All on-site personnel working in areas or conducting activities where it is likely for radiological exposure >100 mrem/year CEDE or 5000 mrem/yr CDE.	Baseline if conditions dictate Routine for any individual likely to exceed 100 mrem/yr CEDE or 5000 mrem/yr CDE from an acute intake or 10 DAC-hrs/month cumulative exposure. Special if acute intake is suspected exceeding 100 mrem/yr or for exposure of 40 DAC-hrs based on BZ air sampling.	0.3 µg - Tot-U/L	Conduct exposure investigation and dose assessment.	Intrusive tasks
Removable surface contamination determined by smearing surface of 100cm^2.	All equipment and items removed from the restricted area and contaminated area.	Each exit	Surface Radioactivity Limits as outlined in Table 8-2 of this SSHP.	Remove by decontamination and resurvey. If contamination can not be removed, control as radioactive material.	Survey all equipment removed from contaminated and restricted areas

LEL = lower explosive limit
PEL = permissible exposure limit
TBD = to be determined
TLV = threshold limit value

7.0 PERSONAL PROTECTIVE EQUIPMENT

PPE for site tasks is based on potential site-specific physical, radiological, and chemical hazards. In cases where multiple hazards are present, a combination of protective equipment will be selected so that adequate protection is provided for each hazard. This section emphasizes the programmatic requirements for PPE. Task-specific equipment is listed on the task specific HSWP. For more information on HSWPs see Section 8.3 of this SSHP. In accordance with USACE requirements, two additional complete sets of PPE will be maintained by SAIC on site for use by government personnel during site visits.

7.1 PPE PROGRAM

SAIC's PPE program is controlled by EC&HS Procedures 13 and 20, 29 *CFR* 1910, Subpart I, Personal Protective Equipment and EM 385-1-1 Section 5. The level of protection and types of materials selected for a particular task are based on the following:

- potential for exposure due to work activity;
- work activity duration;
- route of exposure;
- measurcd or anticipated concentration in the medium of concern;
- toxicity, reactivity, or other measure of adverse effect; and
- physical hazards such as falling objects, flying projectiles, etc.

In situations where the type of contaminant and probability of contact are not known, the appropriate protection is selected based on the professional judgment of the SSHO until the hazards are further evaluated.

The SSHO and FM, in consultation with each other, may raise or lower the level of PPE worn by personnel, depending upon the site-specific hazards encountered in the field. If site conditions are such that the level of PPE is insufficient or work must be stopped, the SSHO or FM will take appropriate action immediately. Criteria indicating a possible need for reassessment of the PPE selection include the following:

- commencing an unplanned (hazard not previously assessed) work activity;
- working in unplanned temperature extremes or change in climatic conditions;
- changing of work conditions (i.e., evidence of contamination, such as discolored soil or elevated instrument readings near the soil);
- exceeding the action limits of chemical or radiological hazards; or
- changing the work scope so that the potential for contact with contaminants changes.

Should respiratory protection (Level C) become necessary, SAIC EC&HS Procedure 9, Respiratory Protection, will be implemented. As a minimum, this will require that respirator users have current training, fit tests, and medical clearance for respirator use. Workers will wear only the type and size respirator for which they have been fit tested. The SSHO will provide site specific respirator training to ensure that workers understand proper respirator use.

7.2 TYPES OF EQUIPMENT

This section presents the types of protective clothing that may be used for the project. Requirements for task-specific levels of protective clothing are presented in the AHA and the task specific HSWP. Levels of protection that will be used to protect against chemical, radiological, and physical hazards at this site include:

- Level C Protective Equipment
  - full-face respirator and air purifying cartridges capable of filtering out organic vapors, acid gases, and radionuclides
  - hooded chemical-resistant clothing (Polyethylene-coated Tyvek® or equivalent) with all openings taped
  - two pair chemical-resistant gloves (hazard specific)
  - safety boots (American Society of Testing and Materials (ASTM)-F2412 & F2413, formerly ANSI Z41)
  - shoe covers
  - hard hat (ANSI Z89.1)
- Level D+ Protective Equipment (may vary depending on activity specific hazards)
  - Tyvek® or equivalent coveralls with all openings taped
  - hazard specific gloves
  - safety boots (ASTM-F2412 & F2413, formerly ANSI Z41)
  - disposable boot covers
  - hard hat (ANSI Z89.1)
  - safety glasses with side shields (ANSI Z87.1)
  - splash goggles or face shield (if splash hazard for eye or face/skin is present)
- Level D Protective Equipment
  - coveralls/field clothes
  - safety boots (ASTM-F2412 & F2413, formerly ANSI Z41)
  - safety glasses with side shields (ANSI Z87.1)
  - hard hat (ANSI Z89.1)
  - leather or similar work gloves if sharp or abrasive materials are handled

7.3 CLEANING, STORAGE, AND PROGRAM VERIFICATION

If site tasks require the use of chemical protective clothing, disposable clothing will be used. Disposable PPE will not be reused. Unused chemical protective clothing will be stored in clean staging areas until needed. The SSHO will verify that the PPE in use is appropriate and is being used properly.

8.0 STANDARD OPERATING SAFETY PROCEDURES

This section presents those general safety rules that apply to all operations performed by SAIC and its subcontractors. The provisions of the plan are mandatory for all on-site employees and visitors. This includes employees engaged in initial site reconnaissance, preliminary field investigations, mobilization, project operations, and demobilization.

8.1 SITE RULES

The following rules apply to all site activities:

- The current version of the OSHA poster will be prominently displayed in the field office.
- Safety briefings will be conducted at least weekly, or at the beginning of any new tasks (i.e., pre-job briefing) by the FM, SSHO, or designee to inform personnel of new hazards or procedures.
- "Tailgate" safety meetings are required daily for tasks involving field work.
- The SSHO, FM, and project personnel are responsible to suspend/stop work and require all personnel to evacuate the affected area if any of the following situations occur:
  - inadequate health and safety precautions on the part of any on-site personnel, and
  - potential for exposure greater than originally expected as a result of planned or unplanned activities.
- Personnel will perform only those tasks they believe they can do safely.
- Personnel will notify the SSHO of any medical conditions (e.g., allergy to poison ivy or bee stings, diabetes, and pregnancy) that require special consideration.
- Personnel will maintain proper workplace housekeeping to minimize the potential for trips and other accidents.
- Contact with potentially contaminated substances will be avoided. Site personnel working in potentially contaminated areas (e.g., chemical use areas, radiological areas, etc.) will avoid walking through puddles, pools, mud, kneeling on the ground, and placing equipment on the ground.
- Spills will be prevented to the greatest extent possible. In the event that a spill occurs, the spilled material will be contained to the extent possible.
- Eating, drinking, smoking, chewing gum or tobacco, and other practices that increase the probability of hand-to-mouth transfer are prohibited in contaminated and potentially contaminated areas.
- Workers should wash their hands and faces upon leaving the work area and prior to eating or drinking.
- All injuries, other than those requiring minor first aid, and accidents will be reported to the SSHO, FM, corporate Health and Safety Manager, and the USACE.
  - All rad related injuries will be reported to SSHO, RSO, RPM, corporate H&S Manager, and the USACE

- All on-site workers will abide by a buddy system. Members of a buddy team will maintain verbal or visual contact. With prior approval, use of a two-way radio will comply with the buddy system requirement.

8.2 PERMIT REQUIREMENTS

SAIC will obtain or coordinate with USACE to obtain all permits necessary for the safe execution of this project. At a minimum, all activities such as digging or drilling will be preceded by an investigation to preclude encountering sub-surface utilities. Prior to opening an excavation, underground installations (e.g., sewer, communication lines, water, fuel, electric lines), shall be located and protected from damage or displacement. Utility companies and other responsible authorities shall be contacted to locate and mark the locations and, if they so desire, direct or assist with protecting the underground installations. This process will be completed and documented in accordance with EC & HS 130 and 160 and with Section 25, Excavations, USACE Health and Safety Manual EM 385-1-1 2003.

8.3 HEALTH AND SAFETY WORK PERMITS (HSWPs)

8.3.1 Development

The HSWP system of documents is used for control of specific work that provides the minimum protective requirements for the performance of the work.

When a HSWP is in effect for an area or activity, SAIC employees and SAIC subcontract employees shall comply with the requirements of this SSHP. HSWPs shall be used in accordance with SAIC-St Louis Health Physics Procedure HP-21, "Health and Safety Work Permits." The HSWP shall follow the applicable provisions of this SSHP, applicable OSHA and USACE requirements, and any special safety, health, and environmental protective measures SAIC intends to implement, based on chosen work methods. All HSWPs and their revisions shall be reviewed by the SSHO and approved by the RPM, or their respective designees. All other permits, (e.g., Confined Space Entry Permit) applicable to a specific work activity must be completed, approved by the RPM, SSHO, or FM, as applicable, and attached to the approved HSWP before the activity is performed.

HSWPs can be designated as routine or special. A routine HSWP is used to control tasks and activities of a repetitive nature with general radiological, industrial, or occupational concerns that are reasonably expected to not change, and may be approved for up to one year. A special HSWP is used to control non-repetitive tasks with increased significance for industrial/occupational safety concerns or with the potential for significant exposure to radiation or radioactive material. Special HSWPs remain active only for the estimated duration of the job and are terminated at completion of the activity.

All protective measures will comply with Section 2, Sanitation, and Section 5, Personal Protective and Safety Equipment, USACE Health and Safety Manual EM 385-1-1 2003.

8.3.2 Implementation

The original approved HSWP shall be transmitted to the SSHO for retention in the HSWP package. A copy of the HSWP and all pre-job briefing forms shall be present in the work area vicinity.

In order to provide for safety awareness at the worker level, the SAIC SSHO or designee shall review the HSWP with the work crew prior to the start of work on the first day of the activity. The review meeting shall include the following topics, as applicable: (1) scope of work being performed; (2) hazardous conditions of the workplace and controls; (3) procedural and HSWP requirements; (4) limiting condition that may void the HSWP or attached permits; (5) hold points; (6) communication and coordination with other work groups; (7) provisions for housekeeping and final cleanup; and (8) emergency response and evacuation planning, as applicable. All workers and supervisors directly participating in the job shall attend the briefing. Following the review, all participants shall sign and date the pre-job briefing form.

All safety awareness measures will comply with Section 1, Program Management, USACE Health and Safety Manual EM 385-1-1 2003.

8.3.3 Revision

HSWPs must be revised if hazardous conditions change to the extent that protective requirements need modification. HSWPs may be revised in the field during work activities upon notification of, and approval from, the SAIC SSHO, RPM, or their respective designee. Approval for a pen and ink change may be written or verbal. The SAIC work crew, subcontractor crew, and field supervisors shall sign the HSWP indicating that they have read, understand, and will comply with the HSWP revision.

Should conditions/concerns change while working under a HSWP, work shall stop until the conditions can be evaluated by the FM and/or SSHO, and a revision to the HSWP shall be issued to address the change. All personnel listed on the original HSWP shall be informed of the change and shall attend an HSWP review conducted by the SAIC SSHO, RPM, FM, or their respective designee prior to the start of work on the first day they conduct work under the revised HSWP.

8.3.4 Exemptions

A HSWP must be prepared for all entries into a Radiological Restricted Area, all tasks which may pose a threat of chemical exposure, and all tasks which pose physical threats in excess of those posed by routine in-office activities. Work activities that do not require an HSWP include:

- office work, site tours outside restricted areas, administrative support, work area inspections/surveillances.
- routine maintenance of barricades, barriers, or tarpaulins.
- placement of labels & signs when movement of containers is not involved.
- general housekeeping when no PPE other than standard safety apparel (hard hat and safety glasses) is required.
- packaging of routine environmental samples for off-site shipment.
- relocation of clean, empty containers when no equipment is needed for lifting.
- field surveillance of storage areas if no hands-on work is to be conducted.

All emergency response activities performed by SAIC employees, subcontractors, and off-site personnel will bypass HSWP requirements. These activities may include fire response, medical emergency response, or natural disaster response. After the immediate emergency response activities are completed, HSWP paperwork will be filled in for completion of the response.

8.4 DRUM/CONTAINER HANDLING

Any sampling or handling of drums (other than clean, empty drums) must first be evaluated (e.g., AHA conducted) and have an HSWP developed. Any drums used for the project will meet Department of Transportation (DOT) requirements and will be labeled to comply with applicable 10 *CFR* 20.1905 or 10 *CFR* 20.1906 requirements. Drums weighing more than 40 pounds must be handled with a drum dolly or other suitable device.

8.5 CONFINED SPACE ENTRY

Any confined space entry will be performed in conformance with the requirements of SAIC Corporate EC&HS Program Manual Procedure 10 "Confined Space Entry" and Section 6.1, Confined Space, USACE Health and Safety Manual EM 385-1-1 2003.

8.6 HOT WORK, SOURCES OF IGNITION, FIRE PROTECTION

- Hot work (oxyfuel cutting, welding, grinding etc..) will be conducted using the appropriate welder's helmet or shaded goggles, leather gloves, and a long-sleeved shirt at minimum.
- A fire extinguisher rated not less than 10-ABC will be in the immediate vicinity of hot work.
- A fire watch will be stationed in the vicinity of the hot work. The fire watch will be maintained for 30 minutes after completion of the hot work.
- Sources of ignition will be kept at least 15 meters from flammable storage areas.
- Flammables storage areas will be posted with signs indicating "No smoking or open flame."
- At least one fire extinguisher with a rating of not less than 20-B will be kept within 75' (23 m) from all flammables storage areas.
- An approved flammable cabinet will be used to store 25 gallons or more of flammable liquid.
- Flammable liquids (other than decontamination solvents) will be kept in approved safety containers with flame arresters.

Work under this Section will conform to Section 9, Fire Prevention and Protection, and Section 10, Welding and Cutting, USACE Health and Safety Manual EM 385-1-1 2003.

8.7 ELECTRICAL SAFETY

- All portable electrical equipment will be double insulated or grounded, and listed by a nationally recognized testing laboratory. All extension cords must be hard usage or extra hard usage as specified in the National Electric Code. Extension cords shall contain an equipment ground wire and shall not be spliced or tapped. Extension cords shall be protected from damage due to foot and vehicle traffic, sharp corners, pinching, etc. For construction sites, all flexible cords shall be inspected by the user of the cord at least daily. Patched, oil soaked, worn, or frayed electrical cords or cables shall not be used.

Extension cords shall not be secured with stables, hung from nails, or suspended by bare wire.

- Conductive materials (drill rigs) will be kept clear of energized power lines. Any overhead wire shall be considered energized unless the person owning such line or operating officials of the electrical utility supplying the line certifies that it is not energized and it has been visibly grounded and tested. The following minimum distances will be observed; Nominal system Voltage Minimum rated clearance 0 - 50 kV 9.8 ft (3 m), 51 - 200kV 14.7 ft (4.5 m), 201 - 300 kV 19.7 ft (6 m), 301 to 500 kV 24.6 ft (7.5 m), 501 - 750 kV 34.4 ft (10.5 m), 751 - 1000 kV 44.3 ft (13.5 m).

Work under this Section will conform to Section 11, Electrical, USACE Health and Safety Manual EM 385-1-1 2003 and with 29 *CFR* 1910, Subpart S.

8.8 EXCAVATION AND TRENCH SAFETY

Trench excavation poses the following potential hazards:

- contact with buried utilities,
- contact with contaminated materials,
- trench wall collapse, and
- work around heavy equipment.

Trench entry poses the additional potential hazards of:

- engulfment,
- exposure to hazardous airborne concentrations of toxic chemicals,
- flammable concentrations of vapors or gases, and
- oxygen deficiency.

The depth of the excavation and the nature of the excavated material significantly impact the potential hazard-the greater the depth, the greater the hazard.

Prior to opening an excavation, the site will be verified free of underground utilities (e.g., sewer, communication lines, water, fuel, electric lines) by contacting the local one-call system, local utility companies, and/or appropriate project personnel. If underground utilities are present, they will be located and protected from damage or movement. Other location-specific hazards, such as the potential for unexploded ordnance, building foundations, unstable rocks, etc., will also be controlled.

When persons will be in or around an excavation, a competent person shall inspect the excavation, the adjacent areas, and protective systems daily as needed throughout the work shifts, and after every rainstorm or other hazard-increasing occurrence. If evidence of a situation that could result in possible cave-ins, slides, failure of protective systems, hazardous atmospheres, or other hazardous conditions is identified, exposed workers shall be removed from the hazard and all work in the excavation stopped until all necessary safety precautions have been implemented.

Excluding personnel from trenches deeper than 4 feet will control cave-in hazards. Personnel will be kept at least 3 feet away from trenches deeper than 4 feet. Visual examination of an excavation will be done from the trench ends, rather than the sides. All excavation shall be performed from a stable ground position. All spoils will be located at least 3 feet from the edge of the excavation to prevent spoil material from falling back into the excavation.

If it becomes necessary for personnel to enter trenches deeper than 4 feet, the requirements of 29 *CFR* 1926.651 will be applied. Excavations will be inspected by a competent person daily, and after every rain or other hazard-increasing occurrence. This will include inspections of the excavation, shoring, benching, or sloping of the trench sides. If conditions indicate that cave-ins, slides, failure of shoring, hazardous atmosphere, or other hazardous conditions are possible, all work in the excavation will cease until the necessary safety precautions have been implemented.

Shoring will be accomplished using a trench box with rigid sides to prevent engulfment. If a trench box is not utilized, the trench sides will be sloped or benched. Atmospheric testing in the trench for flammable gases, toxic gases, and oxygen shall be conducted when there is reason to suspect such a hazard may exist, or when changing conditions may introduce such hazards. Prior to entering the trench(es), flammable gas concentrations must be less than 10 percent of the LEL, toxic gases must be less than 5 PPM (or respiratory protection will be worn), and oxygen must be between 19.5–23.5 percent.

Work under this Section will conform to Section 25, Excavations, USACE Health and Safety Manual EM 385-1-1 2003, and EC&HS Procedures 130 and 160.

8.9 MACHINE GUARDING

All equipment will be operated with all guards provided by the manufacturer. If any guarding must be removed for servicing, the equipment will be disabled and locked out, as appropriate, to preclude movement or release of energy.

Work under this Section will conform to Section 16, Machinery and Mechanized Equipment, USACE Health and Safety Manual EM 385-1-1 2003, and with 29 *CFR* 1910.212.

8.10 LOCKOUT/TAGOUT

Servicing or maintenance on a system where the unexpected energizing, start-up, or release of kinetic or stored energy could cause injury or damage will be isolated and locked out/tagged out. Lockout/tagout shall be performed by authorized personnel. All employees affected by the lockout/tagout shall be notified before and upon completion of the lockout/tagout activity.

Work under this Section will conform to Section 12, Control of Hazardous Energy (Lockout/Tagout), USACE Health and Safety Manual EM 385-1-1 2003, Corporate EC&HS Program Manual Procedure 11, Lock Out/Tag Out, and 29 CFR 1910.147.

8.11 FALL PROTECTION

Work areas with the potential for a fall of 6 feet or more will be provided with fall protection. Fall protection may consist of guardrails, personal fall protection, or equivalent. Personal fall protection will be used if it is necessary for drilling personnel to climb the upright mast or derrick.

Fall protection under this Section will conform to Section 21, Safe Access and Fall Protection, USACE Health and Safety Manual EM 385-1-1 2003, and SAIC EC&HS Procedure 170.

8.12 HAZARD COMMUNICATION

At a minimum, the following steps will be taken;

- MSDS evaluations will be reviewed prior to bringing a new chemical on-site for personal protection and waste management issues.
- all hazardous materials on site will be labeled to comply with 29 CFR 1910.1200. Labeling shall include;
  - clear labeling as to the contents,
  - the appropriate hazard warning, and
  - the name and address of the manufacturer.
- MSDSs will be available on site for all hazardous materials that are present.
- a current inventory of hazardous chemicals on site will be maintained in locations where MSDSs are stored. For emergency response purposes, each entry in the inventory shall include the approximate quantities that will be on-site at any given time. In addition, a site map will be attached to the inventory showing where the inventoried substances are stored.
- site-specific training will include the hazards posed by site contaminants and chemicals, methods and observations that may be used to detect the presence or release of a chemical, their location and concentrations (maps showing the location and concentration of contaminants shall be used whenever feasible), protective measures, work practices, PPE to be used, and emergency procedures.
- copies of MSDSs for all hazardous chemicals (chemicals brought on site) will be maintained in the work area. MSDSs will be available to all employees for review during each work shift.

Hazard Communication under this Section will conform to Sections 1, Program Management 01.B Indoctrination and Training., USACE Health and Safety Manual EM 385-1-1 2003, Corporate EC&HS Program Manual Procedure 8, Hazard Communication, and 29 *CFR* 1910.1200.

8.13 ILLUMINATION

Most site fieldwork will be conducted during daylight hours (no earlier than 15 minutes after sunrise and no later than 15 minutes before sunset) and natural illumination will be used. Fieldwork to be conducted during non-daylight hours will be specifically identified in a task-specific AHA and HSWP.

Work conducted in buildings will be illuminated to meet the minimum requirements stated in 29 *CFR* 1910 and Section 7, Lighting, USACE Health and Safety Manual EM 385-1-1 2003.

8.14 SANITATION

All field-work conducted is under temporary conditions with the crew having transportation readily available to toilet facilities. Applicable requirements include:

- Means for washing hands and faces prior to eating will be provided at the work site.
- An adequate supply of drinking water will be provided. Cool water shall be provided during hot weather.

Sanitation requirements for drinking water, toilets, and washing facilities will be in compliance with 29 CFR 1910.141 and Section 2, Sanitation, USACE Health and Safety Manual EM 385-1-1 2003.

8.15 HOUSEKEEPING

Work areas and means of access shall be maintained safe and orderly. General housekeeping practices are noted below:

- Work areas shall be kept clean to the extent that the nature of work allows.
- Work and storage area floors should be kept dry and in good condition to the extent that the nature of the work allows (e.g. not slippery or cracked, no tripping hazards, etc.).
- All field equipment shall be picked up and put away in a designated storage area upon completion of work and/or at the end of the day.
- Materials that could cause injury shall be kept off the tops of filing cabinets, bookshelves, warehouse shelves, etc.
- Emergency information is posted (e.g. typically located within the field vehicles) at each work site.
- Fire extinguishers accessible, free from obstruction, and easily visible.
- Aisles kept clear (i.e. 28" wide).
- Lighting is adequate and guarded.
- Equipment and/or furniture does not have sharp edges, splinters, or burrs exposed.
- Tables, cabinets and shelves are stable and secure.
- Inside buildings, exits signs shall be marked and not blocked.
- When tasks require it, keep emergency eyewash accessible, free from obstruction, and easily visible.

Work under this Section will conform to Section 14 C, Housekeeping, USACE Health and Safety Manual EM 385-1-1 2003.

8.16 DRILL RIG OPERATIONS

8.16.1 General Drilling Practices

- Incoming drill rigs will receive an initial radiological survey.
- Operating manuals will be present on site for each type of drill rig in use.
- Drill rigs will have at least two functional kill switches, one for the driller and one for the driller's helper. These switches will be confirmed to be functional each day the rig is used.

- Drill rigs will have functional backup alarms.
- Drill rigs will be inspected each day drill rig work is performed. This inspection will be observed by health and safety personnel. Inspections will be documented on the form in **Appendix G**, or equivalent.
- Only the driller, driller's helper, and personnel who have a critical need shall be allowed near moving parts of the drill rig.
- Members of the drilling crew shall be trained in the operation, inspection, and maintenance of the equipment of the drill rig.
- Drill sites will be verified free of underground utilities by clearing each site with local utilities or other appropriate personnel and free of overhead electrical hazards prior to beginning drilling.
- Drill-mounted fire fighting equipment will not be tampered with and will not be removed for other than the intended fire-fighting purposes or for servicing.
- Drilling crews and personnel who work near the drilling rig will be trained in the location and use of the kill switches.
- Personnel within 25 feet of an operating drill rig shall wear hearing protection, provided the occupational noise is in excess of 85 dBA for an 8-hour time-weighted average.
- No loose clothing, loose jewelry, or loose long hair is permitted near drill rig while in operation.
- If lubrication fittings are not accessible with guards in place, machinery will be stopped and disabled (locked out or ignition key removed) for oiling and greasing.
- Work areas and walkways will not be obstructed.
- The derrick (mast) will not be raised unless the area is free of overhead obstructions and at least the minimum safe approach distance from power lines (see Electrical Safety, Section 8.7).
- The derrick will not be in the up position (i.e. must be in the down position) while the drill rig moves from one location to another.
- The derrick will not be raised until the rig has been blocked, leveled, and chocked.
- Prior to drilling, the area at the rear of the rig will be cleared of any items, such as chains, shovels, etc., that might become entangled with the drilling equipment.
- Drill rigs shall cease operations during electrical storms and/or when electrical storms are imminent.

Work under this Section will conform to Section 16.M, Drilling Equipment, and Section 26.E, Drilling, USACE Health and Safety Manual EM 385-1-1 2003.

8.16.2 Hoisting Operations

- Rigging equipment for material handling will be checked by a competent person prior to use on each shift, and as often as necessary, to ensure it is safe. Defective rigging will be removed from service.

- The use and maintenance of rigging equipment shall be in accordance with recommendations of the rigging manufacturer and the equipment manufacturer. Rigging equipment shall not be loaded in excess of its recommended safe working load.
- A hoisting line with a load imposed will not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.
- Workers not directly involved with drilling will stand clear of the drill site when any wire line device is in operation.
- Loads will not be lifted over workers.

Work will comply with Section 15, Rigging, and Section 16, Machinery and Mechanical Equipment, USACE Health and Safety Manual EM 385-1-1 2003.

8.16.3 Cat Line Operations

- The cathead area will be kept free of obstructions and entanglements.
- The operator will not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.
- Personnel will not stand near, step over, or go under a cable or cat line that is under tension.
- Personnel will avoid contact with the cathead during operation due to heat generated by cathead use.

Work will comply with Section 16, Machinery and Mechanical Equipment, USACE Health and Safety Manual EM 385-1-1 2003.

8.17 UNEXPLODED ORDNANCE (UXO)

Unexploded ordnance (UXO) has been encountered at SLDS; however, it is not expected that SAIC employees will encounter UXO during SAIC planned activities. Should any UXO be encountered, SAIC will stop working pending a decision from the USACE and the property owner. If work will be done around UXO it will be done in accordance with EC&HS 120.

8.18 HEAT/COLD STRESS

8.18.1 Heat Stress

Important factors in preventing heat stress induced illnesses are acclimatization, consumption of copious quantities of fluids, and appropriate work/rest cycles. General controls will consist of making fluids readily available, use of the buddy system, and taking scheduled and unscheduled breaks in temperature controlled areas as necessary. The following specific steps will be taken to reduce the potential for heat stress induced illness;

- If ambient temperatures exceed 85° F, site training will include heat stress control, recognition of heat stress induced illness, and first aid for heat stress.

- If ambient temperatures exceed 85° F, cool Gatorade or equivalent drink (mixed according to manufacturer's directions) will be made conveniently available to site workers.
- If ambient temperatures exceed 85° F, workers will be instructed to monitor their own and their buddy's condition relative to heat stress.
- Workers will be allowed to take unscheduled breaks, as needed.
- Workers wearing Tyvek® or other impermeable clothing when ambient temperatures exceed 85° F will be monitored for heat stress by taking their pulses at the beginning of the shift and at the start of each rest period. If any worker's heart rate exceeds 110 beats per minute and their body temperature exceeds 100.4° F after a rest period, further controls shall be implemented. NOTE: If worker heart rate and/or temperature require rest and other control, the worker shall not be permitted to resume work until heart rate and temperature fall below 110 beats per minute and 100.4° F, respectively.

A formal work/rest cycle will be established by the SSHO if workers are wearing Tyvek® or similar coveralls at temperatures greater than 85° F. The work cycle will require that all the employees in a crew take regularly scheduled breaks in a cooler area. Following initial implementation, this schedule may be adjusted by the SSHO based on worker pulse rates, temperatures, acclimation of the workers to the environment, the physical condition of workers, or the nature of work. The SSHO must approve decreases in the protection offered by this schedule. The following table presents requirements for the amount of work and rest in each hour. Note that the cycle is based on assumption of light work (taking notes, walking, light lifting) and adjustments must be made if some members of a team (for example, a driller's helper) are performing more strenuous work. It may be necessary for some members of a crew to be on a different (shorter) cycle. The following table presents the work/rest cycle.

Table 8-1. Temperature Dependent Work Rest Schedule

Temperature	Work Per Hour	Rest Per Hour[a]
<85°F	Continuous work	
85°F to 87°F	45 minutes	15 minutes
87°F to 89°F	30 minutes	30 minutes
89°F to 91°F	15 minutes	45 minutes
>91°F	Consult H&S Manager	

[a] This information is based on a modification of the heat stress TLV presented in the 1999 ACGIH TLV Booklet. The TLV has been modified to address the use of impermeable clothing by assuming no evaporative cooling and removing the influence of the wet bulb thermometer in the Wet Bulb Temperature Index.

8.18.2 Cold Stress

Critical factors in preventing cold stress disorders are adequate clothing and staying dry. The SSHO will ensure the capability to quickly move individuals who become wet to a sheltered, warm area. The following specific steps will be taken [adapted from American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values booklet];

- If ambient temperatures are less than 40° F, site training will include prevention of cold injury, cold injury symptoms, and cold injury first aid.
- A heated break area will be provided if ambient temperatures are less than 32° F.

- As a minimum, breaks will be taken in a warm area every 120 minutes if ambient temperatures are less than 32° F.
- Workers will be allowed to take unscheduled breaks, if needed, in a warm area.
- No outdoor work will be performed if the equivalent chill temperature (temperature combined with the effect of wind) is less than –29° F.

Work under this Section will conform to Section 6.J, Inclement Weather and Environmental Hazards, USACE Health and Safety Manual EM 385-1-1 2003.

8.19 IONIZING RADIATION

Work involving ionizing radiation will be performed in compliance with St. Louis SAIC HP procedures, and USACE EM 385-1-1 Section 6. The guiding philosophy will be to keep exposures ALARA.

8.19.1 Exposure Limits

The following Table 8-2 presents exposure limits as they apply to this project.

Table 8-2. Radiation Exposure Limits

Effected Individual	Period	Effected Organ[b]	USACE Limit[c] (rem)	NRC Limits (rem)
Adult Radiation Worker	Annual	TEDE	0.5	5.0
Adult Radiation Worker	Annual	TODE	5.0	50
Adult Radiation Worker	Annual	Lens of the Eye	1.5	15
Adult Radiation Worker	Lifetime	TEDE	---	---
Adult Radiation Worker	Annual	SDE	5.0	50
Declared Pregnant Radiation Worker	Gestation Period[d]	Fetus	0.5	0.5
SAIC Employee[a]/Public	Annual	TEDE	0.1	0.1
Public Access Areas	Hour	TEDE	0.002	0.002

[a] Applies to all employees not qualified as radiation workers.
[b] The abbreviations are summarized below:
TEDE = Total effective dose equivalent.
TODE = The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye.
SDE = Shallow-Dose Equivalent to the skin or any extremity.
NRC = Nuclear Regulatory Commission
[c] From EM 385-1-80. Requires RSO permission to exceed.
[d] Declared pregnant female should be limited to exposure rates less than 50 mrem per month unless otherwise approved by the RPM.

8.19.2 Surface Radioactivity Limits

The following table presents contamination limits as they apply to this project

Table 8-3. Acceptable Surface Contamination Levels

Nuclide[a]	Average[b,c]	Maximum[b,d]	Removable[b,e]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-234, I-126. I-131, I-133	1000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 dpm $\beta\gamma$/100 cm^2	15,000 dpm $\beta\gamma$/100 cm^2	1,000 dpm $\beta\gamma$/100 cm^2

Information from Nuclear Regulatory Commission (NRC) Regulatory Guide 1.86

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegration's per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

NOTE: Because of the high Th-230 and Ra-226 concentrations in soils at SLAPS and SLDS, equipment and materials must be surveyed to meet the 100 dpm/100 cm^2 average and 20 dpm/100cm^2 removable limits prior to release.

8.19.3 General Requirements

Employees in radiologically contaminated or airborne radioactivity areas will be monitored for contamination before leaving the controlled area. A whole body frisk will be performed upon leaving these areas. In areas where personnel contamination is unlikely, the employee (self-monitoring) may perform this monitoring. Any detected personnel contamination will immediately be reported to an HPT. In areas where contamination is probable, this monitoring must be performed by an HPT. Any detectable contamination will require decontamination to non-detectable levels following established procedures. Removal of contamination on personnel will be attempted with moist paper towels (if in the field) followed by washing with soap and water, if necessary.

The whole body frisk will be conducted using the following process:

- verify the instrument has passed a source test that day.
- verify the instrument is on and set to its most sensitive scale.
- hold hands approximately 1/4 to 1/2 inch from the face of the probe and verify hands are free of contamination prior to picking up probe.
- hold the probe approximately 1/2 inch from the surface being frisked and move the probe at approximately 1-2 inches per second when using a Geiger-Mueller (GM) detector (1/4 inch from surface at 1/2 inch per second for alpha scintillation detectors).

- survey hands.
- survey head (pausing around mouth and nose), neck and shoulders (pause at elbows), chest and abdomen, back, seat of pants, legs (pause at each knee), and shoes in that order.

Employees likely to exceed a radiation dose from external sources of 100 mrem/yr will wear TLDs analyzed under a program meeting the National Institute of Standard and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP). TLDs will be issued and controlled using established procedures.

Instruments and equipment used inside radiological contaminated areas or airborne radioactivity areas will be surveyed prior to release from the area. This survey will be performed by a qualified HPT.

In cases where instruments or equipment may be drawn into an area or extracted from some opening (down-hole drilling equipment, soil cuttings) and may bring significant contamination into a less contaminated or uncontaminated area, these materials will be surveyed as they are withdrawn from the well or borehole, when the area is deemed safe to conduct the survey.

Samples taken in restricted areas, contaminated areas, radiation areas, or airborne activity areas will be surveyed to determine removal and shipping restrictions.

Surface contamination will be evaluated to determine the potential to generate airborne particulates. Areas where the potential exists for airborne radioactivity concentrations greater than 5 percent of a DAC will be sampled for airborne radioactivity. In sampled areas, DAC-hours will be tracked and the need for respiratory protection will be evaluated.

All radiation meters will be calibrated at least annually and will be checked against a known source prior to each day of use. The results of source checks will be maintained on site.

Radiological restricted areas will be identified and posted. Areas will be posted as Radiation Areas, Airborne Radioactivity areas, etc., as required and defined in 385-1-1, Section 6 and 10 *CFR* 20.

Work will comply with Section 6, Hazardous Substances, Agents, and Environments, USACE Health and Safety Manual EM 385-1-1 2003.

8.20 HAZARDOUS WASTE MANAGEMENT

SAIC personnel or SAIC subcontract personnel are not authorized to sign uniform hazardous waste manifests or waste profiles on behalf of the USACE, or in any way direct final transportation to a Treatment, Storage, and Disposal (TSD) facility or direct disposal of field generated waste. Refer to SAIC EC&HS Procedure 25, "Management of Investigation-Derived Waste", which addresses waste restrictions in detail.

8.21 WORKING ON OR NEAR WATER

This guidance specifies safety procedures to be taken during operations on, or within 5 feet of, water deeper than 3 feet. This guidance does not apply to areas where handrails, standard rigid barricades, gratings, or other protective systems are in place.

Water rescue equipment shall be obtained for use in applicable activities., The following equipment shall be considered:

- rescue boat
- safety belts
- vinyl life jackets (Coast Guard approved)
- 30 in. life rings with 90-foot lines (Coast Guard approved)
- two way radios
- lifeline
- rescue equipment boxes (emergency use only)

Employees using equipment shall inspect it prior to use. Any equipment found to be unsafe should be identified as "Defective" and replaced. Upon completion of activities, all safety equipment shall be inspected for damage; damaged items shall be tagged "defective" and replaced as necessary.

When personnel are working on a downward slope where a slip and fall could result in the worker falling into water deeper than 3 ft, the worker shall wear a safety belt or harness with a lifeline attached. The lifeline shall be secured to a sturdy object and shall be manned by an attendant. Where it is not feasible to attach a lifeline to a sturdy object, the attendant may man the lifeline. However, the attendant must be physically capable of holding the worker to prevent him/her from falling into the water.

If work involves sampling or other activities that require the use of a boat, one life ring shall be placed in the boat and one shall be placed with an attendant. When a boat is not within sight of the onshore attendant, radio contact must be maintained.

Work under this section will comply with CFR 1926.106, Working over or near water.

8.22 TRANSPORTING HAZARDOUS MATERIAL

The primary hazardous materials for this project that are subject to these requirements are:

- Various environmental samples (e.g., soil, water, sediment, etc.) collected in the field and sent to a laboratory for the purpose of analysis.
- Materials of Trade - These are hazardous materials, other than a hazardous waste, that are carried on a motor vehicle for the purpose of supporting the operation or maintenance of the vehicle (e.g., pre-preserved sample bottles, calibration gas, etc.)
- Limited Quantity Class 7 (Radioactive) Material (e.g., field rad samples (potentially), radioactive sources, etc.)

The DOT, in an interpretation letter dated June 23, 2006, has determined that environmental samples transported to a laboratory in a client, SAIC, or subcontractor vehicle can be considered a material of trade as long as a motor carrier is not hired to transport these samples. NOTE: Ensure that environmental samples shipped as a material of trade do not exceed the limited quantity limits. Environmental samples being shipped via a motor carrier or by air must comply with EC&HS 28 and FTP-651.

Hazardous materials shipped as materials of trade must comply with the requirements outlined in 49 CFR 173.6.

Radioactive material must be transported in accordance with EC&HS 28 and the HP procedures. Limited Quantity Class 7 (Radioactive) Materials are those packages of hazardous materials where the package contents do not exceed the limits of 49 CFR 173.425, "Table of activity limits--excepted quantities and articles," or the package with contents meets the requirements of 49 CFR 173.421, "Excepted packages for limited quantities of Class 7 (radioactive) materials." They must be in a strong tight container. Each sample set needs to be evaluated so the limited quantity limits are not exceeded. Specific marking and radiological surveys are also required.

Contact the SSHO or FM for assistance in determining whether specific material meets the requirements of DOT hazardous material. Specific tools/checklists have been developed to assist the user in this determination. These tools are available at P:\MARSSIM\Tools-n-Templates. All personnel involved with hazardous material shipping will be trained in accordance with applicable EC&HS 28, FTP-651, HP procedures, and 49 CFR 172 Subpart H.

NOTE: Transportation of hazardous materials not specifically covered above will likely require Corporate EC&HS approval. The PM's approval is required prior to shipping these items.

Hazardous materials must be transported as outlined in EC&HS 28, HP procedures, FTP-651, and applicable DOT regulations. All work under this section will comply with Sections 18.B.09 Railroad crossing and drawbridges, USACE Health and Safety Manual EM 385-1-1 2003.

9.0 SITE CONTROL MEASURES

The SSHO will be responsible for establishing the site control zones, as necessary, around SAIC controlled areas that present physical, radiological, and/or chemical hazards. Implementation of the site control zones will help to minimize the number of employees potentially exposed and to minimize the potential for the spread of contamination. HPTs will monitor the implementation of the required site control work rules and will report any deviations from prescribed practice to the SSHO, or stop work, as appropriate. A log will be kept of all personnel visiting, entering, or working on site. The log will include the date, name, agency or company, time in and out, and PPE.

Site control zones will be established in a number of locations over the site. The exact locations will vary depending on site conditions; therefore, it is not possible to predetermine the size or exact locations of site control zones. SAIC will attempt to exclude all unauthorized personnel (members of the public, etc.) from exclusion and contamination reduction zones. If unauthorized personnel enter a SAIC controlled area and refuse to leave, work will be stopped and the USACE technical manager will be notified. Authorized visitors will be required to show proof of current training and medical surveillance, as appropriate.

Work under this section will comply with Section 28, Hazardous Waste Operations and Emergency Response (HAZWOPER), USACE Health and Safety Manual EM 385-1-1 2003.

9.1 EXCLUSION ZONE

The exclusion (contamination) zone is the area where the greatest potential exists for exposure to contamination or physical hazards. Personnel access to the exclusion zone will be limited to authorized SAIC and subcontractor individuals. The periphery of the exclusion zone will be identified by barricade tape or rope suspended above the ground. An entry and exit checkpoint will be visually defined to regulate the flow of personnel and equipment. The entry and exit checkpoint will be delineated with barricade tape or ropes. The number of people and equipment in the exclusion zone will be minimized to control physical hazards and the spread of contamination. At a minimum, exclusion zones will be established around tasks or areas that pose a potential for the spread of contamination or injury to personnel. Such areas include each drilling site.

The following standard rules will apply to all entries into the exclusion zone.

- the SSHO must approve (and log) entry into the exclusion zone.
- all personnel entering the exclusion zone will wear the prescribed level of protective clothing.
- all items and related paraphernalia intended to be placed on the face or in the mouth (cigarettes, lighters, matches, chewing tobacco, food, cosmetics, etc.) are prohibited in the exclusion zone.
- all personnel in the exclusion zone will follow the buddy system.

Exclusion zones will be established around drilling sites, areas of heavy equipment use, and all activities where loose contamination and/or airborne contamination is a potential hazard. At a minimum, the exclusion zone for drilling operations will be at least equal to the mast height in radius so that no part of an overturned drill rig will fall outside the zone. Note that the exclusion zone is intended to protect personnel who are not involved with the task. Objects, such as stored

unoccupied vehicles or the walls of buildings, may occur within the exclusion zones. Building entrances or windows that occur within the exclusion zone will be locked, or, at a minimum, marked to preclude use.

9.2 CONTAMINATION REDUCTION ZONE

A contamination reduction zone will be established, as necessary, outside the exclusion zone to provide a transition from, and a buffer between, the exclusion zone and the support zone. An entry and exit checkpoint will be visually defined at the periphery of the zone to regulate the flow of personnel and equipment. The entry and exit checkpoint and the perimeter of the zone will be delineated with the use of traffic cones, ropes/barricade tape, or signs.

All personnel entering the contamination reduction zone or restricted area will wear the prescribed level of protective clothing required for that zone. All items intended to be placed on the face or in the mouth (e.g., cigarettes, chewing tobacco, food, cosmetics, etc.) are prohibited. Doffing of protective clothing and personnel decontamination will occur in the contamination reduction zones.

9.3 SUPPORT ZONE

The support zone is the clean and relatively safe area surrounding the exclusion and contamination reduction zones. Note that the support zone is limited to the areas associated with this project and does not generally include areas such as office trailers, roads, and buildings accessible to facility personnel or the public and not directly involved in on-site project activities. Primary functions of the support zone are:

- staging area for clean equipment and supplies, and
- location for support services [e.g., office trailers, laboratory trailers, eating area(s), toilet facilities, parking, visitor area(s), etc.

9.4 SITE COMMUNICATION

Field personnel will be capable of contacting other field personnel and outside agencies. Hand-held radio, portable air horns, or vehicle horns will assure communication on site. If phone service is not immediately available on the site, the field project will be equipped with a cellular phone.

Work under this section will comply with Sections 6.H Personal Floatation Devices, 26.A.06, Protection from Water, USACE Health and Safety Manual EM 385-1-1 2003.

10.0 PERSONAL HYGIENE AND DECONTAMINATION

A system of procedures will be used to control the spread of contamination from the exclusion (contamination) zone and to ensure that workers are sufficiently free of contamination to preclude adverse health effects. PPE doffing and personnel decontamination are part of this system. The doffing of PPE will normally be the only decontamination effort necessary. Further decontamination will only be necessary if the results of contamination surveys indicate contamination on personnel skin or personal clothing. The SSHO will ensure the construction of a decontamination station, as necessary, instruct personnel on its proper use, and verify that personnel follow the appropriate steps. Radiological decontamination will be performed in accordance with SAIC St. Louis Health Physics Procedure HP-10, "Personnel and Equipment Decontamination." This section presents basic requirements for area egress keyed to the level of protection. These requirements may be modified by the SSHO if improvements are needed. See the Hazards Analysis section for task-specific levels of PPE. Specific PPE requirements are outlined on the task-specific HSWP.

10.1 LEVEL D PROTECTION DOFFING/DECONTAMINATION

Station 1: Equipment drop

Place potentially contaminated equipment in a designated area.

Station 2: Removal of disposable boot covers and gloves (if worn).

Deposit disposable gloves and boot covers in a designated container. Note that this step is necessary only if gloves and boot covers are in use.

Station 3: Frisk

Perform whole body frisk at a rate not to exceed 1-2"/sec at a distance of 1/2 inch for GM detector (1/2"/sec. at 1/4" from source for alpha scintillation detector). Any personnel contamination will be immediately reported to the RPM and FM.

Station 4: Field wash

Wash face and hands prior to taking anything by mouth. This may be done with soap and water or disposable disinfectant towels.

10.2 LEVEL D+ PROTECTION DOFFING/DECONTAMINATION

Station 1: Equipment drop

Place potentially contaminated equipment in a designated area.

Station 2: Tape removal

Remove all tape (if used) from outer clothing and place in appropriate waste container.

Station 3: Boot covers, outer disposable garment, and gloves removal

Carefully remove boot covers, outer contamination-resistant garment, and gloves.

Station 4: Frisk

Perform whole body frisk at a rate not to exceed 1-2"/sec at a distance of 1/2 inch for GM detector (1/2"sec. at 1/4" from source for alpha scintillation detector). Any personnel contamination will be immediately reported to the RPM and FM.

Station 5: Field wash

Wash hands and face prior to eating, drinking, smoking, etc. This step may be accomplished with soap and water or disposable disinfectant wipes.

10.3 LEVEL C PROTECTION DOFFING/DECONTAMINATION

Station 1: Equipment drop

Place potentially contaminated equipment in a designated area.

Station 2: Segregated equipment drop

Deposit equipment used on site (tools, sampling devices, containers, monitoring instruments, clipboards, etc.) on plastic sheets or in different containers with plastic liners. Segregation of the equipment at the drop site reduces the possibility of cross-contamination.

Station 3: Outer boot cover and glove removal

Remove tape from outer boots and outer gloves. Remove outer boot covers and outer gloves. Deposit gloves and boot covers in plastic trash bags.

Station 4: Cartridge change

If a worker has left the exclusion zone for the sole purpose of changing a canister/ cartridge of the respirator, this is the last step of the decontamination procedure. Once the worker's canister/cartridge has been changed, the outer boots and gloves will be replaced and re-taped so that all potential pathways to the skin are sealed.

Station 5: Disposable outer garment removal

Remove disposable outer garment, deposit in a plastic trash bag, and dispose in accordance with the project Work Plan.

Station 6: Respiratory protection and disposable inner glove removal

The respirator is the next-to-last item for removal. The cartridges/canisters are placed in a plastic trash bag and disposed of in accordance with the project Work Plan. The respirator is placed in a plastic bag dedicated for used respirators only. Remove disposable inner gloves last and deposit them in a plastic trash bag, in accordance with the project Work Plan.

Station 7: Frisk

Perform whole body frisk at a rate not to exceed 1-2"/sec at a distance of 1/2 inch for GM detector (1/2" second at 1/4" from source for alpha scintillation detector). Any personal contamination will be immediately reported to the RPM and SSHO.

Station 8: Field wash

Wash hands and face prior to eating, drinking, smoking, etc. This step may be accomplished with soap and water or disposable disinfectant wipes.

10.4 EQUIPMENT DECONTAMINATION

Small equipment may be pressure washed or scrubbed/wiped with soap and water. Equipment requiring maintenance or repair will generally be decontaminated prior to servicing. Reusable sampling equipment and any other tools used for intrusive work will be decontaminated between sampling locations. Decontamination requirements between samples are outlined or referenced in the Sampling and Analysis Guide or in task specific work-descriptions.

Following decontamination, all equipment shall be surveyed by an HPT if it is intended that the equipment is to be released for unrestricted use (decontamination between samples does not

require a survey). If fixed or loose contamination is found, release of the equipment will be evaluated by the RPM or FM. Equipment leaving the site for unrestricted use must have no contamination that exceeds the levels listed in Section 8.19.2, "Surface Radioactivity Limits". Results of contamination surveys shall be documented.

Larger pieces of equipment, such as drill rigs, will be decontaminated with pressurized hot water/steam as necessary. Steps will be taken to assure that the transporting of sampling and other equipment does not spread contamination to previously uncontaminated areas. Any equipment that is deemed to be heavily contaminated will be decontaminated in the immediate area of the sample collection, or will be wrapped in plastic during transit to a decontamination area.

11.0 EMERGENCY PROCEDURES AND EQUIPMENT

The FM will remain in charge of all SAIC and subcontractor personnel during emergency activities. The FM will perform emergency notification of emergency medical services, fire department, SSHO, and SAIC FM. The SSHO or FM will make other notifications as necessary. The SSHO will also escort or assign an escort to off-site emergency responders. In order to minimize the potential for accidents and injuries, the SSHO, or designee, will conduct worksite inspections in areas where SAIC activities are being conducted. The inspections will normally be documented in field logbooks. If an emergency occurs, the FM, SSHO, and the field team will participate in a post-emergency briefing to discuss the event, identify the causes, identify corrective measures, and evaluate the responses.

In the event of an accident or incident that meets the reporting requirements, the SSHO or SAIC Program Manager will notify the USACE Project Manager immediately, according to the requirements of EM 385-1-1, section 1-D. If incidents or accidents require reporting to radiological control agencies, the RSO shall report as per HP-22, "Radiological Reporting".

All accidents will be investigated and reported within 24 hours, as specified in EM 385-1-1, section 1.0. The Accident Report (ENG Form 3394) will be completed and submitted to the USACE Occupational Safety and Health Officer at the following address:

Greg Rakers
8945 Latty Avenue
Berkeley, MO 63134
Cell: 314-581-0640 (Primary)
Phone: 314-260-3910

All personnel working on site will be trained in the requirements of this section. This will include recognizing emergencies, reporting emergencies to the SSHO, and responding to emergencies. Employees will also be informed of any changes in potential emergencies or response plans.

Note: SAIC St. Louis FUSRAP personnel are not trained to respond to emergencies other than fighting minor fires in their incipient stages, containment and cleanup of minor spills, and evacuation to a safe location to contact project management and emergency services.

11.1 INCIDENT REPORTING

In accordance with SAIC EC&HS Procedures 4 and 24, SAIC field personnel and subcontractors are responsible for immediate reporting to the SSHO of any event that may adversely impact personnel, the environment, or that may cause equipment damage, regardless of the severity. All "near misses" must also be reported. A "near miss" is an event that did not, but had the potential to, cause injury or damage.

It is the responsibility of SAIC line management to investigate all injuries, property damage, environmental events, and near misses. The primary purpose of reporting accident/incident investigations is to prevent recurrence of such accidents.

11.2 POTENTIAL EMERGENCIES

Credible potential emergencies for this project include fires, minor chemical spills, and personnel injury.

11.2.1 Fires

Small quantities of flammable solvents (typically less than 5 gallons), gasoline, and diesel fuel will be present on site. In the event of a fire, the local fire department will be notified immediately. If it is safe to do so, on-site personnel may attempt to extinguish minor, incipient fires with the available fire extinguishers and isolate any nearby flammable materials. If there is any doubt about the safety of extinguishing the fire, site personnel will evacuate the area. The supervisor or knowledgeable employee will provide the fire department with relevant information when they arrive.

11.2.2 Spills

Potential spills include releases of fuels, lubricants, hydraulic fluids, and decontamination solvents. With the exception of fuels, all of these materials will be used in small quantities. In light of the small quantities of liquids, it is not likely for site operations to generate a major spill. In the event of a spill or leak, the employee making the discovery will immediately notify the SSHO. The SSHO will assess the situation and take appropriate measures as follows.

For small quantities (most likely spill scenario) the field crew will use the project spill control kit to clean up and containerize spilled material and other material such as soil that has become contaminated. Cleanup will be performed wearing nitrile or similar gloves and eye protection, and any other PPE deemed necessary by the SSHO. For larger quantities (more than five gallons of fuel) the SSHO will notify the local fire department and initiate cleanup and control, if feasible, with available equipment. Cleanup will be performed wearing appropriate protective gear, and at least nitrile or similar gloves and eye protection. If the spill cannot be resolved without undue danger (fire or similar hazard) to personnel, the area will be evacuated and the response turned over to local emergency response personnel.

All spills will be reported to the USACE Project Manager, SAIC Program Manager, and the SAIC Environmental Compliance Officer.

11.2.3 Medical Emergencies

In the event of a medical emergency, the SSHO will notify the local emergency medical service immediately. At least two first aid/CPR-trained (American Red Cross, American Heart Association, American Lung Association, etc.) individuals will be on staff at all times and these personnel are qualified to provide first aid pending release of the injured person to emergency medical staff. Contaminated injured personnel will be decontaminated to the extent feasible. Personnel with minor (non-life threatening) injuries will follow normal decontamination procedures (e.g., removal of PPE). Personnel with serious injuries will be decontaminated, if necessary, by disrobing and wrapping in a blanket. Decontamination may be bypassed in the event of life-threatening injuries or illnesses. Emergency Medical Service (EMS) responders shall be informed of any contamination on personnel at the time of request for response and upon arrival on the scene.

11.3 EMERGENCY PHONE NUMBERS

Listed below are emergency groups and their telephone numbers. A telephone or two-way radio will be present in the field and available for use.

All Emergencies	911
Fire department	911 or 314-533-3406
Police	911 or 314-444-5555
Emergency Medical Service	314-653-5665
SLAPS / HISS Hospital – DePaul	314-344-6000
SLDS Hospital – Barnes Hospital One Barnes Hospital Plaza	314-362-5000
Local Health and Safety Manager (Randy Hansen)	314-486-6916
Local Site Safety and Health Officer (Troy Hart)	314-783-1413
Corporate Health and Safety Manager (Steve Davis)	865-481-4755
Corporate EH&S Manager (Gary Waggonner)	858-826-4355

These telephone numbers will be posted on site. Hospital maps are presented in **Appendix B and C** of this SSHP, which also include written directions of routes to the hospitals and the hospital phone numbers. When possible, personnel with injuries, including minor, non-trivial injuries, will be transported by ambulance.

11.4 EVACUATION

The SSHO will designate the evacuation routes and an assembly area. All employees will be familiar with the evacuation routes and assembly area.

11.5 EMERGENCY EQUIPMENT

Several items of emergency equipment will be maintained at the work site. Any incident that is not clearly controllable by personnel wearing standard site clothing, plus protective gloves and using the listed equipment, will require reevaluation by the SSHO. If the SSHO does not feel that on-site personnel can safely control the emergency with the available equipment, the crew will use alternate approaches, such as allowing a small fire to burn out or evacuating the site.

Note: SAIC St. Louis FUSRAP personnel are not trained to respond to emergencies other than fighting minor fires in their incipient stages, containment and cleanup of minor spills, and evacuation to a safe location to contact project management and emergency services.

The required emergency equipment includes:

- first aid kit indoors or in weatherproof container;
- fifteen minute emergency eye wash to meet ANSI Z-358.1-1998;
- fire extinguisher(s) (at least 20-B:C) 8 to 23 meters (25 feet to 75 feet) from outside flammables storage (or use) area;
- one, 5-pound ABC fire extinguisher in each work vehicle;
- basic spill kit suitable to handle small spills of decontamination fluids, hydraulic fluid, or fuels, and containing absorbent pads, tubes, and nitrile or similar gloves; and
- telephone for contact of emergency services and, depending on site conditions, portable radios for on-site communication.

12.0 LOGS, REPORTS, AND RECORD KEEPING

A system of reports and logs will be used to document activities related to site Health and Safety. These reports will include injuries, accidents, near accidents, interpretations of the SSHP or regulations, interactions with auditors/regulators/USACE personnel, and any off-normal events.

- accident and injury reports for all accidents other than minor first aid cases.
- training certificates.
- records or logbooks detailing site training, topics covered, names and signatures of participants and trainer, general site activities, inspections, surveillances, site workers, Health and Safety problems, and problem resolutions.
- medical clearance forms.
- daily drilling safety inspection logs will contain the dates of inspections, identify the person doing the inspection, the examined areas/activities/equipment, any deficiencies, and any corrective actions taken. The drilling inspection checklist is located in **Appendix G** of this SSHP.
- related procedural forms, such as equipment and personnel decontamination, and records of radiological surveys.
- equipment maintenance logs will contain the dates and types of routine maintenance performed on site equipment.
- records of environmental and personal exposure monitoring/sampling results will be maintained and will contain monitoring data, location and time of monitoring, types of work being done, calibration records, and the identities of personnel performing monitoring.
- the health and safety debrief form contained in EC&HS Procedure 20 will be completed by the SSHO at the completion of the project and submitted to the Health and Safety Manager.

13.0 REFERENCES

American Conference of Governmental Industrial Hygienists 2006. *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

National Institute for Occupational Safety and Health 1994. *Pocket Guide to Chemical Hazards.*

NIOSH/OSHA/USCG/EPA 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October.

OSHA 29 *CFR* 1910 and 1926

U.S. Army Corps of Engineers 2003. *Safety and Health Requirements Manual*, EM 385-1-1, November.

U.S. Army Corps of Engineers 2003. *Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities*, Appendix B, ER 385-1-92, 1 July.

U.S. Army Corps of Engineers 1997. Radiation Protection Manual, EM 385-1-80, 30 May.

Nuclear Regulatory Commission 10 *CFR* 20, "*Standards for Protection Against Radiation*"

Site Safety and Health Plan for Sampling and Analysis of Background Soils at and Near The St. Louis Downtown Site (USACE, April, 1998)

St. Louis Downtown Site Record of Decision (USACE, 1998)

Site Safety and Health Plan for Site Activities at the St. Louis Airport Site (USACE, April 1998)

Engineering Analysis / Cost Evaluation (EE/CA) for the Hazelwood Engineering Site (USACE, March 1998)

Environmental Monitoring Implementation Plan for Fiscal Year 2006

APPENDIX A

SAFETY INSPECTION/BRIEFING FORMS

VEHICLE MILEAGE LOG

Vehicle Tag No.: ____________________________

Month/Year: __________________

Date	Beginning Mileage	Ending Mileage	Total Miles	Vehicle Inspected	Comments	Operator
TOTALS						

DAILY HEALTH & SAFETY MEETING

Week of Monday:_____(Mo/Day/Yr)

Tasks Covered: (Add tasks as necessary)

_____ _____
_____ _____
_____ _____
_____ _____

Safety Topics Covered: (e.g., electrical safety, HSWP R-08-001.0, AHA topics, etc.)

_____ _____
_____ _____
_____ _____
_____ _____

Attendance:

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Print Name	Initial						

APPENDIX B

MAP FROM SLAPS/HISS TO CHRISTIAN HOSPITAL

HOSPITAL DIRECTIONS

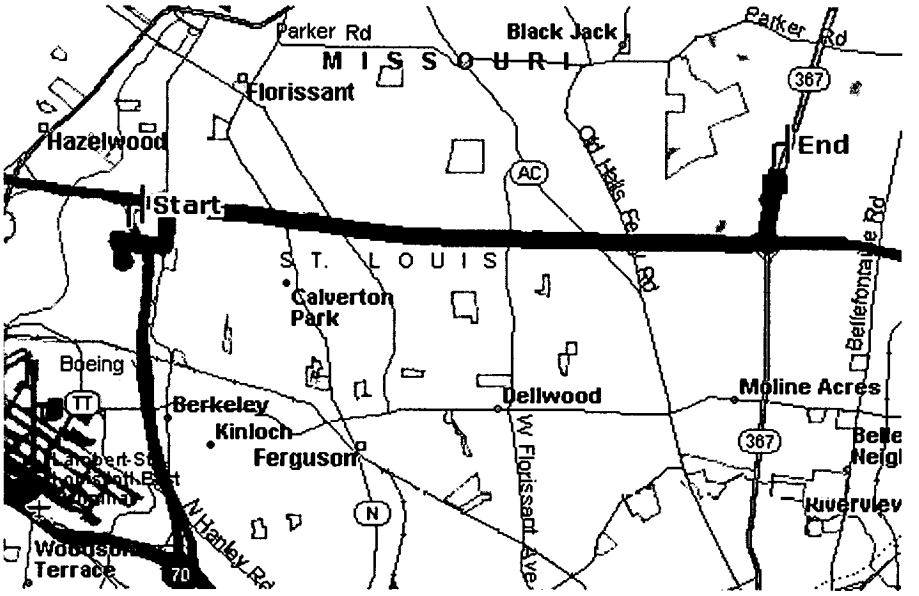
SLAPS to CHRISTIAN HOSPITAL

Leave SLAPS Site
Turn LEFT (West) onto James S McDonnell Blvd
Turn RIGHT (North) onto US-67 [N Lindbergh Blvd]
Take Ramp (RIGHT) onto I-270 towards I-270
At exit 31B, take Ramp (Right) onto SR-367 {Lewis and Clark Blvd} towards MO-367 / Alton IL
Turn LEFT (West) onto Dunn Road
Turn LEFT to stay on Dunn Road
Arrive at Christian Hospital (11133 Dunn Road, St Louis, MO 63136)

8.9 miles, 12 minutes

HOSPITAL DIRECTIONS

HISS / LATTY AVENUE to CHRISTIAN HOSPITAL



Leave HISS or Latty Avenue site
Go east on Latty Avenue to Hazelwood Blvd
Turn LEFT (North) onto Hazelwood Blvd
Turn RIGHT (East) onto Nyflot Ave.
Turn LEFT (North) onto N. Hanley Road
Take Ramp (Right) onto I-270 towards I-270
At exit 31B, take Ramp (Right) onto SR-367 {Lewis and Clark Blvd} towards MO-367 / Alton IL
Turn LEFT (West) onto Dunn Road
Turn LEFT to stay on Dunn Road
Arrive at Christian Hospital, (11133 Dunn Road, St Louis, MO 63136)

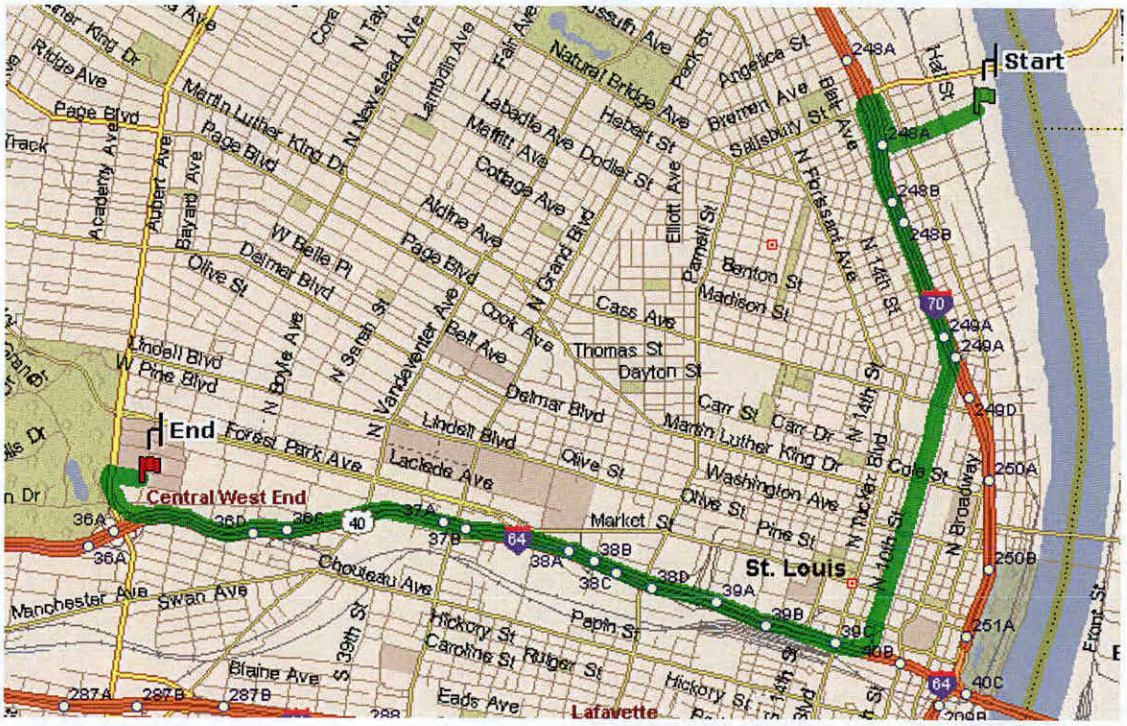
6.4 Miles, 12 minutes

APPENDIX C

MAP FROM SLDS TO BARNES HOSPITAL

HOSPITAL DIRECTIONS

SLDS to BARNES JEWISH HOSPITAL



Leave SLDS
Travel WEST on Angelrodt Street towards Hall Street
Turn RIGHT onto N BROADWAY
Turn LEFT onto SALISBURY ST.
Turn LEFT onto N 11TH ST.
Take the I-70 E ramp.
Merge onto I-70 E.
Take the MEMORIAL DR exit, exit number 250B, towards DOWNTOWN / PINE ST.
Stay straight to go onto N MEMORIAL DR.
Turn SLIGHT RIGHT onto SPRUCE ST
Turn LEFT onto S BROADWAY
Take the I-64 W/US-40 W ramp.
Merge onto I-64 W.
Take the KINGSHIGHWAY NORTH exit, exit number 36B
Merge onto S KINGSHIGHWAY BLVD
Turn RIGHT onto BARNES JEWISH HOSPITAL PLZ.

8.3 MILES, 15 MINUTES

APPENDIX D

SITE MAP OF VICINITY PROPERTIES IN NORTH ST. LOUIS COUNTY

U:\GPS\No...orthCo Basemap\NorthCountyVicinityPropertyMap.mxd

SLAPS

LEGEND:

- North County ROD Boundary
- Property Boundary
- Investigation Area Boundary
- Building
- Road
- Parking Lot
- Tank
- River/Stream/Pond
- Airfield
- Fence
- Railroad
- Stream
- Ditch

N
W E
S

MO-East State Plane
(NAD 83, Feet)
0 500 1,000 Feet

Vicinity Properties
North St. Louis County
St. Louis, Missouri

FUSRAP

DRAWN BY:	REV:	DATE:
TDC	0	10/4/2006

APPENDIX E

SITE MAP OF SLDS VICINITY PROPERTIES

U:\GPS\SL[illegible]S BASEMAP\SLDSVicinityPropertyMap.mxd

Lange-Stegmann Fertilizer Co
ANGELICA STREET
Metropolitan St. Louis Sewer District
Herman Oak Leather CO
John and William Harrison
Smith and Brennan Pile CO
Marcal Rope and Rigging, Inc
NORTH BROADWAY
William and Rebecca Harrison
DT-9
DT-12
Angelica Riverfront Redevelopment Corporation
Walter Brauer
DT-16
Joseph and Rose Pessina
Barbara Gubin
BREMEN AVENUE
FARRAR STREET (VACATED)
DT-36
DT-35
DT-8
DT-34
DT-2
William R. Nichols
DT-15
FORMER SALISBURY STREET ROADBED
MCKINLEY BRIDGE - OVERHEAD
SALISBURY STREET
DT-27
DT-26
DT-11
MALLINCKRODT STREET
Mallinckrodt Inc
DT-25
DT-24
DT-23
NORTH SECOND AVENUE
DESTREHAN STREET
DT-10
ANGELRODT STREET
DT-7
DT-6
DT-22
DT-14
DT-21
DT-20
DT-1
BUCHANAN STREET
DT-28
DT-17
DT-29
DT-3
DT-5
DT-4
DT-30
DT-13
DT-18
DOCK STREET
DT-31

LEGEND:

- SLDS ROD Boundary
- Property Boundary
- Building
- Road
- Parking Lot
- Tank
- River/Stream/Pond
- Fence
- Railroad

MO-East State Plane
(NAD 83, Feet)
0 250 500 Feet

Vicinity Properties
St. Louis Downtown Sites
St. Louis, Missouri

FUSRAP

DRAWN BY:	REV:	DATE:
TDC	0	10/4/2006

APPENDIX F

ST. LOUIS ACTIVITY HAZARD ANALYSIS FORM

Activity Hazard Analysis:

Activity: **Analyzed By:** **Reviewed By:**

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
Travel to/at project site	Operation of motor vehicles and trucks	All site personnel operating motor vehicles shall comply with all federal, state, and local traffic regulations. Personnel shall only use vehicles that are in good condition and are safe to operate. Personnel shall routinely inspect vehicles and document as outlined in the SSHP. Always drive defensively: **Observe High in Steering** - Pick a safe location not necessarily the closest **Understand the Big Picture** - look for any potential dangers **Eyes are Always Moving while Driving** -scan don't stare **Make Sure to Have a Way Out** -leave sufficient space around you **Make Sure You are Seen** -make eye contact or use warning devices Personnel must follow EC&HS 110. This includes: only hands-free cell phone use, no riding in the bed of pickup trucks, always wear seatbelts, secure all equipment for transport. All personnel will wear seatbelts while vehicles are in motion, and comply with all speed limits (including site specific). Backing of vehicles shall be avoided when possible. Extra care shall be taken to back vehicles when unavoidable (e.g., use a spotter).
Unloading Equipment (Insert Activity performed)	Heavy lifting, strains, sprains. Use of forklifts or other mechanical equipment	Personnel must also follow EC&HS 150. No individual employee is permitted to lift any object that weighs over 50 lbs. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting devices are required for lifting objects over the 50 lb. limit. Only qualified personnel shall be permitted to operate equipment. Forklifts and mechanical equipment shall be inspected daily. Forklift inspections shall be documented on SAIC Procedure 26 "Powered Industrial trucks" Exhibit 26-1. Deficiencies in equipment shall be noted on the inspection form. Equipment found to be unsafe shall not be used. All equipment shall be operated at safe speeds and in a safe manner. Equipment operators shall wear safety belts and hearing protection, as

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
(Insert Activity performed)	Overhead power lines Local Vehicle/Pedestrian Traffic Slips, trips, and falls	necessary. Ground personnel shall not position themselves between equipment and stationary objects and shall only approach the equipment after the bucket/fork/load (if applicable) is on the ground and after receiving a signal from the operator. Personnel shall maintain eye contact with the operator when approaching equipment. Equipment load capacities shall not be exceeded. Personnel shall never stand under suspended loads No person is to operate a powered industrial truck (e.g., a forklift) until the training requirements of SAIC EC&HS Procedure 26 "Powered Industrial Trucks" Section 26.7 "Operators Training" and 29 CFR 1910.178 are satisfied. Personnel shall ensure all mechanical guards are in place and functioning properly. All equipment shall be shut down with energies dissipated prior to performing maintenance activities. Lockout/tagout procedures may apply. Only qualified mechanics shall work on or repair mechanical equipment. Equipment operators must remain aware of overhead power lines and maintain safe distances. Spotters shall be used as necessary. Personnel must follow EC&HS 190 Electrical Safety. Follow Traffic Control plan for lane blockage, rerouting traffic, flagmen, etc. Follow all Federal, state, and local permits. Personnel must follow EC&HS 170. Keep work areas clear and maintain proper housekeeping - mark, barricade, or eliminate trip/fall hazards. Personnel shall not jump from equipment or elevated surfaces. Unloaded equipment and materials shall be stored appropriately. Personnel trained in fall protection equipment use and inspection. Competent Person must inspect all fall protection systems and equipment. Provide and use fall protection at working heights > 6 ft. Install and use fall restraints or other appropriate controls when working on roof areas. Appropriate fall protection equipment shall be used while working in man-lifts.

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
(Insert Activity performed)	Hand injuries	Only Type I ladders are permitted. Ladders shall be inspected before each use, be in good condition, and only used as intended by their design. Ladders shall be erected on level surfaces and tied off while being used. When tying off is impractical, then other personnel shall to used to steady the ladder. Personnel shall not overextend their reach while working on ladders. Items to be handled shall be inspected for sharp edges prior to being handled. Personnel shall wear leather gloves when handling sharp materials. Personnel shall be aware of and avoid pinch point hazards.
	Fire	Engines shall be shut off before refueling. A fire extinguisher shall be available at refueling areas. Smoking shall not be permitted near fueling areas. Fuel will be stored in safety cans with flash arrestors. Personnel must follow EC&HS 260 Fire Awareness and Control.
	Electrocution	Only qualified electricians shall make electrical connections. All electrical work shall comply with National Electric Code standards. All circuit breakers shall be labeled. There shall be no work on energized electrical lines or equipment. Lockout tagout procedures (EC&HS 11) will apply during service or repair of machines or equipment in which the unexpected energization, startup, or release of stored energy could cause injury to employees. Personnel must follow EC&HS 190 Electrical Safety. GFCIs shall be used on all power tools and extension cords. Extension cords, power tools, and lighting equipment shall be inspected before each use, protected from damage, and kept out of wet areas.
	Excavation hazards (contact with underground utilities, excavation cave-in, work around heavy equipment, hazardous atmospheres)	Personnel must follow EC&HS 130 & 160. Underground utilities shall be located and marked prior to commencing excavation activities. Excluding personnel from trenches deeper than 4 feet will control cave-in hazards. Personnel will be kept at least 3 feet away from trenches deeper than 4 feet. Visual examination of excavation will be done from the trench ends, rather than the sides. If it becomes necessary for personnel to enter trenches deeper than 4 feet, the requirements of 29 *CFR* 1926.651 will be applied. This will include daily

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
(Insert Activity performed)		inspections of the excavation, shoring, benching or sloping of the trench sides.
	Noise	Noise surveys shall be performed to determine the extent and limits of hazardous noise areas as required by EC&HS 15 Hearing Conservation and Noise Control. Engineering controls shall be implemented where feasible. Areas with noise that cannot be controlled shall be posted as such and personnel shall wear hearing protection to reduce exposures below the OSHA limits. Hearing protection is required for SAIC activities where noise levels exceed 85 dBA in an 8-hr TWA.
	Radiological/chemical contamination	Personnel shall wear Modified Level D (D+) PPE as required by the SSHP and outlined in the HSWP. Medical clearance in accordance with 29 CFR 1910.120 and EC&HS 12. TLDs shall be worn by personnel working in radiological areas or determined by the RPM and SAIC Procedure HP-40. Entry, routine, special, and exit bioassay samples shall be submitted to HP if working in radiological areas or determined by the RPM and SAIC Procedure HP-40. All employees and equipment shall be monitored for contamination prior to exit from radiological areas. The extent of personnel surveys (whole body, hand & foot, etc.) shall performed as listed on the HSWP. Minimize contact with radiological materials, survey and wash hands & face prior to taking anything by mouth (eating, drinking, smoking, chewing, etc.) No eating, drinking, smoking, chewing, etc. permitted in any radiological area. All incoming heavy equipment shall be surveyed for contamination prior to being allowed into radiological areas.
	Injury from steam/pressure washers	Monitoring for chemicals is not anticipated to be necessary but shall be performed, if applicable. Personnel shall be trained in the use of steam/pressure washing equipment.

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
(Insert Activity performed)	Drum/Container handling	The spray from such equipment shall only be directed at surfaces to be cleaned and never at body parts or other personnel. Face protection shall be worn by all personnel associated with the use of steam/pressure washers. Rain gear shall be worn by personnel in addition to other PPE. An HSWP must be developed prior to any sampling of drums or handling of drums showing evidence of damage, corrosion, or any condition that may result in a leak, spill, or release. Any drums used for the transportation of project materials will meet DOT and 10 *CFR* 20 requirements and will be labeled to comply with applicable U.S. Environmental Protection Agency (EPA) requirements. Drums weighing more than 40 pounds must be handled with a drum dolly or other suitable device.
	Chemical hazards	Copies of MSDSs for all hazardous chemicals on site will be maintained in the work area. MSDSs will be available to all employees for review. PPE requirements for work with or around hazardous chemicals (i.e., sample preservation or in the laboratory) shall be commensurate with hazards, chemical use and MSDS recommendations. No eating, drinking, smoking, chewing, etc. permitted in any chemical use area. Emergency eye wash (ANSI Z 358.1) will be available in the vicinity of chemical use area. Medical clearance in accordance with 29 CFR 1910.120 and EC&HS 12.
	Lab work	Prevent contact with chemical, wash hands & face prior to taking anything by mouth (eating, drinking, smoking, chewing, etc.)
	Illumination	Personnel must follow EC&HS 14 and the Laboratory Chemical Hygiene Plan.

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
(Insert Activity performed)		Site fieldwork will be conducted during daylight hours (no earlier than 15 minutes after sunrise and no later than 15 minutes before sunset) and natural illumination will be used. Work conducted in buildings will be illuminated to meet the minimums stated in 29 *CFR* 1910.120(m).
	Drowning	When working within 5 feet of water deeper than 3 feet, employees shall utilize applicable water rescue equipment. Equipment shall be inspected for damage prior to use. When personnel are working on a downward slope where a slip and fall could result in the worker falling into water deeper than 3 feet, the worker shall wear a safety belt or harness with a lifeline attached. The lifeline shall be secured to a sturdy object and shall be manned by an attendant. If work involves sampling or other activities that require the use of a boat, one life ring shall be placed in the boat and one shall be placed with an attendant. When a boat is not within sight of the onshore attendant, radio contact must be maintained.
	Heat Stress	General controls will consist of making fluids readily available, use of the buddy system, and taking scheduled and unscheduled breaks in temperature controlled areas, as necessary.
	Cold Stress	General controls consist of adequate clothing, staying dry, use of the buddy system, and taking scheduled and unscheduled breaks in temperature controlled areas, as necessary. Move individuals who become wet to a sheltered, warm area.
	Biological hazards (bees, wasps, ticks, poison plants (poison ivy/oak/sumac))	Tape interfaces of clothing, use insect repellant, and perform self inspection for ticks as necessary. Personnel should inform supervisors of allergies to biological hazards. Wash hands and face when leaving areas where poison plants are present.

Principle Steps	Potential Safety/Health Hazards	Recommended Controls
	Hazardous Material Transport Inclement Weather (lightning, thunderstorms, tornadoes, etc.)	Personnel must follow EC&HS 28. Personnel will be trained during Site Orientation Training (SOT) to follow SAIC Site Safety and Health Plan for St. Louis – FUSRAP activities concerning site requirements regarding inclement weather.

Equipment To Be Used	Inspection Requirements	Training Requirements
Support vehicles Manual and electric hand tools Heavy duty extension cord and GFCI Sampling instruments Monitoring instruments	Inspect hand tools and extension cords each day of use. Inspect monitoring instruments for calibration each day of use.	Site Orientation Radiological Worker (if work is in radiological area) 40 Hr HAZWOPER & current refresher (if work is in chemically/radiologically contaminated area) Hazard Communication (if hazardous chemicals are used) Hearing Conservation (if noise exposures are > 85 dBA in 8 hr TWA)

APPENDIX G

DRILL RIG INSPECTION CHECKLIST

DRILL RIG INSPECTION CHECKLIST

Site Name: _____

Rig
Model: _____ Manufacturer: _____

Serial Number: _____ Rig Owner: _____

Inspection Performed
by: _____ _____
(Driller's signature) (Date)

Checklist Reviewed and
Emergency shutdown Observed
by: _____ _____
(Signature) (Date

Place and X in each appropriate ( )

1.0 GENERAL

1.1 Check all safety devices which are part of drill rig and which can be verified (see note).
Is (are all) devices(s) intact and operating as designed?

Emergency Interrupt System

A. Kill Switch 1	Yes ( ) No ( ) NA ( )
B. Kill Switch 2	Yes ( ) No ( ) NA ( )
C. Kill Switch 3	Yes ( ) No ( ) NA ( )
D. Kill Switch 4	Yes ( ) No ( ) NA ( )
E. Kill Switch 5	Yes ( ) No ( ) NA ( )
F. Other _____	Yes ( ) No ( ) NA ( )
G. Other _____	Yes ( ) No ( ) NA ( )
H. Other _____	Yes ( ) No ( ) NA ( )

Note: All safety devices (not otherwise listed in this checklist) should be identified for each drill rig at the beginning of each project and subsequently checked at each inspection. Testing of all safety devices must be observed by health and safety personnel. List only safety devices which can be checked without disassembly or without rendering the device ineffective. This checklist does not cover United States Department of Transportation requirements.

1.2 Is the proper type and capacity of fire extinguisher(s) present, properly charged, and inspected? Yes ( ) No ( ) NA ( )

1.3 Is rig properly grounded: Yes ( ) No ( ) NA ( )

Drill Rig Inspection Checklist (continued)

1.4 Are rig and mast a safe distance from electrical lines? Yes ( ) No ( ) NA ( )

1.5 Can mast be raised without encountering overhead obstructions? Yes ( ) No ( ) NA ( )

1.6 Have spill prevention materials been placed under rig (i.e., plastic sheeting)? Yes ( ) No ( ) NA ( )

1.7 Is a spill kit present? Yes ( ) No ( ) NA ( )

1.8 Is the safe operating zone/exclusion zone posted (minimum radius at least equal to height of raised drill mast)? Yes ( ) No ( ) NA ( )

1.9 Do all modifications made to the drill rig permit it to operate in a safe manner and allow the drill to operate within the manufacturer's specifications? Yes ( ) No ( ) NA ( )

1.10 Are moving parts (excluding cathead and other moving parts normally used during operations) properly guarded? Yes ( ) No ( ) NA ( )

1.11 Are all exhaust pipes, which would come in contact with Personnel during normal operation properly guarded? Yes ( ) No ( ) NA ( )

1.12 Are tank(s) and lines free of leakage? Yes ( ) No ( ) NA ( )

1.13 Are all normal or manufactured-recommended maintenance Activities or schedules performed at the required frequency? Yes ( ) No ( ) NA ( )

1.14 Are walking and standing surfaces, steps, rungs, etc., free of Excess grease, oil, or mud which could create a hazard? Yes ( ) No ( ) NA ( )

2.0 CONTROL MECHANISMS

Are all control mechanisms and gauges on the drill rig functional And free of oil, grease, and ice (checked while running)? Yes ( ) No ( ) NA ( )

3.0 HYDRAULICS AND PNENUMATICS

Note: The mast should be lowered during the completion of this section to allow inspection of portions of the lifting mechanisms normally out of reach during operation.

3.1 Do all hydraulic reservoirs exhibit proper fluid levels? Yes ( ) No ( ) NA ( )

3.2 Are hydraulic and/or pneumatic systems in good condition and functioning correctly (checked while running)? Yes ( ) No ( ) NA ( )

4.0 LIFTING MECHANISMS

Note: The mast should be lowered during the completion of this section to allow inspection of portions of the lifting mechanisms normally out of reach during operation.

4.1 Have all wires, ropes, cables, and lines that are kinked, worn, corroded, cracked, bent, crushed, frayed, stretched, birdcaged, or otherwise damaged been replaced and the defective equipment removed from the site? Yes ( ) No ( ) NA ( )

4.2 Have all wires, ropes, cables, and lines been wrapped around winch drums without excessive pinching or binding? Yes ( ) No ( ) NA ( )

4.3 Are all pulleys undamaged and functional? Yes ( ) No ( ) NA ( )

4.4 Are all clips, clamps, clevises, hooks, and other hardware Used to rig wires, ropes, cables, or lines undamaged and Attached properly? Yes ( ) No ( ) NA ( )

4.5 Do all eyes formed in wires, ropes, cables, or lines attached To the rig use a thimble to retain the shape of the eye? Yes ( ) No ( ) NA ( )

4.6 Do all hooks having functioning safety gates/latches? Yes ( ) No ( ) NA ( )

5.0 NONCONFORMING ITEMS

5.1 When did the last operation checklist inspection take place for this drill rig at this site?

Date:_____

5.2 Have any nonconforming items been carried over from the last Inspection? List any such items and dates or original nonconformance.

A. _____

Date:_____

B. _____

Date:_____

C. _____

Date:_____

D. _____

Date:_____

Any nonconforming items must be documented in the following remarks section and reported to the field operations manager for the project prior to operating the drill rig. Reference all remarks to the item numbers noted above.

Remarks:

_____

_____

_____

_____

_____

APPENDIX H

ACCIDENT PREVENTION PLAN INFORMATION

ACCIDENT PREVENTION PLAN INFORMATION

EM 385-1-1 requires specific items of information to be included in a Project Accident Prevention Plan. The following table gives the locations of these specific items within SAIC's program documents and this SSHP.

Requirement	Location of Information
Signature sheet	SSHP, inside front cover
Background information	SSHP Section 1.3
Statement of safety and health policy	SSHP Section 1.2
Responsibilities and lines of authority	SSHP Section 2
Training	EC&HS Proc. 20, SSHP Section 4
Safety and health inspections	SSHP Section 2.4
Safety and health expectations, incentive programs, and Compliance	Policy Statement, Corporate EC&HS Policy Statement, A-1 – Discipline
Accident reporting	EC&HS Proc. 4 & 6, SSHP Section 11
Medical support	SSHP Section 11
Personal protective equipment	SSHP Section 7
Emergency response	SSHP Section 11
Contingency plans	SSHP Section 11
Job cleanup and safe access	SSHP Section 8.1
Public safety requirements	SSHP Sections Introduction, 8, and 11
Local requirements	None
Prevention of alcohol/drug abuse on the job	Policy SG - 21, Drug and Substance Abuse Policy
Hazard Communication	EC&HS Procedure 8 and SSHP Sections 4 and 8.12

AR-112