US Army Corps
of Engineers
Buffalo District

FINAL

SITE SAFETY AND HEALTH PLAN

TOWN OF TONAWANDA LANDFILL

TONAWANDA, NEW YORK

JUNE 1, 2001

200.1e

COMMITMENT TO IMPLEMENT THE TOWN OF TONAWANDA LANDFILL SITE CHARACTERIZATION

SITE SAFETY AND HEALTH PLAN

[redacted] 5/31/01

SAIC Project Manager — Phone 508-946-3500 — Date

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TOTAL P.03

SITE SAFETY AND HEALTH PLAN
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

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LIST OF ACRONYMS AND SYMBOLS

ACGIH	American Council of Government Industrial Hygienists
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
cm^2	square centimeters
DAC	derived air concentration
dBA	Decibels (Audible)
DDE	Deep-Dose Equivalent
DOE	Department of Energy
dpm	disintegrations per minute
EC&HS	Environmental Compliance and Health and Safety (program)
EEMG	Engineering and Environmental Management Group
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FP	flash point
GFCI	ground fault circuit interrupter
ha	hectare
HTRW	hazardous, toxic, and radioactive waste
IDLH	immediately dangerous to life and health
IP	ionization potential
km	kilometer
kV	kilovolt
LEL	lower explosive limit
m	meter
MCL	maximum contaminant level
MED	Manhattan Engineer District
mg/L	milligram per liter
mi	mile
MSDSs	Material Safety Data Sheets
NIOSH	National Institute of Occupational Safety and Health
OEW	Ordnance and Explosive Waste
OJT	on-the-job training
OSHA	Occupational Safety and Health Administration
pCi/g	picocurie per gram
PEL	permissible exposure limit
PID	photoionization detector
PPE	personal protective equipment
PVC	polyvinyl chloride
RA	Restricted Area
RCRA	Resource Conservation and Recovery Act
rem	Roentgen-equivalent Man
RFI	RCRA Facility Investigation

List of Acronyms and Symbols (continued)

RSO	Radiation Safety Officer
SAIC	Science Applications International Corporation
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
TLD	thermoluminescent dosimeter
TLV	threshold limit value
TPH	total petroleum hydrocarbons
TWA	time-weighted average
U	uranium
USACE	United States Army Corps of Engineers
VOC	volatile organic compound
VP	vapor pressure

1. INTRODUCTION

1.1 GENERAL

Science Applications International Corporation (SAIC) maintains a corporate Environmental Compliance and Health and Safety (EC&HS) program intended to ensure safe operation and regulatory compliance. SAIC's EC&HS program document, together with site safety and health plans (SSHP), present the requirements for safely performing field work.

This SSHP sets forth the basic procedures required to protect SAIC and subcontractor personnel involved in the field phase of this project. It also establishes practices to protect the public and the immediate environment from hazards caused by this work. SAIC personnel and subcontractors are required to review this plan prior to onsite 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 and sufficient controls. In addition, subcontractor personnel are required to submit certifications relating to their training and medical monitoring to SAIC to assure compliance with these requirements as detailed in this SSHP. Standard procedures will be used to minimize the potential for personnel injury or illness. These will include site-specific training, routine inspections, visual and instrument surveillance for hazards, and enforcement of the health and safety requirements by project management.

This document is designed to satisfy the requirements of Appendix B to ER 385-1-92, "Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities," the requirements of EM-385-1-1, "U.S. Army Corps of Engineers Safety and Health Requirements Manual," relevant Occupational Safety and Health Administration (OSHA) regulations, and the SAIC EC&HS Manual.

This SSHP is included as an attachment to the project Work Instruction/Work Plans. In cases where required information is contained in the Work Instruction/Work Plans, this information will be referenced rather than repeated in this SSHP. See the Work Instruction/Work Plans for detailed site descriptions, site maps, etc. Both the applicable Work Instruction/Work Plans and this SSHP must be present onsite during field work.

Field work is proposed for the Town of Tonawanda Landfill Site, in the areas identified during earlier studies (DOE 1992, ORNL 1992) Field tasks to be performed by SAIC and its subcontractors may include:

- civil surveying;
- external gamma exposure rate survey;
- collection of soil samples from Geoprobe® holes;
- collection of groundwater samples; and
- equipment decontamination.

The primary hazards posed by the planned tasks are possible contact with previously landfilled waste material, exposure to radioactive contaminants, airborne dust, and physical hazards associated with the Geoprobe® operation and the work environment.

This project will be performed in Level D and Level D+ personal protective equipment (PPE) unless one of several action levels specified in the plan are exceeded or the potential for increased risk becomes apparent during the field activities. Protective procedures, including protective clothing, will be upgraded as necessary by the Site Safety and Health Officer (SSHO) based on established action levels or judgment. Changes will be documented with SSHP addenda, field change orders, radiation safety permits, or equivalent.

EM-385-1-1 requires specific items of information to be included in a Project Accident Prevention Plan. Table 1.1 gives the locations of these specific items within SAIC's program documents and this SSHP.

Table 1.1 SSHP Accident Prevention Plan Information

Requirement	Location of Information
Signature sheet	SSHP, inside front cover
Background information	SSHP front cover and introduction
Statement of safety and health policy	EC&HS Program Document
Responsibilities and lines of authority	SSHP Section 3
Subcontractors and suppliers	SSHP Section 3
Training	EC&HS Proc. 20, SSHP Section 4
Safety and health inspections	SSHP Section 3.5
Safety and health expectations, incentive programs, and Compliance	EC&HS Policy Statement, EC&HS Program Implementation Guide C.2 - Discipline
Accident reporting	EC&HS Proc. 4 & 6, SSHP Sections 3.3, 3.4, 3.5, and 11
Medical support	SSHP Section 11
Personal protective equipment	SSHP Section 5
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 A18, Drug and Substance Abuse
Hazard Communication	EC&HS Procedure 8 and SSHP Sections 4 and 8.11

1.2 SITE DESCRIPTION

1.2.1 Overview of Manhattan Engineer District (MED) Contamination in Tonawanda, New York

From 1942 to 1946, portions of the Linde Site (currently Praxair) in the Town of Tonawanda, New York, were used for separation of uranium ores. These processing activities, conducted under a

Manhattan Engineer District (MED) contract, resulted in elevated levels of radionuclides in portions of the property and buildings. Subsequent disposal and relocation of processing wastes from the Linde Site resulted in elevated levels of radionuclides at four nearby properties in the Town of Tonawanda: the Ashland 1 property, the Seaway property, the Ashland 2 property, and the Town of Tonawanda Landfill. This investigation addresses potential MED-related contamination at the Town of Tonawanda Landfill. The Tonawanda Landfill site was designated a FUSRAP Vicinity Property site in December, 1992. (DOE 1992)

1.2.2 Location of the Town of Tonawanda Landfill

The Tonawanda Landfill Site is located approximately 1.5 miles north of the Linde (Praxair) FUSRAP Site in the Town of Tonawanda, New York. The Tonawanda Landfill site is approximately 170 acres in size and is divided into two parcels – the former Town of Tonawanda Landfill (55 acres) and the Mudflats (115 acres). Both parcels are owned by the Town of Tonawanda. The Landfill parcel is located at the northern end of East Park Drive and is bounded by the residential developments to the north and northwest, a railroad line to the east, and a right of way belonging to the Niagara Mohawk Power Company (NMPC) to the south. The Mudflats portion of the property is located on the opposite side of the NMPC right of way that borders the Landfill. The Mudflats parcel is approximately 115 acres and is bordered by the NMPC right of way to the north, a railroad line to the east, on the west by the former Town of Tonawanda incinerator, and to the south by the New York State Thruway property. One 48 inch diameter Erie County Water Authority (ECWA) water transmission line traverses through the NMPC easement. ECWA has an easement for the installation of a second water main. The area is essentially zoned as commercial/ industrial except for the bordering residential areas referenced above. A site locus plan (Figure 1-1), a plan showing Tonawanda FUSRAP sites (Figure 1-2), and a Landfill site plan (Figure 1-3) are included. Due to geographical separation of the two areas and their different physical characteristics, they will be addressed, as necessary, as separate operable units (OUs).

The NCP defines an OU to mean "a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of release, or pathway of exposure. The cleanup of the site can be divided into a number of OUs, depending on the complexity of the problems associated with the site. OUs may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time that are concurrent but located in different parts of a site."

1.2.3 Site History

The Landfill was operated as a municipal landfill by the Town of Tonawanda (Town) from the mid-1930's through October 1989. The primary waste streams for the landfill were ash generated by the incinerators, construction/demolition debris, and yard refuse (leaves, branches, etc.) collected from town residents. On occasion, the landfill did accept municipal solid waste and wastewater sludges, but only when the incinerators were temporarily inoperable.

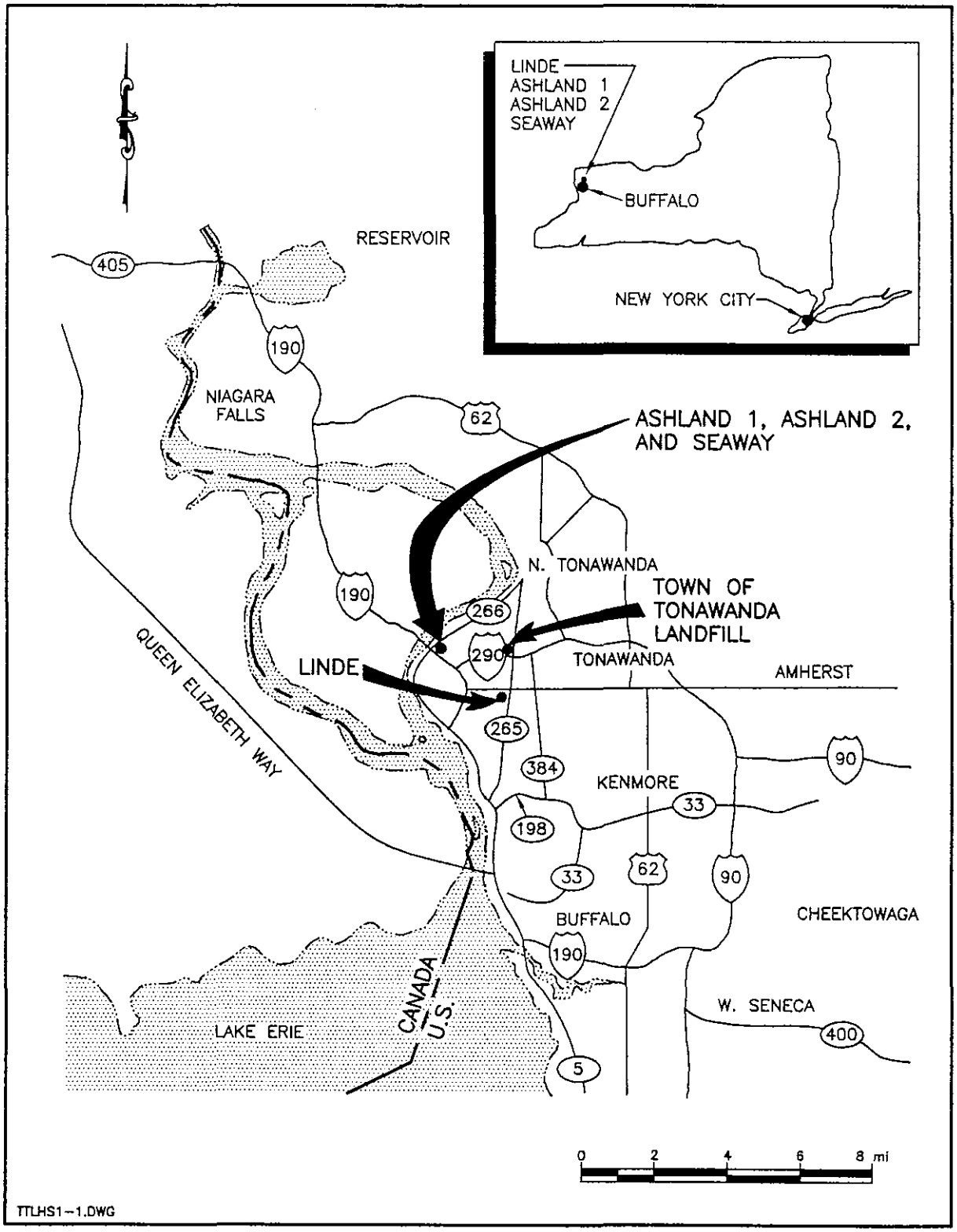

FIGURE 1-1

REGIONAL LOCATION OF THE TOWN OF TONAWANDA, NEW YORK AND THE ASHLAND 1, ASHLAND 2, SEAWAY, LINDE AND THE TOWN OF TONAWANDA LANDFILL SITES

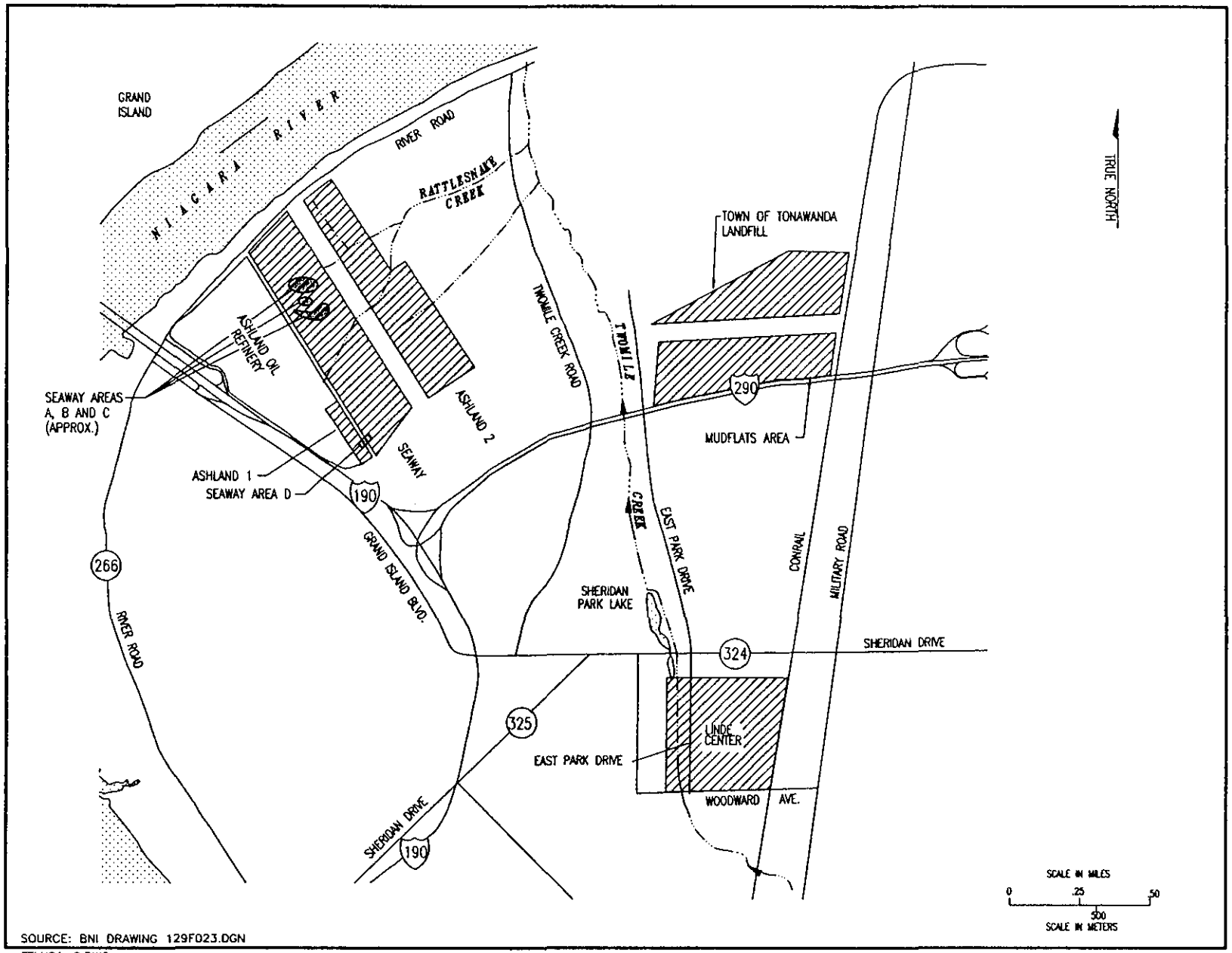

FIGURE 1-2
LOCATIONS OF ASHLAND 1, ASHLAND 2,
SEAWAY, LINDE AND THE TOWN OF TONAWANDA LANDFILL SITES

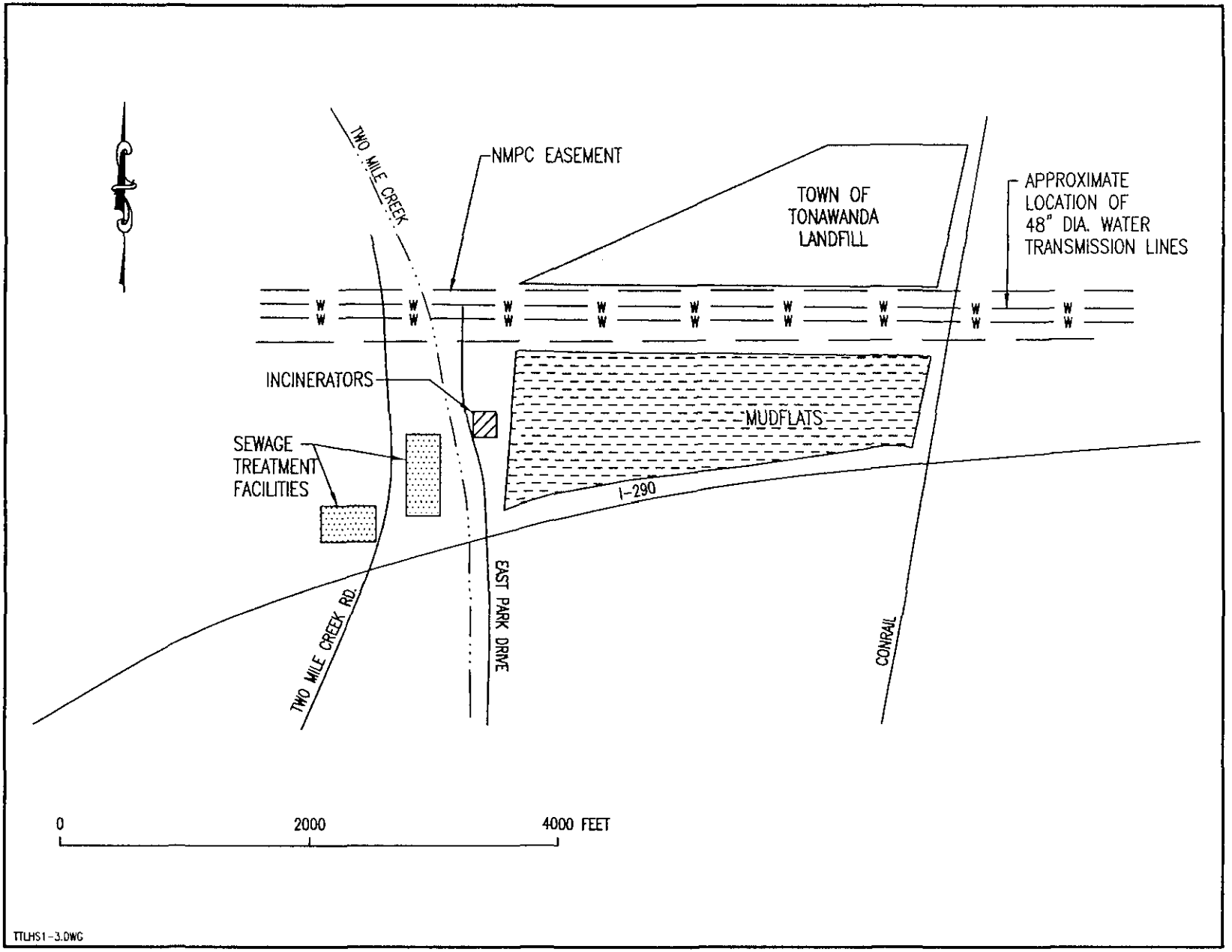

FIGURE 1-3
TOWN OF TONAWANDA LANDFILL APPROXIMATE LOCATIONS

The incinerators, operated by the Town between the 1940s and early 1980s, were used to burn municipal solid waste and sludges generated by the Town's wastewater treatment plant (WWTP). The incinerators are located at the western edge of the Mudflats area. Other than the incinerators, the Mudflats have always remained vacant.

Although neither the Landfill or Mudflats were directly involved with activities normally covered under the FUSRAP program, the Site was designated a FUSRAP Vicinity Property (DOE 1992) due to the potential for MED-related material from the Linde Site having been placed in the Landfill. The Linde Site is the former location of ore processing activities by the Linde Air Products Division (Linde) of the Union Carbide Corporation of Tonawanda, New York. Linde performed these activities under contract to the MED and Atomic Energy Commission (AEC) between 1942 and 1948. Processing activity by-products consisted mainly of solid filter cake and liquid filtrate. Between 1942 and 1944, the liquid filtrate was discharged directly to the municipal sanitary sewer collection system for treatment by the Town WWTP. Sludges generated by the WWTP were placed in the Landfill (USACE 1999a).

Direct discharge of liquid filtrate from the Linde Site to the sanitary sewer collection system was stopped in April 1944. After that, liquid filtrate disposal was completed via on-site deep well injection. However, during periods when the injection wells were backed up or unusable, liquid filtrate was discharged to a nearby storm sewer or drainage ditch located adjacent to the Linde facility. Liquids directed to the storm sewer and drainage trench ultimately discharged into Two Mile Creek. Two Mile Creek is shown in Figure 1-3.

1.2.4 Previous Investigations

Initial radioactive material surveys for the presence of MED-related contaminants at the Landfill and Mudflats were conducted by the DOE in 1990 as part of the Linde FUSRAP Site investigation. The intent of the survey was to assess whether any radioactive material had been transported and disposed of off-site in the general area surrounding the Linde facility. The preliminary survey was completed using a mobile gamma scanning van. An anomaly in the survey detected in the Mudflats during the mobile scanning activities was verified using handheld gamma screening devices. Subsequent soil samples collected from the area around the anomaly indicated elevated levels of U-238 and Ra-226 - two isotopes consistent with material expected to be in ore processing by-products generated at the Linde Site (ORNL 1990).

A limited radiological survey was conducted by DOE in September, 1991 (ORNL 1992). The survey focused on the Landfill and Mudflats and consisted of gamma walkover and scans, measurement of radiation levels, and the collection and analysis of systematic and biased soil samples. The results of the survey detected soils in the Landfill and Mudflats exceeding the radionuclide guideline standards established by the DOE. Laboratory results received indicated some soil samples exhibited characteristics similar to the MED product formerly produced at the Linde facility and others were consistent with the by-products of the refining process conducted at the same Linde facility. The Landfill and Mudflat were subsequently designated as a Vicinity Property of the Linde FUSRAP Site (DOE 1992).

DOE conducted additional soil sampling activities at the Landfill and Mudflats in 1994 to determine the vertical extent of the radiological contamination at the site. Analytical results obtained for subsurface soil, sediment, surface water, and groundwater samples indicated the radiological contamination was essentially limited to the upper 1.5 feet of soil. However, contamination was detected in one sample collected 11.5 feet below existing grade (BNI 1995).

The USACE completed a Radiological Human Health Assessment for the Landfill and Mudflats site in February, 1999. After reviewing several closure scenarios and the radiation doses and health risks associated with each alternative, the USACE concluded that if the Landfill was closed with radiologically impacted soil left in place and if the Landfill is properly maintained after closure, risk of exposure to the public would be well within the acceptable CERCLA risk range. The assessment also concluded that if the Mudflats area is developed for industrial use it could pose a public health risk. Closure scenarios for the Landfill addressed during the assessment included capping the contaminated soil in place and excavation and removal of the impacted soil. Closure alternatives evaluated for the Mudflats area included no action, covering the impacted area with clean soil, and excavation and removal of impacted soil (USACE 1999b).

In addition to the potential MED-related material identified in the Landfill and Mudflats areas of the site, a previous investigation conducted by the DOE in 1984 indicated the presence of a non MED-related radionuclide, Am-241, contaminated material in two locations in the Landfill portion of the site (DOE 1984). The two areas of Am-241 are shown on Figure 2-1 of the FSP. The source of the Am-241 was found to be a nearby former radioactive components manufacturing facility that discharged Am-241 contaminated material to the sanitary sewer which ultimately ended up in the wastewater sludge generated by the municipal water treatment plant. Wastewater sludge was commonly brought to the incinerator for incineration and then interned at the Landfill. The Am-241 material in the Landfill was attributed to the spread of contaminated ash generated by the incinerators (DOE 1984). Subsequent investigations by the Town of Tonawanda (TMA/Eberline 1988) and others confirmed the presence of Am-241 contaminated material in the Landfill. A subsequent report also confirms the presence of a third area of Am-241 contaminated material (TMA/Eberline 1988). To date, there have been no removal or remedial actions associated with the Am-241 contaminated material identified in the Landfill.

The concentration ranges of contaminants of concern from a safety and health perspective while conducting field activities at the Town of Tonawanda Landfill are provided in Table 1.2.

Table 1.2 Historical Concentration of Contaminants at Town of Tonawanda Landfill

Isotope	Concentration Range (pCi/g)	Media	Location
Radium-226	0.32 – 2000	Soil	North-center of Landfill, Mudflats
Thorium-230	0.65 – 430	Soil	North-center of Landfill, Mudflats
Uranium-238	0.88 – 1800	Soil	North-center of Landfill, Mudflats
Americium-241	0 – 750	Soil	NE Corner of Landfill

2. HAZARD/RISK ANALYSIS

The purpose of this site task hazard analysis is to identify and assess potential hazards that may be encountered by site personnel and to prescribe required controls. Table 2.1 is a checklist of common hazards that may be posed by this type of project. It includes negative declarations for hazards that will not be encountered.

Because surface and subsurface soils, as well as groundwater, at the Town of Tonawanda Landfill site may be contaminated with radioisotopes, there is some potential for exposure to ionizing radiation. Site tasks also present a variety of possible physical hazards, with drilling and soil sampling operations offering the greatest potential for significant injury. Physical hazards include falling, entanglement with equipment, uneven ground, drill rig operations, explosion, fire, heavy lifting/moving, noise, and inclement weather. If additional tasks or significant hazards are encountered during the work, this document will be modified by addendum or field change order to include the additional information.

Table 2.1 Hazards Inventory

Yes	No	Hazard
X		Biological hazards (bees, ticks, wasps, poison ivy)
	X	Confined space entry (Potential for entry)
	X	Drowning
X		Electrical shock
	X	Excavation entry (Excavations will not be entered)
X		Exposure to chemicals
X		Fire
	X	Unexploded ordnance
X		Heavy equipment
X		Noise
X		Radiation or radioactive contamination
X		Temperature extremes
X		Lifting
X		Falls from elevated surfaces
X		Landfill gases

2.1 TASK-SPECIFIC HAZARD ANALYSIS

Table 2.2 presents task-specific hazards, task-specific hazard analyses, relevant hazard controls, and required monitoring, if appropriate, for all of the planned site tasks

Table 2.2 Hazards Analysis

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
Soil Boring and Sampling Using Geoprobe®	General safety hazards (moving equipment, lifting, slips, falls)	Level D PPE (see Section 5.0) plus hardhat, buddy system. No employees under lifted loads. Exclusion zone around rig, only necessary and experienced personnel within exclusion zone, two functional kill switches or operating control requiring positive action from operator "deadman's switch", functional back-up alarm, Geoprobe® operating manual on-site, lifts of >50 lbs. will be performed by two or more personnel or using mechanical assistance, extensive heavy lifting will require additional lifting training. Care will be taken to clear immediate work area of ice/snow or to place sand/salt to reduce slipping hazard. HAZWOPER 40-hour training, standard procedures (see Chapter 8).	Site safety inspections Geoprobe® inspections	Daily Daily See "Daily Safety Inspection Log"	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Noise	Hearing protection within 25 feet of rig	Safety inspections	Daily	Hearing Conservation Training Daily Safety Briefing Site Worker Training
	Fire (fuels)	Fuel and flammables stored in safety cans with flame arresters Fire extinguisher rated ≥20B 25 to 75 feet from flammables storage No ignition sources in fuel storage areas Fuel storage areas (if any) marked with "No Smoking or Open Flame" signs Bonding (metal to metal contact) during pouring Gasoline powered equipment shut down during fueling	Safety inspections	Daily See "Daily Safety Inspection Log"	Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Exposure to chemicals (see Table 2.3)	PPE (Level D) including nitrile or PVC gloves for contact with potentially contaminated material. Medical clearance for HAZWOPER work Minimal contact, wash face and hands prior to taking anything by mouth	PID or equivalent and other sampling as appropriate	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Radiological hazards (See Table 2.3)	Refer to Appendix A – Radiation Protection Plan			Radiation Worker Training Daily Safety Briefing Site Worker Training
	Temperature extremes	Administrative controls (see Section 8.14) Heated break area if temperature is below 32 °F No work if temperature is below -29 °F If impermeable clothing is worn, (1) a mandatory work/rest cycle will be implemented as specified in Section 8.14; (2) workers will be notified of their responsibility to take unscheduled breaks, if needed.	Temperature measurements at least twice a day; heart rate monitoring if personnel wear impermeable clothing. Measurement or estimation of wind speed will also be conducted. The wind speed and the temperature will be used to calculate the effective temperature using a wind chill graph or chart. (Refer to Appendix E.) Similarly, if the work extends to warm weather, both temperature and humidity will be measured to determine the WBGT Index.	Twice Daily See "Daily Safety Inspection Log".	Daily Safety Briefing Site Worker Training
	Landfill Gases	Exclusion zone around drill rig, only necessary and experienced personnel with exclusion zone.	4-gas LEL meter	Constant monitoring during drilling activities	Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Biological hazards (bees, ticks, Lyme disease, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day.	Visual survey	Daily – upon completion of daily field activities	Daily Safety Briefing Site Worker Training
	Electric shock	Identification and clearance of overhead and underground utilities (See Section 8.0)	Visual of all work areas Digging clearance from local utilities	Dig Safe	Daily Safety Briefing Site Worker Training
Groundwater Sampling and Sample Preservation	General safety hazards (moving equipment, lifting, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots, hardhats if overhead hazards are present (see Section 5.0 of SSHP). Buddy system Lifts of >50 lbs will be performed by two or more personnel or with mechanical assistance, extensive heavy lifting will require additional lifting training. Care will be taken to clear immediate work area of ice/snow or to place sand/salt to reduce slipping hazard. Hazardous waste safety training. Exclusion zone if there is a potential for unauthorized entry.	Site safety inspections	Daily See "Daily Safety Inspection Log".	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Noise	None, unless SSHO determines that equipment potentially exceeds 85 dBA.	Safety inspection	Daily	Daily Safety Briefing Site Worker Training
	Fire (fuels)	Fuel stored in safety cans with flame arresters Fire extinguisher in fuel use areas. No ignition sources in fuel storage areas Bonding (metal to metal contact) during pouring Gasoline powered equipment shut down during fueling	Site safety inspections Combustible gas indicator if prior monitoring indicates potential for flammable atmosphere.	Daily See "Daily Safety Inspection Log".	Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Exposure to chemicals	PPE (Level D) including nitrile or PVC gloves to handle potentially contaminated material Minimal contact, wash face and hands prior to taking anything by mouth Medical clearance for HAZWOPER work 15 minute eyewash within 100 feet when pouring corrosive sample preservatives, eyewash bottle within 10 feet when adding water to pre-preserved sample containers. Site training must include hazards and controls of exposure to contaminants and chemicals used on site. MSDSs kept on site. All chemical containers labeled with contents and hazard.	Site safety inspections, PID monitoring if prior monitoring during soil boring indicated a potential for exposure	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Landfill Gases	Exclusion zone around well-head. Monitoring program while sampling.	4-gas LEL meter	Upon opening well during sampling activities	Daily Safety Briefing Site Worker Training
	Electrical shock	Ground Fault Circuit Interrupters will be used if electrical hand tools are used.	Visual of all work areas	Prior to use	Daily Safety Briefing Site Worker Training
	Temperature extremes	Administrative controls (see Section 8.14) Heated break area if temperature is below 32 °F No work if temperature is below -29 °F If impermeable clothing is worn, (1) a mandatory work/rest cycle will be implemented as specified in Section 8.14; (2) workers will be notified of their responsibility to take unscheduled breaks, if needed.	Temperature measurements at least twice a day; heart rate monitoring if personnel wear impermeable clothing Measurement or estimation of wind speed will also be conducted. The wind speed and the temperature will be used to calculate the effective temperature using a wind chill graph or chart. (Refer to Appendix E.) Similarly, if the work extends to warm weather, both temperature and humidity will be measured to determine the WBGT Index.	Twice Daily See "Daily Safety Inspection Log".	Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Biological hazards (bees, ticks, Lyme disease, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day.	Visual survey	Daily – upon completion of daily field activities	Daily Safety Briefing Site Worker Training
Equipment Decontamination	General equipment decontamination hazards (hot water, slips, falls, equipment handling)	Level D modified PPE (see Section 5.0)	Site safety inspections	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Steam/hot water	Level D+ PPE including Face shield, heavy duty PVC or similar gloves. Saranax suit, rain suit, or splash apron optional (when operating steam washer)	Site safety inspections	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Noise (spray washer and generator)	Hearing protection within 25 feet when washer is operating unless equipment-specific sound level measurements indicate noise <85 dBA	Site safety inspections	Daily	Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Fire (isopropanol and gasoline)	Fuel and flammables stored in safety cans with flame arresters Fire extinguisher rated ≥20B 25 to 75 feet from flammables storage No ignition sources in fuel storage areas Fuel storage areas (if any) marked with "No Smoking or Open Flame" signs Bonding (metal to metal contact) during pouring Gasoline powered equipment shut down during fueling	Safety inspections	Daily See "Daily Safety Inspection Log"	Daily Safety Briefing Site Worker Training
	Exposure to chemicals (see Table 2.3)	Level D modified PPE including nitrile or PVC gloves for contact with potentially contaminated materials Medical clearance for HAZWOPER work Wash face and hands prior to taking anything by mouth	Site safety inspections	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Exposure to radioactive materials (See Table 2.3)	Refer to Appendix A – Radiation Protection Plan			Radiation Worker Training Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Temperature extremes	Administrative controls (see Section 8.14) Heated break area if temperature is below 32 °F No work if temperature is below -29 °F If impermeable clothing is worn, (1) a mandatory work/rest cycle will be implemented as specified in Section 8.14; (2) workers will be notified of their responsibility to take unscheduled breaks, if needed.	Temperature measurements at least twice a day; heart rate monitoring if personnel wear impermeable clothing. Measurement or estimation of wind speed will also be conducted. The wind speed and the temperature will be used to calculate the effective temperature using a wind chill graph or chart. (Refer to Appendix E.) Similarly, if the work extends to warm weather, both temperature and humidity will be measured to determine the WBGT Index.	Twice daily See "Daily Safety Inspection Log"	Daily Safety Briefing Site Worker Training
	Electrical shock	GFCI for electrical hand tools	Site safety inspections as appropriate	Daily	Daily Safety Briefing Site Worker Training
Visual Surveying, Radiological Measurements, Geophysical Surveying, Civil Surveying, Other Non-intrusive Tasks at Ground Level	General safety hazards	Level D PPE (see Section 5.0). Buddy system. Site-specific training, HAZWOPER 40-hour training	Safety inspections	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Biological hazards (bees, ticks, Lyme disease, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry Inspect for ticks during the day and at the end of each work day.	Visual survey	Daily – upon completion of daily field activities	Daily Safety Briefing Site Worker Training

Principle Steps	Potential Safety / Health Hazards	Recommended Controls	Equipment to be used	Inspection Requirements	Training Requirements
	Exposure to chemicals (see Table 2.3)	Level D PPE including nitrile or PVC gloves for contact with potentially contaminated materials Medical clearance for HAZWOPER work Wash face and hands prior to taking anything by mouth	Site safety inspections	Daily	HAZWOPER 40-hour Training Daily Safety Briefing Site Worker Training
	Landfill gases	Monitor atmosphere while conducting on-site activities.	4-gas LEL meter	While conducting on-site activities	Daily Safety Briefing Site Worker Training
	Exposure to radioactive materials (See Table 2.3)	Refer to Appendix A – Radiation Protection Plan			Radiation Worker Training Daily Safety Briefing Site Worker Training
	Temperature extremes	Administrative controls (see Section 8.14) Heated break area if temperature is below 32°F No work if temperature is below –29°F If impermeable clothing is worn, (1) a mandatory work/rest cycle will be implemented as specified in Section 8.14; (2) workers will be notified of their responsibility to take unscheduled breaks, if needed.	Temperature measurements at least twice a day; heart rate monitoring if personnel wear impermeable clothing. Measurement or estimation of wind speed will also be conducted. The wind speed and the temperature will be used to calculate the effective temperature using a wind chill graph or chart. (Refer to Appendix E.) Similarly, if the work extends to warm weather, both temperature and humidity will be measured to determine the WBGT Index.	Twice daily See "Daily Safety Inspection Log"	Daily Safety Briefing Site Worker Training

GFCI = ground fault circuit interrupter
PID = photoionization detection
PPE = personal protective equipment
PVC = polyvinyl chloride
APR = air purifying respirator
CGI = combustible gas indicator
LEL = Lower Explosive Limit
H_2S = Hydrogen Sulfide
DAC = derived air concentration

The primary activities to be carried out at the Town of Tonawanda Landfill site include:

- civil surveying;
- external gamma exposure rate survey;
- collection of soil samples from Geoprobe® holes;
- collection of groundwater samples; and
- equipment decontamination.

These activities present a potential for exposure to chemical and radiological contaminants, as well as a variety of physical hazards.

2.2 POTENTIAL EXPOSURES

Information on the significant suspected contaminants and chemical tools that will be used for the project is contained in Table 2.3. Note that this list does not include all the contaminants that have been detected. Only those contaminants with relatively low exposure limits and that are present in relatively great concentrations have been listed in Table 2.3. If additional contaminants or chemical tools that pose new or significantly greater hazards are identified prior to, or during, site activities, they will be provided as an addendum to this document.

Table 2.3 Potential Exposures

Chemical	TLV, PEL, STEL, IDLH or DAC[a]	Health Effects/ Potential Hazards[b]	Chemical and Physical Properties[a]	Exposure Route(s)[b]
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
Landfill Decomposition Gas, Incorporating Methane	NA	Simple asphyxiant (insufficient oxygen to breathe). May form flammable mixture with air.	Colorless Gas; VP:>760 MM; IP:12.51eV	Methane is physiologically inert. Other components may be hazardous
Protactinium 231	DAC: 2E-12 µCi/ml	Cancer	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Thorium 230	DAC: 3E-12 µCi/ml	Cancer	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Thorium 232	DAC: 5E-13 µCi/ml	Cancer	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Actinium 227	DAC: 2E-13 µCi/ml	Cancer	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Radium 226	DAC: 3E-10 µCi/ml	Cancer	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Uranium 238	TLV: 0.2 mg/m^3; A1 DAC: 2E-11 µCi/ml	Cancer Kidney damage	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Uranium 234	TLV: 0.2 mg/m^3; A1 DAC: 2E-11 µCi/ml	Cancer Kidney damage	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Uranium 235	TLV: 0.2 mg/m^3; A1 DAC: 2E-11 µCi/ml	Cancer Kidney damage	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact
Other Radionuclides: Americium 241	DAC: 3E-12 µCi/ml	Cancer	Solid; VP: NA; FP: NA	Inhalation, Ingestion, Contact

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

FP = flash point
IDLH = immediately dangerous to life or health
IP = ionization potential
NA = not available
NIOSH = National Institute of Occupational Safety and Health
PEL = permissible exposure limit
STEL = Short-term exposure limit
TLV = threshold limit value
TWA = time-weighted average
VP = vapor pressure
A1 = confined human carcinogen
A2 = animal carcinogen

3. STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

This section presents the lines of authority, responsibilities, and communication procedures concerning site safety and health and emergency response. It includes key SAIC and subcontractor personnel. All field work will be under the supervision of the SAIC Field Manager. The SAIC Field Manager will oversee normal and emergency work and will perform any required emergency notification. Table 3.1 identifies the individuals who will fill key roles for the project field activities.

Table 3.1 Staff Organization

Position	Name	Phone
USACE Project Engineer	[redacted]	716-879-4287
Program Manager	[redacted]	513-659-1900
Health and Safety Manager	[redacted] CIH, CSP	423-481-4755
Project Health Physicist/Radiation Safety Officer	[redacted], CHP	423-481-4619
Project Manager	[redacted], PE	508-946-3500
SAIC Field Manager/Site Safety and Health Officer	[redacted]	973-431-2242
SAIC Site Radiation Project Manager/Health Physics Technician	[redacted]	865-481-4647

3.1 SAIC PROGRAM MANAGER

The SAIC Program Manager is responsible for ensuring conformance with SAIC Corporate, SAIC Engineering and Environmental Management Group (EEMG), and USACE policies and procedures. Specific responsibilities of the Program Manager include:

- coordinating with USACE personnel;
- ensuring that project managers satisfy SAIC and USACE health and safety requirements;
- ensuring that project staff implement the project SSHP; and
- ensuring that projects have the necessary resources to operate safely.

3.2 SAIC HEALTH AND SAFETY MANAGER

The SAIC Health and Safety Manager manages the EEMG 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 SAIC Health and Safety Manager is certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene, is certified as a safety professional by the Board of Certified Safety Professionals, and has more than fifteen years of hazardous waste experience. The specific responsibilities of the Health and Safety Manager include:

- conducting site-specific training;
- conducting on-site audits at least once per month during field work;
- coordinating with USACE health and safety personnel;
- reviewing and approving SSHPs;
- approving downgrades in PPE or protective procedures;
- reviewing monitoring data;
- reviewing accident reports; and
- recommending changes to engineering controls, work practices, and PPE.

3.3 TASK MANAGER

The SAIC Task Manager is responsible for overall project execution. The responsibilities of the Task Manager include:

- coordinating with USACE personnel, including reporting accidents and incidents to the USACE Project Manager immediately and submitting written reports within two working days;
- ensuring implementation of the project SSHP;
- maintaining auditable project documentation of all required records;
- ensuring that a qualified SSHO is designated; and
- maintaining a current copy of the project SSHP.

3.4 PROJECT HEALTH PHYSICIST/RADIATION SAFETY OFFICER (RSO)

The project health physicist will address radiological hazards associated with the project. The project health physicist's qualifications include certification and over 10 years of experience. Specific responsibilities include:

- providing or reviewing radiation portions of SSHP;
- conducting site training and audits as needed;
- assessing radiological exposure measurements; and
- ensuring compliance with EM-385-1-1 and other federal and state regulations through guidance in SAIC EEMG Health Physics procedures and program oversight.

3.5 SAIC FIELD MANAGER

The SAIC Field Manager will oversee the field activities associated with the project and will be responsible for site accessibility, safety, and quality assurance. He/she is responsible for enforcing the field requirements of this SSHP, and may also serve as SAIC Site Safety and Health Officer as described in Section 3.6 of this report. Specific responsibilities of the Field Manager are listed below:

- enforcing compliance with the project SSHP;
- coordinating on-site operations, including subcontractor activities;
- ensuring that subcontractors follow the requirements of this SSHP;

- coordinating and controlling any emergency response actions;
- ensuring that at least two persons currently certified in first aid/cardiopulmonary resuscitation (CPR) are on site during site operations;
- performing (or ensuring) a daily safety inspection and documenting the inspection on the daily safety inspection form attached; and
- maintaining current copies of the project SSHP, and the SAIC EC&HS Manual on site.

3.6 SAIC SITE SAFETY AND HEALTH OFFICER

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. Either the Field Manager or the Site Remediation Project Manager/Health Physics Technician will act as SSHO. The SSHO's qualifications include, at a minimum, current HAZWOPER training, HAZWOPER Supervisor training, experience with similar projects, knowledge of and understanding of the project SSHP, and the ability to use the required monitoring equipment. The SSHO has primary responsibility for the following:

- implementing and verifying compliance with this SSHP and reporting to the Field Manager, Task Manager, and Health and Safety Manager any deviations from anticipated conditions;
- conducting and documenting daily safety inspections;
- completing the health and safety debrief in EC&HS Procedure 20;
- documenting deficiencies identified in the daily inspections and responsible parties, procedures, and timetables for correction;
- stopping work or upgrading protective measures (including protective clothing) if uncontrolled health and safety hazards are encountered. Indications of uncontrolled health and safety hazards include monitoring instrument readings in excess of the established action limits, encountering liquids other than water, soil staining suggestive of unexpectedly high concentrations of nonvolatile contaminants, etc. The SSHO must also authorize resumption of work following correction of the adverse condition(s);
- ensuring that site personnel have access to this plan and are aware of its provisions;
- conducting a site-specific pre-entry health and safety briefing covering potential chemical and physical hazards, safe work practices, and emergency procedures;
- maintaining on-site auditable documentation of
  - 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 (PID), combustible gas indicators, radiation monitoring equipment, 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;
- 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 SSHP's emergency points of contact are correct;
- ensuring that all monitoring equipment is operating according to the manufacturer's specifications and performing field checks of instrument calibration;
- ensuring monitoring for potential on-site exposures is conducted in accordance with this SSHP;
- updating the project SSHP (field changes) to ensure that it adequately identifies all tasks and significant hazards at the site and notifying project personnel and the SAIC Health and Safety Manager of changes;
- investigating accidents and near accidents and reporting (in concert with Field Manager) same to Task Manager and Health and Safety Manager;
- conducting daily "tailgate" safety briefings; and
- controlling visitor access to the exclusion zone.

3.7 SITE RADIATION PROJECT MANAGER/HEALTH PHYSICS TECHNICIAN

Health physics technicians are responsible for verifying that radiological control practices are being implemented and stopping work if controls are insufficient. He/she may also serve as SAIC Site Safety and Health Officer as described in Section 3.6 of this report. HP technicians will be trained to at least the requirements at EM-385-1-1 Section 6. Specific duties include:

- performing entry and exit surveys of equipment;
- performing or verifying surveys of personnel leaving controlled areas;
- performing radiological surveys, as needed;
- observing work in controlled areas to verify compliance with radiological controls;
- DAC-hr tracking;
- performing tasks as required by SAIC EEMG radiation safety procedures;
- ensuring compliance with EM-385-1-1 and other federal and state regulations by implementing SAIC EEMG Health Physics procedures; and
- notifying the RSO of procedural deviations and radiological incidents and deficiencies.

4. TRAINING

Personnel who participate in field activities associated with this project are subject to the training requirements presented in Table 4.1. No individual will be allowed to begin work without the necessary training and medical physical documentation. Field activities include all the tasks specified in Section 2.0 of this plan as well as any other unspecified tasks that take place within the exclusion zones, contamination reduction zones, or support zone of the site. Examples of such other tasks include conveying sampling equipment to field crews, observing field crews, transporting samples within the confines of the site, etc. Activities such as driving or walking on paved roads that are not within potentially contaminated areas, paperwork or meetings inside routinely occupied (safe) buildings, and paperwork and similar activities inside office trailers are not field activities and are not subject to these training requirements. Casual visitors, such as package deliverers, who access only the office or staging areas of the support zone are not subject to these training requirements.

Table 4.1 Training Requirements

Training	Worker	Supervisor	Site visitor
Hazardous Waste Safety (40 hour, 3 day OJT) (HAZWOPER)	✔	✔	✔
Hazardous Waste Safety Annual Refresher (8 hour) (HAZWOPER)	✔	✔	✔
Hazardous Waste Safety Supervisors Training (8 hour) (HAZWOPER)	X	✔	X
General Hazard Communication Training (Contained in 40-hour and 8-hour courses)	✔	✔	✔
Respiratory Protection Training (required only if respirators are worn; contained in 40-hour course)	✔	✔	✔
Hearing Conservation Training (for workers in hearing conservation program; contained in 40-hour and 8-hour courses)	✔	✔	✔
Radiation Worker Training	✔	✔	X
Site Worker Training	✔	✔	X
Site Specific Hazard Communication (contained in pre-entry briefing)	✔	✔	X
Safety Briefing (daily and whenever conditions or tasks change)	✔	✔	X
Site Visitor Training	X	X	✔
First Aid/CPR (Standard Red Cross or Equivalent)	≥2 workers	X	X

Key:

✔ =Required
X =Not required
OJT =on-the-job training

4.1 OFF-SITE TRAINING

The 40-hour Hazardous Waste Site Worker course is required for activities in the exclusion (contamination) zone, contamination reduction (buffer) zone, and for any activity that poses a

potential to encounter hazards associated with hazardous waste. Three days of relevant field experience is required in conjunction with this training.

The 8-hour Hazardous Waste Safety Refresher course is required annually to maintain currency in the 40-hour course.

The Hazardous Waste Safety Supervisors Training is required for personnel who directly supervise hazardous waste site workers. This is an 8-hour course that must be taken once. Note that the 40-hour course is a prerequisite.

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

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 on a time weighted average. This refresher training is provided as part of the Hazardous Waste Safety Refresher course.

4.2 SITE WORKER TRAINING

Personnel on site must have received the site-specific safety training. Two versions of this training will be used. The site worker version will contain full information on site hazards, hazard controls, and emergency procedures. A shortened version will be used for visitors who will be on site for short times and who will not do hands-on work. This shortened version will contain the hazard information that is directly relevant to the purpose of the visit. Signatures of those attending and the type of briefing must be entered in project documentation before site access will be granted. The site-specific training will include the following site-specific information, as appropriate:

- Town of Tonawanda Landfill site-specific training;
- overview of site hazards and conditions;
- names of site health and safety personnel and alternates;
- contents of the project SSHP;
- hazards and symptoms of contaminant exposure (chemical and radiological);
- hazards and symptoms of chemicals used onsite;
- physical hazards in the workplace;
- location and availability of written hazard communication program;
- site and task PPE (including purpose, donning, doffing, proper use);
- safe work practices to minimize risks;
- safe use of engineering controls and equipment;

- medical surveillance requirements;
- site control measures;
- reporting requirements for spills and emergencies;
- decontamination procedures to prevent the spread of chemical and radiological contamination;
- contingency plans (communications, phone numbers, emergency exits, assembly point, etc.);
- hearing conservation (for noisy work if worker does not have documented hearing conservation training)
- spill containment procedures (reporting, clean-up methods, etc.); and
- emergency equipment locations and use (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 and/or Field Manager and will be attended by all site workers and supervisors. 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.

Site workers scheduled to perform field activities as defined in section 4.0 will undergo Radiation Worker Training. Successful completion of the Radiation Worker Training provides the necessary knowledge to safely work in all areas where field activities will be performed, and provides the qualifications necessary to become a Radiation Worker. Radiation Worker Training will be conducted by the Site Radiation Project Manager.

4.3 SITE VISITOR TRAINING

Site visitors will receive a briefing specific to hazards and controls associated with their intended site duties from the SSHO and/or Field Manager. A site visitor will be escorted by qualified personnel when in a controlled area to assure that the individual will not be exposed to hazards for which he/she has not received training.

4.4 DOCUMENTATION

Documentation of the required training outlined in Table 4.1 will be maintained in the on-site project files.

5. 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. For task-specific equipment section 2.0, the Hazard/Risk Analysis section of this SSHP. In accordance with USACE requirements, two complete sets of PPE will be maintained by SAIC on site for use by government personnel during site visits.

5.1 PPE PROGRAM

SAIC's PPE program is controlled by EC&HS Procedures 13, 20, HP-107, and 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 because of work being done;
- route of exposure;
- measured 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 EEMG Health and Safety Manager until the hazards are further evaluated.

The SSHO may raise or lower the level of PPE worn by the teams, depending upon the site-specific hazards encountered in the field. Prior to lowering the level of PPE, the Project Manager, Field Manager and the Health and Safety Manager will be contacted/consulted and the results documented. If site conditions are such that the level of PPE is insufficient or work must be stopped, the SSHO will take appropriate action immediately and the appropriate personnel (see above) will be contacted afterwards. Criteria indicating a possible need for reassessment of the PPE selection include the following:

- commencement of an unplanned work phase (hazard not previously assessed);
- working in unplanned temperature extremes;
- 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 degree of 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 fit tests and medical clearance for respirator use. Workers will wear only the type and size for which they have been fitted. The SSHO will provide site specific respirator training to ensure that workers understand proper respirator use.

5.2 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 Hazards Analysis table (Table 2.2) of this SSHP. 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 radionuclides
  - hooded chemical-resistant clothing (Tyvek® or equivalent) with all openings taped
  - two pair chemical-resistant gloves (nitrile and exam gloves)
  - safety boots
  - shoe covers
  - hard hat (if overhead hazards are present)

- Level D+ Protective Equipment
  - Tyvek® or equivalent coveralls - pants taped closed over boots
  - latex, nitrile or polyvinyl chloride (PVC) gloves - taped closed over coverall sleeves
  - safety boots
  - hearing protection (if necessary)
  - disposable boot covers
  - hard hat (if overhead hazards are present)
  - safety glasses with side shields
  - splash goggles or face shield (if splash hazard for eye or face/skin is present)
  - disposable booties, if required

- Level D Protective Equipment
  - coveralls/field clothes
  - safety boots
  - safety glasses with side shields
  - hearing protection (if necessary)
  - hard hat (if overhead hazards are present)
  - latex, nitrile or PVC gloves if contaminated materials are handled
  - leather or similar work gloves if sharp or abrasive materials are handled
  - disposable booties.

5.3 CLEANING, STORAGE, AND PROGRAM VERIFICATION

If site tasks require the use of protective clothing, disposable clothing will be used. Used disposable PPE will be damaged to preclude any reuse. Unused 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.

6. 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, 1910.20 and SAIC EC&HS Procedures 12 (Medical Surveillance) and 20 (Hazardous Waste) to assess and monitor workers' health and fitness for employment in this 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 onsite during the project.

The frequency of employee medical exams shall be as follows:

- 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; and

- 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 permissible exposure limit (PEL) or published exposure levels in an emergency situation.

7. 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. If people other than the SSHO are using air monitoring equipment, then the SSHO will verify or conduct training on use of equipment. The SSHO will document training using a standard EEMG QA form. 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 1910.20. The minimum project-specific monitoring requirements and action levels are presented in Table 7.1.

Although overexposure to airborne organic contaminants is very unlikely, air monitoring will be conducted using a photoionization detector (10.2 eV) or flame ionization detector, 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 contamination. If breathing zone concentrations of total organic vapors exceed 5 ppm for more than 5 minutes, the activity will be stopped and the SSHO will notify the Field Manager, Task Manager, and Health and Safety Manager. 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 gasses and oxygen will be conducted using a combination combustible gas indicator if site conditions suggest the potential for flammable concentrations of solvents or other airborne gasses or vapors. Indications of such potential include elevated (>100 ppm) total organic concentrations at the source (borehole) or indication that methane may be present such as in a landfill or buried organic material. This monitoring will be conducted close to the source (2-12" from borehole) to reflect worst-case conditions. If used, the combustible gas indicator will be calibrated daily using the technique set forth by the manufacturer.

Monitoring for ionizing radiation, radiological contamination, and airborne radioactivity will be conducted in accordance with the Radiation Protection Plan, Appendix A.

Site perimeter or off-site monitoring and sampling may be conducted if conditions indicate the potential for significant off-site exposure.

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 7.1 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)	At least once every 30 minutes during intrusive activities; continuously during elevated readings	<5 ppm >5 ppm	Level D Withdraw and evaluate -identify contaminants -notify Project Manager and H&S Manager -implement control measures, potentially including Level C PPE	Drilling (Geoprobe®), other intrusive tasks
Flammability and oxygen concentration with combustible gas indicator	At borehole and any area where flammable gases are suspected	Continuously during intrusive activities	<10% LEL >10% LEL <19.5% O_2	Continue and evaluate source Withdraw and allow area to ventilate for a minimum of 30 minutes; notify Project Manager and H&S Manager	Drilling (Geoprobe®)
Temperature	In or near work area	At least twice daily to record approximate lowest and highest temperatures	>70°F <40°F	Administrative controls (See Section 8.14)	All tasks
Noise	Exclusion zone around drilling, equipment decontamination zone around generator	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 (Geoprobe®), generator use
Radiological – Details on monitoring requirements and action limits for radiological contaminants are provided in Appendix A – Radiation Protection Plan					

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

8. STANDARD OPERATING SAFETY PROCEDURES

This section presents those general safety rules that apply to all operations performed by SAIC and its subcontractors. These requirements are generic in the sense that they apply to all projects. Therefore, there may be portions of this section that do not apply to this specific project. The provisions of the plan are mandatory for all on-site employees subcontractors 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 OSHA poster #2203 will be prominently displayed on site, if site activities will be continuous for more than two weeks.

- Daily safety briefings ("tailgate") will be conducted by the Field Manager and/or SSHO to inform personnel of new hazards or procedures.

- The SSHO, project personnel, and management 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 significant environmental insult as a result of planned activities.

- Personnel will perform only those tasks that they believe they can do safely.

- Personnel will notify the SSHO of any medical conditions (e.g., allergy to bee stings, diabetes, 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 in the exclusion zone 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 material will be contained, cleaned up, and reported as necessary (see Sections 8.10 and 11.0).

- 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 will wash their hands and faces upon leaving the work area and prior to eating or drinking.

- All injuries and accidents requiring more than first aid will be reported to the SSHO, Task Manager, Project Manager, EEMG Health and Safety Manager, and USACE.

- All on-site workers will abide by a buddy system. Members of a buddy team will maintain verbal or visual contact.

8.2 PERMIT REQUIREMENTS

SAIC will obtain or coordinate with USACE as appropriate, 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 and coordination with the site owner to preclude encountering sub-surface utilities and clearance.

8.3 DRUM/CONTAINER HANDLING

No drums of unknown material will be addressed as part of this project. Any drums used for the project will meet Department of Transportation and 10 CFR 20 requirements and will be labeled to comply with applicable U.S. Environmental Protection Agency (EPA) requirements. The discovery of plastic or metal drums of any size requires immediate notification to USACE.

8.4 CONFINED SPACE ENTRY

Any confined space entry will be performed in conformance with the requirements of SAIC EC&HS Procedure 10, 29 CFR 1910.146, and EM-385-1-1, Section 6I. No confined space entry work is anticipated as part of this project.

8.5 SOURCES OF IGNITION, FIRE PROTECTION

This work will be performed in conformance with EM-385-1-1, Section 9.

- Sources of ignition will be kept at least 15 meters from flammables 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 8 to 23 meters from all flammables storage areas.

- An approved flammables cabinet (if necessary) will be used to store 25 or more gallons of flammable liquid.

- Flammable liquids (other than decontamination solvents) will be kept in safety containers with flame arresters.

8.6 ELECTRICAL SAFETY

This work will be conducted in conformance with 29 CFR 1910, Subpart S and EM-385-1-1, Section 11.

- All portable electrical equipment will be double insulated or grounded and connected through a ground fault circuit interrupter.

- Conductive materials (drill rigs) will be kept clear of energized power lines. The following minimum distances will be observed; 0-50 kV - 10 feet; 51-100 kV - 12 feet; 101-200 kV - 15 feet; 201-300 kV - 20 feet; 301-500 kV - 25 feet; 501-750 kV - 35 feet; 750-1000 kV - 45 feet.

8.7 MACHINE GUARDING

All equipment will be operated with all guards provided by the manufacturer and in compliance with 29 CFR 1910, Subpart O and EM-385-1-1 Section 16.B. If any guarding must be removed for servicing, the equipment will be disabled to preclude movement or release of energy.

8.8 LOCKOUT/TAGOUT

All potentially hazardous servicing or equipment repair will be governed by the SAIC EC&HS Procedure 11, Lock Out/Tag Out, and 29 CFR 1910.147.

8.9 FALL PROTECTION

Work areas with the potential for a fall of 4 feet or more will be provided with fall protection in compliance with EM-385-1-1 Section 21.A.15. This fall protection will consist of guardrails or personal fall protection.

8.10 HAZARD COMMUNICATION

Hazard communication will be governed by SAIC EC&HS Procedure 8, Hazard Communication, 29 CFR 1910.1200, and EM-385-1-1 Section 8. At a minimum, the following steps will be taken.

- All hazardous materials used as part of this effort on site will be labeled to comply with the hazard communication standard as follows:
  - 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 used as part of this effort

- Site-specific training will include the hazards posed by site chemicals, protective measures, and emergency procedures, including reporting requirements in the event of releases/spills.

- 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.

8.11 ILLUMINATION

Most site field work 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. Field work to be conducted during non-daylight hours will be specifically identified in the hazard assessment table. Work conducted in buildings will be illuminated to meet the following minimums stated in 29 CFR 1910.120; stairs and ladders 10 foot-candles, offices 50 foot-candles, and first aid areas 30 foot-candles.

8.12 SANITATION

- Means for washing hands and faces prior to eating will be provided at the work site.

- Potable drinking water will be provided in labeled, sanitary dispensers.

8.13 GEOPROBE® OPERATIONS

8.13.1 General Drilling Practices

- Operating manuals will be present on site for each type of drill rig in use.

- Daily inspection log will be maintained with each vehicle at all times.

- Geoprobe® rigs will have at least two functional kill switches or operating control requiring positive action from operator "deadman's switch" one for the operator and one for the operator's helper. These switches will be confirmed to be functional in the presence of the Field Manager, and the results recorded in the Field Manager's logbook, each day that the rig is used.

- Geoprobe® rigs will have functional backup alarms.

- Geoprobe® rigs will be inspected daily by the operator and this inspection will be confirmed by the SSHO. This inspection will address; structural damage, loose bolts and nuts, chain drive tension, loose or missing guards, fluid leaks, hoses, pressure gauges and pressure relief values.

- Only the operator, operator's helper, and personnel who have a critical need will be allowed near moving parts of the drill rig.

- Drill sites will be verified free of underground utilities by clearing each site with local utilities or appropriate base personnel prior to beginning drilling.

- Geoprobe®-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.

- Geoprobe® crews and personnel who work near the drilling rig will be trained in the location and use of the kill switches.

- No loose clothing, loose jewelry, loose long hair permitted near Geoprobe® 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.

- 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 Geoprobe® equipment.

8.14 COLD/HEAT STRESS

Critical factors in preventing cold stress disorders are adequate clothing and staying dry. The SSHO and Field Manager 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. Refer to Appendix E for wind chill chart.

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 70°F, site training will include heat stress control, recognition of heat stress induced illness, and first aid for heat stress.

- If ambient temperatures exceed 70°F, cool Gatorade or equivalent drink (mixed at 4 parts water to 1 part concentrate) will be made conveniently available to site workers.

- If ambient temperatures exceed 70°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, if needed.

- Workers wearing Tyvek® or other impermeable clothing when ambient temperatures exceed 70°F will be monitored for heat stress by taking their pulses at the beginning of each rest period. If any worker's heart rate exceeds 110 beats per minute, the next work period will be shortened by one third (From NIOSH/OSHA/USCG/EPA; Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities).

- An initial work rest cycle will be established for employees wearing impermeable clothing based on the air temperature. The length of each work period will be as follows (From NIOSH/OSHA/USCG/EPA; Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities). Refer to Appendix E for heat index

Temperature °F	work period
72.5 to 77.5°F	120 minutes
77.5 to 82.5°F	90 minutes
82.5 to 87.5°F	60 minutes
87.5 to 90°F	30 minutes
≥90°F	15 minutes.

8.15 IONIZING RADIATION

All work involving ionizing radiation will be performed in compliance with SAIC EC&HS and EEMG procedures and USACE EM-385-1-1 Section 06.E. The site radiation safety program provides for: the radiological safety of workers, public, and environment; controlling distribution and releases of radioactive material; and maintaining occupational radiation exposure to individuals within the limits of 10 CFR 20, U.S. Army Corps of Engineers Regulation EM-385-1-1, Section 06.E, "Ionizing Radiation", and at levels As Low As Reasonably Achievable (ALARA). Implementation of this program is discussed in the Radiation Protection Plan, Appendix A.

9. SITE CONTROL MEASURES

The SSHO/Radiation Safety Officer (RSO) will be responsible for establishing the site control zones, as necessary, around SAIC controlled areas that present physical 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. The SSHO/RSO will monitor the implementation of the required site control work rules and will report any deviations from prescribed practice to the Field Manager 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 an SAIC controlled area and refuse to leave, work will be stopped and the USACE Project Engineers will be notified. Authorized visitors will be required to show proof of current training and medical surveillance.

9.1 EXCLUSION ZONE

The exclusion zone (Restricted Area) 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, USACE personnel, and Town of Tonawanda Landfill personnel, on an as needed basis. 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 entry into the exclusion zone.

- The SSHO or Field Manager 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, and all activities where 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 or restricted area may 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.

9.2 SUPPORT ZONE

The support zone is the clean and relatively safe area surrounding the exclusion and contamination reduction zones. Entry requirements for the support zone consist of the general requirements (training, medical surveillance) for on-site work. 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.].

9.3 SITE COMMUNICATION

The field project will be equipped with a cellular phone.

10. PERSONAL HYGIENE AND DECONTAMINATION

A system of procedures will be used to control the spread of contamination from the exclusion zone (Restricted Area) 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 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. This section presents basic requirements for personnel decontamination 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 PPE.

10.1 LEVEL D PROTECTION DOFFING/DECONTAMINATION

Station 1: Equipment drop

Place potentially contaminated equipment in a designated area.

Station 2: Removal of disposable gloves and boot covers (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 radiological survey of hands, shoes, and any other areas that may have become contaminated. Any personal contamination will be removed with tape, moistened towel, or soap and water.

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 radiological survey of hands, bottoms of shoes, and any other areas that may have become contaminated. Any personal contamination will be removed with tape, moistened towel, or soap and water.

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 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 requires exchange of respirator cartridge(s), a safety representative may exchange the cartridge(s) at the exit to the contaminated area.

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 radiological survey of hands, shoes, and any other areas that may have become contaminated. Any personal contamination will be removed with tape, moistened towel, or soap and water.

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

Sampling and related equipment will be decontaminated to a level sufficient to prevent cross-contamination of subsequent samples. This stringent requirement assures that decontaminated sampling equipment is sufficiently clean from a personnel contact perspective. Larger pieces of equipment, such as drill rigs, will be decontaminated with pressurized hot water/steam. The following description of the sampling equipment decontamination process is intended to provide only a general overview.

Steps will be taken to assure that the transporting of sampling equipment does not spread contamination to previously uncontaminated areas. Sampling and related equipment will be screened for contamination prior to being transported. 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.

11. EMERGENCY PROCEDURES AND EQUIPMENT

The Field Manager will remain in charge of all SAIC and subcontractor personnel during emergency activities. The Field Manager will perform emergency notification of emergency medical services, fire department, SAIC Task Manager, SAIC Health and Safety Manager, etc. The field manager will also escort or assign an escort to offsite emergency responders. In order to minimize the potential for accidents and injuries, daily safety and health inspections will be conducted by the Field Manager or SSHO. If an emergency occurs, the Field Manager, the SSHO, and the field team will participate in a briefing to discuss the event, identify the causes, identify corrective measures, and evaluate the responses.

In the event of an accident or incident, the Field Manager or SAIC Task Manager will notify the USACE Project Manager immediately according to the requirements of EM-385-1-1.

All accidents must be reported to the District Safety Officer:

U.S. Army Corps of Engineers
Buffalo District
CELRB-PE-EE
[redacted]
1776 Niagara Street
Buffalo, New York 14207
(716) 879-4406

All accidents will be investigated and reported within 24 hours as specified in EM-385-1-1. The Accident Report (ENG Form 3394) will be completed and submitted to the USACE Industrial Hygienist at the following address:

U.S. Army Corps of Engineers
Buffalo District
CELRB-ED-EH
[redacted]
1776 Niagara Street
Buffalo, NY 140207-3198
716-879-4173

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

11.1 POTENTIAL EMERGENCIES

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

11.1.1 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 will attempt to extinguish the fire 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.

11.1.2 Spills

Potential spills include releases of fuels, lubricants, hydraulic fluids, and decontamination solvents. In the event of a spill or leak, the employee making the discovery will immediately notify the SSHO and/or the Field Manager. The Field Manager will determine whether the leak poses an environmental risk or will exceed the capacity of on-site personnel and equipment. In the unlikely event that there is a probability that the spill will extend beyond the immediate area, result in an environmental insult, or exceed the capabilities of the on-site personnel, the Field Manager will inform the local fire department and hazardous materials response team. If this is not the case, the on-site spill kit will be used to clean up the spill.

11.1.3 Medical Emergencies

Field crews will use a variety of equipment that could cause injuries. In the event of a medical emergency, the Field Manager will notify the local emergency medical service immediately. Personnel with serious injuries will be stabilized onsite pending arrival of emergency medical service personnel. At least one first aid/CPR-trained individual will be on site at all times and these personnel will 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 injuries will follow normal decontamination procedures. 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.

11.2 EMERGENCY PHONE NUMBERS

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

Poison Control Center	800-682-9211
Ambulance	911
Fire Dept.	911
Kenmore Mercy Hospital	716-447-6100
EEMG Health and Safety Manager (Steve Davis)	423-481-4755
SAIC Engineering, Inc.	508-946-3500

Kenmore Mercy Hospital in Tonawanda will be used for any required medical services. Medical emergencies will be handled by contacting onsite emergency services and waiting for ambulance to arrive. The following directions to the hospital may be used for non-emergency services. From facility, left on East Park Drive; right on Sheridan Drive; right onto Elmwood Ave.; two blocks on right.

These telephone numbers will be posted on site. Prior to initiating on-site work the SSHO will post a map showing the hospital and directions to the hospital. A map is presented in Appendix C of this SSHP.

11.3 EMERGENCY ALERTING

Each team will have a means for generating an audible alarm, which will consist of a compressed gas horn or vehicle horn. These devices will be used to signal to other project personnel in the event of accidents or emergencies. Short blasts (less than 1/2 second) of the horn will be used to request assistance, while extended blasts (more than 2 seconds) will signal an evacuation.

11.4 EVACUATION

Site evacuation routes and assembly area are depicted on Figure D-1, located in Appendix D. All employees will be familiar with the evacuation routes and assembly area. Refer to the project Work Plan for site maps.

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. The required emergency equipment includes:

- 16-unit first aid kit indoors or in weatherproof container, inspected weekly;
- compressed gas horns or vehicle horn;
- fifteen minute emergency eye wash to meet American National Standards Institute standard;
- fire extinguisher(s) (at least 20-B) 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 sorbent pads, tubes, and nitrile or similar gloves; and
- telephone and/or portable radios.

12. 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.

- Employee/visitor log book.
- Accident and injury reports for all accidents other than first aid cases.
- Training certificates.
- Logbooks detailing site training, topics covered, names and signatures of participants and trainer, general site activities, site workers, H&S problems, and problem resolutions.
- Medical clearance forms.
- Daily safety inspection logs will contain the dates of inspections, identity of the person doing the inspection, the examined areas/activities/equipment, any deficiencies, and any corrective actions taken.
- Related procedures such as equipment and personal decontamination.
- Equipment maintenance logs will contain the dates and types of routine maintenance performed on site equipment.
- Environmental and personal exposure monitoring/sampling results will be maintained in a log that 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 H&S Manager.
- Health Physics radiological survey forms, air sample forms, and dosimetry forms.

Examples of reporting forms to be used for the project are included in Appendix B of this SSHP.

13. REFERENCES

American Conference of Governmental Industrial Hygienists 1998. *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

BNI 1995. Bechtel National, Incorporated. Town of Tonawanda Landfill Contaminated Waste Volume Estimate. October 1995.

Code of Federal Regulations - 29 CFR 1910 and 1926, Occupational Safety and Health Administration (OSHA)

Code of Federal Regulations - 40 CFR 192, Environmental Protection Agency (EPA)

Code of Federal Regulations - 10 CFR 20, Nuclear Regulatory Commission

DOE 1984 . *An Aerial Radiological Survey for Am-241 Contamination in Tonawanda, New York.* October 1984.

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TMA/Eberline 1988. *Radiological Characterization of Municipal Landfill – Tonawanda, NY.* February 1988.

USACE 1994. *Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities*, Appendix B, ER 385-1-92, U.S. Army Corps of Engineers. March, 1994

USACE 1996. *Safety and Health Requirements Manual*, EM-385-1-1, U.S. Army Corps of Engineers. September 1996

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

USACE 1999a. Scope of Work for Remedial Investigation/Feasibility Study, Linde Site – Tonawanda, NY, Tonawanda Landfill Vicinity Property. December 1999.

USACE 1999b. *Technical Memorandum: Radiological Human Health Assessment for the Town of Tonawanda Landfill, Tonawanda, New York,* U.S. Army Corps of Engineers. February 1999.

Science Applications International Corporation (SAIC) Procedures

EC&HS Procedure 4, Accident Reporting
EC&HS Procedure 6, OSHA Recordkeeping and Reporting
EC&HS Procedure 8, Hazard Communication and Hazardous Chemical Control
EC&HS Procedure 9, Respiratory Protection Program
EC&HS Procedure 10, Confined Space Entry
EC&HS Procedure 11, Lock Out/Tag Out
EC&HS Procedure 12, Medical Surveillance
EC&HS Procedure 13, Personal Protective Equipment
EC&HS Procedure 15, Hearing Conservation and Noise Control
EC&HS Procedure 20, Hazardous Waste Operations
EEMG HP-107, Control of Airborne Radiation Exposure

APPENDIX A

RADIATION PROTECTION PLAN

CONTENTS

1. RADIOLOGICAL PLAN OVERVIEW

This document describes the Health Physics Plan that provides for the radiological safety of the SAIC field team during Remedial Investigation (RI) field activities at the Town of Tonawanda Landfill (TTL) in Tonawanda N.Y. This plan has been designed to comply with the following direct and referenced radiation safety regulations that apply to FUSRAP work:

1) USACE EM 385-1-1, Safety and Health Requirements Manual

2) USACE EM 385-1-80, Radiation Protection Manual

3) USACE ER 385-1-92, Appendix B, Safety and Health Document Requirements for HTRW and OEW Activities

4) 10 CFR 20, Standards for Protection Against Radiation

5) 10 CFR 19 Notices, Instructions, and Reports to Workers

6) 49 CFR 172, Hazardous Materials

The following SAIC EEMG STL procedures will be utilized during field activities; HP-004 "Quality Control of Radiation Monitoring Equipment", HP-108 "Operation of Portable Radiation Survey Instruments", and HP-405 "Radiological Surveys". Signed copies of these approved procedures are available at SAIC Central Records, Oak Ridge, TN.

The RSO, or approved alternate, will be onsite during all work activities including mobilization and demobilization. RSO responsibilities are detailed in the in the Site Safety and Health Plan.

SAIC makes the following commitment regarding radiation exposure: Individual and collective radiation exposures to on-site workers and the public will be kept below regulatory limits and As Low as Reasonably Achievable (ALARA). It is anticipated that no individual will exceed the 100 mrem USACE TEDE ALARA limit during this field project.

2. RADIOLOGICAL HAZARDS

Based on source term information contained in USACE Technical Memorandum Radiological Human Health Assessment for the Town of Tonawanda Landfill (RHTL) (SAIC 1999), the radiological contaminants of concern at the TTL are U-238, Ra-226, Th-230 as well as other MED decay products (see Attachment A). This plan will use the activity concentrations derived in the RHTL to estimate dose to field personnel. There is also a potential for other, non-MED related, radionuclides to be present, such as Am-241, which was generated at a nearby radioactive component manufacturing facility, and ultimately disposed of as ash. From a radiological perspective, consideration of the hazard associated with these isotopes largely focuses on the potential for uptake into the body. Potential exposure pathways include ingestion, inhalation, and direct exposure from the landfill and from soil cuttings extracted from sample locations.

3. DOSE MODEL FOR FIELD PERSONNEL DURING SAMPLING ACTIVITY

In order to model dose to field personnel from samples, Resrad™ version 5.82 (April 1998) has been employed using site specific source term data presented in the RHTL and very conservative assumptions. Dose contribution from near surface contamination will be added to the dose contribution from samples (this model) in Section 4. Dose model assumptions are presented in Attachment A.

In the RHTL, the TTL source term dataset was taken from two sources; the Results of the Radiological Survey of the Town of Tonawanda Landfill, Tonawanda, New York (ORNL 1992), and the FUSRAP technical memorandum Tonawanda Landfill Field Sampling Results (BNI 1995). The original data contained limited and incomplete data for some relevant nuclides, so these nuclides were scaled into the source term.

In the RHTL, UMTRCA criteria was used to model source term concentrations. Data from areas with concentration greater than UMTRCA criteria were aggregated into a data subset and the UCL_{95} was calculated. This was a conservative approach, considering that if data were included that did not contain elevated radioactivity, the source term would contain lower radionuclide concentrations. By including only data having elevated activity levels, the source term produced the worst case radionuclide concentration. Source term data used in this model are from the TTL section of the RHTL Remedial Worker Statistical Summary (RHTL Table 1), with exposure point concentrations duplicated in Attachment A of this document.

Field personnel on this project will remove a calculated 0.83 m^3 of soil during sampling activities (400 locations * 1.83 m depth * 1.9 cm radius sample tube). Impacted zone assumptions in this model are based on spreading out all of the soil cuttings over a 10 m by 10 m area, and occupying this area for 200 hours (20 days * 10 hrs/day), the estimated sampling duration of the project.

4. DOSE PROJECTION

Based on the dose model assumptions and source term presented in Attachment A, each individual will receive a total dose of 5 mrem from the extracted soil during the sampling fieldwork, 90% of which will be due to direct gamma exposure from Ra-226. The dose contribution from the samples can then be added to the dose contribution from the near surface material while sampling and doing the gamma walkover survey. Since both of these activities are non-intrusive, the RHTL baseline recreational user scenario dose model is applicable (Ref 11). The walkover survey is estimated at 70 hours (7 days * 10 hrs/day), the sampling is estimated at 200 hours, for a total of 270 hours. The recreational user is expected to receive 10 mrem/year based on 99 hours, an approximate rate of 0.1 mrem/hr. The dose contribution from the near surface contamination is then calculated as 27 mrem (0.1 mrem/hr * 270 hr).

By adding the dose from the samples with the dose from being present on the landfill, if an individual were to participate in the walkover survey and sampling effort, the individual would receive a total dose of 32 mrem.

An Activity Hazard Analysis has been prepared for radiological contaminants and is presented in Attachment C.

5. RADWORKER TRAINING

As required by EM 385-1-1 Section 06.E.03 and 10 CFR 19, personnel who have the potential to receive 100 mrem TEDE in a year must be radworker trained. Although on-site workers involved in walkover survey and sampling activities at the TTL Site are not expected to receive a dose of 100 mrem/yr, each individual will receive radworker training so that doses might be kept ALARA.

Radworker training will include at a minimum, 4 hours of instruction in the following aspects of radiological safety: health effects of ionizing radiation, exposure limits (including those for 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.

6. RADIOLOGICAL MONITORING

Monitoring for ionizing radiation, radiological contamination, and airborne radioactivity will be conducted to ensure that personnel exposures are kept below the USACE ALARA limit of 100 mrem, and to prevent the spread of contamination. When monitoring information is received, radiological exposure reports will be issued to monitored individuals, and copied to the EEMG Central Records Facility for long term retention.

Monitoring requirements and action levels for radiological hazards are presented in Attachment B.

7. INTERNAL MONITORING

USACE EM-385-1-1 section 06.E.05 states that bioassay is necessary if an individual has a potential to receive an internal dose greater that 0.5 rem per year. NRC Regulatory Guide 8.7 also references this monitoring requirement at 10% of the annual limit. In addition, NRC Regulatory Guide 8.7 states that previous dose received at other facilities during the year need not be considered. 0.5 rem is equivalent to 200 DAC-hours. Post-job bioassay measurements will be performed to validate air sample results if any individual exceeds 10% of the required level, or 20 DAC-hours.

Internal dose verification monitoring will be accomplished using breathing zone (lapel) particulate air sampling. Air monitoring will be conducted during sampling activities on individuals with the highest potential of inhaling radioactive material (as determined by the field Health Physics Technician).

Air samples will be analyzed for gross alpha using a Ludlum 2929/43-10-1, or equivalent. The gross alpha air sample concentration will be compared against the 10 CFR 20 Appendix B Th-230 (conservative isotope) Derived Air Concentration (DAC) value. Although not expected, respiratory protection will be implemented if, based on air sample data, any individual is likely to receive in excess of 12 DAC-hrs (10 CFR 20.1701) in any one week.

8. EXTERNAL MONITORING

Area and sample dose rates will be verified during the performance of work. Because of the very low dose rates anticipated (0.1 mrem/hr), an energy compensated GM μR meter, which detects exposure in the μR range, will be used.

As an extra precaution, field personnel external dose will be verified using Thermoluminescent dosimeters (TLD's) Each site worker and visitor subject to this health and safety plan will wear a TLD while onsite. Dosimetry will be stored with a control badge in a locked dosimetry receptacle, when not in use. All dosimetry, including the control badge, will be collected and evaluated after field activities are complete. Radiological exposure reports will be issued to monitored individuals and copied to the EEMG Central Records Facility.

9. EQUIPMENT CONTAMINATION MONITORING

Incoming surveys will be performed on the sample rig prior to intrusive activities. A release survey will be performed prior to releasing the sample rig from the site, to ensure surficial contamination limits are not exceeded. Sampling equipment will be direct frisked as it is extracted from the sample media. This survey will be the primary mechanism to ensure that contamination is not spread during intrusive activities. This procedure will also be used to identify any tools and equipment that have come in contact with (potential) radioactive material. Sampling probes, tools and equipment that came in contact with potentially radioactive material will be monitored for total and removable contamination upon removal from the immediate work area.

Equipment surficial survey results will be compared to 20 dpm/100 cm^2 removable, and 100 dpm /100 cm^2 total (fixed and removable) criteria in accordance with Regulatory Guide 1.86 guidance (using Ra-226 as the contaminant).

Any tools or equipment with alpha contamination exceeding the acceptable surface contamination limits will be managed as contaminated material. Contaminated material and equipment will be either decontaminated or containerized for disposal, under the direct supervision of the health physics technician.

Personnel and equipment direct contamination surveys will be performed with an alpha scintillation detector coupled with a ratemeter (Ludlum 2221/43-89 or equivalent). Each frisker will have a current annual calibration and will be response checked each day prior to use with a Thorium-230 source. Frisker response checks will be performed in accordance with HP-004 "Quality Control of Radiation Monitoring Equipment", and will be documented on HP-004 Attachment 7, "Count Rate Meter Source Test Log", or equivalent.

Smears and air samples will be counted with an alpha scintillation detector coupled with a scaler (Ludlum 2229/43-10 or equivalent). The bench counter will have a current annual calibration and will be source checked each day prior to use with a Thorium-230 source. Source checks will be performed in accordance with HP-004 "Quality Control of Radiation Monitoring Equipment", and will be documented on HP-004 Attachment 10, "Lab Instrumentation QC Data Sheet", or equivalent.

10. PERSONNEL CONTAMINATION MONITORING

All on-site workers who have the potential to handle radioactive material will be monitored for total contamination periodically, upon exit of an exclusion zone, and/or prior to leaving the Site. Monitoring will be performed with a frisker under the direct supervision of a HP technician. Personnel will be considered contaminated if total activity at 1/4" from the skin or clothing is equal to, or in excess of the detection limit (at a frisk rate not to exceed 2" per second) as determined by the RSO.

If personnel contamination is detected, the affected area will be decontaminated with soap and lukewarm water under the direct supervision of the HP technician, and the nature and extent of the contamination event will be documented.

11. INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) may include soil, sediment, decontamination fluids, or personal protective equipment (PPE). Unused sample media and used PPE will be contained in drums and staged in an IDW storage area. Each drum will be clearly labeled as to its contents, date of generation, and dose rate.

12. SHIPMENT OF SAMPLES

Per Department of Transportation (DOT) regulations, radioactive material exceeding 2 nCi/g must be shipped as radioactive material (RAM). The UCL_{95} soil activity (Attachment A) is assumed to be the worst case concentration (1.3 nCi/g). Therefore, unless activity in excess of the limit is suspected, samples will not be shipped as radioactive material. However, each sample cooler (shipping package) will be surveyed for radiation and contamination, and any container exceeding site release criteria or 0.5 mrem/hr (contact) will not be shipped. If contaminated, the shipment cooler will be decontaminated. If in excess of 0.5 mrem/hr, samples with elevated activity will be placed in a shielded container..

13. RADIOACTIVE SOURCE ACCOUNTABILITY AND CONTROL

Radioactive sources will be received and shipped as 49 CFR limited quantities. Only (NRC license) exempt radioactive check sources will be used at the site. Radioactive sources will be controlled when not in use. The source container will be labeled with a "Radioactive Material" label. Each source will be accounted for during morning response check activities. In the event of a missing source, the USACE and Project Health Physicist will be notified.

14. POSTING AND LABELING

Due to both the limited times in any one location, and the low specific activity of the material, work areas will not be radiologically posted. However, intrusive activities will be designated as

an exclusion area, and will be monitored by a Health Physics Technician who will prevent unauthorized entry into the work area. An NRC Form 3 will be posted in a conspicuous location at the site.

15. CONTAMINATED INJURY PROTOCOLS

Upon initial arrival at the site, the hospital will be notified of the contaminants present at the site by the SSHO. All non-life threatening injured personnel will be frisked prior to leaving the site. Contaminated personnel will be decontaminated prior to release.

In the event of a life threatening injury, personnel will be frisked while waiting for an ambulance. In no case will frisking or decontamination delay medical care. In the event of a potentially contaminated person with life threatening injuries:

- The hospital will be notified that a potentially radioactively contaminated person is being sent, and that a person knowledgeable in radiation protection will arrive with him/her. The USACE will be contacted as soon as possible. The Site RSO, or alternate, will follow the ambulance to the hospital with survey equipment.
- The RSO will not interfere with medical care, but will advise the ambulance, path to the emergency room, and emergency room as necessary with regard to radiation protection.
- All potentially contaminated medical personnel will be frisked when the emergency has passed. All equipment that came in contact with the contaminated person, as well as the ambulance and emergency room/transfer path will be surveyed and decontaminated as necessary. All contact trash will be labeled with a radioactive material and biohazard label (as applicable), and returned to the site.

16. RADIATION PROTECTION PLAN REFERENCE MATERIALS

(1) 10 CFR 20, "Standards for Protection Against Radiation"

(2) U.S. Army Corps of Engineers Regulation No. ER 385-1-80, "Ionizing Radiation Safety"

(3) U.S. Army Corps of Engineers Regulation No. EM 385-1-1, Section 06.E, "Ionizing Radiation"

(4) ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration"

(5) ANSI 3.1 - 1987, "Selection, Qualification and Training of Personnel for Nuclear Power Plants"

(6) Regulatory Guide 8.13, December 1987, "Instructions Concerning Prenatal Radiation Exposure"

(7) Regulatory Guide 8.36, 1992, " Radiation Dose To the Embryo/Fetus"

(8) Regulatory Guide 8.34, 1992, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses"

(9) 49 CFR, Subtitle B, Chapter I, Subchapter C, Parts 171 through 178, "Hazardous Materials Regulations"

(10) USACE Technical Memorandum "Radiological Human Health Assessment for the Town of Tonawanda Landfill", February 1999.

(11) USACE "Scope of Work for Remedial Investigation / Feasibility Study Tonawanda Landfill Vicinity Property", December, 1999.

ATTACHMENT A

Health Physics Work Record

Attachment A - Health Physics Technical Work Record (TWR)
(Page 1 of 2)

Location: Tonawanda Landfill, Tonawanda N.Y.
Number/Rev: TL-00-01/00
TWR: Field Personnel Dose Model Assumptions

Town of Tonawanda Field Sampling Scenario			
RESRAD Parameter	**Value**	**Units**	**Reference/Comments**
Area of Impacted Zone	100	m^2	10 m by 10m area.
Thickness of Impacted Zone	.0083	m	Soil extraction volume estimate over assumed impacted area.
Cover Depth	0	m	Field samplers will extract the contaminated soil (no cover).
Density of Impacted Zone	1.5	g/m^3	RESRAD Default
Impacted Zone Erosion Rate	0	m/yr	Not Applicable during field activities
Impacted Zone Total Porosity	0.45	-	1993 Tonawanda FS
Impacted Zone Effective Porosity	0.2	-	RESRAD Default
Impacted Zone Hydraulic Conductivity	123	m/yr	1993 Tonawanda FS
Evapotranspiration Coefficient	0.46	-	1993 Tonawanda FS
Precipitation	1.23	m/yr	1993 Tonawanda FS
Runoff Coefficient	0.25	-	1993 Tonawanda FS
Inhalation Rate	12300	m^3/yr	(Yu et al. 1993) assumes a mixture of heavy and moderate activity.
Mass Loading for Inhalation	0.0006	g/m^3	(Yu et al. 1993) assumes 600 $\mu g/m^3$ of air for construction activities.
Exposure Duration	1	Yr	RESRAD minimum.
Fraction of Time Spent Indoors	0	-	No indoor activities.
Fraction of Time Spent Outdoors	0.023	-	Based on 200 hours of sampling activities.
Soil Ingestion		g/yr	(EPA 1990) 50 mg/day for workplace soil ingestion.
External Gamma	Active	-	Assumed
Inhalation	Active	-	Assumed
Plant Ingestion	Suppressed	-	Assumed
Meat Ingestion	Suppressed	-	Assumed
Aquatic Foods	Suppressed	-	Assumed
Drinking Water	Suppressed	-	Assumed
Soil Ingestion	Active	-	Assumed
Radon	Suppressed	-	Assumed

Health Physics Technical Work Record (TWR)
(Page 2 of 2)

Location: Tonawanda Landfill, Tonawanda N.Y.
Number/Rev: TL-00-01/00
TWR: **Field Personnel Dose Model Assumptions**

Town of Tonawanda Landfill Exposure Point Concentrations	
Analyte	**EPC (pCi/g)**
Ac-227[b]	9.24
Pa-231[b]	9.24
Pb-210[c]	220.9
Ra-226	220.9
Ra-228[d]	2.2
Th-228[d]	2.2
Th-230	416.6
Th-232	2.2[e]
U-234[f]	200.9
U-235[b]	9.24
U-238	200.9

[a] EPC = UCL_{95} - background
[b] Assumed at 4.6 % of U-238 specific activity
[c] Assumed to be in secular equilibrium with Ra-226
[d] Assumed to be in secular equilibrium with Th-232
[e] If UCL_{95} > Maximum Detection, then EPC = Maximum Detection - Background
[f] Assumed to be in secular equilibrium with U-238

ATTACHMENT B

Monitoring Requirements and Action Limits

Attachment B - Monitoring Requirements and Action Limits

Hazard or Measured Parameter	Area	Interval	Limit	Action	Tasks
Radiological total (fixed and removable) contamination with a alpha sensitive plastic scintillation count rate system. (includes whole body frisk)	Sampling locations, when personnel handle potentially contaminated materials, when equipment is removed from potentially contaminated areas.	Upon extraction from soil, intermittently, and upon exit from the exclusion area.	Equipment must be less than the surficial contamination limit of 100 dpm/100cm^2 (alpha). Personnel contamination must not be detectable during a 2"/second frisk (as determined by the RSO).	Remove by decontamination and re-survey. Notify RSO. If personnel contamination with a half life greater than 2 hours, notify Project Manager, CHP, and H&S Manager. Additional controls may include changes to PPE, decontamination procedures, control as radioactive material, or engineering controls	All onsite tasks
Removable surface contamination determined by smearing a surface of 100cm^2, and counting the smear with a with a alpha/beta sensitive plastic scintillation count rate system..	All equipment and items that came in contact with potentially contaminated material.	Intermittently and prior to leaving the Site. Prior to removal from work zone.	Equipment must be less than the surficial contamination limit of 20 dpm/100cm^2 removable (alpha).	Remove by decontamination and resurvey. Notify RSO. Additional controls may include wrapping the item prior to use, decontamination procedures, controlling the items as radioactive material, or engineering controls	All onsite tasks
Sampling for airborne radioactive particulates.	Breathing zone of selected employees.	Full shift sampling on selected personnel with the highest potential of inhaling radioactive material during intrusive work.	12 DAC/week	Notify RSO, Project Manager, CHP, and H&S Manager. Additional controls may include engineering controls or respiratory protection.	Sampling activities
Dose Rates	Work Area	Prior to beginning work.	If dose rates are measurably above background, institute actions.	Limit the time in the area. Increase distance and provide shielding, as practical (ALARA).	All onsite tasks

ATTACHMENT C

Radiological Activity Hazard Analysis

Attachment C - Radiological Activity Hazard Analysis

Safety and Health Hazards	Probability / Severity	Controls	Monitoring
SAMPLING			
External Exposure	High / very low	Medical clearance for HAZWOPER work If area dose rates are measurable limit the time in the area. For samples, increase distance and provide shielding, as practical (ALARA).	Dose rate survey of work area prior to work. TLD
Internal Exposure	Low/low	Keep sample cuttings wet to minimize airborne exposure. Containerize or cover potentially contaminated material. Medical clearance for HAZWOPER work Do not eat, drink, smoke, or chew in sampling area or prior to successful frisk. Don't touch face when handling potentially contaminated material. Respiratory protection if engineering controls are not adequate. Exclusion zone around contaminated areas.	Lapel air sample during intrusive activities. Individual bioassay if air monitoring indicates internal exposure in excess of 20 DAC-hrs.
Skin Contamination	Low/very low	PPE Modified level D. Tyvek (or equivalent) suits, nitrile (or equivalent) gloves, disposable shoe covers. Exclusion zone around contaminated areas.	Perform a whole body frisk upon exiting a potentially contaminated area (exclusion zone).
WALKOVER SURVEY			
External Exposure	High / very low	Medical clearance for HAZWOPER work	Dose rate survey of work area prior to work. TLD
Internal Exposure	Very Low/low	Medical clearance for HAZWOPER work Do not eat, drink, smoke, or chew in work area, or prior to successful frisk.	
Skin Contamination	Very Low /very low	PPE Level D.	Perform a whole body frisk prior to site exit.

ATTACHMENT D

TTL Site Procedural Applicability

Attachment D - TTL Site Procedural Applicability

Procedure	Applicability
SAIC EEMG STL HP-004 "Quality Control of Radiation Monitoring Equipment"	Entire content applicable, except: 1. Gamma Spec. System QC section is not applicable, there will not be a gamma spec in use. 2. Instrument calibrations will be documented on forms provided by the contractor performing the calibrations. 3. A deficient instrument report will not be generated for detector mylar window light leak. Forms: All except Attachments 11,12,13. Forms may be combined if all recorded information is present.
SAIC EEMG STL HP-108 "Operation of Portable Radiation Survey Instruments"	Entire content applicable, except: 1. Signing out the instrument is not necessary at a small field site. Forms: N/A
SAIC EEMG STL HP-405 "Radiological Surveys"	The following content is applicable: 2. Performance of Beta/Gamma radiation surveys. 3. Performance of smear surveys. 4. Airborne particulate sampling. 5. Documentation of radiation, contamination, and airborne surveys. Forms: Attachments 1,2,3,4,5 (or equivalent)

APPENDIX B

REPORTING FORMS

EQUIPMENT CALIBRATION

PROJECT NAME: **PROJECT NO:**

IDENTIFIER	DESCRIPTION	BACKGROUND READING	PRE	ADJUSTMENT (IF NEEDED)	POST	NAME	DATE

HEALTH AND SAFETY MONITORING LOG

PROJECT NAME: **PROJECT NO:**

		RESULTS				
DATE	INSTRUMENT/NO.	BZ	AREA	TIME	REMARKS	NAME

TAILGATE SAFETY MEETING LOG

PROJECT NAME: PROJECT NO:

DATE: M Tu W Th F Sa Su TIME:

WEATHER:

WORKING CONDITIONS:

PPE:

ITEMS DISCUSSED:

THE FOLLOWING INDIVIDUALS ATTENDED THE DAILY TAILGATE SAFETY MEETING (SIGNATURES)

SITE SAFETY AND HEALTH OFFICER

DAILY SAFETY INSPECTION										
PROJECT: Page ___ of 3										
Date										
Response (Use Y, N, or NA)										ITEM
										Daily safety briefing conducted?
										Emergency numbers and route to hospital posted?
										SSHP on site, available to employees, and complete?
										Required exposure monitoring conducted and documented?
										Monitoring instruments (PID, OVA, CGI) calibrated daily against known standard and documented?
										Sixteen-unit first aid kit available and inspected weekly?
										Personnel wearing PPE required by SSHP for fieldwork (at least safety shoes or boots, safety glasses with side shields, and nitrile or similar gloves to handle potentially contaminated material)?
										Personnel using buddy system (maintaining visual or verbal contact and able to render aid)?
										If temperature >70° F: heat stress training conducted, cool fluids available, pulse rates of personnel wearing Tyvek being monitored, work/rest cycle in SSHP being followed?
										If temperature <40° F: cold stress training conducted, controls in SSHP implemented?
										Personnel using appropriate biological hazard controls (see SSHP)?
										Drill rig operating manual on site?
										Drill rigs inspected daily and documented?
										Personnel near drill rig or other overhead hazards wearing hardhats?
										Each of two drill rig kill switches tested daily?
										Employees excluded from under lifted loads?

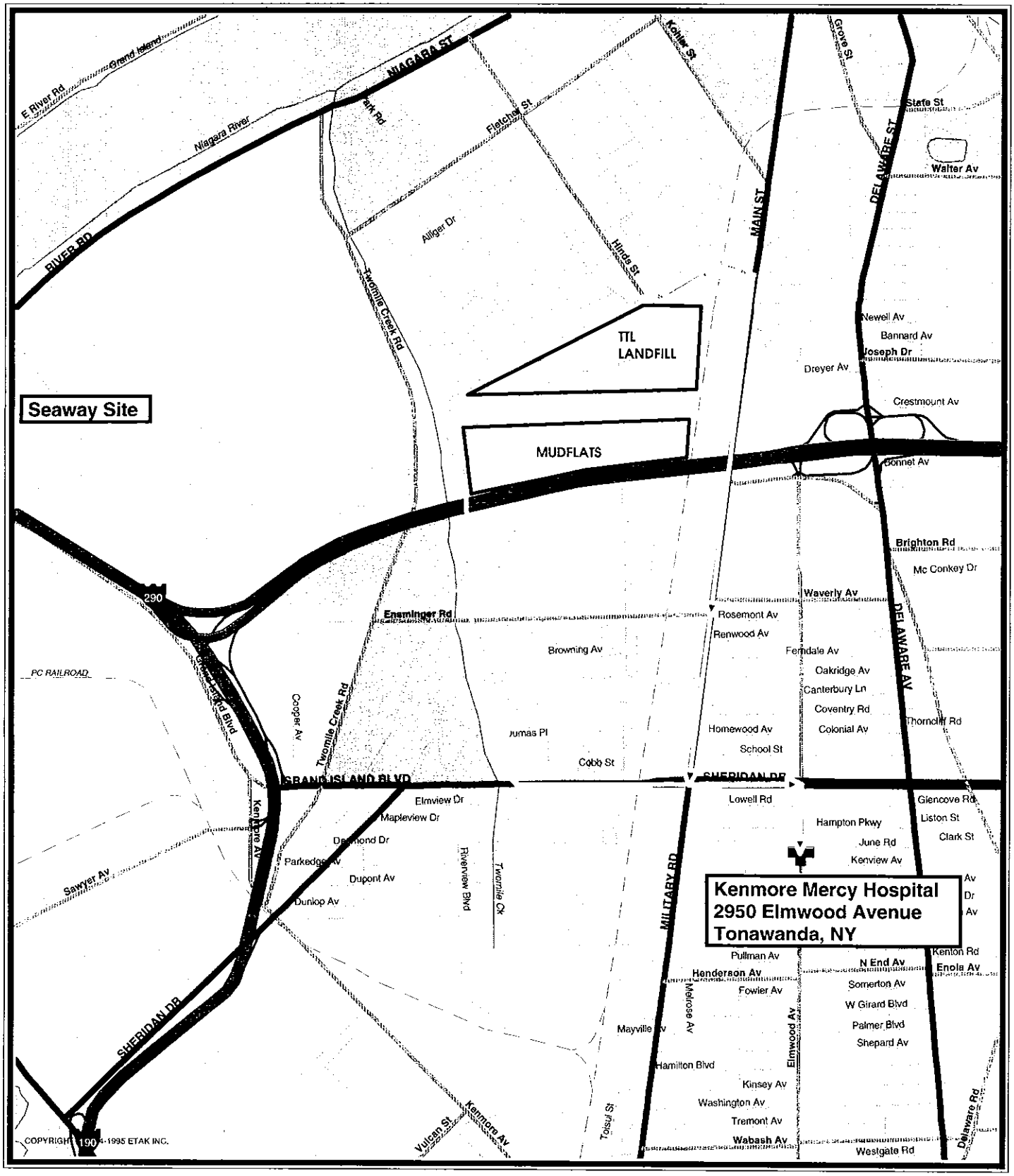
DAILY SAFETY INSPECTION										
PROJECT: Page ___ of 3										
Date										
Response (Use Y, N, or NA)										ITEM
										Unnecessary personnel excluded from hazardous areas, specifically near intrusive investigations?
										Radius of exclusion zone around drill rig at least equal to mast height?
										Personnel wearing hearing protection when within 25 feet of drill rigs, generators, or other noisy equipment?
										Containers of flammable liquids closed and labeled properly?
										Fully charged fire extinguisher available 25 to 75 feet from flammables storage area and inspected monthly?
										Personnel exiting potentially contaminated areas washing hands and face before eating?
										Personnel using steam washer wearing faceshield, hearing protection, heavy duty waterproof gloves, Saranax®, or rainsuit?
										Portable electrical equipment double-insulated or plugged to a GFCI?
										Electrical wiring covered by insulation or enclosure?
										Three-wire, UL-approved extension cords used?
										Housekeeping adequate (walkways clear of loose, sharp, or dangerous objects and trip hazards; work areas clear of objects that might fall on employees)?
										Walking/working surfaces safe (not slippery, no unguarded holes, no trip hazards)?
										Confined-space entry (entry into trenches deeper than 4 feet) performed according to SSHP and EC&HS Procedure 10?
										Excavations deeper than 5 feet shored or sloped (if personnel will enter) and in compliance with SSHP?
										Moving (rotating) machinery guarded to prevent employee contact?
										Fall protection provided for work at elevations greater than 4 feet?

DAILY SAFETY INSPECTION											
PROJECT: Page ___ of 3											
Date											
Response (Use Y, N, or NA)											ITEM
											MSDSs for hazardous materials on site?
											If work is conducted in areas open to hunting (and during season), high visibility vests and other alerting systems such as lights, noise devices (radios) in use?
											Fifteen-minute eyewash (accessible and full) within 100 feet of areas where corrosive sample preservatives are poured?
											Potable and nonpotable water labeled?
											Chainsaws have anti-kickback protection? Personnel wearing cut resistant gloves, protective chaps?
											Visitor access controlled?
											Site hazards and controls consistent with SSHP?
											Site hazard controls appropriate and sufficient?
Actions taken to correct or control any "N" responses:											
Name					Signature						Date

APPENDIX C

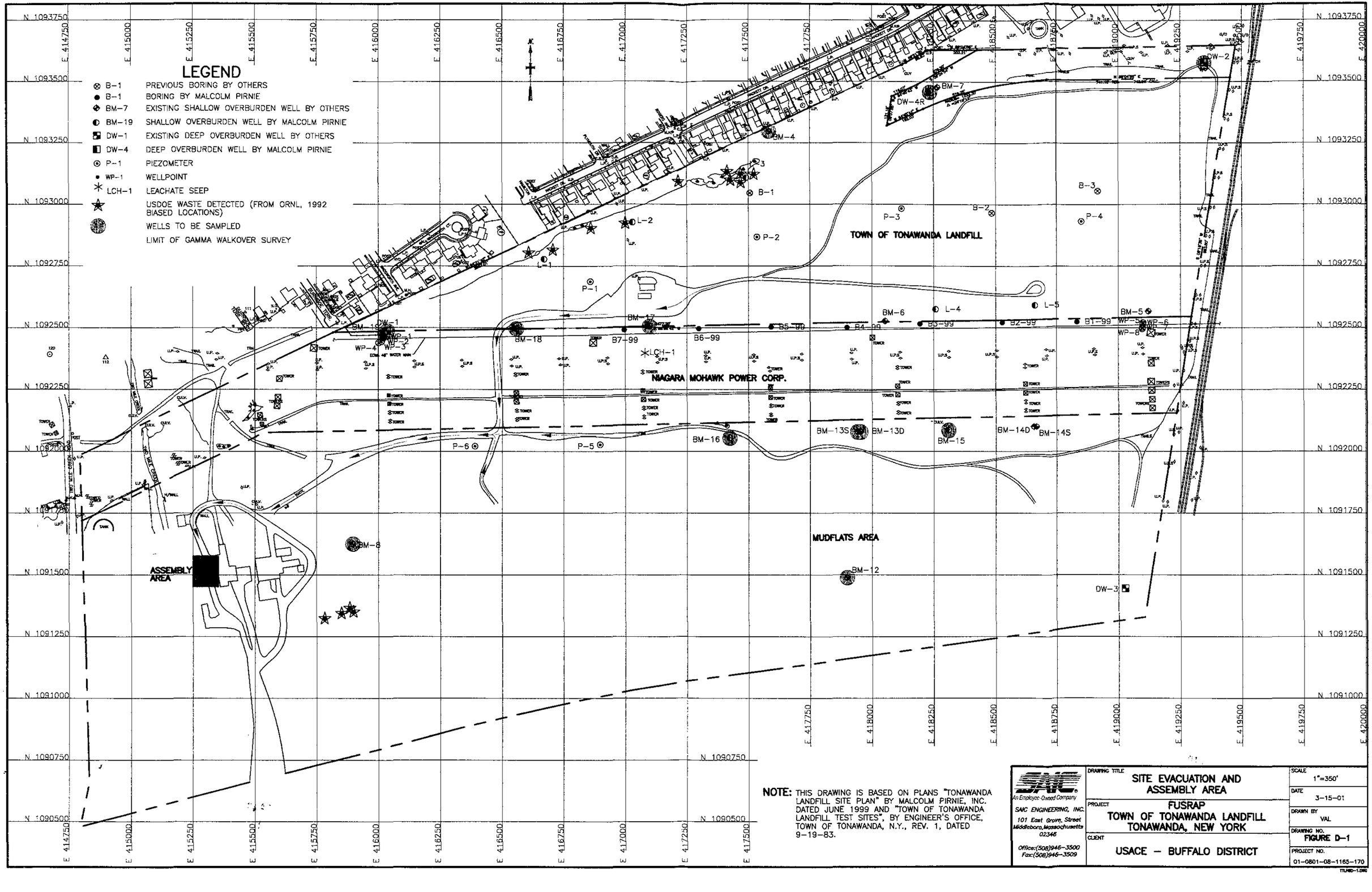
HOSPITAL LOCATION MAP

Hospital Location Map



APPENDIX D

SITE EVACUATION ROUTES & ASSEMBLY AREA



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

SAIC An Employee-Owned Company
SAIC ENGINEERING, INC.
101 East Grove Street
Middleboro, Massachusetts 02346
Office:(508)946-3500
Fax:(508)946-3509

DRAWING TITLE: SITE EVACUATION AND ASSEMBLY AREA

PROJECT: FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

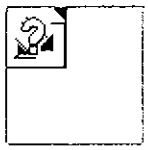
CLIENT: USACE – BUFFALO DISTRICT

SCALE	1"=350'
DATE	3-15-01
DRAWN BY	VAL
DRAWING NO.	FIGURE D-1
PROJECT NO.	01-0801-08-1165-170

TITLEBD-1.DWG

APPENDIX E

WIND CHILL CHART & HEAT INDEX



Meteorological Tables

1. Wind Chill
2. Heat Index

Text Only
Home
Introduction
Current Conditions
Forecasts
Satellite
Radar
Climate Data
River Data
Severe Weather
Aviation
Spotter Info
Weather Radio
Office Info
Models
Links
Maps
Weather Education
OHRFC
Regional HQ
Disclaimer
What's New

Wind Chill

Wind Chill Temperature (F)	Terminology
> 15 - ≤ 32	Cold
> 0 - ≤ 15	Very Cold
> -20 - ≤ 0	Bitter Cold
≤ -20	Extreme Cold

WIND SPEED (MPH)

AIR TEMPERATURE (F)

	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-4
4	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-4
5	32	27	22	16	11	6	0	-5	-10	-15	-21	-26	-31	-36	-42	-4
10	22	16	10	3	-3	-9	-15	-22	-27	-34	-40	-46	-52	-58	-64	-7
15	16	9	2	-5	-11	-18	-25	-31	-38	-45	-51	-58	-65	-72	-78	-8
20	12	4	-3	-10	-17	-24	-31	-39	-46	-53	-60	-67	-74	-81	-88	-9
25	8	1	-7	-15	-22	-29	-36	-44	-51	-59	-66	-74	-81	-88	-96	*
30	6	-2	-10	-18	-25	-33	-41	-49	-56	-64	-71	-79	-86	-93	*	*
35	4	-4	-12	-20	-27	-35	-43	-52	-58	-67	-74	-82	-89	-97	*	*
40	3	-5	-13	-21	-29	-37	-45	-53	-60	-69	-76	-84	-92	*	*	*
45	2	-6	-14	-22	-30	-38	-46	-54	-62	-70	-78	-85	-93	*	*	*

*-denotes wind chill temperatures of ≤100(F)

Heat Index Table

HEAT INDEX	affects on the human body
130 or above	heat stroke highly likely with continued exposure
105 to 130	heat stroke likely with prolonged exposure
90 to 105	heat stroke possible with prolonged exposure

RELATIVE

HUMIDITY

AIR TEMPERATURE (F)

	70	75	80	85	90	95	100	105	110	115
30	67	73	78	84	90	96	104	113	123	135
35	67	73	79	85	91	98	107	118	130	143
40	68	74	79	86	93	101	110	123	137	151
45	68	74	80	87	95	104	115	129	143	
50	69	75	81	88	96	107	120	135	150	
55	69	75	81	89	98	110	126	142		
60	70	76	82	90	100	114	132	149		
65	70	76	83	91	102	119	138			
70	70	77	85	93	106	124	144			
75	70	77	86	95	109	130				
80	71	78	86	97	113	136				
85	71	78	87	99	117					
90	71	79	88	102	122					
95	71	79	89	105						
100	72	80	91	108						