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DEFINITIONS USED IN THIS PLAN

A **certified employee** is a person who has completed all of the requirements for training certification as specified under Title 8 California Code of Regulations (CCR) Section 5192.

Hazardous waste operations include environmental investigation, remediation, sampling for groundwater monitoring, maintenance of groundwater and soil treatment systems, and hazardous waste operations at onsite treatment, storage, and disposal facilities (TSDF).

Hazardous substance removal work includes removal, containment, incineration, neutralization, and stabilization of hazardous substances.

A **qualified person** has specific training, knowledge, and experience in the area for which the person has the responsibility and the authority to control work activities. For hazardous substance removal work, a qualified person will be responsible for scheduling any air sampling, laboratory calibration of sampling equipment, evaluation of contaminated materials sampling results, and performing any equipment testing and evaluating the results of the test.

The **Site Health and Safety Supervisor** has the responsibility and authority to develop, implement, and verify compliance with the *Health and Safety Plan for United Technologies Corporation Pratt & Whitney Rocketdyne San Jose, Hazardous Waste Operations*.

A **work supervisor** has the responsibility and authority to direct a hazardous waste operation. Work supervisors for hazardous substance removal work will have completed all of the requirements for training certification as specified under 8 CCR 5192.

LIST OF ACRONYMS

AHERA	Asbestos Hazard Emergency Response Act
APR	Air Purifying Respirator
Cal/OSHA	California Occupational Safety and Health Administration
CB	Citizen's band
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
CRZ	Contaminant Reduction Zone
CSEP	Confined Space Entry Procedures
DMS	Document Management System
DOT	Department of Transportation
DPR	Design Process Review
EMPP	Environmental Monitoring Program Plan
EPA	Environmental Protection Agency
EMT	Emergency Medical Technician
ERT	Emergency Response Team
eV	Electron Volt
FID	Flame Ionization Detector
Freon 11	Trichlorofluoromethane
Freon 113	Trichlorotrofluoroethane
GAC	Granular Activated Carbon
GTS	Groundwater Treatment System
HASP	Health and Safety Plan
Hazwoper	Hazardous Waste Operations and Emergency Response under Title 8 CCR Section 1592
HMX	Cyclotetramethylenetetranitramine
HPD	Hearing Protection Device
IDLH	Immediately Dangerous to Life or Health
IIPP	Illness and Injury Prevention Program
LEL	Lower Explosive Limit
MEK	Methyl Ethyl Ketone (2-Butanone)
MIBK	Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)

LIST OF ACRONYMS
(Continued)

MPH	Miles per Hour
MSDS	Material Safety Data Sheets
NIOSH	National Institute for Occupational Health
OSHA	Occupational Safety and Health Administration
OVM	Organic Vapor Monitor
PBNA	Phenylbetanaphthalenamine
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PEL	Permissible Exposure Limit
PID	Photo-Ionization Detector
PPE	Personal Protective Equipment
PPM	Part per Million
R&AT	Research and Advanced Technology
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
RWQCB	Regional Water Quality Control Board
SCR	Site Cleanup Requirements
SPF	Sun Protection Factor
STELs	Short-term Exposure Limits
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
THF	Tetrahydrofuran
TSDF	Treatment, Storage, and Disposal Facility
UTC	United Technologies Corporation, Pratt & Whitney Rocketdyne, San Jose
VOC	Volatile Organic Compound
WDR	Waste Discharge Requirement
WI	Work Instruction
WWTP	Wastewater Treatment Plant

SECTION 1
INTRODUCTION

1.1 PURPOSE

This project control document, *Health and Safety Plan for United Technologies Corporation, Pratt &Whitney Rocketdyne, San Jose, Hazardous Waste Operations*, has been prepared according to the specifications presented in California Hazardous Waste Operations Standard and Emergency Response Standard 8 CCR 5192, California Hazard Communication Standard 8 CCR 5194, CAL/OSHA's Safety and Health Standard 8 CCR Chapter 4, and other applicable regulations. The purpose of this Health and Safety Plan (HASP) is to establish safe procedures and practices for United Technologies Corporation, Pratt & Whitney Rocketdyne, San Jose Site (UTC) employees and contractors engaged in hazardous waste operations at UTC. This document does not apply to activities in environmental analytical laboratories as they are subject to specific health and safety requirements under other regulations.

UTC is in the process of decommissioning its facilities. Under decommissioning, hazardous waste operations include assessment, decontamination, and demolition of buildings and equipment, including closure of Resource Conservation and Recovery Act (RCRA) facilities. As part of decommissioning, the RCRA Storage Facility at Station 2233 and the RCRA Storage Magazine at Station 0312 will be operated to handle waste from the decommissioning process.

Other hazardous waste operations conducted at the UTC facility include environmental investigation, remediation, and self-monitoring as set forth in the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) Waste Discharge Requirements (WDR) Order Number 95-190, EPA RCRA §3008(h) Consent Order RCRA-09-89-0018, and RWQCB Site Cleanup Requirements (SCR) Order Number R2-2004-0032. Maintenance of groundwater and soil treatment systems, hazardous waste operations at the onsite Treatment, Storage, and Disposal Facilities (TSDF), such as the Storage Facility (2233) and the Storage Magazine (0312), and closure of RCRA facilities are also performed at UTC.

Site investigations, remediation, and demolition require a high level of safety planning. Adequate planning is the first and most critical element in controlling employee exposure to hazardous materials and physical hazards. Accordingly, proper safety techniques and safety equipment are an integral part of each specified task. This plan addresses those safety procedures and equipment that shall be used during onsite hazardous waste operations to reduce the probability of personal injury or chemical exposure.

This HASP serves as the main health and safety document for hazardous waste operations conducted under UTC's control at the UTC facility. It is anticipated that most of the hazardous waste operations

will be conducted by independent contractors, while UTC personnel will be mainly performing auditing functions.

This HASP is supplemented by Work Instructions, which include UTC's standard operating procedures for health and safety. The provisions of this HASP will be implemented by UTC personnel. It is imperative that all UTC personnel read this HASP before participating in onsite hazardous waste operations.

All safety regulations required by UTC, and those required by State and Federal law, must be strictly observed by all UTC personnel and contractors. All contractors are responsible for their own health and safety program that must, at a minimum, be consistent with the requirements of this HASP. Contractor's personnel must read and follow the HASP they are working under before participating in onsite hazardous waste operations. In addition, each contractor must develop and implement an active Illness and Injury Prevention Program. Contractor personnel will be trained annually as required by 8 CCR 3203.

This revision to the *Health and Safety Plan for United Technologies Corporation, Pratt & Whitney Rocketdyne San Jose, Hazardous Waste Operations* was prepared to include a discussion of threatened and endangered species on the site, the receipt of the Biological Opinion from the U.S. Fish and Wildlife Service, and to reference UTC's *Environmental, Health & Safety Guidelines for Contractors* and the *Environmental Manual*.

Mention of a specific manufacturer or product does not imply endorsement or impose a requirement for use.

1.2 BACKGROUND INFORMATION

The UTC Site is located at 600 Metcalf Road southeast of San Jose, California. UTC developed, manufactured, and tested solid propellant rocket motors for the defense and space exploration industries. The site began operating in 1959. The facility employs about 50 people and occupies 5,113 acres including 200 buildings. A perimeter fence and 24-hour guards at the gates provide site security.

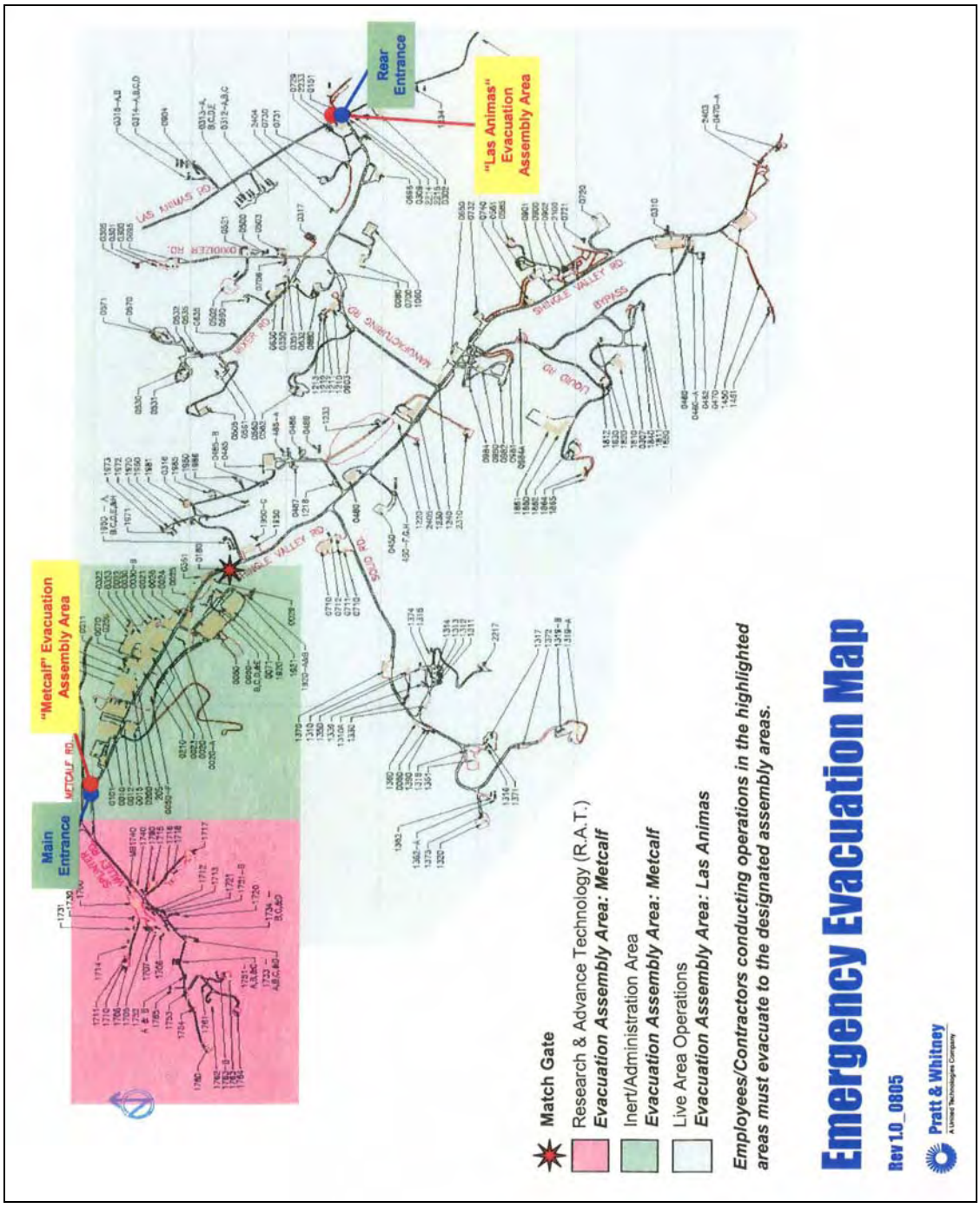
Historically, rocket motors were filled with propellants designed to cause a controlled oxidation reaction and release large amounts of energy and gas. Solid rocket propellants were typically synthetic rubber with reactive materials suspended in the rubber matrix. The typical materials used onsite in the production of propellant were polybutadiene polymers, ammonium perchlorate, and aluminum powder. Cyclotetramethylenetetranitramine (HMX) and cyclotrimethylene-trinitramine (RDX) may have been added to propellants to enhance energy levels. Chlorinated and non-chlorinated solvents were used for cleaning motor cases and subassemblies.

Figure 1-1 shows the facility layout. The site is located in an area of rolling hills, steep terrain, and relatively broad valleys. The two main valleys within the developed portion of the site are Shingle Valley and Mixer Valley. Each valley has an intermittent stream. The streams and creeks flow into Las Animas Creek, a tributary to Anderson Reservoir located within one-half mile of the southern boundary of the site. The streams are dry most of the year, but they can carry considerable flow during the wet season, generally October through March.

The front entrance to the UTC facility is located on Shingle Valley Road off Metcalf Road. Shingle Valley Road and Mixer Road are the main roads serving the two main valleys. Manufacturing Road connects Shingle Valley and Mixer Roads and ends at Las Animas Road that is the back entrance to the site. Splinter Valley Road, Solid Road, Liquid Road, and Oxidizer Road serve the side valleys. Most of the station buildings can be reached by these paved roads. In addition, there are several dirt roads that serve out-of-the-way locations.

Rest rooms and drinking water are available in Station 0012 in the Administration and Inert Area. Electricity is available at several stations, and UTC has several mobile power generators as well. Telephones are available at most stations. Smoking is only allowed at two designated locations: one is at the back gate and the other is in the Inert Area. The availability of rest rooms, drinking water, electricity, and telephones shall be addressed before fieldwork begins.

FIGURE 1-1
SITE MAP



SECTION 2
PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 FIELD WORK CHAIN OF COMMAND

The UTC hazardous waste operations management structure is illustrated in Figure 2-1. Each element of the applicable project organization is discussed below.

The UTC Project Manager is responsible for allocating and administering the resources required to successfully comply with technical, field service, and health and safety requirements for work under their control. The Decommissioning Project Manager is responsible for decontamination, decommissioning and demolition of buildings and equipment, including closure of RCRA facilities and operation of the RCRA Storage Facility at Station 2233 and the RCRA Storage Magazine at Station 0312. The UTC Corporate Remediation Project Manager is responsible for investigation, remediation, and monitoring activities of impacted groundwater and soils, including the maintenance of the groundwater and soil treatment systems and RCRA post-closure activities. It is anticipated that the Decommissioning Project Manager and the UTC Corporate Remediation Project Manager will use independent contractors for their hazardous waste operations.

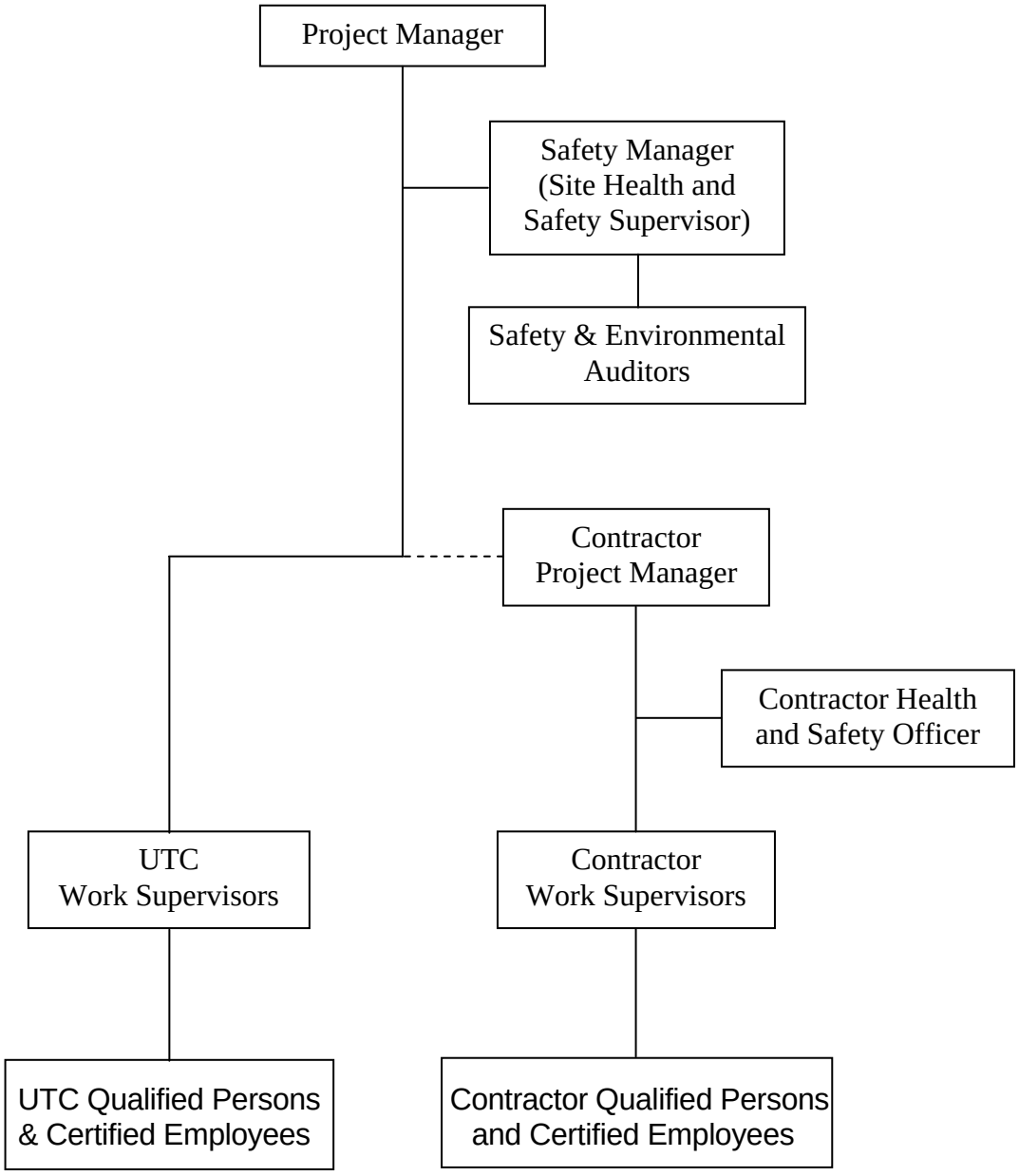
The UTC Site Health and Safety Supervisor has the responsibility and authority for establishing, implementing, monitoring to verify compliance, and administering the UTC health and safety program for hazardous waste operations. Currently, the UTC Site Health and Safety Supervisor position is filled by the UTC Safety Manager. The Site Health and Safety Supervisor is also responsible for ensuring that UTC hazardous waste operations meet federal and state health and safety requirements. The duties of the Site Health and Safety Supervisor include providing health and safety guidance for new onsite activities performed by UTC employees. UTC's Safety Department has ultimate responsibility and authority for safety.

The UTC Site Health and Safety Supervisor is responsible for reviewing this Health and Safety Plan to assess the need for addenda and/or revisions on an annual basis. In addition, he is responsible for seeing that health and safety audits are done and that records are maintained that show compliance with the Health and Safety Plan.

Members of the UTC Safety and Environmental Departments audit onsite work for compliance with work permits, standard operating procedures, and federal, state, and local laws and regulations. The auditors focus on safety and environmental aspects of work performed by UTC and contractors.

UTC has work supervisors who have the responsibility and authority to direct selected portions of UTC hazardous waste operations. The work supervisors are also responsible, along with the Site Health and Safety Supervisor, for full compliance with safety requirements on assignments under their control.

FIGURE 2-1
HAZARDOUS WASTE OPERATIONS
PROJECT MANAGEMENT STRUCTURE



Contractors conducting onsite hazardous waste operations will have work supervisors and may each designate a Health and Safety Officer who is the contractor's onsite health and safety supervisor.

Each UTC and Contractor work supervisor is responsible for the health and safety of the personnel in their organization involved in onsite hazardous waste operations, and for the management of the hazards under their control. The work supervisor or designee will conduct a safety briefing for all personnel involved in a specific hazardous waste operation before beginning the activity. The briefings will include such topics as onsite hazards, hazard controls, personal protective equipment, air monitoring, and site-specific safety and emergency procedures.

Each person performing hazardous waste operations (such as general laborers, equipment operators, soil samplers, groundwater samplers, maintenance personnel, and supervisors) will be a qualified and/or certified employee (a person who has completed all of the requirements for training certification as specified under 8 CCR 5192). For work involving the removal, containment, incineration, neutralization, and stabilization of hazardous substances, a qualified person (a person who has specific training, knowledge, and experience in the area for which the person has the responsibility and the authority to control) will be responsible for conducting or overseeing air sampling, laboratory calibration of sampling equipment, evaluation of contaminated materials sampling results, and performing any equipment testing and evaluating the results of the test.

Table 2-1 presents the key positions and alternates responsible for site safety, response operations, and notification of public agencies of releases or discharges.

TABLE 2-1
KEY POSITIONS

Responsibility	Key Position	Alternate Position
Site Safety	Joe McKean Safety Manager (408) 776-4262	On-Call Safety Engineers
Response Operations	Leonard Orton Security Manager (408) 776-6018	Danny Lopez Fire Chief (408) 776 4282
Notification of Public Agencies of Releases or Discharges	Timothy Marker Environmental Manager (408) 776-4060	On-Call Environmental Engineers

2.2 UTC RESPONSIBILITIES

Each UTC Project Manager is responsible for informing employees and contractors of hazardous conditions relating to activities under their control.

The UTC work supervisors are responsible for compliance with Federal, State and local statutes, ordinances or regulations regarding health and safety for activities under their control. These requirements include verifying that all employees engaged in hazardous waste operations under their control have successfully completed the required health and safety training according to the provisions of 8 CCR 5192, are certified for hazardous waste field work by a licensed physician when required by the provisions of 8 CCR 5192, and are participants of a medical surveillance program when required by the provisions of 8 CCR 5192.

2.3 CONTRACTOR RESPONSIBILITIES

Contractors performing hazardous waste operations at the site are responsible for compliance with all Federal, State, and local statutes, ordinances, or regulations regarding health and safety, and their own HASPs. Contractors' health and safety program must be consistent with the requirements of this HASP. Each contractor shall identify a lead individual who is responsible for the health and safety compliance of the contractor's employees, subcontractors, and consultants. This person will be responsible for demonstrating consistency with the health and safety procedures outlined in this plan and reporting/investigating all incidents and near misses.

In conformance with the CAL/OSHA Hazardous Waste Site Operations Final Rule (8 CCR 5192) and Title 29 Code of Federal Regulations (CFR) Section 1910.120, each contractor working under UTC control shall certify in writing that all of the personnel proposed for onsite hazardous waste operations have successfully completed the required health and safety training, have been certified for hazardous waste field work by a licensed physician (when required by the provisions of 8 CCR 5192), are participants of a medical surveillance program (when required by the provisions of 8 CCR 5192), and have been satisfactorily fit tested for respirator (when required by the provisions of 8 CCR 5144). Each contractor will also certify that they have an active Illness and Injury Prevention Program and that personnel are trained in Hazard Communication. This can be accomplished by completing the *Contractor Certification of Training, Medical, and Safety Requirements Form* shown in Appendix D.

2.4 VISITORS

Visitors (for example, agency personnel) to any onsite hazardous waste operation location will be briefed on the hazards present at that location by the work supervisor or designee. Visitors will be always escorted while at an onsite hazardous waste operation work location and will be responsible for compliance with the requirements specified in the work supervisor's HASP. Visitors that do not meet

the requirements for training and medical surveillance will only be allowed in support areas and will not be allowed into exclusion or immediate work areas. The areas to be visited will be verified free of inhalation and dermal hazards prior to the visitor's entry.

SECTION 3
SCOPE OF WORK

3.1 GENERAL

UTC is in the process of decommissioning its facilities under the Santa Clara County Department of Environmental Health, Hazardous Materials Division. After reviewing available information on each building, assessments are conducted to identify specific risks and hazards associated with equipment and facilities. Following the risk and hazard assessments, the equipment and facilities are decontaminated. In some cases, decontamination may be performed by demolishing the facility.

EPA RCRA §3008(h) Consent Order Number RCRA-09-89-0018 requires UTC to define the presence, magnitude, extent, direction, and rate of movement of any hazardous wastes or hazardous constituents within and beyond the UTC boundary; develop and evaluate the corrective action alternatives necessary to remedy those releases identified in the preceding clause; and implement corrective measures at UTC. RWQCB SCR Order Number R2-2004-0032 established specific cleanup standards for soil and groundwater and specified completion of remedial investigations and implementation of remedial measures.

Several tasks have been specified by the SCR. These tasks are done so that they also fulfill the EPA Consent Order requirements. As the scope of work for each effort is identified, hazardous waste operations may be conducted by UTC and its contractors.

Non-explosive hazardous wastes (decommissioning and remediation) may be picked up from storage sheds and drums/bins across the site and transported to the Storage Facility at Station 2233 for transfer of materials to lab packs and bins, sampling of drums and bins, and labeling and manifesting prior to off-site disposal. Storage Facility 2233 activities also include the inspection of hazardous waste storage areas (the Storage Facility 2233) and hazardous waste storage sheds located elsewhere onsite), cleanup of minor leaks and spills at hazardous waste storage areas, and crushing drums at Station 2233. Potentially explosive hazardous wastes from decommissioning may be transported to Storage Magazine (0312). These materials are shipped offsite for destruction. Typical explosive and energetic compounds included solid oxidizers such as ammonium perchlorate, secondary high explosives such as HMX and RDX, and secondary explosives such as nitrocellulose.

This Health and Safety Plan along with the UTC Work Instructions and contractor's Health and Safety Plans address most of the above-listed activities. Addenda or revisions to the HASP will be prepared as required. An example of a HASP addendum/ revision form is presented in Appendix A. In addition, task-specific HASPs (Appendix B) may be prepared for activities that are outside the scope of this Health and Safety Plan. Addenda to the task-specific HASPs may also be prepared (see Appendix C for an example form).

3.2 IDENTIFIED FIELD ACTIVITIES

It is anticipated that most of the hazardous waste operations will be conducted by independent contractors, while UTC personnel will be mainly performing auditing functions at hazardous waste field operations. As such, it is important for UTC employees to be aware of the hazards of the activities that they are auditing. In addition, UTC employees will follow the contractor's HASP when in a contractor's work area.

Many field activities are routinely conducted at the UTC facility as part of the hazardous waste operations for the site. Descriptions of the following activities are presented in Appendix F. Low-level hazardous activities include:

- Bioremediation/composting,
- Creek monitoring and stream flow measurements,
- Facility decontamination
- Groundwater treatment system monitoring,
- Maintenance of remediation systems,
- Oversight/Auditing,
- Sampling of solids by hand,
- Soil vapor sampling,
- Steam cleaning,
- Storage Facility (2233) and Storage Magazine (0312) activities,
- Water sampling and water level measurements, and
- Well development.

Moderately hazardous activities include:

- Demolition and/or excavation and
- Drilling activities.

SECTION 4
HAZARD EVALUATION

This section presents the data necessary for the development of health and safety protocols for onsite activities. The goals of the hazard evaluation are twofold: (1) to summarize available chemical analytical data and the corresponding impacts on worker health and safety and (2) to characterize the physical hazards associated with the site. This information is important in the development of action levels to be used for the assessment of levels of respiratory and dermal protection. The use of real-time air monitoring instruments and the judgment of onsite health and safety specialists will provide the basis for upgrading or downgrading levels of protection. Hazards for identified hazardous waste operations at UTC are presented in Appendix F.

4.1 AVAILABLE DATA SUMMARY

Most of the available chemical analytical data from remedial investigations to date have been summarized in the reports cited in Section 13.5 and the UTC *Environmental Monitoring Reports*. The list of chemicals used at each station is in the annual *Hazardous Materials Management Plan* for UTC. The following chemicals and general chemical types have been used onsite:

- Ammonium perchlorate oxidizer
- Non-chlorinated solvents
- Isocyanates
- Polybutadiene polymers
- Powdered aluminum and iron reactive fuel
- Oils, petroleum fuels, paints, and epoxys
- Quality control laboratory chemicals
- Water treatment chemicals

The likelihood of encountering these types of materials during hazardous waste operations is dependent upon the location and the types of processes in place near that location. For the most part, these types of materials are contained in the process areas and are not expected to be encountered in large concentrations in an uncontrolled environment.

Table 4-1 presents general information on the predominant chemicals of concern found in the soils at the UTC site. All of these compounds have been found in UTC soils at concentrations above 1 mg/kg, with the exception of vinyl chloride and 1,4-dioxane. Vinyl chloride and 1,4-dioxane have been included because they have been found at concentrations in UTC groundwater above 1 and 0.5 mg/L, respectively. Data are presented for 1,4-dichlorobenzene and 1,2,4-trichlorobenzene because there were more data available for these isomers than 1,3- dichlorobenzene and 1,3,5-trichlorobenzene

TABLE 4-1
PREDOMINANT CHEMICALS OF CONCERN IN UTC SOILS

Chemical Name CAS Number	IP[1] (eV)	PID Resp[2]	PEL[3] (ppm)	IDLH[4] (ppm)	Flammable Range %	Odor (ppm)	Notes
Acetone 67-64-1	9.69	0.59	750	2,500	2.5-12.8	100	F
Aniline* 62-53-37	7.70	NA	2 (skin)	100	1.3-110	5-70	Ca, F, P, S
Asbestos (Chrysotile) 12001-29-5	NA	NA	0.1 fibers/cc	ND	NA	NA	Ca
Benzene 71-43-2	9.24	1.43	1 (skin)	500	1.2-7.8	4.68	Ca, F
2-Butanone (MEK) 78-93-3	9.54	0.64	200	3,000	1.4-11.4	4.8-25	F
Carbon tetrachloride 56-23-5	11.47	NA	2 (skin)	200	NA	21.4-400	Ca
Chlorobenzene 108-90-7	9.07	1.43	10	1,000	1.3-9.6	0.21-60	F
Chloroform 67-66-3	11.42	NA	2	500	NA	50-307	Ca
2-Chlorotoluene 95-49-8	8.83	NA	50 (skin)	NA	1.36-?	0.32	F
Copper (dust) 7440-50-8	NA	0	1 mg/m^3	100 mg/m^3	NA	NA	
1,4-Dichlorobenzene 106-46-7	8.98	NA	10 (skin)	150	2.5-?	<15	Ca, P
1,1-Dichloroethane 75-34-3	11.06	NA	100	3,000	5.4-11.4	120	
1,1-Dichloroethene 75-35-4	10.00	NA	1	NA	6.5-15.5	NA	Ca, F
cis-1,2-Dichloroethene 540-59-0	9.65	NA	200	1,000	5.6-12.8	0.85-500	
Dimethylsulfide* 75-18-3	9.68	NA	NA	NA	2.2-19.7	0.001-0.020	F
1,4-Dioxane 123-91-1	9.13	NA	25	500	2.0-22	2.7	Ca, F
1-Dodecanethiol* 112-55-0	NA	NA	NA	4 mg/m^3 (15 min)	NA	NA	F, I
4-Ethenylcyclohexene* 100-40-3	NA	NA	NA	NA	NA	NA	
Ethyl benzene 100-41-4	8.76	0.59	100	800	0.8-6.7	0.25-200	I
Lead 7439-92-1	NA	0	0.05 mg/m^3	100 mg/m^3	NA	NA	
Methane 74-82-8	12.98	0	10,000	NA	5-14	NA	F
Methylene chloride 75-09-02	11.32	0	25	2,300	13-23	25-320	Ca

[1] - Ionization Potential in electron-volts (eV)
[2] – Model 580B PID relative response with 10.2 eV lamp
[3] - Permissible Exposure Limit, California OSHA (8 CCR 5155)
[4] - Immediately Dangerous to Life and Health Level, NIOSH Publication # 2001-145.

Ca - Refers to a suspected or known carcinogen
F - Flammable
HR - High response
I - Irritant
LDC - Lowest detectable concentration
NA - Not available at this time/Not applicable
P - Poison
S - Skin notation
* - Tentatively identified

TABLE 4-1 (continued)
PREDOMINANT CHEMICALS OF CONCERN IN UTC SOILS

Chemical Name CAS Number	IP[1] (eV)	PID Resp[2]	PEL[3] (ppm)	IDLH[4] (ppm)	Flammable Range %	Odor (ppm)	Notes
1-Methylnaphthalene 91-57-6	7.96	NA	NA	NA	NA	0.02-?	I
2-Methylnaphthalene* 91-57-6	7.96	NA	NA	NA	NA	0.02-0.05	I
4-Methyl-2-pentanone (MIBK) 108-10-1	9.30	NA	50	500	1.2-8.0	0.10-8	F, I
Pentachloroaniline* 527-20-8	NA	NA	NA	NA	NA	NA	F, I
Perchlorate 7790-98-9	NA	NA	NA	NA	NA	NA	I
PCB - Aroclor 1242 53469-21-9	NA	NA	1 mg/m^3	5 mg/m^3	NA	NA	Ca
Phenylbetanaphthalenamine (PBNA)* 135-88-6	NA	NA	NA	NA	NA	NA	Ca
Silica 7631-86-9	NA	NA	0.1 mg/m^3	3,000 mg/m^3	NA	NA	I
Styrene 100-42-5	8.40	NA	50 (skin)	700	0.9-6.8	0.047-200	F, I
1,2,3,5-Tetrachlorobenzene* 634-90-2	NA	NA	NA	NA	NA	NA	
Tetrachloroethene (PCE) 127-18-4	9.32	0.53	25	150	NA	4.68-50	Ca, I
2,3,4,5-Tetrachlorophenol* 4901-51-3	NA	NA	NA	NA	NA	NA	
Tetrahydrofuran (THF) 109-99-9	9.45	0.27	200	2,000	2-11.80	20-50	F, I
2,4,6-Trichloroaniline* 634-93-5	NA	NA	NA	NA	NA	NA	
1,2,4-Trichlorobenzene* 108-70-3	NA	NA	5	NA	NA	3	I, P
1,3,5-Trichloro-2,4-dinitrobenzene* 6284-83-9	NA	NA	NA	NA	NA	NA	
Toluene 108-88-3	8.82	2.0	50	500	1.1-7.1	0.17-40	F, S
Toluene diisocyanate* 584-84-9	NA	NA	0.005	2.5	0.9-9.5	0.2-2.4	Ca, I
1,1,1-Trichloroethane (TCA) 71-55-6	11.00	NA	350	700	7.5-12.5	20-500	
Trichloroethene (TCE) 79-01-6	9.45	0.77	25	1,000	8-10.5	21.4-400	Ca
Trichlorofluoromethane (Freon 11) 75-69-4	11.77	0	1,000	2,000	NA	135-209	

[1] - Ionization Potential in electron-volts (eV)
[2] – Model 580B PID relative response with 10.2 eV lamp
[3] - Permissible Exposure Limit, California OSHA (8 CCR 5155)
[4] - Immediately Dangerous to Life and Health Level, NIOSH Publication # 2001-145.

Ca - Refers to a suspected or known carcinogen
F - Flammable
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NA - Not available at this time/Not applicable
P - Poison
S - Skin notation
* - Tentatively identified

TABLE 4-1 (continued)
PREDOMINANT CHEMICALS OF CONCERN IN UTC SOILS

Chemical Name CAS Number	IP[1] (eV)	PID Resp[2]	PEL[3] (ppm)	IDLH[4] (ppm)	Flammable Range %	Odor (ppm)	Notes
Trichlorotrifluoroethane (Freon 113) 76-13-1	11.99	0	1,000	2,000	NA	68-135	
Vinyl chloride 75-01-4	9.99	NA	1 (LDC) (skin)	NA	3.6-33.0	260	Ca, F
Xylene isomers 1330-20-7	8.44-8.56	NA	100	900	1.0-7.0	0.47-5.7	F, I
Zinc Dust 7440-66-6	NA	0	5 mg/m^3	NA	NA	NA	

[1] - Ionization Potential in electron-volts (eV)
[2] – Model 580B PID relative response with 10.2 eV lamp
[3] - Permissible Exposure Limit, California OSHA (8 CCR 5155)
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S - Skin notation
* - Tentatively identified

that are found onsite. The information in Table 4-1 includes exposure limits, relative response of monitoring instruments, and chemical characteristics.

The potential hazards to personnel working at this site have been identified as chemical, physical, and biological hazards. Each potential hazard is described in Section 4.2.

4.2 CHEMICAL HAZARD REVIEW

General Hazard Assessment: Based on the information available, the overall chemical hazard for performance of work under this plan from an onsite worker health and safety standpoint is **low to moderate**. The primary chemical hazard present is associated with the chlorinated solvents and perchlorate found in the soils and groundwater beneath the site. Limited volatile organic compounds (VOC) contamination, if any, is expected at the facility surface. Both inhalation and dermal absorption are potential routes of exposure to VOCs and polychlorinated biphenyls (PCBs) during such activities as well drilling, construction, and environmental sampling.

Inhalation Exposure Hazards: Acute inhalation exposure to the organic solvents found onsite produce typical central nervous system effects such as dizziness, headache, and nausea. High level exposure may cause narcosis. Chronic inhalation exposures to these chemicals have produced liver and kidney toxicity. In addition, the onsite contaminants of concern include confirmed human carcinogens such as benzene and vinyl chloride, and suspected human carcinogens such as trichloroethene (TCE).

Although PCBs are present in the soil, the extremely high boiling point and low vapor pressure of PCBs makes it highly unlikely that PCB vapors will be present. PCB-contaminated soil may also be blown into the air as dust and inhaled (see Section 6.3 for particulate monitoring). However, the known concentrations of PCBs in soil are below 10 mg/kg, resulting an action level that is much higher than the 5 mk/M^3 nuisance dust level. For these reasons, no inhalation hazard or an eye irritation hazard from PCBs is anticipated.

Limited air quality data have been collected at the site. The concentrations of the chemicals that are detected onsite, coupled with the fact that the contamination is primarily confined to the subsurface, suggests that the potential inhalation hazard posed by organic vapors in the ambient air is low. However, during active disturbance of the soils such as drilling or excavation, this condition could change. Therefore, continuous monitoring of the air for the presence of organic vapors may be necessary during certain operations.

The industrial air contaminant standards and guidelines for the predominant chemicals of concern are presented in Table 4-1. Exposures to these materials will be controlled to levels below the published exposure limits.

Dermal Exposure Hazards: The presence of organic solvents and other materials in the soils and groundwater makes it necessary to provide dermal protection to workers when activities involve handling soil, groundwater, or equipment contacted by these media. Dermal exposure to PCBs may cause chloracne. Dermal exposure to soils or groundwater contaminated with organic solvents, benzene, vinyl chloride, and trichloroethene may cause skin irritation.

Ingestion Hazards: The presence of organic solvents and other materials in the soils and groundwater makes it necessary for site workers to practice good personal hygiene after handling soil, groundwater, or equipment contacted by these media. Incomplete washing of the hands after removing gloves may result in accidental ingestion of site contaminants when eating, drinking, or smoking.

Chronic ingestion of PCBs has produced liver toxicity. Persons who have suffered systemic intoxication of PCBs generally have symptoms of nausea, vomiting, weight loss, jaundice, edema, and abdominal pain. PCBs are suspected human carcinogens.

Review of Chemicals Used in Field Work: Chemicals used onsite by the environmental field teams or production workers may also pose an exposure hazard.

Where work is under UTC's control, a Design Process Review (DPR) must be completed and approved by the UTC Safety Department before any new chemical is brought onto the UTC site or a chemical already present at UTC is used in a new application. A new chemical is defined as any chemical not currently used at the UTC facility. The material safety data sheets (MSDS) for chemicals used by UTC personnel and contractors during environmental field activities will be maintained onsite. The MSDS for any hazardous materials brought onsite by environmental contractors will be provided to UTC Safety before brought onsite. Chemical inventories and MSDSs for UTC activities are located in the UTC Safety Department.

For work that is not under UTC's control, the contractor must use a review and approval process of all new chemicals that is similar to UTC's DPR review.

4.2.1 Suspected Asbestos Containing Materials

In the event that UTC personnel or contractors contact materials suspected to contain asbestos, all related activities will cease immediately. The UTC Safety Department should be notified immediately if a material potentially containing asbestos is found in a friable state. The Safety Department should also be notified before any renovation, demolition, or activity that might cause the release of asbestos fibers. Any removal activities will follow the protocol set forth in 8 CCR 1529. An Asbestos Hazard Emergency Response Act (AHERA) certified contractor with oversight by a Cal-OSHA certified asbestos contractor will be required to remove the materials. Under no circumstances will work be allowed to continue without the appropriate personal protective equipment, monitoring, and trained

personnel.

4.2.2 Lead-Based Paint

Lead-based paint may be present in site buildings. Exposure to lead can cause weakness, lassitude, insomnia; facial pallor; eye pallor; anorexia, low weight, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremors; wrist and ankle paralysis; brain damage; kidney damage; irritated eyes and hypotension.

Lead abatement shall be done in strict accordance with 8 CCR 5198. A competent person as defined by 8 CCR 5198 shall be present during all lead removal activities. The lead standard for the construction industry is 8 CCR 1532. Proper procedures must be implemented and all personnel involved with lead based paint removal activities must have proper training and medical evaluations. Workers and supervisors need to be DHS trained for lead removal work.

An initial exposure assessment will be conducted by the competent person to determine the extent of engineering controls required to maintain exposures below the action level. Real-time air monitoring for total airborne particulate will be conducted during all lead removal activities. Personal sampling will be conducted based on the initial exposure assessment and results of the real-time monitoring.

4.2.3 Silica

Demolition of stone that contains crystalline silica, sand, or cement may lead to exposure to respirable crystalline silica above health limits. Use of sand and cement in groundwater well construction and grouting of boreholes may also lead to exposure to crystalline silica. Workers who inhale excessive amounts of crystalline silica can develop silicosis, a serious and potentially fatal lung disease.

Silicosis is a progressive and irreversible condition of the lung that can lead to serious disability or death. Additionally, the International Agency for Research on Cancer considers inhaled crystalline silica to be a known human carcinogen. Workers with impaired lung function due to silica exposure are more susceptible to other respiratory diseases such as tuberculosis.

Several methods for reducing exposure to silica dust are available. Using water to suppress dust is perhaps the most effective and often-used control method. Applying water at the point of operation (*e.g.*, a directed water spray) should always be considered. When engineering and work practice control measures are insufficient to keep personnel exposure below the PEL, respirators must be used as necessary to make up the difference.

4.2.4 Proposition 65

The UTC site contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. A list of these chemicals is available to all employees, contractors and visitors. Contact the Safety Manager for information on these chemicals.

4.3 EXCAVATION ACTIVITIES

Cal/OSHA Standard 8 CCR 1539 and the sections following the standard provide specific information on locating underground utilities, using support systems, securing sides, slopes, and faces, taking precautions for work adjacent to previously backfilled areas, using dust control measures, and using ladders and ramps. Excavation activities must be conducted in accordance with this section, the applicable Cal/OSHA standard 8 CCR 1541.

The physical hazards are related to the excavation itself and the operation of heavy equipment. The presence of overhead utilities such as power lines requires careful positioning of the excavating equipment in order to maintain a safe distance between the lines and the closest part of the equipment. The presence of underground utilities such as power lines, water lines, and sewer pipes must be determined prior to beginning the excavation.

Excavation of contaminated soils may generate airborne particulates that must be controlled. Dry, dusty soil will be wetted with a water spray from a potable water source to control the generation of dust. Soil should not be wetted to a degree that will cause runoff or erosion.

Excavations pose significant hazards to personnel if they are not carefully controlled. There exists a chance for the excavation to collapse if it is not dug properly, sloped, benched, or shored as required by 8 CCR 1540. Protective systems, as required by 8 CCR 1540, must be utilized if the potential for hazardous cave-ins exist. Excavations may also pose a fall hazard.

Before excavation activities commence, the existence and location of underground pipe, electrical equipment, and gas lines shall be determined. If excavation operations are located near underground installations, the exact location of the installations must be determined by safe and acceptable means. While the excavation is open, underground installations must be protected, supported, or removed as necessary to safeguard personnel.

4.3.1 Inspections by a Competent Person

Daily inspections of excavations, the adjacent areas, and protective systems must be made by the contractor's competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions.

Inspections also must be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed personnel must be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

4.3.2 Sloping of Excavation Walls

Excavation walls must be sloped, shored or benched to prevent cave in. The maximum allowable is the steepest incline of an excavation face (that is acceptable for the soil type) as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H: V). Soil and rock deposits must be classified in accordance with Appendix A of 8 CCR 1540. The maximum allowable slope for a soil or rock deposit must be determined from Table B-1. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope, which is at least horizontal to one vertical (1/2H: 1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with 8 CCR 1540. Configurations of sloping and benching systems must be in accordance with 8 CCR 1540.

MAXIMUM ALLOWABLE SLOPES
FOR EXCAVATIONS LESS THAN 20 FEET DEEP

Soil or Rock Type	Maximum Allowable Slopes (H:V)[1]
Stable Rock	Vertical (90 degrees)
Type A[3]	¾:1 (53 degrees)
Type B	1:1 (45 degrees)
Type C	1½:1 (34 degrees)

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. Sloping or benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.
3. A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth must be 3/4H:1V (53 degrees).

4.3.3 Overhead Electrical Clearances

If excavation activities are conducted in the vicinity of overhead power lines, the power to the lines must be de-energized, tested de-energized, marked up/guaranteed, and grounded or the equipment must be positioned such that no part, including excavation boom, can come within the minimum clearances. Also see Section 4.4.1.

4.3.4 Excavation Entry

Activities should be planned and conducted such that entry into excavations is not necessary. In the event that excavation entry is necessary, the excavation must be properly sloped, benched, or shored, and ladders or ramps must be available every 25 feet laterally in the excavation. Each entry shall have an attendant who observes the entrant(s) and is prepared to render assistance. A permit from Cal/OSHA must be obtained before entering a trench or excavation that is more than 5 feet deep. An excavation permit must be obtained from UTC where a person is required to enter a trench or digging that exceeds a depth of **4 feet** where UTC is in control of the work.

4.4 DRILLING ACTIVITIES

Drilling activities may include installation of monitoring wells. Contractors conducting drilling operations must do so in compliance with California Code of Regulations Title 8 Section 8005. Drilling contractors must evaluate and control the hazards associated with the use of the drilling rig.

For work under UTC control, approval must be obtained from the UTC Safety Department before drilling or hand-augering during an environmental investigation or remediation; the area will be assessed for underground utilities using known information and a utility locator, as necessary.

Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain, or failing to adequately secure the rig prior to the start of operations. Underground and overhead utility lines can create hazardous conditions if contacted by drilling equipment. Tools and equipment such as elevators, cat lines, and wire rope have the potential for striking, pinning, or cutting personnel.

Drillers must possess required state licenses to perform such work. All members of the drill crew shall receive site-specific training prior to beginning work. The contractor is responsible for the safe operation of the drill rig as well as the crew's adherence to the requirements of the work supervisor's HASP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the driller, wear all personal

protective equipment, and be aware of all hazards and control procedures. The drill crews must participate in the Daily Safety Meetings and be aware of emergency procedures.

Each day, prior to the start of work, the drill rig and associated equipment must be inspected by the driller and/or drill crew. The following items must be inspected:

- Vehicle condition,
- Proper storage of equipment,
- Condition of all wire rope,
- Fire extinguisher and
- First aid kit.

All boring locations must be inspected by the driller prior to setting up the rig to verify a stable surface exists. This is especially important in areas where soft, unstable, or uneven terrain is common. The drill rig must be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

Before drilling, the location of underground pipe, electrical equipment and electrical lines will be identified by the contractor. Markouts will be obtained, and boring locations will be established at least 10 feet from the markouts.

During any subsurface drilling in areas where underground installations are known or suspected, boring or sampling the first five feet of the entry will be made with minimal force using manual tools such as a post-hole digger or manual direct push method. If any evidence of a product line or underground utility is encountered a new sampling location will be selected.

If soil contaminants are suspected, air monitoring will be conducted for flammable gases and vapors. Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the lower explosive limit (LEL) in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

4.4.1 Overhead Electrical Clearances

If drilling is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables can come within the minimum clearances presented in the following table:

OVERHEAD ELECTRICAL CLEARANCES

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

4.5 BUILDING DECOMMISSIONING AND DEMOLITION ACTIVITIES

Equipment dismantlement and building decommissioning activities involve a potential for exposure to many physical and health hazards associated with the equipment utilized or the dismantlement and removal activities themselves. The physical hazards involved with building decommissioning may include:

- limited lighting and warning signs;
- inadequate or missing guards, handrails and other protective devices;
- potential exposure to asbestos and flaking lead based paint;
- presence of rodents, insects or other animals within the premises;
- obstructed exit routes and doors;
- unstable structures and equipment, especially roofs and elevated surfaces;
- lack of fire extinguishers and fire alarms; and
- lack of communication within the structure.

Contractors must address all physical and health hazards presented by the dismantlement, removal, and demolition activities. Specific control measures for working within abandoned buildings may include the following:

- provide adequate portable lighting and keep all active work areas well lit;

- be cautious around equipment, open pits, trenches or other hazardous areas;
- avoid contact with building materials, especially when moving them;
- avoid any wild animals, and if it is expected that dogs, raccoons or other large animals may be present have an animal control officer inspect the premises prior to the site visit;
- maintain knowledge of clear exit route, keep doors clear and open;
- do not walk on roofs or elevated structures unless an engineering survey by a competent person has been performed;
- use fall protection measures as discussed in Section 4.5.3; and
- always use the buddy system and have some form of communication (cell phone, radio) available.

Removal of hazardous substances and waste materials and cleaning/decontamination of equipment shall be in compliance with 8 CCR 5192 Hazardous Waste Operations and Emergency Response (HAZWOPER).

Lockout/tagout procedures as specified in 8 CCR 3314 shall be followed by personnel that may be exposed to hazardous energy sources. Line breaking activities shall follow all required procedures and regulations (lockout/tagout), and be performed under the supervision of a competent person. When required by UTC, line-breaking activities shall not be conducted until the appropriate facility personnel have been consulted.

4.5.1 Building Demolition

The physical hazards involved with demolition work relate to the work done with heavy equipment, hand and power tools, and the demolition environment itself. Personnel may be struck by or against equipment or materials resulting in fractures, lacerations, punctures, and abrasions. Walking and working surfaces may present slip, trip, or fall hazards. Slippery surfaces can increase the likelihood of slips and falls in addition to back and overexertion injuries. Hot work activities such as cutting and welding may present the risk of a fire or explosion hazard. Overhead hazards such as power lines may be present.

Operations on elevated surfaces (roofs, catwalks, mezzanines, etc.) may expose workers to falls if not utilizing the proper fall protection system. Work from ladders, scaffolding, and aerial lifts also exposes employees to fall hazards and injuries should the equipment be used improperly or employees are not trained in the equipment's safe use.

Electricity may pose a hazard to employees during the use of portable electrical equipment and lead cords. Sources of energy that are not locked out and/or tagged out expose personnel to various forms of energy (electrical, mechanical, high pressure, etc.) that could be hazardous during the performance of site tasks. Additionally, employees installing temporary and permanent wiring are exposed to electrical hazards if proper precautions and procedures are not followed, or

inexperienced or unqualified personnel conduct the work.

Improper operation of heavy equipment (forklifts, front end loaders, aerial lifts, cranes, etc.) may result in personnel being struck by the equipment or loads being handled, resulting in contusions, fractures, and lacerations. Personnel may be injured and equipment damaged if it is not used for the purpose intended, overloaded, or used improperly by inexperienced or unauthorized individuals. Loads being lifted by cranes may shift causing them to fall and strike personnel causing serious injury or death.

Contractors must identify all demolition hazards and implement protective measures. Prior to permitting employees to start demolition operations, an engineering survey of the structure shall be made by a competent person to determine the condition of the framing, floors, walls, and the possibility of an unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked. Contractors must train their employees in the use and care of equipment that they will be expected to operate.

4.5.2 Cal OSHA Requirements

Contractors must address all physical and health hazards presented by the dismantlement, removal, and demolition activities in accordance with Cal OSHA Subchapter 4 Article 31 Section 1735. These requirements are summarized in this section.

The Facilities Department shall be notified and all utility service shut off, capped, or otherwise controlled, at the building or curb line before starting demolition, unless it is necessary to use electricity or water lines during demolition. If use is necessary, the utility services shall be relocated or rearranged as necessary and protected from physical damage.

It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

Pipe-covering insulation, steel beam and column fire protection, and heating, ventilating and air-conditioning ductwork shall be surveyed for asbestos. If asbestos is present, the employer of the workers shall comply with Cal OSHA Section 1529.

Prior to starting demolition operations, all structural or other hazardous deficiencies noted during the survey shall be shored, braced or otherwise corrected as recommended in the survey.

Walls, which serve as retaining walls to support earth or adjoining structures, shall not be demolished until the hazard from moving ground has been eliminated by sloping, shoring or, where

necessary, adjoining structures have been properly underpinned. Walls, which are to serve as retaining walls against which debris will be piled, shall not be so used unless determined to be capable of safely supporting the imposed load.

During demolition, continuing inspections shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors or walls, or loosened material. Personnel shall not be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

In demolishing any building or structure or alteration involving partial demolition thereof, all material displaced, unless required for reconstruction, shall be transported immediately to the ground. The amount of material stored upon any structure or any portion of such structure shall not exceed its safe carrying capacity.

Except for the cutting of holes in floors for chutes, holes through which to drop materials, preparation of storage space, and similar necessary preparatory work, the demolition of exterior walls and floor construction shall begin at the top of the structure and proceed downward and each story of exterior wall and floor construction shall be removed and dropped into the storage space before commencing the removal of exterior walls and floors in the story next below.

Any openings cut in a floor for the disposal of materials shall be no larger in size than 25 percent of the aggregate of the total floor area, unless the lateral supports of the removed flooring remain in place. Floors weakened or otherwise made unsafe by demolition operations shall be shored to safely support the intended imposed load from demolition operations.

Flooring boards may be removed from not more than one floor above grade to provide storage space for debris, provided falling material is not permitted to endanger structural stability.

When wood floor beams serve to brace interior walls or free-standing exterior walls, such beams shall be left in place until other equivalent support can be installed to replace them.

Sections of walls shall not be allowed to fall upon floors supported by wood joists or other floors unable to withstand such impact.

Walkways shall be provided where necessary for access. Walking across exposed floor joists, steel beams, or girders is prohibited.

All personnel on demolition projects shall be protected from falling material at personnel entrances to multi-story structures being demolished, by sidewalk sheds or canopies or both, providing protection extending from the face of the building for a minimum of 8 feet. All such canopies shall be at least two feet wider than the building entrances or openings (one foot wider on each side thereof) and shall be capable of sustaining a load of 150 pounds per square foot.

Exterior wall openings on all floors shall be protected to a height of not less than 42 inches, except on the ground floor and the floor being demolished.

Where a hazard exists from fragmentation of glass, all glazed openings shall be removed at least one floor below the working level.

No wall section, which is more than one story or 12 feet in height, shall be permitted to stand alone without lateral bracing, unless a civil engineer, currently registered in California, has submitted engineering data to the Division substantiating the capability of the wall to stand without lateral support.

All walls shall be left in a stable condition at the end of each workday.

Steel construction shall be dismantled column length by column length, and tier by tier (columns may be two-story lengths.) Any structural unit being dismantled shall not be overstressed.

Planks spanning the distance between adequate beams shall be used where necessary as a substitute for weakened floors, and as access walkways over open or weakened areas.

When demolishing floors and roofs, employees shall be prohibited from working below this activity. Demolition of floor spaces shall continue until all unsupported flooring is removed. When personnel are required to remove floor support beams, wall sections, etc., by hand, scaffolding or elevating work platforms and aerial devices shall be provided and used where necessary to insure employee safety.

Stairways designated as means of access shall be maintained clear for use within two floors or twenty-four feet of the demolition work above.

Ladders shall be provided for these remaining two floors and shall be constructed and maintained in accordance with Article 25, Ladders. Other access ways shall be entirely closed off at all times.

Walkways or ladders shall be provided to enable employees to safely reach or leave any scaffold or wall.

In a multi-story building, when a stairwell is being used for access or egress, it shall be properly illuminated by either natural or artificial means, and completely and substantially covered over at a point not less than two floors below the floor on which work is being performed, and access to the floor where the work is in progress shall be through a properly lighted, protected, and separate passageway.

Construction passenger elevators for hoisting personnel shall be provided on demolition projects on multi-story buildings seven or more floors or seventy-two feet or more in height.

Landings shall be provided for the passenger elevators on or in buildings at intervals not to exceed four floors or forty-eight feet.

Where there is doubt concerning structural integrity or engineering data indicates attachment of an elevator may jeopardize the strength of the building or structure, alternate methods of installation may be permitted. Other means of personnel access may also be allowed where the above is clearly impractical.

If the method of demolition leaves the structural steel frame in place, then the tier of beams next below the tier from which beams and columns are being removed shall be planked over, unless safety nets are used or the floor of such tier has not been removed. Necessary openings for material handling are allowed. All loose material shall be removed from the steel frame as demolition progresses downward.

Provisions for dust control shall include the use of water to keep material or debris sufficiently wet or other equivalent steps taken to prevent dust from rising.

Mechanical equipment shall not be used on floors or working surfaces unless a qualified person has determined that such floors or surfaces are of sufficient strength to support the imposed load.

Where mechanical equipment is used for demolition work, floor openings shall have curbs or stop-logs to prevent equipment from running over the edge.

No salvage of materials shall be permitted during demolition operations on any building, structure, falsework or scaffold more than three stories high or the equivalent height for which a permit is required.

4.5.3 Elevated Work Safety

Safety during elevated work will conform to the requirements of California Code of Regulations Title 8. Safety procedures governing the use of scaffolding and aerial lifts shall conform to the requirements of California Code of Regulations Title 8 Section 1660. Safety procedures governing the use of ladders shall conform to the requirements of California Code of Regulations Title 8 Section 8371.

All personnel exposed to fall hazards shall be trained regarding the nature of the hazards of elevated work prior to assignment.

Fall Protection: All personnel exposed to fall hazards greater than 6 feet shall be protected from the hazard by a fall protection system and fall protection systems shall comply with the guidelines established in the California Code of Regulations Title 8 Section 1669.

All personnel exposed to fall hazards shall be trained by a competent person in compliance with California Code of Regulations Title 8.

Written certification of fall protection training for personnel exposed to fall hazards shall be maintained by each contractor.

Aerial Lifts: Only trained and authorized personnel shall operate aerial platforms.

The operator shall be trained on the same model of aerial platform as the one to be used during actual work site operations. Under the direction of a qualified person, the trainee shall operate the aerial platform for a sufficient period of time to demonstrate proficiency and knowledge.

Personnel working on aerial lifts shall be trained in compliance with California Code of Regulations Title 8.

Aerial lifts shall be inspected at least daily prior to operation. The inspection should include, but not be limited to, the following:

- Operating and emergency controls;
- Safety devices;
- Personal protective devices, including fall protection;
- Air, hydraulic, and fuel systems for leaks;
- Cables and wiring harness;
- Loose or missing parts;
- Tires, and wheels;
- Placards, warnings, control markings; and operating and safety manual(s);
- Outriggers, stabilizers, extendible axles and other structures;
- Guardrail system; and
- Other items specified by the manufacturer.

Only trained personnel shall make repairs to aerial lifts.

Personnel working from boom type lifts shall be protected from falling by the use of a safety harness and lanyard properly attached to a manufacturer-approved tie off point.

Before the aerial lift is used, the operator shall check the work area for possible hazards such as, but not limited to: holes, bumps or obstacles, debris, overhead obstructions, inadequate surface and support (soft soils), and wind and weather conditions.

Prior to each lift, the operator shall ensure the following:

- Outriggers or extendible axles, if so equipped, are used as required by the manufacturer;
- Guardrails are installed and the access gate is closed;
- The load and the distribution of the load are in accordance with manufacturer's recommendations;
- There is adequate clearance from overhead obstructions;
- If aerial platform is used in the vicinity of overhead power lines, the lines must be de-energized, or the equipment must be positioned such that no part of the aerial platform or personnel on the platform can come within the minimum clearances as listed in the Overhead Electrical Clearances table in Section 4.4.1.

All personnel in the platform are wearing the required fall protection equipment and are secured to the manufacturer's approved tie off locations.

Personnel shall maintain a firm footing on the platform floor. Personnel shall not climb on the guardrails of the aerial platform to gain additional height or reach. Additionally, the use of ladders, planks, buckets, and other makeshift devices to gain additional height or reach is prohibited.

Aerial platforms shall not be driven in an elevated position unless designed to do so.

Scaffolds: The following requirements shall be followed when using scaffolds:

- Scaffolds shall only be erected, moved, or dismantled under the direction and supervision of a competent person who is experienced in scaffold erection, dismantling, or moving. Only trained and experienced personnel selected by the competent person shall perform such work.
- Scaffolds shall be inspected prior to use each day and frequently throughout the work shift by a competent person.
- Guard rails and toeboards shall be installed on all open sides and ends of scaffold platforms that are greater than 6 feet in height.

- Footing for scaffolding shall be sound and capable of withstanding the load imposed.
- All frame-type scaffolds shall rest on base plates and mudsills.
- Blocks, barrels, buckets, boxes and other unstable items shall not be used to support scaffolds.
- Scaffold platforms shall be fully planked, and the planks shall overlap a minimum of 12 inches or be secured to prevent movement.
- An access ladder is required for all scaffolds. Climbing of cross braces is prohibited.
- Personnel working on scaffolds shall be trained as required by California Code of Regulations Title 8.

Ladders: The following requirements shall be followed when using ladders:

- Ladders and stairways shall comply with California Code of Regulations Title 8 Section 8371.
- Ladders shall be used for only the purpose for which they were designed.
- Straight and extension ladders shall be set up properly, secured to prevent movement, and extended 3 feet above the landing surface.
- Stepladders shall be used only in the open position with the spreaders locked.
- Personnel shall not stand on the top step or the top of a stepladder.
- Stepladders shall not be moved while in use (walked).
- Personnel shall not overreach while using ladders.
- Users shall inspect ladders prior to use.
- Ladders shall be inspected frequently by a competent person. Ladders found to be damaged or defective shall be removed from service immediately and tagged “DO NOT USE”.
- The areas around the top and bottom of a ladder shall be kept clear.

- Ladders shall be free from any defects.

- Ladders shall be kept free from oil, solvents, or other materials that present a slipping hazard.

- Personnel shall face the ladder when ascending and descending, and maintain at least three-point contact.

- Personnel shall not carry loads up ladders that may cause them to loose their balance or maintain less than three-point contact with the ladder.

4.6 CONFINED SPACE ENTRY ACTIVITIES

Confined space entry activities often involve a combination of physical and chemical hazards. The specific requirements of confined space entry apply when work must be performed in a space that is:

- Not designed for continuous human occupancy,
- Has unfavorable natural ventilation, or
- Has restricted egress.

Some confined spaces contain mechanical hazards such as equipment, and/or atmospheric hazards such as airborne contaminants or oxygen deficiency. Such spaces require a permit for entry.

Confined spaces include tanks, bins, hoppers, tunnels, and any other enclosed space where there is a source for vapor/gas emissions and poor ventilation, and any below-grade enclosure in a location where "heavier than air" vapors may be present. If these conditions exist, a confined space entry permit must be obtained from the UTC Safety Department for activities that are under UTC control.

UTC follows procedure WI 23.07.53. Specific training for working in confined spaces is required. The confined space must be monitored for oxygen deficiency, flammable gas, and toxic gas. The applicable Cal OSHA standard is contained in 8 CCR 5156 through 8 CCR 5159.

The hazards associated with confined space entry are listed below.

- Toxic vapors, liquids, and dusts at concentrations exceeding the exposure limit,
- Flammable materials at concentrations >10% of the lower explosive limit (LEL),
- Oxygen <19.5% that may cause asphyxiation,
- An excess of oxygen (>23.5%) that may increase the fire hazard,
- Electric shock from portable lights and tools,
- Injury from mechanical equipment,
- Physical hazards (such as slipping or falling),

- Burns from inadvertent openings of steam or chemical supply valves, and
- Inability to readily get in or out of the space due to the location and/or size of openings.

Personnel involved in confined space entry activities must be properly trained in the hazards of entry, air monitoring procedures, the entry permit system, non-entry rescue, and personal protective equipment. Personnel must be properly trained and designated for the following roles:

- Entry Supervisor
- Attendant
- Entrant

Contractors engaged in confined space entry activities must provide documentation of proper training of all involved personnel.

4.7 GENERAL HAZARD REVIEW

General hazards associated with hazardous waste operations include working around heavy equipment (drill rigs, excavators, backhoes, etc.), explosion and/or fire, rough terrain, noise, weather conditions, sunburn, heat stress, and earthquakes.

4.7.1 Moving Heavy Equipment Onsite

Precautions must be taken when working around heavy equipment such as drill rigs. Of particular concern is the moving of this equipment from location to location within the site. All site-specific safety and traffic control requirements must be strictly followed. Except where electrical distribution and transmission lines have been de-energized and visibly grounded, equipment or machines shall be operated next to power lines only according to the guidelines specified in 8 CCR 2946-2948 Cranes and Derricks. The applicable Cal/OSHA standard is contained in 8 CCR 4884 and the following sections. Before field activities, the field team leader should be shown how to shut down all power-operated equipment (i.e., drill rigs, tractors, other vehicles) in case of an emergency.

Dust, fumes, mists, vapors, or gases produced during construction or demolition work must not exceed the limits specified in 8 CCR 5155. When ventilation is used, the system must meet the requirements of 8 CCR 1536.

4.7.2 Explosion and Fire Hazards

Explosion and fire hazards are significant concerns at this site. It is imperative that all UTC personnel and contractors follow the onsite safety regulations, speed limits, and emergency procedures when

onsite. Visiting personnel are **not**, by any means, to go into unauthorized areas (site-specific safety requirements are discussed in Section 5, Site Control Procedures). In addition, in areas known to contain flammable material, the appropriate protective clothing will be worn. UTC flame-retardant lab coats and grounded shoes are required in some areas. A fire extinguisher will be kept nearby when operating equipment with the potential to start a fire.

Isobutylene and methane compressed gas cylinders used for the calibration of Photo-Ionization Detector (PID) and Flame Ionization Detector (FID) field instruments should be kept in a safe condition. Flammable gases (such as hydrogen) should be stored in locations approved by the Safety Department. Specific safety requirements for handling compressed gases are found in 8 CCR 1740.

4.7.3 Uneven Terrain

Uneven terrain is common on the UTC site and may increase risk of injuries if not careful. Personnel shall wear appropriate foot protection while onsite.

The topography of the UTC site may limit access of vehicles and equipment. Vehicles should be kept on established roadways whenever possible. The work supervisor will identify possible terrain limitations for the proposed work and modify the work locations as necessary. In addition, the ephemeral streambeds and other natural drainages on the site may present significant flash flood hazards during rainfall events. All personnel must be aware of flood potentials at their work location. If severe storms are forecasted for the area, the work supervisor or designee should keep a storm watch during the day.

4.7.4 Noise

Noise levels around the drill rig and other heavy equipment during field activities may exceed a comfortable range, in which case hearing protection is needed. The use of earplugs is highly recommended during drilling (within 20 feet of the drill rig), excavation, and demolition activities. Hearing protection devices (HPDs) will always be available onsite. Use of HPDs is required by Cal/OSHA whenever the 8-hour time-weighted average noise level equals or exceeds 90 dBA. The applicable Cal/OSHA standard is contained in 8 CCR 5095 and the following sections. UTC employees are required to use HPDs whenever the noise level exceeds 85 dBA.

4.7.5 Weather Conditions

Dusty conditions associated with some sites increase the potential of contaminated and non-contaminated particulate inhalation. Dry, windy weather and erodible surface soils could potentially expose site personnel to large quantities of airborne particulates. Personnel shall wear appropriate

garments and air-purifying respirators if conditions warrant. Dust/particulate monitoring and suppression may be necessary if extended periods of dusty conditions exist.

In case of extreme weather conditions that may pose a health and/or safety risk to workers (heavy rain, electrical storm, excessive wind), field activities will cease until the work supervisor finds that the conditions are safe to resume.

4.7.6 Sunburn

Working outdoors on sunny days for extended periods can cause sunburn to the skin. Excessive exposure to sunlight is associated with the development of skin cancer. Field staff should take precautions to prevent sunburn by using sunscreen lotion with a sun protection factor (SPF) of at least 15 and/or wearing hats and long-sleeved garments.

4.7.7 Heat Stress

There is a potential for heat stress when field activities are performed on warm, sunny days, and is accentuated when chemical protective clothing is worn. Relative humidity, wind, and workload severity and duration can also create heat stress. Personal factors that may contribute to heat stress include age, health, water consumption, caffeine consumption, use of prescription medications, and acclimatization. Individuals who have not acclimatized to hot weather may be more at risk to heat stress. Acclimatization for heavy work under hot conditions may require four to fourteen days of progressively increasing work starting with about two hours work per day. Personnel undergoing acclimatization need to be closely monitored for signs and symptoms of heat illness.

Heat stress prevention measures and monitoring should be carried out if site temperatures are above 70°F. Initially, visual monitoring of field personnel can be used.

Precautions to prevent heat stress may include work/rest cycles so that rest periods are taken before excessive fatigue occurs, and regular intake of water to replace what is lost from perspiration. Work/rest cycles may be established based on monitoring the heart rate (pulse) of each individual worker. Rest breaks should be long enough to reduce the heart rate below levels calculated according to the following method.

1. The worker initially measures his/her resting heart rate before starting work activities.

2. At the start of the first rest period, the worker measures his/her heart rate. This initial heart rate should not exceed 75 percent of the calculated individual's age-adjusted maximum heart rate, which equals (0.75) x (200 - age in years). At 1 minute into the rest

period, the recovery heart rate is measured. The recovery heart rate should not exceed 110 beats per minute.

3. If the initial heart rate exceeds 75 percent of the calculated age-adjusted maximum heart rate, or the 1-minute recovery heart rate is greater than 110 beats per minute, then the next work period should be decreased by one third. Personnel shall not return to work until the sustained heart rate is below 75 percent of the calculated age-adjusted maximum heart rate.

Heat stress due to water loss can be prevented. To prevent dehydration, water intake must approximate loss of body fluids. Water intake guidelines are as follows:

1. The sense of thirst is not an adequate regulator of water replacement needs during heat exposure. Therefore, water should be replaced at prescribed intervals. Before work begins, field personnel should drink two 8-ounce glasses of water and up to four 8-ounce glasses of water when the work environment is hot and personnel are likely to be sweating more than usual.. Each hour, field personnel should drink at least two 8-ounce glasses of water and up to four 8-ounce glasses of water when the work environment is hot and personnel are likely to be sweating more than usual..

2. Plain, cool water is excellent. An adequate supply of potable water and drinking cups should be readily available, such as in a support vehicle, to provide water during resting periods.

3. Adding salt to water is not recommended. However, in addition to water, other fluids could include dilute fruit juices and electrolyte replacement drinks diluted 3:1 with water. Do **not** use salt tablets.

An initial work/rest cycle of one-hour work and fifteen minutes rest is recommended for protection of the staff when the heat stress hazard is high. The recommended cycle may be adjusted up or down based upon worker monitoring, environmental conditions, and the judgment of the work supervisor or designee. Any time that field team members recognize the signs or symptoms of heat stress before a scheduled rest period, they will immediately notify the field team leader so a rest period can be called. Personnel suffering from heat illness or believing a preventative recovery period is needed, shall be provided access to an area with shade (blockage from direct sunlight) that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes.

Heat stress, if not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life threatening. These are heat exhaustion and heat stroke. Heat exhaustion will result if the prevention measures described above are not implemented. Ignoring the signs and symptoms of heat exhaustion will lead to the development of heat stroke.

Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down, and the body cannot cool itself sufficiently. Heat is excessively stored in the body and brain damage can result causing permanent disability or death.

4.7.8 Heat Exhaustion

The signs and symptoms of heat exhaustion are headache; dizziness; nausea; weakness; fainting; profuse sweating; loss of appetite; approximately normal body temperature; dilated pupils; weak and rapid pulse; shallow and rapid breathing; possible cramps in abdomen and extremities; difficulty in walking; **cool and sweaty skin to the touch; pale to ashen gray coloring**.

First aid for heat exhaustion is as follows:

1. Call 2222 for emergency help. No personnel with symptoms of heat exhaustion should be left unattended or sent home without medical assessment and authorization.

2. Immediately remove the victim to the support area. If you are the victim, go to the support area.

3. Decontaminate, if practical, before entering support area.

4. While waiting for help to arrive, start cooling, but be careful not to cause a chill (i.e., rest in the shade, apply a wet towel to the forehead, and open and/or remove clothing as much as practical, especially chemical-resistant clothing.)

5. Drink cool water slowly, but only if conscious and not in shock.

6. It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

4.7.9 Heat Stroke (Sun Stroke)

The signs and symptoms of heat stroke are **skin that is hot and dry to the touch, reddish coloring**, body temperature >105°F, no sweating, mental confusion, deep and rapid breathing that sounds like snoring progressing to shallow and weak breathing, headache, dizziness, nausea, vomiting, weakness, dry mouth, convulsions, muscular twitching, sudden collapse, and possible unconsciousness.

First aid for heat stroke is as follows:

1. Call 2222 for emergency help; no exceptions for a heat stroke victim. No personnel with symptoms of heat exhaustion should be left unattended or sent home without medical assessment and authorization.

2. Immediately remove the victim to the support area. Before entering the support area, remove and dispose of the victim's chemical-resistant clothing, if practical.

3. Cool the victim rapidly using whatever means are available, including shade, opening up and/or removing clothing, soaking clothing and skin with water and fanning, placing the victim in a vehicle with the air conditioning on maximum.

4. Do not give drinking water to the victim.

5. Treat for shock, if needed.

In case of personal injury, the UTC project manager should be notified.

4.7.10 Cold Stress

Cold stress is not anticipated during the execution of this project because daytime temperatures are not expected to be below 45^{o}F. However, field personnel should be aware that most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.

In the event that the weather becomes unusually cold (temperatures below 45^{o}F), field personnel should be protected from exposure to cold by wearing proper clothing. This will prevent the deep core temperature from falling below 36 degrees Celsius (^{o}C). Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences. To prevent such occurrence, the following measures must be implemented:

- Field personnel must wear warm clothing, such as mittens, heavy socks, etc., when the air temperature is below 45^{o}F. Protective clothing, such as Tyvek or other disposable coveralls, may be used to shield employees from the wind.

- When the air temperature is below 35^{o}F, clothing for warmth, in addition to chemical protective clothing, will be warn. This should include:
    - Insulated suits, such as whole body thermal underwear,
    - Wool socks or polypropylene socks to keep moisture off the feet,
    - Insulated gloves,

- Insulated boots,
- Insulated head cover such as hard hat, winter liner, or knit cap,
- Insulated jacket, with wind and water-resistant outer layer.

- At air temperatures below 35^{o}F, the following work practices must be implemented:
  - If the clothing of a field personnel might become wet on the job site, the outer layer of clothing must be water impermeable;
  - If a field personnel's underclothing becomes wet in any way, the person must change into dry clothing immediately. If the clothing becomes wet from sweating (and the person is not uncomfortable), the employee may finish the task at hand prior to changing into dry clothing;
  - Field personnel must be provided with a warm (65^{o}F or above) break area;
  - Hot liquids such as soups or warm, sweet drinks shall be provided in the break area. The intake of coffee and tea should be limited, due to their circulatory and diuretic effects;
  - The buddy system shall be practiced at all times on site. Any field personnel observed with severe shivering shall leave the work area immediately;
  - Field personnel should dress in layers, with thinner lighter clothing worn next to the body;
  - Field personnel should avoid overdressing when going into warm areas or when performing strenuous activities; and
  - Field personnel handling liquids with a high vapor pressure, such as gasoline, methanol, or hexane, shall take special precautions to avoid soaking of gloves and clothing with those materials.

4.7.11 Earthquakes

The potential for incidence of major earthquakes in the area of the UTC site presents one of the greatest single physical hazards associated with site activity. Major structural damage to buildings, roads, and utilities can be expected as a result of a major earthquake. At each work location, the work supervisor should identify the location of potential hazards including those related to overhead and underground utilities, possible slope instability (upslope and downslope), and proximity to potentially-dangerous UTC operations.

Emergency procedures for earthquakes are discussed in the Integrated Incident Response and Contingency Plan.

If an earthquake occurs:

- When inside a building, immediately take cover under a table, desk or in a doorway. Stay away from heavy equipment, glass, and chemical storage areas.

- When outside a building, stay there. Move away from buildings, walls, power poles, and lampposts. Do not go near downed power lines and areas where chemical releases may have occurred.

- When in a moving vehicle, stop the vehicle as soon as possible and in a safe manner. Stay in the vehicle because it is a great shock absorber. Do not stop under or on an overpass or bride, or near tall buildings and walls

- After the earthquake, check for injured personnel. Do not move seriously injured personnel unless they are in immediate danger. Evacuate the building using the standard building evacuation procedures in the Integrated Incident Response and Contingency Plan. Do not re-enter buildings until the buildings have been checked out. Do not operate any equipment until it has been determined to be safe to use.

4.8 BIOLOGICAL HAZARDS

Biological hazards associated with hazardous waste operations include snakebites and ticks. All personnel must be alert for the presence of venomous snakes, spiders, and scorpions at the site. Snakes and spiders typically favor shady locations such as lumber piles and drum storage areas.

4.8.1 Rattlesnakes

Rattlesnakes inhabit the site. Workers should proceed with caution in areas where snakes are suspected. Snake chaps are recommended. First aid procedures for snakebite are provided below:

1. Call 2222 for emergency help.

2. Keep the victim calm and relaxed; restrict activity.

3. Immobilize the area of the bite. **DO NOT USE A TOURNIQUET**. Keep the snake bite area lower than the heart.

4. Care for shock.

5. It is necessary to identify the type of snake to be sure that in fact a poisonous snakebite was received. Do not attempt to capture the snake yourself. If confirmed, anti-venom should be given within two hours.

6. Transport quickly.

4.8.2 Spiders

Black Widow and Brown Recluse spiders inhabit the site. Workers should proceed with caution in areas where spiders or other insects are suspected. First aid procedures for a Black Widow or Brown Recluse spider bite are provided below:

1. Keep the victim calm and relaxed. Restrict activity and apply cold/ice pack to the bite.

2. If the patient has an allergic reaction, care for shock.

3. Transport the patient to the nearest medical facility.

4.8.3 Ticks

There is a potential for exposure to Lyme disease-carrying ticks during field activities. The ticks that carry Lyme disease are found throughout the United States. To reduce the likelihood of contracting Lyme disease, the following information should be given to all staff that may be assigned to work that potentially exposing them to ticks.

Lyme disease symptoms are similar to those of many infectious diseases. They include fever, headache, nausea, stiff neck, muscle and joint pains, and enlarged lymph glands. These signs may last for several weeks, and may vary in intensity among individuals. A key sign to look for if one has been in an area subject to tick infestation is a "bull's eye" rash. The rash is more correctly described as a ring surrounding the site of the tick bite (the bite itself may not be visible). This rash occurs in over 85% of confirmed Lyme cases. Left untreated, Lyme progresses to include pain in the large joints (particularly the knee), cardiac arrhythmias, and arthritis. Antibiotics are used for treatment of Lyme disease.

If any or all these symptoms appear following fieldwork, consultation with a physician is advised. The physician may recommend a blood test for anti-Lyme titer, as a confirmatory screen.

Avoiding exposure is the best precaution, but not often possible. When working in bushy areas, light colored clothing, including long sleeve shirts, long pants, hats, and gloves should be worn. The pant cuffs should be taped to boot or socks, and an over-the-counter insect repellent should always be

used. Also, when leaving the field, check for ticks, especially around the neck and waist where ticks may have entered. If a person has been bitten, try to collect the tick for identification and observe that area for the rash. When working in heavily infested areas, white Tyvek should be worn.

4.8.4 Poison Oak

Poison oak exists throughout the site. Direct contact with the plant should be avoided. Wearing a Tyvek suit in poison oak areas will provide some protection. Contact with the exterior of the Tyvek should be avoided when removing the suit. A barrier cream, such as Stokogard, may also be used in poison oak locations. First aid for poison oak is to wash the affected area with cold, soapy water.

4.8.5 Wildlife

There are many animals located throughout the site (wild boars, rodents, skunks, and raccoons). Although the animals may appear tame, a safe distance should be kept. Rabies is not uncommon in this area.

SECTION 5
SITE CONTROL PROCEDURES

5.1 UTC SAFETY REQUIREMENTS

It is the policy of UTC to provide a safe work place, proper equipment and materials, and establish and insist on safe methods and practices at all times. Diligent attention to safety and health, in all aspects of site operations, is a responsibility all personnel must share. The following rules are designed to protect UTC personnel and onsite contractors while working at UTC. All contractors shall comply with the requirements of the *Environmental, Health & Safety Guidelines for Contractors* (QPG 25.05.02.04). All UTC employees and contractors shall comply with the requirements of the *Environmental Manual* (QPG 23.06.52).

5.1.1 Site Entry and Exit

All contractors involved in hazardous waste operations will undergo contractor safety orientation by an UTC representative before entry to the site. Entry and exit for UTC contractors without heavy equipment are restricted to the Front Gate entry Check Point. All contractors shall then go only to their designated work areas. Drill rigs, backhoes, and other heavy equipment must be brought onsite and exit through the Back Gate, and use the back road. Heavy equipment should stay off the front road because Metcalf Road is steep and narrow.

5.1.2 Badges

Each person entering the facility for the first time must first report to the Security Office (Station 0101) and receive a Badge.

- Badges must always be visible.
- If your Badge is lost, notify Security immediately.
- Return Badges to the Gate Guard when no longer needed.

5.1.3 Prohibited Items

The following items are prohibited:

- Cameras or other photographic equipment without a camera pass;
- Electronic sending and receiving equipment (except pipe locators);
- Explosives or incendiaries in any form (except process material);
- Guns, ammunition, or similar weapons;

- Matches, lighters, or other flame producing devices in the limited access areas (factory-installed vehicle lighters may remain in the vehicle);
- Narcotics and alcoholic beverages;
- Operation of Citizen Band (CB) radios is not allowed;
- Poisonous or corrosive solids, liquids, or gases (except process material);
- Smoking is not allowed onsite (except at two designated locations); and
- Telescopes and binoculars.

5.1.4 Motor Vehicle Operation

Seatbelts are required to be worn by UTC and contractor personnel when driving onsite. The Speed Limit is a maximum of 15 MPH in the Inert Area and 25 MPH in the Limited Access Area. Speed Limits may be reduced to be protective of threatened and endangered species.

Explosive vehicles are any vehicles displaying red flags. These vehicles are carrying explosives. Emergency vehicles have red flashing lights and sirens. **When approaching an Emergency/Explosive Vehicle, pull to the side of the road and stop.** It is not necessary to pull off the road where your vehicle may get stuck. Remain stopped until the Emergency/Explosive Vehicle has passed. Do not overtake or pass any vehicle displaying red flags. Some vehicles carrying explosives may have DOT "Explosive" placards and no red flags; UTC does not require stopping for these vehicles, but they should be treated with caution.

Park only in authorized parking spaces. Yellow curbs indicate temporary parking or loading area. Red curbs indicate a Fire Access Lane - DO NOT PARK.

5.1.5 Limited Access Area

The facility consists of an Inert Area and Limited Access Area. The Inert Area contains office and other support facilities. The Limited Access Area contains those facilities that were involved with the propulsion systems. Leave all matches, lighters, or other flame producing devices at the Match Station when entering the Limited Access Area. Employees and contractors entering the Limited Access Area must have Live Area Access training or be escorted by someone who is authorized by UTC Security to escort people (has an E on their badge).

5.1.6 Station Barrier Cords

Some stations may have a Safety Barrier Cord to control access to work areas. Safety Barrier Cords are yellow or yellow/black braider rope. Do not cross over or otherwise pass a Safety Barrier Cord.

Contact the work supervisor who placed the Safety Barrier Cord to have the Safety Barrier Cord lowered or removed for access.

5.2 START-UP AND SHUTDOWN PROCEDURES

The following protocols will be followed before start-up of hazardous waste operations:

- A signed **Work Permit** will be obtained for hazardous waste operation fieldwork that is not standard work. A Work Permit is not required where there is an emergency with the potential to create severe injury or loss of life.

- **Pre-Assessment**: A Pre-Assessment is required whenever work is performed under a work permit and propellant/explosives remain in the facility.

- An **Excavation Permit** will be obtained where a person is required to enter a trench or digging that exceeds a depth of 4 feet for work that is under UTC control. A **Line Break** permit will be obtained during hazardous waste operations where a line is required to be dismantled, taken apart, separated, or opened up, such that the contents could escape and cause serious injury or create an environmental exposure for work that is under UTC control.

- The field team leader will ensure that appropriate first aid equipment is readily available.

- Safety and monitoring equipment will be checked for proper function before use each day.

- Field personnel will be briefed on safety procedures at the startup of hazardous waste operations by the work supervisor or designee. As needed, the work supervisor or designee will review site conditions with respect to modifications of work and update field personnel on safety procedures. The briefings will be documented.

At the shutdown of daily operations, all personnel will process through appropriate decontamination, and all equipment will be appropriately decontaminated and secured.

5.3 LOCKOUT/TAGOUT PROCEDURES

Before maintaining or testing equipment where an unexpected start-up could compromise a person's safety, the equipment shall be rendered inoperative and isolated from all hazardous energy sources. Each piece of equipment should have a specific written lockout/tagout procedure. The equipment isolation shall be done by a person who has been trained and is authorized to implement the

lockout/tagout procedure. Wherever practical, the equipment will be locked out rather than tagged out. Routine minor servicing activities may not be covered by lockout/tagout requirements, provided that alternative protective measures are taken (e.g., power off, mechanical brakes set). Locks and tags used to lockout/tagout equipment shall only be removed by the person who placed them or the person's supervisor.

When contractors are engaged in activities covered by UTC's lockout/tagout requirements, the hiring department and the contractor shall inform each other of their respective energy control programs.

5.4 WORK ZONES FOR EXCAVATION, DEMOLITION, AND DRILL RIG ACTIVITIES

The primary means of maintaining site control and reducing migration of hazardous materials into uncontaminated areas during hazardous waste operations that are moderately hazardous (excavation, demolition, and drill rig activities) at UTC will be by designating work zones. Work zones serve to limit hazardous area access, contain gross contamination, provide work zone security, and place a buffer zone between the potentially hazardous area and the rest of the site community. The following work zones will be established for demolition, excavation, and drill rig activities:

- Exclusion Zone,
- Contamination Reduction Zone, and
- Support Zone.

The exclusion zone includes those areas considered contaminated, potentially contaminated, or could become contaminated during hazardous waste operations. Once these contaminated or potentially contaminated areas are defined, a buffer zone is added to assure the safety of the surrounding site community. While the delineation of exclusion zones is necessary before initiating site work, they may be increased or decreased during the work as new data are collected and evaluated. Access to the exclusion zones is controlled through defined entrance/exit points. Entering and leaving an exclusion zone will be controlled by the field team leader.

The contamination reduction zones are located upwind of the exclusion zones, when possible, and will be designed to limit contamination from leaving the work zone because of the work party activities. Access control points to both the exclusion zone and any support zones will be maintained here. This area provides a space for the decontamination of personnel, equipment, and samples, and as an area to help the work parties (respirator cartridge exchange, equipment staging). This work zone will be established in an area assumed to be clean, but considered potentially contaminated as soon as personnel or equipment are processed from the exclusion zone through decontamination. The boundary area between the exclusion zone and contamination reduction zone will be called the "hot line." It is here that a decontamination corridor is set up to ensure the decontamination of all personnel, equipment and samples leaving the exclusion zone. The other boundary, between the contamination

zone and the support zone, will be known as the contamination control line. It will serve as the entrance/exit point to the work zone and will provide the site security and contamination control.

The support zone will be the area furthest away from the hazardous substances. It is where support activities occur. It will be located in a known, non-contaminated area. All work zone boundaries will be clearly marked with hazard tape and traffic cones, as appropriate.

All personnel will satisfy the following requirements before initiating excavation, demolition, and drill rig activities onsite:

- Received adequate training in the occupational safety and health aspects of hazardous waste site operations (see Section 10),
- Passed a physical examination if personnel (1) may be exposed to hazardous substances or health hazards at or above the Permissible Exposure Limits (PEL) for 30 days or more a year, (2) may be exposed to hazardous substances or health hazards at or above the published exposure limit for 30 days or more a year, if there is no PEL, or (3) wears a respirator during any part of the day for more than 30 days a year.
- Certified by a physician of ability to wear respiratory protection, if personnel may be required to wear a respirator, and
- Received a briefing on all aspects of any applicable task-specific HASP.

All personnel entering the Contamination Reduction Zone and the Exclusion Zone through the contamination control line will be dressed in the specified level of protection for the specific task. Similarly, all personnel, equipment, and samples exiting to the support zone will complete decontamination before crossing the contamination control line.

5.5 THREATENED AND ENDANGERED SPECIES

The UTC site has several threatened and endangered species including the California Red-Legged Frog, the California Tiger Salamander, the Bay Checkerspot Butterfly, the Santa Clara Dudleya, the Metcalf Canyon Jewelflower, and the Mt. Hamilton Thistle. The U.S. Fish and Wildlife Service has designated critical habitat for the Bay Checkerspot Butterfly and the California Tiger Salamander that includes portions of the UTC site.

UTC has implemented a comprehensive program to protect threatened and endangered species that includes an education, training, and biomonitoring inspection requirements. On July 31, 2006, a Biological Opinion was received from the U.S. Fish and Wildlife Service that included general avoidance and conservation measures for threatened and endangered species and specific measures

for California Red-Legged Frogs, the California Tiger Salamanders and the San Joaquin Kit Fox. The San Joaquin Kit Fox is a potential visitor to the site. Each year, the U.S. Fish and Wildlife Service may issue a new Biological Opinion/Permit.

5.6 SAFE WORK PRACTICES

Safe work practices for hazardous waste operations include:

- A copy of this HASP must be available to any UTC employee, contractor, and subcontractor who will be involved in onsite hazardous waste operations under UTC's control. A copy of this HASP will be kept at UTC during hazardous waste operations. It is also recommended that a copy of this HASP be kept at each work location where environmental, excavation or demolition activities are being conducted under UTC's control.

- The buddy system is recommended for all hazardous waste operations. There shall always be at least two Hazwoper trained and medically certified employees present during hazardous waste operations where the overall hazard is considered moderate or high (excavation, demolition, and drill rig activities) and when there is the potential for open or direct contact with materials (spills, lab packs, or transfers) at the Storage Facility (2233) and Storage Magazine (0312).

- All equipment should be checked for integrity, proper function and calibration before entering an Exclusion Zone or controlled area and before starting work activities.

- Do not use faulty or suspect equipment. Cal/OSHA Standard 8 CCR Subchapter 5 requires electrical equipment to be intrinsically safe and suitable for use in the appropriate classified environment.

- Use only new and intact protective clothing. Immediately change suits, gloves, etc. if they tear.

- General work areas shall have a minimum illumination intensity of 5 foot-candles. Other specifications for minimum illumination intensities for different work areas and operations are contained in 8 CCR 1523.

- Do not use hands to wipe perspiration away from face. Use a clean towel or paper towels.

- Always practice contamination avoidance. Walking or loitering in potentially contaminated areas should be avoided.
- Do not eat, drink, or apply cosmetics while in the Exclusion Zone.
- Wash hands, face, and arms as soon as possible upon exiting from an Exclusion Zone, and before taking rest breaks, lunch break, and leaving the site at the end of the workday.
- Perform decontamination procedures completely as required by this HASP and contractors HASP.
- Notify the UTC project manager immediately if there is an accident that causes an injury or illness.
- Always follow UTC facility rules.

5.7 CONTROL MEASURES FOR SPECIFIC ACTIVITIES

Control measures for the identified hazardous waste operations field activities where they are under UTC's control are presented in Appendix F. In the event that breathing zone concentrations exceed the action levels for level C or B, engineering controls (water sprayer for dust suppression and mechanical ventilation such as a portable fan for VOC emissions) should be used.

SECTION 6
HAZARDOUS WASTE OPERATIONS MONITORING PLAN

The potential hazards identified in the hazard analysis portion of this plan were used in the assessment of the need for initial and/or on-going monitoring for exposure to the hazards as follows.

6.1 REAL-TIME MONITORING INSTRUMENTS

A direct-reading instrument that may be used to monitor air quality in and around the work areas is the Thermo Environmental Model 580B OVM, which uses a PID. The instrument measures the total organic vapors present in the sampled air. For health and safety purposes, total detected organic vapors will generally be used to confirm the selection of protective equipment. The PID is calibrated using isobutylene as the standard. Calibration is validated daily before initiation of site work. The PID measures compounds with ionization potentials ranging from 9.0 to 11.7 electron volts (eV). Note that the PID will **not** detect compounds with ionization potentials above the lamp energy. The PID will not operate properly in an atmosphere with high humidity.

A combustible gas indicator with an oxygen sensor equipped with an audible alarm may be used to monitor combustible gas concentrations. In the event that the PID registers a significant reading (>500 ppm), the combustible gas meter may be used for comparison against that value. This helps to assess whether the deflection is the result of a high organic vapor reading or a potentially combustible atmosphere.

In addition, a Drager pump and indicator tubes may also be used to help identify specific chemicals in the work area. Colorimeter tubes should always be available for trichloroethene, 1,1,1-trichloroethane, and tetrachloroethene. Drager tubes may also be used for the following chemicals that have poor air-purifying respirator (APR) warning properties:

- Benzene
- Carbon tetrachloride
- Chloroform
- Methylene chloride
- PCE
- TCA
- TCE
- Vinyl chloride

Calibration and operating instructions must be available for any health and safety monitoring equipment used on site. The PID and oxygen/explosimeter calibration is checked before initiating

onsite work activities and rechecked daily. Examples of PID and Drager pump operating procedures are provided in Appendix G. All calibration recordings are to be entered on calibration record forms (an example is given in Appendix G) or into logbooks.

Air monitoring for background levels of air contamination should be performed before the start of drilling activities. The field team leader, designee, or industrial hygiene specialist should monitor air quality in the workspace. The response of any detection on the instrument from core samples during drilling operations will result in the immediate monitoring of the air quality in the workspace.

6.2 ACTION LEVELS

Any time that the instrument readings show a concentration greater than background plus 1 part per million (ppm) measured in the breathing zone for 30 seconds, air-purifying respirators will be worn by all personnel at that work location. For the purposes of this plan, the breathing zone is that zone from the worker's waist up. The following action levels are always to be used for readings taken in the breathing zone.

- Level D: Background levels to 1 ppm above background levels
- Level C: 1-10 ppm above background levels sustained for more than 30 seconds
- Level B: 11-500 ppm above background levels sustained for more than 30 seconds

For potentially explosive environments, a combustible gas indicator will be used with the following action levels applied during confined space entry.

- 0-10% LEL - Continue work with caution while monitoring continuously.
- >10% LEL - Stop work and contact the UTC project manager.

Oxygen levels will also be measured during confined space entry with the following action levels.

- 21% Oxygen - Normal oxygen level.
- <19.5% Oxygen - Oxygen deficient, stop work and contact the UTC project manager.
- >23.5% Oxygen - Oxygen enriched, stop work and contact the UTC project manager.

Only the site Health and Safety Supervisor or designee has the authority to downgrade the level of protection for work performed under UTC's control.

6.3 DUST AND PARTICULATE MONITORING

If climatic and surface soil conditions adversely impact ambient air quality with particulate matter for extended periods and dust suppression measures are ineffective, air monitoring may become

necessary for areas where PCBs or metals are suspected to be present. The monitoring will be conducted as follows:

- Before hazardous waste operations begins at a specific area of the UTC site, the work supervisor will identify whether that work area contains surface soils contaminated with hazardous compounds that are not detectable as organic vapors and could become airborne under the anticipated work conditions.

- If windy, dusty conditions persist, it will be the responsibility of the work supervisor or designee to operate a dust monitor (Mini-Ram PDM-3 or equivalent) to assess whether the dust level indicates a need to change the required personal protective equipment level.

The nuisance dust level is 5.0 mg/M.^{3} For normal situations where the contaminant level in soil is low, the action level will be much higher than 5.0 mg/M.^{3} Therefore, the action level for contaminated soils should not exceed 2 mg/M^3. The following action levels will be used for airborne contaminants:

- Visible dust – Institute administrative controls
- > 2 mg/M^3 – Institute dust suppression measures
- > 5 mg/M^3 above background- Stop work. Contact the UTC Site Health and Safety Officer. Use more aggressive dust control measures.

Five excursions above the action level in any 15-minute period or a sustained reading in excess of the action levels for 5 minutes will trigger a response. The frequency of air monitoring may be adjusted by the UTC Site Health and Safety Officer after sufficient characterization of site contaminants has been completed, tasks are modified, or site controls have proven effective.

6.4 PERSONAL EXPOSURE SAMPLING

Personal air sampling may be conducted for the purpose of evaluating personnel exposure to chemicals according to the Cal/OSHA standards. The person sampled must be given the results of the air sampling. Sampling results will be used to assess whether the time-weighted average values are being exceeded.

Site personnel may be required to participate in a quantitative air sampling program to document the site workers' potential exposure to onsite airborne contaminants. The decision to initiate this program may be based on organic vapor readings, eye or respiratory tract irritation, odors, or visible effluent.

Personnel may be exposed to chemicals by inhalation, skin absorption, or ingestion. The basic strategy is to accurately assess employee exposures using current methods and equipment. The measurement of airborne concentrations of gases, vapors, and particulate matter evaluates inhalation exposure. The assessment of skin absorption and ingestion is usually accomplished by

observing the operation and noting potential skin exposure and hand-to-mouth transfer of contamination.

A personal sample is collected by placing a collection device (filter, tube, impinger, etc.) in the breathing zone of personnel such that representative air is sampled. The personnel at maximum risk are generally selected for sampling. This selection is based on the proximity of the personnel to the source of the hazard, the air flow patterns in the area, the mobility of the personnel, and the amount of time he or she is exposed. If air sampling indicates the maximum risk personnel's exposure is below acceptable levels, it can be reasonably assumed that exposures of other employees are also below the acceptable limits.

Exposure sampling may be for the full work shift (usually 8 hours) or for a partial period. Full shift sampling is best for measuring true employee exposure since the sample device is present for the entire time the employee is potentially exposed. Partial period sampling such as 15-minute sampling may be conducted to evaluate an employee's exposure during a specific short-term operation. Many chemical agents have Short-Term Exposure Limits (STELs) for 15-minute exposures. Partial-period sampling is also beneficial in identifying specific components of an employee's full shift exposure.

The selection of a sampling and analytical method is based on the type of information required, the availability of methodology and equipment, the reliability of the method(s), and the efficiency of the method(s). Direct-read methods include detector tubes and survey meters. Integrated methods include sorbent tubes, filters, and absorbent solutions. Direct-read methods provide an indication of exposure immediately. Integrated methods require laboratory analysis, but are generally more accurate.

Integrated sampling should be performed following methodology that has been validated. The National Institute for Occupational Safety and Health (NIOSH) publishes a Manual of Analytical Methods. Additional methods are published by the Occupational Safety and Health Administration (OSHA). Sample analysis should be performed by a laboratory that is accredited by the American Industrial Hygiene Association.

SECTION 7
PERSONAL PROTECTION REQUIREMENTS

7.1 LEVELS OF PROTECTION

The levels of protection required to conduct activities associated with the completion of the scope of work described in Section 3 are presented in this section. These levels of protection are presented using the descriptions provided in the US EPA Standard Operating Safety Guides (November 1989). These levels generally include:

Level D:
Steel toe/shank leather boots or steel toe/shank rubber boots
Tyvek or equivalent coveralls/work coveralls
Surgical gloves
Nitrile gloves (if necessary)
Leather gloves
Hard hats (if overhead hazards are present)
Safety glasses

Level C:
Full face air-purifying respirator (or half face air-purifying respirator with safety glasses; the full face respirator is recommended over the half face)
Steel toe/shank rubber boots (or steel toe/shank leather boots with boot covers)
Tyvek, polyethylene-coated Tyvek, or equivalent coveralls (taped at the ankle and wrists, also taped to the respirator if a full-face respirator is worn)
Surgical gloves
Nitrile gloves (taped at wrists)
Hard hats (if overhead hazards are present)

Level B:
Supplied air (bottled air or airlines equipped with escape air)
Steel toe/shank rubber boots (or steel toe/shank leather boots with boot covers)
Saranex, polyethylene-coated Tyvek, or equivalent coveralls (taped at ankle, wrists, and respirator)
Surgical gloves
Nitrile gloves (taped at wrists)
Hard hats (if overhead hazards are present)

Eye Protection: Eye protection is required for UTC and contractor personnel within designated eye protection areas (at all stations except Stations 0012, 0014, 0024, and 0101). Eyeglasses must meet ANSI Z87.1-1989 specifications (safety glasses). The applicable Cal/OSHA standard is contained in 8 CCR 3382. Contact lenses will not be allowed onsite any time during field activities.

Respiratory Protection: All personnel in the immediate work area that may need to wear a respirator must have access to an air-purifying respirator, for which they have been satisfactorily fit-tested. Facial hair and/or beards that interfere with the proper sealing of the respirator are not allowed for field personnel. Personnel who require prescription lenses will be provided with approved spectacle kits for use with respiratory protection. Each contractor shall have a written respiratory protection plan for the selection and use of respirators. The applicable Cal/OSHA standard is contained in 8 CCR 5144.

Head Protection: Head protection should be used in the presence of overhead objects, when heavy equipment is being operated, when there is a potential for flying objects, and when there is a possible electrical shock hazard. Head protection must meet ANSI Z89.1-1969 and Z89.2 specifications. The applicable CAL/OSHA standard is contained in 8 CCR 3381.

Foot Protection: Foot protection must meet ANSI Z41.1-1999 specifications. The applicable Cal/OSHA standard is contained in 8 CCR 3385. Personnel shall wear conductive shoes or two leg-stats when working on conductive floors. Only cotton socks of at least 70% cotton blend shall be worn with conductive shoes. Before working on a conductive floor, the conductivity of the shoes must be verified at the station.

Hand Protection: Appropriate gloves will be worn to provide protection where there is a potential for exposure of hands to physical or chemical hazards. Gloves for physical hazard protection must be selected based on the predominant hazard (i.e., laceration, thermal hazard). Gloves for chemical protection must be selected based on the chemicals encountered, the level of chemical exposure, the duration of the exposure, and the resistance of the glove material to the chemical(s).

Body Protection: Personal protection will be selected based on the activity and the potential contaminant. For areas where dust is a potential hazard, Tyvek or equivalent coveralls may be required. In areas where chemical contamination is likely, polyethylene coated Tyvek, Saranex, or equivalent may be required. When selecting appropriate attire, heat stress must also be considered.

These levels provide workers with the appropriate personal protective equipment to safeguard against dermal and/or inhalation hazards that may be encountered. Level A personal protection (fully encapsulating suit) is not anticipated for hazardous waste operations at the UTC site. Modifications in the personal protective equipment requirements may be necessary as new conditions and/or tasks warrant. These modifications must be documented. The assessment to downgrade the level of protection will only be made by the site Health and Safety Supervisor or designee for work performed under UTC's control.

Upon initiating each task, the anticipated organic vapor concentration and site-specific conditions will be used to decide the level of protection. For the duration of the task, the actual organic vapor concentration that is present shall be used to assess the level of protection required. The initial levels of protection will be documented in a field logbook.

The following field equipment is recommended for work under UTC's control:

Personal Protective Equipment (PPE)

- Air-Purifying Respirator with Cartridges - Organic Vapor/Acid/P 100 High Efficiency Particle Filter.
- Barrier Cream
- Cotton Lab Coats (explosive hazards)
- Hearing Protection Devices
- Nitrile Gloves, Latex Gloves
- Safety Glasses
- Steel Toe Boots
- Tyvek, Polyethylene Tyvek, Saranex, and boot covers

Monitoring Equipment

- Drager Pump and colorimetric associated tubes for TCE (2/a), PCE (5/a), TCA (50/d), benzene and vinyl chloride
- Explosimeter, as necessary
- PID with calibration gas (isobutylene) and 11.7 eV lamp
- Personal Sampling Pumps and associated cartridges and/or tubes, if necessary
- Thermometer (disposable oral for heat stress monitoring)

Decontamination Equipment

- Brushes
- Deionized water
- Detergent (biodegradable)
- Disposable towels
- Drum liners or plastic trash bags
- 5-Gallon tubs
- Sprayer (also use for dust suppression)
- Visqueen

Vehicle Equipment

- Eye wash – 15 minutes minimum
- Fire extinguisher
- First Aid Kit with Bloodborne Pathogen Kit
- Instant Coldpacks
- Potable water

SECTION 8
DECONTAMINATION AND DISPOSAL PROCEDURES

Decontamination procedures are established for removing contamination that may have accumulated on workers and equipment during hazardous waste operations. The purpose of decontamination is to prevent worker exposure and to prevent the migration of contaminants from the site.

8.1 PERSONAL DECONTAMINATION

For personal decontamination, a Contamination Reduction Zone (CRZ) should be designated before starting hazardous waste operations that include excavation, demolition, and drill rig activities (see Section 5.4). All personnel working within an Exclusion Zone should pass through the CRZ upon exiting the Exclusion Zone. The CRZ is set up at the perimeter of the work area and consists of the sequential wash and rinse procedure and appropriate equipment drop areas.

All personnel decontamination water should be containerized in drums. Decontamination may consist of brushing with a stiff brush to remove dry particles and, if necessary, washing with an Alconox solution and rinsing with clean water.

8.2 EQUIPMENT DECONTAMINATION

8.2.1 Sampling and Monitoring Equipment

All possible measures shall be taken by personnel to prevent the contamination of any monitoring equipment to be used. Once contaminated, instruments may be difficult to clean without damaging them. Any delicate instrument that cannot be decontaminated easily may be protected while it is being used by placing it in a bag and using tape to secure the bag around the instrument. Openings in the bag can be made for sample intake and exhaust.

Equipment decontamination may take place on visqueen or other suitable material. Sampling equipment may be washed with an Alconox solution and rinsed with deionized water. Sampling equipment may also be steam-cleaned. Following sample collection and sealing, sample containers may be decontaminated by washing with an Alconox solution followed by a rinse with deionized water. The decontamination water should be containerized.

8.2.2 Respiratory Protective Equipment

If air-purifying respirators are required, there is a high potential for these units to become contaminated. Respirators should be cleaned after use. When decontaminating this equipment, the exterior should be thoroughly cleaned. Certain parts of the contaminated respirators should be disassembled, washed in warm water with a detergent made for respirators, rinsed with clean water and allowed to dry before reassembly. Disassembly shall only be done by personnel trained in this task. If supplied airlines are used, the mask should be cleaned as mentioned for air-purifying respirators and the hose washed and inspected for signs of deterioration.

Respirators and cartridges should be stored to protect against dust, heat, sunlight, extreme cold, moisture and damaging chemicals. Each respirator should be stored in an air-tight plastic bag or an equivalent. Each respirator should be stored in a cool, dark place that allows the respirator to maintain its original shape and form.

8.2.3 Heavy Equipment

Heavy equipment such as drill rigs, backhoes, and associated tools should be thoroughly cleaned at the beginning of each new soil intrusive activity during hazardous waste operations to prevent cross contamination. The equipment may be steam-cleaned. This equipment should also be decontaminated before leaving the facility. The level of personal protection required for decontamination will depend on the degree of contamination encountered during the soil intrusive activity.

8.3 DRUM AND CONTAINER HANDLING

Hazardous substances and contaminated soils, liquids, and debris will be handled, transported, labeled, and disposed in accordance with 8 CCR 5192.120(j). All wastes generated onsite must be properly containerized. Drums and containers will meet appropriate DOT, CAL/OSHA, and EPA regulations for the wastes they contain. The container must be secured so as not to allow material to enter or leave it. Bins must be closed and covered with tarps, if necessary, to prevent rainwater from entering the bin.

When practical, drums and containers will be inspected for integrity before moving. Site operations should be organized so as to minimize the amount of drum and container movement. Material handling equipment used to transfer drums and containers will be selected, positioned, and operated in a manner that to minimizes the potential for ignition of vapors released from ruptured drums or containers. Salvage drums and appropriate quantities of absorbent will be available for use in spills, leaks, or ruptures. UTC's spill containment program is discussed in the *Integrated Incident Response and Contingency Plan.*

Each container that accumulates hazardous waste will be marked with the Hazardous Waste label containing a generic description of the waste and an accumulation start date.

8.4 DISPOSAL OF WASTE DERIVED FROM HAZARDOUS WASTE OPERATIONS

In general, there are several types of wastes generated during hazardous waste operations at UTC:

- Demolition wastes,
- Monitoring well development and purge water,
- Soils
- Drilling mud/slurry
- Equipment decontamination rinse water,
- Disposable protective clothing, and
- Granular activated carbon (GAC) and ion exchange resin.

Demolition wastes may be loaded directly into trucks or placed into bins for offsite disposal. Well development water, pump test water, sampling purge water, and decontamination rinse water is placed in containers (drums or water tanks) and transported to one of the onsite groundwater treatment systems. Soils, drilling mud, steam cleaning water from drilling operations, and disposable protective clothing can be stored in 55-gallon drums staged on pallets at the work site in an easily accessible location. Large amounts of soil wastes may be placed into bins or loaded directly into trucks for offsite disposal. Used GAC and resin from the onsite groundwater treatment systems and the soil vapor extraction units are tested as necessary, collected, and recycled or disposed of properly.

The disposition of all hazardous waste operations field activity derived wastes is ultimately decided by UTC. All wastes staged in this manner are collected, tested (as needed), and disposed of according to applicable Federal, State, and local regulations.

Solids and mud that have been labeled as potentially hazardous may be taken to the hazardous waste pad at Station 2233. At Station 2233, solids and mud may be consolidated and sampled, as needed. Hazardous solids and mud may be landfilled or incinerated depending upon the contamination. Solids and mud that are not hazardous may be disposed where they were collected by thinly spreading over the ground.

Contaminated water may be drummed or transferred to a vacuum truck, and disposed of by a waste disposal company. Waters shown to be free of chemicals are properly disposed onsite using methods that do not allow the waters to enter the creeks.

8.5 SANITATION AND HOUSEKEEPING

8.5.1 Sanitation

The work supervisor will ensure that adequate drinking water, toilet facilities and hand washing facilities are available daily to all field personnel. For drinking water, a least two gallons per person shall be provided daily. Potable water shall be supplied from a pressurized source (i.e. tap water) or commercially available bottled water. Disposable drinking cups will be provided at each work location and shall be stored and made available in a sanitary manner. Any non-potable sources of water shall be clearly identified "Non- Potable, Do Not Drink".

Sanitary facilities shall be available at all times to field personnel (onsite rest room facilities or onsite portable chemical toilets). Toilet facilities shall be within immediate access for field personnel (within 5 minutes).

Hand washing facilities shall be adjacent to the decontamination station at each location and at the toilet facilities. Hand washing facilities shall consist of soap, clean water, water basins and single use hand towels. Any wastewater collected shall be disposed properly.

8.5.2 Housekeeping

A strict housekeeping program will be implemented daily at each work location. The purpose of the housekeeping program is to reduce or prevent accidents and prevent unwanted spread of debris or other materials in any areas. The Health and Safety Officer and work supervisor shall both be responsible for ensuring that good housekeeping is maintained at all times during the project.

The following housekeeping procedures apply to this project.

- Only "in use" equipment and tools shall be off-loaded from vehicles
- Work access shall be continuously "policed" by field personnel and the Work supervisor for cleanliness and orderliness.
- All spills shall be immediately cleaned up.
- Any loose dirt and debris that is not part of the designated spoils pile (from excavations) shall be immediately cleaned up.
- No dirt or loose debris shall be left in any work area, or allowed to leave any work area either by vehicle, foot traffic or wind movement.
- During wind conditions, excavated spoils may be wetted with water fog to reduce airborne dust. No water run-off shall be generated or allowed.

At the end of each work period, any open excavations shall be barricaded in ALL directions with lighted barricades and all barricades connected by a double run of barrier tape. A similar procedure shall apply to any stockpiled soils.

SECTION 9
EMERGENCY RESPONSE PLAN

9.1 GENERAL

To reduce the impact of an accident related to hazardous waste operations at UTC, an emergency response plan is necessary. UTC's emergency response plan, *Integrated Incident Response and Contingency Plan*, consists of an emergency response system designed to reduce the impact of an accident by rapid containment of spills. It is imperative that all environmental personnel know and understand the site-specific emergency procedures in place. These procedures will depend on the exact location of work. Accordingly, the *Integrated Incident Response and Contingency Plan* is designed to make optimum use of all available resources for speedy containment of the incident, so that the threat to people, the environment, and site property is minimized. The following sections describe the responsibilities, emergency actions, contacts, and procedures necessary for an effective emergency response system.

Most occurrences at the facility do not require evacuation of the main office/plant facilities in the inert area. Evacuation plans are specific to the location of fieldwork. Assembly areas are specified in the *Integrated Incident Response and Contingency Plan*.

9.2 RESPONSIBILITIES

Because of the potential hazards at the site and conditions under which operations are conducted, the possibility of an emergency developing is real. Should an emergency develop, lines of authority have been established for supervising the situation. The Incident Commander is the senior fire fighter or emergency response team member on scene.

Hazardous material spills triggering the implementation of the *Integrated Incident Response and Contingency Plan*, fires and explosions, personnel injuries, and transportation accidents can occur anywhere at any time. Any individual may become the first observer of one of these situations and should immediately notify the UTC Emergency Communication Center by dialing 2222 on one of the onsite phones. Next, the UTC Emergency Communication Center will notify the Incident Commander.

9.3 EMERGENCY PROCEDURES

Upon notification of a potential emergency response, the Incident Commander will immediately identify the type, extent, and potential impact of the hazard to human health, livestock, and the environment.

For fires, injuries, chemical releases or leaks triggering the implementation of the *Integrated Incident Response and Contingency Plan*, the Incident Commander will:

1. Evaluate and determine the need for evacuation, and initiate evacuation of the hazard area, if necessary,
2. Obtain medical attention for any injured persons,
3. Direct emergency response personnel in containment and cleanup of the spill,
4. Direct the UTC Emergency Communication Center to dispatch additional emergency personnel, as required, and
5. Contact local authorities so that downstream and downwind persons can be notified and evacuated, if necessary.

For chemical releases or leaks triggering the implementation of the *Integrated Incident Response and Contingency Plan*, the emergency response personnel will:

1. Make sure unnecessary persons are removed from the hazard area,
2. Verify that all personnel use appropriate protective clothing and equipment,
3. Remove ignition sources, as appropriate,
4. Stop the leak, if possible,
5. Remove surrounding materials that could react to the hazard,
6. Identify the major components in the waste at the time of the spill,
7. Use adsorbent materials to contain, divert, and cleanup the spill or leak, and
8. Drum/bin recovered liquid wastes, contaminated soil, containment materials, and cleanup materials for proper disposal.

Upon direction by emergency personnel to evacuate an area, all personnel in the work area will decontaminate, as practical, and assemble in a safe area as directed. Evacuation routes and assembly areas for evacuation of major areas of the site are shown in Figure 1.1. Personnel will not return to the hazard area unless authorized by the Emergency Coordinator.

9.4 FIRST AID AND EMERGENCY EQUIPMENT

The *Integrated Incident Response and Contingency Plan* discusses the (1) first aid supplies and emergency medical equipment, (2) personal protective equipment, (3) spill cleanup materials and equipment, and (4) fire suppression equipment that are maintained at UTC. The onsite Emergency Response Team (ERT) has a standard ambulance, two class A pumper fire engines, two fire squads, a first aid utility van, and a hazardous material response trailer.

9.5 PERSONAL INJURY

As needed, emergency first aid will be applied by onsite Emergency Medical Technicians (EMTs) followed by transportation of the individual to the nearest medical facility, if needed. Personnel applying first aid have the potential for exposure to bloodborne pathogens. Exposure to bloodborne pathogens is prevented through universal precautions, engineering and work practice controls, and personal protective equipment. Personnel working in the field and providing emergency first aid shall have immediate access to an industrial first aid kit supplemented by a bloodborne pathogen exposure control kit at a minimum. Personnel will follow appropriate decontamination and disposal procedures in case of potential exposure to body fluids potentially infected with bloodborne pathogens.

The Incident Commander will request onsite EMTs and an ambulance/rescue squad for transportation in an emergency, as necessary.

9.6 GENERAL FIRST AID

Generic first aid procedures are included in this section. Typical responses may include:

Skin Contact: Call extension 2222. Decontaminate, as practical. The EMTs may wash and rinse the affected area thoroughly, then provide appropriate medical attention. Eyes should be rinsed for at least 15 minutes with clean potable water upon chemical contact.

Inhalation: Call extension 2222. Immediately move the victim to fresh air, if safe to do so. Decontaminate, as practical. If necessary, the EMTs will attempt to restore breathing.

Ingestion: Call extension 2222. Decontaminate, as practical. The UTC Emergency Communications Center will arrange transportation.

9.7 FIRE/EXPLOSION

In case of fire or explosion, or potential fire/explosion, the UTC Emergency Communications Center should be immediately notified at extension 2222. The Emergency Communications Center will notify the ERT, as necessary.

Hazardous work in the affected area will be shut down immediately. The area will be cleared of all personnel not actively involved in fighting the fire. Those persons will report to the designated assembly areas for accountability.

9.8 SPREAD OF CONTAMINATION

In case of the spread of contaminants beyond the work area, the UTC Emergency Communications Center should be immediately notified at extension 2222. The Emergency Communications Center will notify the ERT, as necessary. The UTC project manager should also be notified.

9.9 ADVERSE WEATHER CONDITIONS

In case of adverse weather conditions, the work supervisor or designee will decide if work can continue without sacrificing the health and safety of any field workers. Before deciding if work should continue, items to consider include:

- Potential for heat stress and heat-related injuries,
- Limited visibility,
- Potential for electrical storms,
- Potential for flash floods, and
- Potential for high winds resulting in contaminant transport.

9.10 EARTHQUAKES

In case of a major earthquake, evacuate the building using the standard building evacuation procedures in the Integrated Incident Response and Contingency Plan. Do not re-enter buildings until the buildings have been checked out and reentry has been authorized. Do not operate any equipment until it has been determined to be safe to use. Field personnel should avoid overhead electrical wires and objects that might topple over.

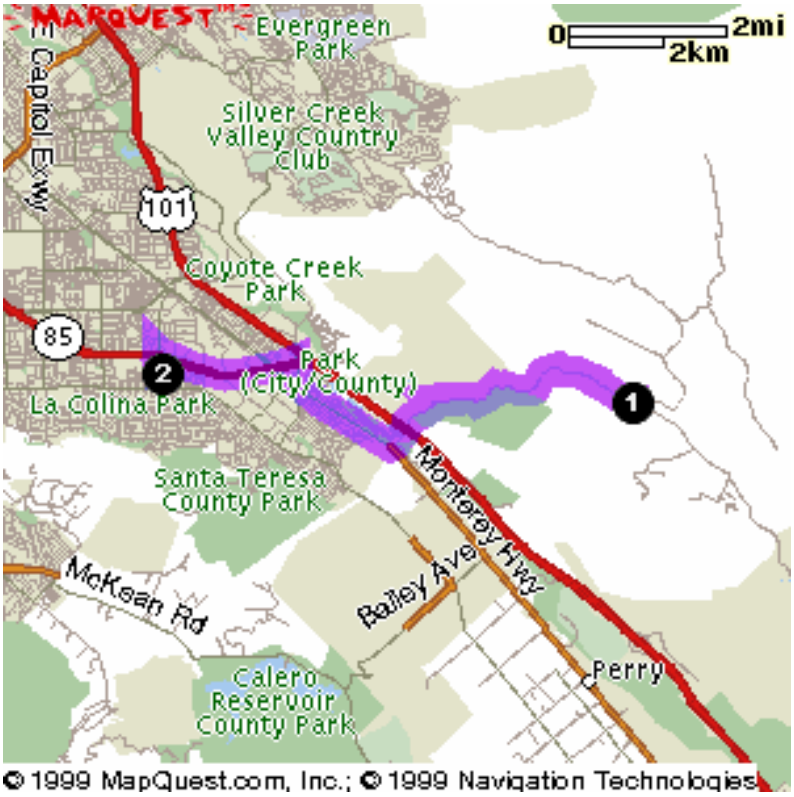
9.11 EMERGENCY INFORMATION

The ERT responds to all emergencies at the facility. The facility has an emergency telephone communication system. Telephones are located in a number of buildings on the site. The telephones are used as a direct means of reporting an emergency by dialing 2222. This number connects the caller to the UTC Emergency Communications Center that serves as a central point of communications for summoning the required UTC responses. If an emergency occurs, it is necessary to call extension 2222 to give the Emergency Communications Center the information concerning the emergency.

In case of emergency, immediately call extension 2222. Do not transport a victim unless directed to do so by the UTC Emergency Communications Center. **The UTC Emergency Communications Center will arrange transportation.** Directions are provided to the nearest medical facility. However, the selection of the hospital by the ERT may be dependent upon the type and severity of the injury.

Directions to the nearest medical facility: See Figure 9-1 for a map and directions to Kaiser Permanente Santa Teresa Community Hospital. Additional emergency telephone numbers are listed in Appendix B, page 11

FIGURE 9-1
MAP TO THE NEAREST HOSPITAL



Santa Teresa Community Hospital
250 Hospital Parkway
San Jose, CA
408-972-3000

Directions to the nearest medical facility (Kaiser Permanente Santa Teresa Community Hospital): Go out the main gate and turn left onto Metcalf Road. Go to the end of Metcalf Road and turn right onto Monterey Highway. Go north on Monterey Highway and take the Bernal Road east exit. Head east on Bernal Road and turn right onto Highway 85 (north). Take Highway 85 to the Cottle Road exit and head south on Cottle Road. Go past the Light Rail exit and take the next left at the intersection of Cottle Road and Hospital Parkway. The hospital is at the end of Hospital Parkway.

SECTION 10
TRAINING REQUIREMENTS

10.1 BASIC TRAINING

All personnel doing hazardous waste operations field work at the UTC site will have completed the CAL/OSHA mandatory hazardous waste operations training and will be trained annually in accordance with 8 CCR 5192 and 29 CFR 1910.120. Personnel are also trained in Hazard Communication and the Illness and Injury Prevention Program (IIPP). In addition, each employee will be familiar with the requirements of this site health and safety plan, and will participate in site activity and safety briefings. Additional training will be necessary in case of Level B activities or confined space entry procedures.

10.2 HAZARD COMMUNICATION STANDARD

UTC and contractors performing hazardous waste operations will train their personnel following the Hazard Communication Standard (8 CCR 5194 and 29 CFR 1910.120). As part of the hazard communication standard, UTC provides MSDSs for chemicals used onsite and has them readily accessible to employees. MSDSs associated with hazardous waste operations may include the following:

- Calibration gases such as isobutylene
- Sample preservatives such as hydrochloric and nitric acids
- Decontamination materials such as methanol or Alconox

Contractors are responsible for providing material safety data sheets to the UTC Safety Department for any hazardous materials brought onto the UTC facility.

10.3 INJURY AND ILLNESS PREVENTION PROGRAM

UTC and contractors will train their personnel as required by 8 CCR 3203. IIPP training is done to (1) reduce the frequency and severity of work-related accidents/incidents, injuries, and illnesses, (2) provide uniform health and safety guidance for personnel, and (3) comply with all federal, state, and local health regulations that affect UTC activities. Contractors must have documentation that their personnel have received IIPP training following California Senate Bill 198 (8 CCR 3203).

10.4 CPR, FIRST AID, AND BLOODBORNE PATHOGEN TRAINING

It is recommended that a person currently certified in basic first aid and adult cardiopulmonary resuscitation (CPR) be present when hazardous waste operations take place that include excavation, demolition, and drill rig activities. Members of the ERT who are on duty and are currently certified in CPR and first aid provide on-call support.

UTC and contractor personnel who are trained in and perform CPR or first aid have the potential for exposure to bloodborne pathogens. Therefore, they will be trained annually following 29 CFR 1910.1030 and 8 CCR 5193. Exposure to bloodborne pathogens is prevented through universal precautions, engineering and work practice controls, and personal protective equipment. Personnel working in the field and providing CPR or first aid shall have immediate access to an industrial first aid kit supplemented by a bloodborne pathogen exposure control kit. Personnel will follow appropriate decontamination and disposal procedures in case of potential exposure to body fluids potentially infected with bloodborne pathogens. All incidents must be immediately reported to the UTC Safety Department.

10.5 EMERGENCY RESPONSE TRAINING

UTC employees who work with chemicals or hazardous waste receive basic training in proper use, storage, handling, and management of these materials. This training includes chemical right-to-know, chemical safety, environmental protection, incident prevention, incident recognition, identification of hazards, use of personal protective equipment, notification procedures, evacuation procedures, containment and cleanup of small releases, incident investigation, follow-up and documentation. This training is provided to new employees and is updated with regular refresher courses.

Members of the ERT are certified Fire Fighter I/II, Emergency Medical Technician IAs, and Hazardous Material First Responder - Operational.

10.6 PRE-HAZARDOUS WASTE OPERATION FIELD ACTIVITY BRIEFING

Before the performance of onsite hazardous waste operations, the work supervisor or designee will review the contents of their HASP with all personnel who will be involved with hazardous waste operation field activities. Following the briefing, all personnel will be required to signify that they have read and understood the contents of this HASP (Appendix E) when the work is under UTC control.

10.7 UPDATE BRIEFINGS

The work supervisor or designee will update the safety requirements for the tasks to be done with each field team, as needed, due to changing work tasks. The update briefing will be documented, either in a logbook or on a separate form.

SECTION 11
MEDICAL SURVEILLANCE REQUIREMENTS

All UTC personnel and contractors involved in hazardous waste operations are required to participate in a medical surveillance program consistent with 8 CCR 5192 if they (1) may be exposed above the PEL for 30 days or more a year, (2) may be exposed to hazardous substances or health hazards at or above the published exposure limit for 30 days or more a year, if there is no PEL, or (3) wear a respirator more than 30 days a year. Medical examinations will meet the requirements of 8 CCR 5144 and 8 CCR 5192, and be done:

- Before assignment,
- At least once every twelve months,
- At the end of employment or reassignment to an area where the employee would not be covered provided the employee has not had an examination within the past 6 months,
- As soon as possible upon notification by an employee that the employee has developed signs or symptoms suggesting possible overexposure to hazardous substances or health hazards, and
- As soon as possible when the employee has been injured or exposed above the permissible exposure limits.

SECTION 12
DOCUMENTATION

12.1 FIELD LOG BOOK

The field team leader or designee will keep a field Log Book or field forms where site information, subcontracting personnel working onsite, and documentation of visitors to the site will be recorded. At a minimum, the following information will be put in the log book or field forms on a daily basis:

- weather,
- personnel onsite, company, and title,
- proposed work activity,
- level of protection donned,
- air monitoring equipment readings obtained during work activities, and
- any health and safety-related issues or situations.

12.2 EMPLOYEE EXPOSURE/INJURY INCIDENT REPORTING

Immediately report any observed serious illness/injury, significant property damage, or fire by calling extension 2222. Also, report the incident to the UTC project manager. For work under UTC's control, the UTC work supervisor will complete the appropriate section of the UTC Incident Report form and return it to the UTC Safety Department within 48 hours of the incident.

Report any non-emergency incidents that involve an injury/illness to the UTC project manager. For work under UTC's control, the UTC work supervisor will notify the UTC Safety Department and complete the appropriate section of the UTC Incident Report form and return it to the UTC Safety Department within 48 hours of the incident. A CAL/OSHA reportable injury/illness is reported by the UTC Safety Department within 24 hours of the incident.

12.3 RECORD KEEPING

Medical records shall be retained for a minimum of the duration of employment plus 30 years and meet the criteria of 8 CCR 3204. The medical records will contain at a minimum the name and social security number of the employee, the physician's written opinions, recommended limitations, results of examinations and tests, employee medical complaints related to exposure to hazardous substances, and a copy of the information provided to the physician by the employer. Personal exposure monitoring (Section 6.4) records shall be retained for a minimum of 30 years and meet the criteria of 8 CCR 3204.

Employee medical records are confidential. Employees and their authorized representatives will have access to their employee medical records upon request.

SECTIONS 13
REFERENCES

13.1 FEDERAL HEALTH AND SAFETY GUIDANCE/REQUIREMENTS

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, DHHS (NIOSH) Publication Number 85-115.

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, *Pocket Guide to Chemical Hazards*, DHHS (NIOSH) Publication Number 90-117.

U.S. Department of Labor, Occupational Safety and Health Administration, *Occupational Safety and Health Standards 29 CFR 1910 (General Industry)*.

U.S. Department of Labor, Occupational Safety and Health Administration, *Occupational Safety and Health Standard 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response, Final Rule)*.

U.S. Department of Labor, Occupational Safety and Health Administration, *Occupational Safety and Health Standard 29 CFR 1910.1000 (Air Contaminants)*.

U.S. Department of Labor, Occupational Safety and Health Administration, *Occupational Safety and Health Standard 29 CFR 1910.1200 (Hazard Communication)*.

U.S. Department of Labor, Occupational Safety and Health Administration, *Occupational Safety and Health Standards 29 CFR 1926 (Construction Industry)*.

U.S. EPA, Environmental Response Branch, Hazardous Response Support Division, Office of Emergency Response, *Standard Operating Safety Guidelines*, November 1984.

U.S. EPA, Region 9, *Administrative Order on Consent U.S. EPA Document Number RCRA-09-89-0018, Proceeding under Section 3008 (h) of the Resource Conservation and Recovery Act, as amended, 42 U.S.C. § 6928(h)*, February 22, 1991.

13.2 STATE HEALTH AND SAFETY REQUIREMENTS

California Code of Regulations, Title 8, Chapter 4, Subchapter 4, *Construction Safety Orders*.

California Code of Regulations, Title 8, Chapter 4, Subchapter 5, *Electrical Safety Orders*.

California Code of Regulations, Title 8, Chapter 4, Subchapter 7 commencing with Section 3200, *General Industry Safety Orders*.
California Code of Regulations, Title 8, Chapter 4, Subchapter 7, Section 5189, *Process Safety Management of Acutely Hazardous Materials.*

California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 7, Section 5192, *Hazardous Waste Operations and Emergency Response*.

California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 7, Section 5193, *Bloodborne Pathogens*.

California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 7, Section 5194, *Hazard Communication*.

California Code of Regulations, Title 22, Division 2, Chapter 3 commencing with Section 12000.

California Code of Regulations, Title 22, Division 4.5, *Environmental Health Standards for the Management of Hazardous Waste*.

California Regional Water Quality Control Board, San Francisco Bay Region, *Order Number 95-190 Waste Discharge Requirements for United Technologies Corporation, Chemical Systems Division, Coyote Center, 600 Metcalf Road, San Jose, Santa Clara County*, September 13, 1995.

California Regional Water Quality Control Board, San Francisco Bay Region, *Order Number R2-2004-0032, Revision to Final Site Cleanup Requirements and Rescission of Orders Nos. 94-064 (as amended), 98-070, and 91-006 for: United Technologies Corporation for the property located at 600 Metcalf Road, Santa Clara County*, May 19, 2004.

13.3 UTC WORK INSTRUCTIONS

The UTC standard procedures are maintained as Work Instructions (WI), Quality Procedures (QP), or Quality Procedure Guideline (QPG) on the electronic Document Management System (DMS), which is available to UTC employees on a local area network. Printed DMS procedures are not official, only the electronic version is official. A partial list of UTC work instructions is included below:

Number	Work Instruction Title
QP 23.07	*Injury and Illness Prevention Program*
QPG 23.06.52	*Environmental Manual*

QPG 23.08.15	*Integrated Incident Response and Contingency Plan*
QPG 25.05.02.04	*PWR/SJ Environmental health & Safety Guidelines for Contractors*
WI 23.06.13	Deactivation, Decontamination and Closure of Articles, Equipment and Facilities
WI 23.07.33	*Work Permits*
WI 23.07.53	Confined Space Entry Program
WI 23.07.67	*Classification and Decontamination of Explosive Facilities and Equipment*
WI 23.07.73	*Process Safety Management (PSM) Compliance Plan*
WI 23.08.03	*Environmental Release Reporting*
WI 25.01.05	*Excavation Permit*
WI 25.01.06	*Line Break Permit*
WI 25.04.02	*Control of Hazardous Energy (Lockout/Tagout)*
WI 25.05.02	*Contractor Environmental, Health & Safety Program*

13.4 UTC TECHNICAL REPORTS

The following technical reports discuss soil and groundwater contaminants at UTC. Further information can be found in the UTC Annual and Quarterly *Environmental Monitoring Reports*.

ICF Technology Incorporated, *RCRA Facility Investigation/Corrective Measures Study, United Technologies Corporation, Chemical Systems Division*, June 1991.

ICF Technology Incorporated, *RCRA Facility Investigation/Corrective Measures Study - Addendum*, June 22, 1993.

ICF Kaiser Engineers Incorporated, *Soil Remediation Status Report for 1993*, March 31, 1994.

ICF Kaiser Engineers Incorporated, *Motor Test Area Soil and Groundwater Characterization and Remedial Action Workplan*, November 1, 1995.

ICF Kaiser Engineers Incorporated, *Soil and Groundwater Characterization Summary and Effectiveness Evaluation of the Improved Groundwater Extraction System at the OBF*, April 1, 1996.

ICF Kaiser Engineers Incorporated, *Soil Remediation Status Report for 1994/1995*, April 30, 1996.

ICF Kaiser Engineers Incorporated, *Motor Assembly Area/Component Test Area Soil and Groundwater Characterization Report and Remedial Action Workplan*, February 1, 1997.

ICF Kaiser Engineers Incorporated, *Characterization of Perchlorate Migration Pathways to Surface Waters,* October 6, 1998.

Shaw Environmental, Incorporated, *Extent of 1,4-Dioxane in Groundwater*, December 20, 2002.

ENSR International, Incorporated, *Characterization of Perchlorate in Groundwater Report*, January 27, 2005.

ENSR International, Incorporated, *Perchlorate Characterization Report for Surface Soil*, January 27, 2005.

ENSR International, Incorporated, *Characterization of Perchlorate in Subsurface Soil*, March 30, 2005.

APPENDIX A

HEALTH AND SAFETY PLAN ADDENDUM/REVISION FORM

UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY ROCKETDYNE, SAN JOSE
HEALTH AND SAFETY PLAN ADDENDUM/REVISION

Section: _____

Addendum: _____

Revision: _____

Effective Date: _____

Prepared by: _____

Approved by Site Health and Safety Supervisor: _____

Subject: _____

_____

_____

Addendum/Revision: _____

_____

_____

_____

_____

_____

_____

APPENDIX B

EXAMPLE TASK-SPECIFIC HEALTH AND SAFETY PLAN FORM

UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY ROCKETDYNE, SAN JOSE
TASK-SPECIFIC HEALTH AND SAFETY PLAN

I. GENERAL INFORMATION

Task Description: _____

Project: _____

Site Area: Station _____

UTC Work Supervisor: _____ ext. _____

Purpose of Site Visit: _____

_____

_____

Proposed Date of Work: _____

Proposed Field Team:

Personnel:	Discipline/Tasks Assigned:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Prepared by: _____

Reviewed and Approved by: _____
Work Supervisor

Reviewed and Approved by: _____
Site Health and Safety Supervisor,
Safety Manager

II. BACKGROUND

Overall Hazard is: High: _____ Moderate: _____Low: _____ Unknown: _____

Area Description: The facility consists of steep to gently rolling hills on relatively flat to gently sloping valley floors. A perimeter fence and 24-hour guards at the gates provide site security. For additional details, refer to the *Health and Safety Plan for United Technologies Corporation, Pratt &Whitney Rocketdyne, San Jose, Hazardous Waste Operations*.

Area Features: The facility consists of many buildings and other structures that were associated with the manufacturing of solid rocket propellant and the transportation of these propellants via trucks. Propellants manufactured by UTC were tested and classified as a Class 1.1 or 1.3 explosive by the Bureau of Explosives and the Department of Transportation (DOT).

Onsite transportation of energetic materials is accomplished using company pickup trucks. Each of these vehicles is clearly marked with red flags on the front and rear bumper corners of the truck. These vehicles also have a DOT-approved placard identifying the propellant as a Class 1.1 or 1.3 explosive. When approached by an oncoming vehicle marked as carrying propellant, employees, visitors, and contractors must pull to the shoulder of the road and stop until the vehicle has safely passed. Individuals must also never overtake a vehicle that is carrying propellant.

The other major natural feature of the facility is an intermittent stream in each valley. The streams are dry most of the year, but they can carry considerable flow during the wet season, generally October through March.

Area Status: All safety regulations required by UTC, and those required by state and federal law must be strictly observed. The status of each individual station varies and the field crew should check with the station controller before entering a given station.

III. CHEMICAL/WASTE CHARACTERISTICS

Chemical/Waste Type(s): Liquid __ Solid __ Sludge __ Gas/Vapor __

Characteristic(s): Corrosive __ Ignitable __ Radioactive __

Volatile __ Toxic __ Reactive __ Unknown __

Other Characteristics:

See Table 4.1 of the *Health and Safety Plan for United Technologies Corporation, Pratt & Whitney Rocketdyne, San Jose, Hazardous Waste Operations* and Table 1 below for chemical characteristics and exposure limits.

TABLE 1

Chemical Name CAS Number	IP[1] (eV)	Response[2] PID	PEL[3] (ppm)	IDLH[4] (ppm)	Flammable Range %	Odor (ppm)	Notes

1 - Ionization Potential in electron volts (eV).
2 - PID relative response.
3 - Permissible Exposure Limit, California OSHA (8 CCR 5155) - November 1993.
4 - Immediately Dangerous to Life and Health Level, NIOSH Publication # 85-114, June 1990.
Ca - Refers to a suspected or known carcinogen.
F - Flammable.
HR - High response.
I - Irritant.
NA - Not available at this time/Not applicable.
S - Skin notation.

IV. SCOPE OF WORK

Stations to be investigated: _____

V. HAZARD EVALUATION

Chemical Hazards: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Physical Hazards: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

VI. AREA OPERATIONS

Monitoring Equipment Checklist:

_____

_____

_____

_____

Operating Procedures and Methods for Surveillance:

_____

_____

_____

_____

Perimeter Establishment: _____

Area Secured: Facility secure.

Map of Area: _____

Perimeter Identified: _____

Exclusion Zones Identified: _____

_____

_____

VII. PERSONAL PROTECTION

Personal Protection Used on Previous Tasks:

_____

_____

_____

Level of Protection Required for this Task: D ___ C ___ B ___

Selection Criteria:

_____

_____

_____

Modifications for Personal Protection Requirements:

_____

_____

_____

Action Levels:

_____

_____

_____

TABLE 2
RECOMMENDED LEVELS OF PROTECTION

Task	Level of Protection	Respiratory	Clothing	Gloves	Other

APR = Air-Purifying Respiratory with GMC-H or GMA Cartridges
B = Butyl
BC = Boot Covers
CRSTB = Chemical Resistant Steel toe boots
E = Earplugs or muffs
HH = Hard Hat
L = Latex
N = Nitrile
NA = Not Anticipated
S = Saranex
SA = Supplied Air
SG = Safety Glasses
SSC = Silver Shield Gloves and Covers
STB = Steel toe boots
T = Tyvek
W = Work Clothes
* = If Necessary

VIII. DECONTAMINATION PROCEDURES

Personnel Decontamination: All personnel decontamination water will be contained. Decontamination consists of brushing with a stiff brush to remove dry particles and, if necessary, wash with Alconox, and a clean water rinse.

PPE will be doffed to minimize contamination using the following steps:

1. Remove any extraneous or disposable clothing, boot covers, outer gloves and tape.
2. Remove Tyvek.
3. Remove internal gloves by rolling them off the hand, inside out.
4. Wash hands

Equipment Decontamination: Hand sampling equipment is washed with Alconox and rinsed with deionized water. The decontamination water is contained.

Sampling Container Decontamination: Following sampling collection and sealing, sample containers are decontaminated by washing in an Alconox solution followed by a rinse with deionized water. The decontamination water is contained in the same containers as equipment decontamination water.

Decontamination Modification (personnel and/or equipment): _____

_____

_____

Investigation/Remediation Derived Waste Handling Procedures: All decontamination water and wastes generated is contained pending the return of the laboratory results.

IX. ONSITE TRAINING

Received and understood task-specific Health and Safety Plan:

Name	Date

Attendees	Subject-Coverage	Date

X. EMERGENCY INFORMATION

		Phone No.
Ambulance:	UTC Emergency Communications Center	2222
Medical:	UTC Emergency Communications Center	2222
Police:	UTC Emergency Communications Center	2222
ERT:	UTC Emergency Communications Center	2222

Directions to the nearest medical facility: Go out the main gate and turn left onto Metcalf Road. Go to the end of Metcalf Road and turn right onto Monterey Highway. Go north on Monterey Highway and take the Bernal Road east exit. Head east on Bernal Road and turn right onto Highway 85 (north). Take Highway 85 to the Cottle Road exit and head south on Cottle Road. Go past the Light Rail exit and take the next left at the intersection of Cottle Road and Hospital Parkway. Santa Teresa Community Hospital is at the end of Hospital Parkway. In case of emergency, immediately call extension 2222. Do not transport a victim unless directed to do so by the UTC Emergency Communications Center. The UTC Emergency Communications Center will arrange transportation.

Site Resources

Water Supply: _____

Toilet Facility: _____

Telephone: _____

Emergency Contacts

		Phone No.
UTC Work Supervisor:	_____	_____
Site Health and Safety Supervisor:	Joe McKean	(408) 776-4262
Environmental Manager:	Tim Marker	(408) 776-6040
Security Manager:	Leonard Orton	(408) 776-6018

XI. EMERGENCY PROCEDURES

Site emergency procedure responsibilities for hazardous waste operations field activities:

Position/Title	Responsibility	Action
Emergency Communications Center	Communications	
UTC Emergency Coordinator	Direct Emergency Activities	As needed
UTC Emergency Response Team	Apply First Aid/CPR	As needed
UTC Emergency Response Team	Drive Emergency Vehicle	As needed

Emergency Procedures:

- If person exposed to hazardous material via skin: Call 2222. Soap wash and rinse for at least 15 minutes.
- If person exposed to hazardous material via inhalation: Call 2222. Remove from exposure. Artificial respiration/CPR as needed.
- If person exposed to hazardous material via ingestion: Call 2222.
- If person injured: Call 2222.
- If potential or actual fire or explosion: Call 2222.
- If radiation exposure: Not applicable.
- If contaminant spreads beyond site: Call 2222.
- Procedures for inclement weather: Field crew needs to be aware of potentially heavy rain and the possibility of flooding and lightning. If such conditions exist, field crew will evacuate the work area and notify the UTC project manager.
- Procedures for earthquake: Avoid overhead electrical wires and the objects that might topple over.

APPENDIX C

TASK-SPECIFIC HEALTH AND SAFETY PLAN EXAMPLE ADDENDUM/REVISION FORM

UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY ROCKETDYNE, SAN JOSE
TASK-SPECIFIC HEALTH AND SAFETY PLAN ADDENDUM/REVISION

Section: _____

Addendum: _____

Revision: _____

Effective Date: _____

Prepared by: _____

Approved by Supervisor: _____

Subject: _____

_____

_____

Addendum/Revision: _____

_____

_____

_____

_____

_____

_____

_____

APPENDIX D

CONTRACTOR CERTIFICATION OF TRAINING, MEDICAL, AND SAFETY REQUIREMENTS FORM

CONTRACTOR CERTIFICATION OF TRAINING, MEDICAL, AND SAFETY REQUIREMENTS

The Contractor acknowledges that it has read, understands, and has made available to its employees copies of 8 CCR 5144, USACE Executive Order 1440.2, and the provisions of American National Standards Institute Standard Z88.2 for respiratory protection. The Contractor certifies that the Contractor and its employees who will be engaged in environmental field activities at UTC shall meet all of the requirements of the above documents and will continue to meet the requirements while performing environmental field activities. This certification includes the following items:

- When required by 8 CCR 5192, the Contractor's employees have been examined by a licensed physician within the last 12 months and have been determined to be physically able to perform the work, to use respirators, and to use other protective equipment required for this assignment;
- The employees have received health and safety training for working on hazardous waste sites according to the provisions of 8 CCR 5192;
- The employees have received training for Hazard Communication according to the provisions of 8 CCR 5194;
- The employees have received training as part of the Contractor's Illness and Injury Prevention Program according to the provisions of 8 CCR 3203;
- When required by 8 CCR 5144, the Contractor has established and maintains a respiratory protection program;
- The Contractor has established and is maintaining a Health and Safety Program that complies with the provisions of 8 CCR 5192; and
- The Contractor maintains appropriate surveillance of the Work Area conditions and degree of employee exposure or stress.

The Contractor further certifies that only respirators approved or accepted by NIOSH/MSHA will be used by the Contractor's employees; that each of the Contractor's employees has been properly fitted to the respirators provided by the Contractor, including a test of the face-to-face piece seal; that the Contractor's employees have been trained in the proper use of respirators and their limitations; that the Contractor has provided its employees with written procedures covering the safe use of respirators in dangerous atmospheres; and that the Contractor has established a program for inspection, maintenance, and care of the respirators.

_____
Signature of Contractor

_____
Title

_____
Date

APPENDIX E

SITE HEALTH AND SAFETY PLAN SIGNATURE FORM

HEALTH AND SAFETY PLAN SIGNATURE FORM
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY ROCKETDYNE, SAN JOSE

I have read, understood, and agreed to comply with the provisions of the *Health and Safety Plan for United Technologies Corporation, Pratt & Whitney Rocketdyne, San Jose Hazardous Waste Operations*.

PRINTED NAME	SIGNATURE	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

APPENDIX F

FIELD ACTIVITIES HAZARD ANALYSES

FIELD ACTIVITIES HAZARD ANALYSES

1.0 GENERAL

It is anticipated that most of the hazardous waste operations will be conducted by independent contractors, while UTC personnel will be mainly performing auditing functions at hazardous waste field operations. As such, it is important for UTC employees to be aware of the hazards of the activities that they are auditing. In addition, UTC employees will follow the contractor's HASP when in a contractor's work area.

Hazardous waste operation field activities are routinely conducted at UTC. Descriptions of these activities and their associated hazards are presented in this appendix. Summaries of the hazards associated with each task and recommended control measures are also presented.

Several ratings are used in the following activity descriptions to estimate the potential for personnel exposure to hazards. Level D personal protection is required for activities with a low rating. Personnel should be ready to upgrade to a higher level of protection for activities with a moderate rating. A higher level of protection is required for activities with a high rating. Personnel usually enter the exclusion zone in Level C or B personal protection for activities with a high rating.

2.0 LOW-LEVEL HAZARDOUS ACTIVITIES

The potential for personnel exposure is low for activities in this section. A low level of personal protection is required upon first entry into the activity (Level D).

2.1 Bioremediation/Composting

Bioremediation includes the addition of air, nutrients, or bacteria into the ground to enhance biological degradation of contaminants in soil or groundwater. This process may include the use of pressurized injection systems.

The Station 0710 biosparge system injects air below the water table to stimulate aerobic degradation of diesel in groundwater by naturally occurring microorganisms. An air compressor provides air pressure to a series of sparge points.

Composting involves providing native microbes with a carbon source (the compost mixture). Mushroom compost, methyl soyate, or calcium magnesium acetate may be used to compost soil impacted with perchlorate. Through respiration, the microbes digest the carbon source while using available oxygen. The microbes that are in subsurface soils use up the available oxygen in the soil vapor. Some of the native microbes possess enzymes that are capable of breaking up perchlorate ion to form oxygen and chlorate ion. Those microbes continue to digest the carbon source using the oxygen from perchlorate. The chlorate ion quickly breaks down to chlorite ion and, then, to chloride ion.

Bioremediation		
Hazard		Recommended Control Measure
Chemical	Chemical contact from vapors during sampling activities	Gloves and safety glasses. Monitoring of breathing zone. Tyvek and respirator as needed.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Heavy equipment	Steel-toe boots and leather gloves.
	High pressure equipment	Gloves, safety glasses, and Tyvek.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable.
Biological	Spiders	Gloves.
	Wildlife	Avoidance.

2.2 Creek Monitoring and Stream Flow Measurements

Creek monitoring involves observations of the physical environmental conditions at each creek station, and the collection of water quality parameters and samples as part of the UTC Environmental Monitoring Program Plan (EMPP). Groundwater parameters and samples are collected by taking a grab sample from the stream using the supplied sample container. Stream flow measurements are done as part of the EMPP.

Creek Monitoring and Stream Flow Measurements		
Hazard		Recommended Control Measure
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Flash flood	Attention to the condition of the stream.
Biological	Spiders and ticks	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison oak	Barrier cream. Gloves and Tyvek.

2.3 Facility Decontamination

As part of the planned decommissioning activities, buildings and equipment will be decontaminated. Individual assessments will be conducted to identify specific risks and hazards associated with equipment and facilities. These assessments will use a combination of historical information, visual inspections, and analytical measurements to properly characterize the level of contamination. Once identified, equipment and facilities will be labeled as to their hazard level (1X, 3X, or 5X), certified, and documented. Equipment and facilities may be contaminated with energetic materials and other hazardous materials, including asbestos and/or lead.

Written decontamination plans will be prepared and followed. The plans will be consistent with P&W Work Instruction 23.06.13 *"Deactivation, Decontamination and Closure of Articles, Equipment and Facilities"* and P&W Work Instruction 23.07.67 "*Classification and Decontamination of Explosive Facilities and Equipment*." Only qualified and properly trained personnel will be used to decontaminate and decommission the articles, equipment and facilities.

Facilities Decontamination		
Hazard		Recommended Control Measure
Chemical	Chemical contact	Gloves and safety glasses. Tyvek if there is a potential for splash.
	Volatile chemical release	Monitoring of breathing zone. Gloves, Tyvek, and respirator as needed.
Physical	Slips, trips and falls	Remove faulty ladders and other physical hazards
	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Overhead hazards	Hardhat, as needed.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable.
	Heavy equipment	Steel-toe boots and leather gloves.
	High pressure equipment	Gloves, Tyvek, and face shield or goggles.
	Explosion	Safety glasses and face shields. Flame-retardant lab coats. Grounded shoes. Operational shields such as Lexguard.
	Confined space entry (if entry is necessary)	Monitoring of breathing zone for oxygen and VOCs, appropriate PPE, and personnel training.
Biological	Spiders and Tics	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison Oak	Barrier cream. Gloves and Tyvek.
	Sanitary sewage	Gloves and Tyvek. Personnel decontamination.

2.4 Groundwater Treatment System Monitoring

The influent and effluent air streams of a groundwater treatment system (GTS) are sampled to monitor the fate of contaminants from the groundwater and to monitor the mass of VOCs being emitted from the air stripping column. Vapor samples are collected at sampling ports on the GTS directly into Summa canisters, Tedlar bags, or plastic baggies.

Water samples are collected from the GTS to characterize the influent and to assess the effectiveness of the treatment system. The GTS influent water, GTS effluent water, and the carbon effluent water are collected at sampling ports.

Groundwater Treatment System Monitoring		
Hazard		Recommended Control Measure
Chemical	Chemical contact from splash during sampling activities	Gloves and safety glasses. Tyvek if there is a potential for splash.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable.
	Overhead hazards	Hardhat, as needed.
Biological	Spiders	Gloves.
	Wildlife	Avoidance.

2.5 Maintenance of Remediation Systems

Maintenance of groundwater and soil vapor extraction and treatment systems is performed at UTC. These systems transport and treat VOC, 1,4-dioxane, and perchlorate-contaminated groundwater and VOC vapors. The treatment unit at Station 0535 also treats PCB-contaminated groundwater. These units use particulate filters, granular activated carbon (GAC) to remove VOCs, 1,4-dioxane, and perchlorate, ion exchange resin to remove perchlorate, and HiPox to destroy 1,4-dioxane; the carbon and resin are periodically replaced. The pressurized lines and pumps may be repaired or upgrading from time to time.

Wet activated carbon removes oxygen from air causing a hazard to workers inside carbon vessels and enclosed or confined spaces. Monitoring of oxygen levels and confined space entry procedures will be followed before entering such an area.

Maintenance of Remediation Systems		
Hazard		Recommended Control Measure
Chemical	Chemical contact from splash during repair/service	Two pairs of gloves, safety glasses, and face shield. Tyvek, if there is a potential for splash. If there is a potential for splash from hydrogen peroxide, PVC or rubber is recommended for gloves, clothing, and footwear, while cotton, wool, and leather should be avoided.
	Volatile chemical release	Monitoring of breathing zone. Gloves, Tyvek, and respirator as needed.
Physical	Slips, trips and falls	Remove faulty ladders and other physical hazards
	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Overhead hazards	Hardhat, as needed.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable.
	Heavy equipment	Steel-toe boots and leather gloves.
	High pressure equipment	Gloves, Tyvek, and face shield or goggles.
	Cryogenic material (oxygen)	Safety glasses, face shield, long sleeve shirts, pants without cuffs, and steel-toe boots.
	Confined space entry (if entry is necessary)	Monitoring of breathing zone for oxygen and VOCs, appropriate PPE, and personnel training.
Biological	Spiders and Tics	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison Oak	Barrier cream. Gloves and Tyvek.

2.6 Oversight/Auditing

Oversight of environmental field activities should be done from outside the work area as much as possible to reduce potential exposure. When oversight is done within the work area, the health and safety requirements for the work activity also apply to the personnel doing the oversight.

Oversight Measurements		
Hazard		Recommended Control Measure
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
Biological	Spiders and ticks	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison oak	Barrier cream. Gloves and Tyvek.

2.7 Sampling of Solids by Hand

Drilling in soil may be performed using a hand auger with drive samples collected using a slam-bar and a liner. Waste bins of soil, ash, or solids may be sampled using a hand auger. Surface soils, ash, or solids may be sampled by scooping up the sample and transferring to sample bottles. Concrete is sampled by coring the concrete and breaking off chips from the center of the core for analysis. The surface of the concrete can also be sampled by chipping the concrete where VOCs are not of concern. Surfaces can be sampled by wiping a known amount of the surface area with clean gauze wetted with an appropriate solvent. The air quality of the working space is monitored with a PID and the results are written down in a field notebook.

All materials generated while augering are contained in 55-gallon drums that are labeled appropriately. All equipment is thoroughly decontaminated between sampling and before leaving the site. Decontamination of equipment is done by washing the equipment with an Alconox solution in a wash tub, followed by deionized water rinses. The decontamination water is contained for proper disposal.

Sampling of Solids by Hand		
Hazard		Recommended Control Measure
Chemical	Soil contact and vapor exposure during sampling activities	Gloves and safety glasses. Monitoring of breathing zone. Tyvek and respirator as needed.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Heavy equipment	Steel-toe boots and leather gloves.
	Confined space entry (if entry is necessary)	Monitoring of breathing zone, appropriate PPE, and personnel training.
Biological	Spiders and Tics	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison Oak	Barrier cream. Gloves and Tyvek.

2.8 Soil Vapor Sampling

Steel probes may be installed into the vadose zone by means of a hydraulic truck-mounted percussion hammer. The interface of the surface soil with the outside of the probe is sealed with a Bentonite slurry. The Teflon tubing from the steel probe is connected to a glass sampling bulb. The other end of the bulb is connected to a portable pump.

Soil vapor samples can also be collected directly into Summa canisters, Tedlar bags, or plastic baggies from soil vapor extraction vents and sampling ports on the soil vapor extraction units used for soil remediation.

Soil Vapor Sampling		
Hazard		Recommended Control Measure
Chemical	Chemical contact from vapor	Gloves and safety glasses.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable.
Biological	Spiders	Gloves.
	Wildlife	Avoidance.

2.9 Steam Cleaning

Steam cleaning may be performed to decontaminate augers, well casings, and vehicles. Steam cleaners may be mobile and brought to the work place, or may be at a fixed site.

Steam Cleaning		
Hazard		Recommended Control Measure
Chemical	Chemical contact from splash/vapor during activities	Gloves and safety glasses. Tyvek and face shield if there is a potential for splash.
Physical	High pressure equipment, steam	Gloves, safety glasses, and Tyvek.
	Heavy equipment	Steel-toe boots and leather gloves.

2.10 Storage Facility (2233) and Storage Magazine (0312) Activities

Hazardous waste operations are conducted at an onsite treatment, storage, and disposal facility (TSDF): the Storage Facility (2233) and the Storage Magazine (0312). The activities include (1) pick-up of hazardous wastes from storage sheds and drums/bins across the site with transfer to the Storage Facility (2233), (2) pick-up of energetic hazardous wastes from storage sheds across the site with transfer to the Storage Magazine (0312), (3) transfer of materials to lab packs and bins, (4) sampling of drums and bins, (5) labeling and manifesting of hazardous material containers, (6) inspection of hazardous waste storage areas such as the Storage Facility (2233), Storage Magazine (0312), and hazardous waste storage sheds, (7) cleanup of minor leaks and spills at hazardous waste storage areas, and (8) crushing drums at the Storage Facility (2233).

The chemical hazards that are present during environmental investigation and remediation activities may also be present during transfer, sampling, and storage of hazardous waste, especially when bins are used that are not airtight. Transfer and storage of process hazardous waste is normally done under a controlled environment where exposure is expected to be low. However, there is a greater variety of chemicals and a greater likelihood of high levels of chemicals in process waste. Therefore, it is important to be aware of the properties of the materials that are being handled and the condition of the storage containers before handling hazardous waste.

Note that some of the activities at the Storage Facility (2233) and Storage Magazine (0312) have low-level hazards such as audits, inventory, labeling, marking, transportation, loading and unloading of containers. However, open or direct contact with materials (spills, lab packs, or transfers) is moderately hazardous and requires two people to be present.

Storage Facility (2233) and Storage Magazine (0312) Activities		
Hazard		Recommended Control Measure
Chemical	Chemical contact from splash/vapor	Gloves, safety glasses, respirator, and Tyvek. Monitoring of breathing zone.
Physical	Slips, trips and falls	Remove faulty ladders and other physical hazards
	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Overhead hazards	Hardhat, as needed.
	Heavy equipment	Steel-toe boots and leather gloves.
	Noise	Hearing protection devices.
	Confined space entry (if entry is necessary)	Monitoring of breathing zone for oxygen and VOCs, appropriate PPE, and personnel training. Confined space permit required.
Biological	Spiders and Tics	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison Oak	Barrier cream. Gloves and Tyvek.

2.11 Water Sampling and Water Level Measuring

Extraction wells are connected to the GTS. Extraction wells are sampled using discharge ports at the wellhead. Static water levels of groundwater monitoring wells are measured using an electrical sounder. All monitoring equipment is decontaminated between wells using a deionized water rinse. The rinse water is contained for proper disposal. If floating product on groundwater is known or suspected, a battery-powered oil-water interface probe or detection tape is used to measure the depth and thickness of the floating layer before well purging. Groundwater monitoring wells are purged using either a submersible Grundfos stainless steel electric pump, a submersible pneumatic bladder pump, or a Teflon bailer.

Monitoring of the sanitary wastewater treatment, storage, and disposal system consists of observing physical conditions at the Wastewater Treatment Plant (WWTP) and holding ponds, recording influent and effluent data, and collecting and analyzing water quality samples as part of the EMPP. Groundwater monitoring wells located upgradient and downgradient of the WWTP and holding ponds are used to monitor groundwater for potential releases from the sanitary wastewater treatment, storage, and disposal system.

Besides WWTP monitoring wells, sampling of the influent and effluent of the Wastewater Treatment Plant is done as part of the EMPP. Influent and effluent composite samples may be collected hourly over a 24-hour period using a battery-operated ISCO composite sampler. The influent sample is collected at the headworks, and the effluent sample is collected at the effluent pump station. In addition, effluent grab samples are collected at the effluent pump station using a Teflon bailer and at any holding ponds receiving effluent from the WWTP using a large sterilized container (supplied by the laboratory). Grab sample temperature, pH, and dissolved oxygen are measured in the field.

All measuring and monitoring equipment are decontaminated between wells using a deionized water rinse. The rinse water is contained for proper disposal. The rinse water from Wastewater Treatment Plant Sampling can be disposed into the headworks of the system. Groundwater produced during well purging activities is either placed in labeled 55-gallon containers or in a truck-mounted 100-gallon polyethylene holding tank for proper disposal. Purged groundwater from wells with diesel product is placed in labeled 55-gallon containers for proper disposal.

A clean Teflon bailer is lowered into the well and a sample of the groundwater is pulled up to fill the sample containers. A grab groundwater sample can be obtained using a clean Teflon bailer lowered into the borehole where there is not a developed well.

A surface water sample is collected by using a container to scoop up the sample that is then deposited into the analytical sample containers. Dripping water may be sampled by placing the analytical sample container directly under the drip.

Water Sampling and Water Level Measurements		
Hazard		Recommended Control Measure
Chemical	Chemical contact from splash/vapors during sampling activities	Gloves and safety glasses. Tyvek if there is a potential for splash. Monitoring of breathing zone. Respirator as needed. A PID is used to monitor VOCs in the working space when first opening a well where the groundwater concentration of total VOCs is above 1 mg/L or unknown (a respirator is also used until the level of VOCs in the working space is measured to be less than 1 ppmv).
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable.
Biological	Spiders and ticks	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison oak	Barrier cream. Gloves and Tyvek.
	Sanitary sewage	Gloves and Tyvek. Personnel decontamination.

2.12 Well Development

Wells are developed by either bailing, airlift, surge block, pumping techniques, or a combination of techniques. Equipment choice is based on the expected volume of water to be purged, the recharge rate, and the depth of groundwater in the particular well.

All measuring and monitoring equipment are decontaminated between wells using a deionized water rinse. The rinse water is contained for proper disposal. Groundwater produced during well developing activities is either placed in labeled 55-gallon containers or in a truck-mounted 100-gallon polyethylene holding tank for proper disposal. Purged groundwater from wells with diesel product is placed in labeled 55-gallon containers for proper disposal.

Well Development		
Hazard		Recommended Control Measure
Chemical	Chemical contact from soil and vapor	Gloves and safety glasses. Tyvek if there is a potential for splash. Monitoring of breathing zone. Respirator as needed.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Heavy equipment	Steel-toe boots and leather gloves. Attention to the movement of equipment.
Biological	Spiders and ticks	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison oak	Barrier cream. Gloves and Tyvek.

3.0 MODERATELY HAZARDOUS ACTIVITIES

The potential for personnel exposure is moderate for activities in this section. Personnel should be ready to upgrade to a higher level of protection.

3.1 Demolition and/or Excavation

Demolition and excavation can entail the use of backhoes, excavators, front loaders, and other heavy equipment. There may be more than one piece of heavy equipment operating in an area simultaneously. It is important that personnel be aware of all operations that are occurring at a work location and physical hazards such as trenches. For work under UTC's control, approval must be obtained from UTC before excavating; the area will be assessed for underground utilities using known information and a utility locator, as necessary.

All equipment is thoroughly decontaminated between work locations and before leaving the site. The decontamination water is contained for proper disposal.

Demolition and/or Excavation		
Hazard		Recommended Control Measure
Chemical	Chemical contact from soil/vapor, exposure to building materials	Safety glasses during demolition. Dust control during demolition. Gloves when sampling. Monitoring of worker breathing zone and stockpiles. Tyvek and respirator as needed.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable. Underground and overhead utilities will be checked before commencement of activities.
	Overhead hazards	Hardhat.
	Heavy equipment	Steel-toe boots and leather gloves. Attention to use of equipment. Appropriate site control will be established before commencement of activities. Orange vests.
	Open excavation	Attention to the excavation area. Excavation will be adequately secured at the end of the day. If entry is necessary and excavation is greater than five feet deep, the excavation will be shored according to CAL/OSHA requirements. An UTC permit will be obtained before entering an excavation greater than 4 feet.
	Noise	Hearing protection devices.
	Explosion	Safety glasses and face shields. Flame-retardant lab coats. Grounded shoes. Operational shields such as Lexguard.
Biological	Spiders and ticks	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison oak	Barrier cream. Gloves and Tyvek.

3.2 Drilling Activities

Drilling activities may involve soil sampling, well or vent installation, and well destruction. Most drilling is performed using a truck-mounted hollow-stem auger. For work under UTC's control, approval must be obtained from UTC before drilling or hand-augering; the area will be assessed for underground utilities using known information and a utility locator, as necessary. Drive samples are collected using liners. A geologist logs the borings. Core samples or the cuttings are monitored with a PID and the results are written down in a field notebook. The response of any detection on the monitoring instrument from core samples requires the immediate monitoring of the air quality. Wells are destroyed by over-drilling the well casing or pressure-grouting.

All boreholes are sealed with grout and bentonite slurry within 24 hours of completion of drilling of that particular hole, unless a well is being installed. All materials generated while drilling are contained in 55-gallon drums and labeled appropriately. All equipment is thoroughly decontaminated between boreholes and before leaving the site. Decontamination of augers and drilling rigs is done by steam cleaning. The decontamination water is contained for proper disposal.

Drill Rig Activities		
Hazard		Recommended Control Measure
Chemical	Chemical contact from soil/vapor during sampling activities, exposure to silica in sand and cement	Gloves and safety glasses. Continuous monitoring of worker breathing zone. Tyvek and respirator as needed.
Physical	Uneven terrain	Steel-toe boots. Attention to the terrain.
	Electrocution	Attention to equipment use and inclusion of lockout/tagout procedures when applicable. Underground and overhead utilities will be checked before commencement of activities.
	Overhead hazards	Hardhat.
	Heavy equipment	Steel-toe boots and leather gloves. Attention to use of equipment.
	Noise	Hearing protection devices.
Biological	Spiders and ticks	Gloves, Tyvek tucked into boots and sealed with duct tape.
	Wildlife	Avoidance.
	Poison oak	Barrier cream. Gloves and Tyvek.