

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Site: VESTAL WATER SUPPLY WELL

Location: Vestal, New York

Prepared By: TETRA TECH FW, INC.

Date Prepared: May 29, 1996; Revised June 18, 2004

Version: 3

Revision: 0

Project Description: The start up and routine inspection of a water treatment facility. Monthly influent/effluent sampling, groundwater sampling; drilling; well installation, inspection, repair & abandonment activities; hand augering; and manual direct push soil probe operation.

Document ID # 96-0048

Waste types: Liquid; Solid

Characteristics: Volatile; Toxic

Status: Former Industrial Site

Background Review: Complete

Overall Hazard: Low to Moderate

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APPROVALS

By their signature, the undersigned hereby certify that this HASP has been reviewed and approved for use at Vestal Water Supply Well.

Project Manager
Heidemarie Roldan

Date

RAC II Program Manager
Grey Coppi, CIH, CSP

Date

RAC II Program, Health and Safety Manager
Grey Coppi, CIH, CSP

Date

1.0 INTRODUCTION

1.1 Purpose

This site-specific Health and Safety Plan (HASP) addresses the health and safety practices that will be employed by all site workers participating in activities at the Vestal Well Groundwater Treatment Facility, in Vestal, New York. The HASP takes into account the specific hazards inherent to the Vestal Well Groundwater Treatment Facility site activities and presents procedures to be followed by Tetra Tech FW, Inc., (TtFW) its subcontractors, and all other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. Activities performed under this HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926, and the TtFW Health and Safety Program. Many programs are referenced in this HASP but are not included. A copy of the HASP will be maintained at the site. Modifications to the HASP may be made with the approval of the PHSM using the Field Change Request Form found in Appendix A.

1.2 Scope

The HASP addresses the following activities:

- Influent/Effluent Sampling
- Groundwater Sampling
- Water Level Measurements
- Drilling, Well Installation
- Well Inspection, Repair & Abandonment
- Hand Augering
- Hand Operation of Direct Push Soil Probe
- Handling IDW
- Decontamination

1.3 Application

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- Client representatives;
- Federal, state or local representatives; and
- TtFW employees and subcontractors.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies the TtFW Project Organization.

2.1 Program Manager - William R. Colvin, PMP, P.G.

- Coordinates with the Project Manager to ensure HASP is developed in accordance with the RAC II Program Health and Safety Guidelines; and
- Has overall responsibility for Health and Safety at EPA RAC II project sites.

2.2 Project Manager - Heidemarie Roldan

- Ensures implementation of this program through coordination with the Program Health and Safety Manager;
- Participates in all incident investigations;
- Ensures that the HASP has all of the required approvals before site work is conducted;
- Has the overall project responsibility for project health and safety; and
- Ensures that the PHSM is informed of project changes which require modifications to the HASP.

2.3 Subcontractor Personnel

- Ensures that the HASP is implemented;
- Report any unsafe or potentially hazardous conditions and accidents/incidents to the Project Manager;
- Maintain knowledge of the information, instructions and emergency response actions contained in this HASP;
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions;
- Assists in the investigation of all accidents/incidents.
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Investigates all incidents;
- Acts as Emergency Coordinator;
- Ensures that all health and safety activities identified in this HASP are conducted and/or implemented;
- Ensures that proper personal protective equipment is utilized;
- Notifies Project Manager of all accidents/incidents;
- Coordinates with the Project Manager in any accident/incident investigation.

2.4 RAC II Program Health and Safety Manager (PHSM) - G. Coppi, CIH, CSP

- Provides for the development of the HASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves individuals who are assigned HSO responsibilities;
- Coordinates revisions of this HASP with field personnel; and

- Assists in the investigation of all accidents.

3.0 SITE HISTORY AND PROJECT DESCRIPTION

3.1 Location

The Vestal Well 1-1 site is located about 5 miles southwest of the city of Binghamton, NY on the south bank of the Susquehanna River and encompasses approximately 330 acres in the Town of Vestal, NY. The western portion of the site extends north of the Susquehanna River into the town of Endicott, NY and is bordered by NY Rte 17 on the south, Choconut Creek on the west and N. Main Street on the east. The eastern portion of the site is bordered by N. Main St. on the west by Rte 434, (Vestal Parkway) on the south, Rte 26 on the east and also extends north of the Susquehanna River into the town of Endicott.

3.2 Background and Site Description

The site is generally flat with an average elevation of 820 feet above mean sea level. However, the topography on the south side of Vestal Parkway rises rapidly to elevations of nearly 1500 feet where bedrock is exposed at ground surface. The site includes 3 municipal supply wells intended to provide drinking water to Vestal Water District #1. The western portion of the site includes the well field, a soccer field, fireman's training center, several wetlands, state-owned lands and a residential area between NY Rte 17 and the Susquehanna River. The eastern portion of the site contains an industrial park. Several active facilities are located within this area including Chenango Industries, Inc., Dataflow Inc., Vestal Asphalt Inc. (also known as Neil Guiles Asphalt), Rhinebuilt Auto Supply Service, Southern Tier Welding Supply, Garbade Construction, and North American Van Lines. There are also several business establishments along Rte 434 (Vestal Parkway), including a gas station and a dry cleaners. The RI for NYSDEC (Ecology and Environment Spring 1985) confirmed the presence of 8 volatile organic compounds in the groundwater southeast and east of Well 1-1. Highest concentrations were found near the Stage Rd area close by the Industrial Park. Lesser concentrations were found immediately west of Well 1-1 that was, at that time, essentially uncontaminated. In addition, existing data indicated potential VOC contamination in the soil and possible metal contamination in both soil and groundwater. Two wetland areas exist within the well site: bordering Chenango Industrial property on east is about 1/2 acre in size: discharges into the drainage ditch that eventually converges with a drainage ditch from the second wetlands area. This second area is about 2 acres large between Rte 434 (Vestal Parkway) and the railroad tracks draining into a ditch that runs parallel to the railroad track. Both areas are vegetated with cattails and sedges. A site layout map is included in Appendix B.

3.3 Site Characterization Data

In 1954, Well 1-1 was established to supplement the water supply for the hamlets of Vestal & Twin Orchards. Prior to 1954, Well 1-1 was upgraded for increased capacity, Well 1-2 came on-line and in 1965 Well 1-3 was put into operation. All densely populated areas are now served with public water from groundwater wells.

The town's well field is located in the Endicott-Johnson City primary aquifer. Contamination of Well 1-1 was detected in early 1980 following a spill of 1,1,1-trichloroethane from an underground storage tank at an IBM facility onto a shallow aquifer in Endicott in 1979. Monitoring of wells in neighboring communities determined the presence of VOC in Well 1-1. One municipal well located east of the study area also contained similar contaminants. Both Well 1-1 and 1-2 have been pumped to waste into the Susquehanna River since 1980. Initially combined on the NPL (Dec. 1982) these 2 well sites are now listed separately because indications are contamination from different sources. Due to its position and large pumping capacity Well 1-1 is being used as a "Curtain" well to intercept contaminant plume from reaching Wells 1-2 and 1-3. Water from Well 1-2 has a limited capacity for future peak demands and has recently been taken out of service due to sand cave-in; Well 1-3 is highly corrosive being presently controlled by treatment.

3.4 Site Related Incidents, Complaints, And Actions

Town of Vestal Reports 1983 (RJ Martin) indicated source of contamination somewhere in vicinity of Well 1-33, located in the industrial area along a section of Stage Rd. Highest levels of contaminants were found in Well 1-33. In addition, groundwater flow under static conditions as well as when wells 1-1, 1-2, and 1-3 were in operation, flowed similarly, i.e., northwesterly towards the Susquehanna River and Well 1-1. The potential sources of contamination included Chenango Industries a dump near Well S-2 and the Neil Guiles Asphalt Co., all located in the industrial park vicinity.

RI/FS for NYSDEC (1985) by ERE confirmed the presence of high levels of (mostly) chlorinated solvents in Well 1-33, in Wells S-6 and S-7 located near the Chenango Leach Field, aromatic hydrocarbons were found in Well S-2. EPA rejected FFS recommendation to construct water main between water district #1 and 5 stating that a sufficient capacity of good quality water still existed with no short-term threat of losing this capacity.

4.0 HAZARD ASSESSMENT

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under HASP Section 1.2.

4.1 Properties of Chemical Contamination

Through previous sampling routines, several volatile organic compounds have been identified in the groundwater such as trichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, and trans-1,2-dichloroethene. These compounds are not anticipated to pose an occupational exposure due to the low concentrations and due to the nature and scope of the

activities that are planned at the site. Additional information can be found in Table 4-1 and in Appendix C - Chemical Data Sheets.

4.2 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals, insects, and plants.

4.2.1 Animals

During site operations, animals such as dogs, cats, raccoons, skunks, mice and snakes may be encountered. Bites from these animals could cause poisoning, rabies, or serious injury requiring medical treatment. Workers shall use discretion and avoid all contact with animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting a licensed pest control technician.

4.2.2 Insects

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents (DEET for Ticks) when working in areas where insects are expected to be present. If insects are prevalent, efforts will be made to remove them from the site by contacting a licensed pest control technician.



Rocky Mountain Ticks

Left to Right: Female, Male

4.2.2.1 Lyme Disease

Since the site is located in the northeast, the potential for coming into contact with deer ticks exists. Lyme disease is caused by an infection from a deer tick, which is about the size of the head of a pin. During the painless tick bite, a microorganism (spirochete) may be transmitted into the bloodstream that may lead to Lyme disease. The effects of the disease vary from person to person, which often makes it difficult to diagnose. Typically, the incubation period ranges from two days to two weeks. In most cases, the infected area will resemble a red bulls-eye with concentric rings. Within the same period, flu-like symptoms may develop. If left untreated, the red ringed area will eventually fade and Lyme disease may further develop into an arthritis-like condition.

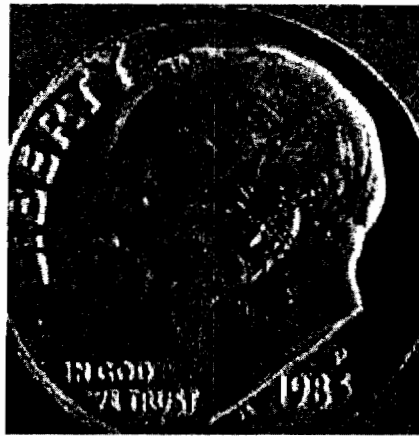
Table 4-1

CHEMICAL DATA

COMPOUND	CAS#	OSHA ACGIH PEL	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
1,1,1-Trichloroethane	71-55-6	350 ppm	Inh, Ing, Con	Irritant to eyes, skin; headache, weakness, exhaustion; CNS depression; poor equilibrium	Eyes, skin, CNS, CVS, liver	IP = 11.0 eV, BP= 165F Colorless liquid with a mild, chloroform-like odor.
Trichloroethene	79-01-6	50 ppm	Inh, Ing, Abs, Con	skin irritation, tremors, nausea, vomiting, dermatitis, insomnia	skin, eyes, liver, CNS	IP=9.45 eV, BP= 189F colorless liquid(unless dyed blue) with a chloroform odor.
1,1-Dichloroethene	75-35-4	5ppm (8-hr) 20 ppm STEL	Inh, Abs, Con, Ing	irritant to skin, throat, dizziness, nausea, vomiting, headache	skin, eyes, CNS, liver, kidneys	IP 10.00eV, colorless liquid or gas, with a mild chloroform like odor
1,1-Dichloroethane	75-34-3	100 ppm	Inh, Ing, Abs	skin irritation, CNS depression,	skin, eyes, liver, CNS	IP=11.06 eV, colorless oily liquid with a chloroform like odor
trans-1,2-Dichloroethene	111-44-4	200 ppm	Inh, Ing, Con	irritant to nose, throat	eyes, liver, CVS, respiratory	IP=11.00 eV, BP-165 F Colorless liquid with a chloroform odor

Abbreviations

- Abs = absorption
- BP = Boiling point
- CNS = Central Nervous System
- Con = skin contact
- CVS= Cardiovascular system
- eV = electron volts
- Ing = ingestion
- Inh = inhalation
- IP = Ionization Potential
- ppb = parts per billion



Left to Right: Deer tick, Black Legged tick



The changing appearance as the Deer tick engorges

Left to Right: Unengorged female, ¼ engorged, ½ engorged & fully engorged

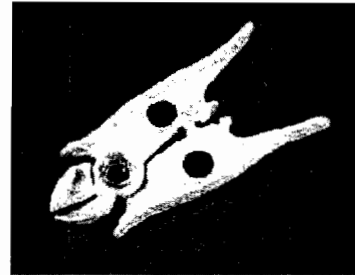
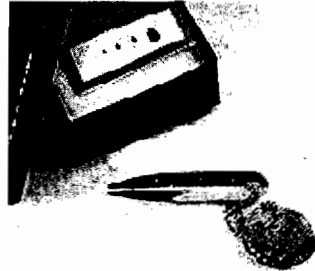
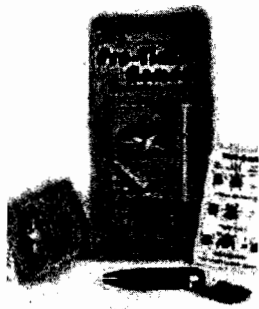
The best method for stopping insect borne disease is to avoid the bite. Control measures to prevent Lyme Disease include the following:

- Avoid dense or high brush, when possible
- Wear light colored clothing
- Spray DEET on your skin and Permethrin on clothing and work boots
- Tuck pant legs into socks and shirts into gloves, if possible
- Self/Buddy check of neck, hairline, groin and body after working in areas that may contain deer ticks
- Wear light colored tyvek or clothing
- Wear booties over work boots
- Look for ticks upon returning from field work
- Shower As Soon As Possible
- If a tick is found, remove it by pulling gently at the head with tweezers or better, the Pro-Tick removal system. (see below.)
- Report any of the above symptoms and all tick bites to the PHSM for evaluation. Employees bitten by deer ticks during the course of employment or one who finds an engorged tick on their body, will be given a medical examination.

Analysis of the tick for Spirochete may be warranted. Administration of antibiotic therapy may be warranted. Either action may be taken with the concurrence of the Corporate Medical Consultant.

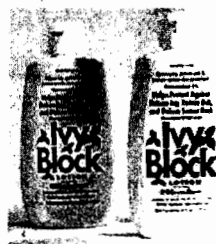
A source for Pro-Tick removal systems as well as Deet and Permethrin based lotions and sprays as well as sun screen can be found on-line at <http://www.scs-mall.com/store/>

“Pro-Tick” Tick Removal Device:



4.2.3 Plants

Plants such as poison ivy and poison oak may be prevalent at the site during certain times of the year. Workers will be trained to recognize these plants and to minimize contact with them. PPE may be worn by employees in order to reduce the potential for exposure. Pre-exposure topical lotions such as Tecuu may be applied prophylactically. “Ivy Block” is an easy to use non-prescription, pre-exposure lotion. You apply it like sunscreen to all exposed skin. It dries quickly and the active ingredient, bentoquatam, guards you against the harmful oil in poison ivy, oak and sumac. Remove lotion with running water and soap after risk of exposure has ended. Toll FREE ORDER LINE (800) 421-1223.



The use of Chlorox wipes to decontaminate reusable clothing to preclude exposure to poison ivy may prove valuable. Gloves should be worn during decontamination and removal of PPE.

4.3 Physical Hazards

Most safety hazards are discussed in the Activity Hazard Analysis found in Appendix D. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this HASP.

4.3.1 Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. A heat stress prevention program will be implemented when ambient temperatures exceed 70° F for personnel wearing impermeable clothing and for other personnel when the WBGT index exceeds the ACGIH TLVs. The following are the main elements of EHS 4-6.

- Selection of PPE to reduce the risk of heat related illness;
- Hydration;
- Cool rest areas;
- Engineering Controls (i.e. drenching);
- Administrative Controls (work schedules, acclimatization, work/rest regimens);
- PPE (i.e. ice vests);
- Monitoring (body core temperature, pulse rate).
- Identification of heat related illnesses (heat cramps, heat exhaustion, and heat stroke); and
- Employee training.

4.3.2 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The following are the main elements of EHS 4-6:

- PPE (i.e. hard hat liners, boot and glove liners, insulated coveralls);
- Engineering controls (i.e. heaters, wind shields, covered metal handles);
- Administrative controls (i.e. work/warm up schedule, acclimatization);
- Recognition of cold stress related injury (frostbite and hypothermia);
- Warm rest areas; and
- Employee training.

4.3.3 Noise

Noise is a potential hazard that may be associated with the operation of the treatment system, power tools, pumps and generators. The selection of fans and the installation of system components such as duct work were made such as not to create noise that will exceed the levels of permissible noise exposures as established by OSHA. Acoustical block units were installed in the blower room. Noise is not expected to pose an occupational exposure, however suspected high noise operations will be evaluated to determine if protective measures are warranted. Workers with 8-hour TWA exposures exceeding 85 dBA will be included in a Hearing Conservation Program.

Noise is also a hazard associated with drilling and well installation operations. Ear plugs should be worn when needed.

4.3.4 Hand Tool Usage

In order to complete the various tasks for the project, personnel will utilize hand tools. The use of hand tools can present a variety of hazards, including physical harm from being struck by flying objects, and being cut or struck by the tool.

4.3.5 Manual Lifting

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

4.3.6 Slips/Trips/Falls

The potential for slips/trips and falls is present during any field activities. The risk increases as work areas become cluttered, or if uneven terrain, water or debris is present. Exposure could result in worker injury.

4.3.7 Punctures/Cuts

Walking in areas of debris or scrap metal increases risk or possibility of puncture injuries or cuts. During sampling activities it will be necessary to handle tools and sample jars. Proper maintenance and inspection is necessary to prevent injury.

4.3.8 Splashing

During activities such as groundwater sampling, and water level measurements splashing is a potential hazard. This could result in water, debris or chemicals causing damage to the eye.

4.3.9 Underground Utilities

Striking underground utilities is a possible hazard whenever drilling is conducted. All steps will be taken to locate underground utilities as described in EHS 3-15 include the following:

- White lining the drilling areas.
- Calling a One-Call center for locating service.
- Obtaining a private locating service for private property or conducting a geophysical survey.
- Maintaining reference numbers in the site log and updating them.
- Using the checklists in EHS 3-15.

5.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. The AHAs follow the guidance of EHS 3-5. AHAs will be developed for all activities as necessary, prior to start-up. The AHAs will be used to train workers in proper safety procedures.

AHAs are included in Appendix D of this HASP. AHAs have been developed for the following phases of work:

- Mobilization/Demobilization
- Influent/Effluent Sampling
- Groundwater Sampling
- Water Level Measurements
- Well Drilling/Installation
- Well Development & Surveying
- Video Well Inspection
- Hand Augering
- Hand Operation of Direct Push Soil Probe
- Handling IDW
- Decontamination

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) specified in Table 6-1 represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on the selection rationale for each activity can be found under Section 4.0 and Appendix D - Activity Hazard Analyses. For the purposes of PPE selection, the PHSM and Project Manager are considered competent persons. The signatures on the front of the HASP constitute certification of the hazard assessment. For activities not covered by Table 6-1, the Project Manager will conduct the hazard assessment and select the PPE using the form provided in Appendix A and shall certify the assessment by signing the form. PPE selection will be made in consultation with the PHSM.

Modifications to initial PPE selection may also be made by the Project Manager in consultation with the PHSM using the same form. A written justification for downgrade will be provided to the PHSM for approval on a field change request form.

6.1 PPE Abbreviations

HEAD PROTECTION

HH = Hard Hat

HEARING PROTECTION

EP = ear plugs

HAND PROTECTION

LWG = Leather Work Gloves

Nit = Nitrile outer gloves

NitSur = Surgical nitrile (not latex)
inner gloves

EYE/FACE PROTECTION

PFS = Plastic Face Shield =

ANSI approved safety glasses
with side shields

BODY PROTECTION

WC= Work clothes (i.e., shirt
& long pants)

FOOT PROTECTION

STB = Leather work boots with
steel toe.

RESPIRATORY PROTECTION

Level D = No respiratory
protection required

**TABLE 6-1
PERSONAL PROTECTIVE EQUIPMENT SELECTION**

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATORY PROTECTION
Influent/ Effluent Sampling	HH	SG	STB	NitSur	WC	None	Level D
Groundwater Sampling	HH	SG	STB	NitSur	WC	None	Level D
Water level Measurements	HH	SG	STB	NitSur	WC	None	Level D
Mobilization/Demobilization	HH	SG	STB	LWG	WC	EP as needed	Level D
Well Installation/Drilling	HH	SG	STB	LWG, NitSur	WC	EP as needed	Level D*
Hand Augering	HH	SG	STB	LWG, NitSur	WC	None	Level D*
Hand Operation of Direct Push Soil Probe	HH	SG	STB	LWG	WC	EP as needed	Level D*
Well Repair & Development	HH	SG	STB	LWG, NitSur	WC	EP as needed	Level D*
Video Well Inspection	HH	SG	STB	NitSur	WC	None	Level D*
Handling IDW	HH	SG	STB	Nit	WC	None	Level D*
Decontamination of Equipment	HH	SG and PFS	STB	Nit or NitSur	WC	EP as needed	Level D

* Upgrade to Level C with OV cartridges if air monitoring readings exceed action level

6.2 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges will be removed and disposed after two (2) hours of use, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges will be removed and disposed after one (1) hour of use.

Respirators will not be stored at the end of the shift with contaminated cartridges left on. Cartridges will not be reused the next day.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding site contaminants;
- Using the rules of thumb provided by the American Industrial Hygiene Association (AIHA);
- Total airborne concentration of contaminants is anticipated to be less than 200 ppm
- The humidity is expected to be less than 85%; and
- Desorption of contaminants (including those with poor warning properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (i.e., overnight) and result in a non-use exposure.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors have been considered when developing the cartridge change-out schedule.

- Type of contaminant(s);
- Contaminant concentration;
- Relative humidity;
- Breathing rate;
- Temperature;
- Changes in contaminant concentration, humidity, breathing rate and temperature;
- Mixtures of contaminants;
- Accuracy in the determination of the conditions;
- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration;
- Age of the cartridge;
- Condition of the cartridge and respirator;
- Respirator and cartridge selection and respirator fit;
- Respirator assembly, operation, and maintenance;
- User training, experience and medical fitness;
- Warning properties of the contaminant; and
- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or back-up indication for cartridge change-out.

Final Breakthrough Time Calculation

When using a Facepiece with a Cartridge under the following conditions:

Chem 1 at Conc:

at

Chem 2 at Conc:

at

Chem 3 at Conc:

at

Breakthrough Chemical PEL (ppm):

Temperature:

Relative Humidity:

Pressure:

Breathing Rate:

Breakthrough Concentration:

Based on the estimated Breakthrough Time at which cartridges need to be replaced is: minutes

MSA Cartridge Life Expectancy Calculator™

7.0 AIR MONITORING

The following sections contain information describing the types, frequency and location of real-time air monitoring.

7.1 Real-Time Air Monitoring

This section addresses the real-time air monitoring that will be conducted including instrumentation, selection, frequency and location of monitoring.

7.1.1 Work Area

Table 7.1 provides the instrumentation, frequency and location of the real time air monitoring for each main activity. Table 7.2 lists the Real Time Air Monitoring Action Levels to be used in all work areas.

The following instruments will be used for work area monitoring:

- Photo-Ionization Detector (PID), 10.6 eV (1,1 DCE as indicator compound) or Flame-Ionization Detector (FID); and
- Combustible gas/Oxygen Meter (CGI/O₂), MSA model 360 or equivalent.

In general the approach for determining when an upgrade in the level of respiratory protection is warranted is to upgrade when real-time air monitoring indicates that ½ of the PEL is reached. This approach is conservative since the PEL is based upon an 8-hour TWA exposure and not an instantaneous exposure. Other factors include the following:

- The PID/FID is measuring total organic vapors and not a specific compound; and
- The PID/FID response factor is different for each organic vapor.

The CGI/O₂ meter will be used to monitor for oxygen and combustible gases in the basement of the old pump house (where influent samples are collected) and at the borehole or well head.

7.2 Data Quality Assurance

7.2.1 Calibration

Instrument calibration shall be documented and included in a dedicated safety and health log book or on separate calibration pages. All instruments shall be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

TABLE 7-1

FREQUENCY AND LOCATION OF AIR MONITORING

ACTIVITY	AIR MONITORING INSTRUMENT	FREQUENCY AND LOCATION
Sampling Influent	CGI/O ₂ meter	Prior to entering basement. Monitor oxygen first, then combustible gases. Measure at 4 foot intervals starting from the ground level inside the building.
Sampling Influent/Effluent	FID/PID	Initially and at 15 minute intervals, Breathing Zone, well head
Groundwater Sampling	FID/PID	Initially and at 15 minute intervals, Breathing Zone, well head
Water Level Measurements	FID/PID	Initially and at 15 minute intervals, Breathing Zone, well head
Well Drilling/Installation	FID/PID	Initially and at least every 15 minutes thereafter, Breathing Zone & borehole/well head.
	CGI/O ₂ meter	Initially and at least every 15 minute thereafter, Breathing Zone & borehole/well head.
Hand Augering	FID/PID	Initially and at 15 minute intervals, Breathing Zone, well head
Hand Operation of Direct Push Soil Probe	FID/PID	Initially and at least every 15 minutes thereafter, Breathing Zone & borehole/well head.
	CGI/O ₂ meter	Initially and at least every 15 minute thereafter, Breathing Zone & borehole/well head.
Well Repair & Development	FID/PID	Initially and at least every 15 minute thereafter, Breathing Zone & borehole/well head.
Video well inspection	FID/PID	Initially and at least every 15 minute thereafter, Breathing Zone & borehole/well head.
Handling IDW	FID/PID	Initially and at least every 15 minute thereafter, Breathing Zone.

TABLE 7-2

REAL TIME AIR MONITORING ACTION LEVELS

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
FID/PID	Breathing Zone	<2.5 ppm above background	No respiratory protection required	Based on 1/2 the OSHA PEL for 1,1-dichloroethene (5 ppm).
FID/PID	Breathing Zone	>2.5-20 ppm above background	Upgrade to Level C	Based on 1/2 the OSHA PEL for 1,1-dichloroethene (5 ppm) & STEL of 20 ppm.
CGI/O ₂ meter	Inside basement of old pump house	19.5 - 22 % O ₂	No respiratory protection required	Permit-required confined space conditions do not exist.
CGI/O ₂ meter	Inside basement of old pump house	< 19.5 % O ₂ or > 22 % O ₂	Do not enter basement, contact PHSM	Oxygen deficiency, permit-required confined space conditions exist.
CGI/O ₂ meter	Inside basement of old pump house	0 - 5 % LEL	No respiratory protection required	Permit-required confined space conditions do not exist.
CGI/O ₂ meter	Inside basement of old pump house	> 5 % LEL	Do not enter basement, contact PHSM	Potential for explosive atmosphere, permit-required confined space conditions exist
CGI/O ₂ meter	Borehole/well head	0 - 10% LEL	No hazard	Less than 10% LEL
CGI/O ₂ meter	Borehole/well head	> 10% LEL	Stop work, leave area & allow to vent	Possible explosion hazard

7.2.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the Project Superintendent for reference.

7.2.3 Data Review

Subcontractor personnel will interpret all monitoring data based on Table 7-2 and his/her professional judgment. They shall review the data with the PHSM to evaluate the potential for worker exposure. Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PHSM.

7.3 Other Monitoring

Temperature Extremes monitoring will be conducted in accordance with EHS 4-6.

8.0 ZONES, PROTECTION AND COMMUNICATION

8.1 Site Control

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. During groundwater sampling and water level measurements a three-zone approach will be utilized. It shall include an Exclusion zone (EZ), Contamination Reduction zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

This project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists, will only be allowed access after providing the Project Superintendent with proper training and medical documentation.

The following shall be used for guidance in preliminary zone designations.

Support Zone - The SZ is an uncontaminated area (treatment plant and any trailers, etc.) that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

Contamination Reduction Zone - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for Exclusion Zone entry and egress in addition to access for heavy equipment and emergency support services.

Exclusion Zone - All activities that may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an exclusion zone (EZ). This zone will be clearly delineated by cones, tapes or other means. The Project Superintendent may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site Project Superintendent allowing adequate space for the activity to be completed, field members and emergency equipment.

8.2 Contamination Control

8.2.1 Personnel Decontamination Station

Due to the limited site activities, personnel decontamination shall be limited to removing PPE, bagging and labeling for proper disposal. All employees shall wash their hands and face prior to eating, drinking or smoking.

8.3 Communications

Telephones - A telephone will be located in the water treatment plant for communication with emergency support services/facilities.

An automatic telephone dialer is installed with the facility's alarm system that automatically dials the preprogrammed operator number and reports the condition. A voice message "alarm" could mean any equipment failure. Another voice message is "chlorine leak."

Hand Signals - Hand signals shall be used by field teams along with the buddy system. They shall be known by the entire field team before operations commence and their use covered during site-specific training. Typical hand signals are the following:

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's waist.	Leave the area immediately, no debate.
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

9.0 MEDICAL SURVEILLANCE PROCEDURES

All Tetra Tech FW, Inc. employees and subcontractor personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a medical surveillance examination in accordance with 29 CFR 1910.120(f).

The TtFW Corporate Medical Surveillance Program is described in detail in EHS 4-5. The Corporate Medical Consultant is WorkCare located in California. Dr. Peter Greaney is Board certified in occupational medicine.

9.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the Project Superintendent before an employee can work in the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the PHSM in consultation with the Corporate Medical Consultant and the Project Superintendent if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

9.2 Medical Data Sheet

A medical data sheet is provided in Appendix A. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

10.0 SAFETY CONSIDERATIONS

10.1 General Health and Safety Work Rules

A list of work rules and general safe work practices were included in the TtFW Health and Safety Procedure EHS 3-6. The work rules will be posted in a conspicuous location at the site.

10.2 Sampling

Safety considerations during the site sampling will involve a visual sweep of the site and taking care to avoid areas of obvious contamination or unsafe walking surfaces due to uneven terrain. Personnel will wear appropriate PPE with nitrile inner gloves to minimize contact with contaminants. Real-time air monitoring shall be conducted. Sample containers shall be wiped off to prevent contamination from being spread. The field team will maintain line of sight with each other, use the buddy system at all times and maintain verbal communications.

10.3 Old Pump House

The basement of the old pump house is considered a confined space. The basement is about eight feet below the pump house ground level floor and there is no ventilation. This location is where the influent samples will be collected. It is not anticipated that a permit will be required to enter the basement as the likelihood for encountering a hazardous atmosphere is remote. Monitoring shall be performed as detailed in Section 7 of this HASP prior to entering the basement to ensure that a hazardous atmosphere (which would require a confined space entry permit) does not exist.

Access to the basement is from a fixed ladder inside the old pump house. Care should be taken when approaching the ladder access as there is inadequate guarding to prevent a worker from falling down the opening. Hard hats will be required to prevent hitting the back of one's head on the concrete as the ladder is ascended/descended. Equipment should not be carried in the hands while using the ladder, but rather should be lowered down into the basement.

10.4 General Construction Hazards

The following is a list of applicable safety considerations for the major tasks. Further information is provided in the specific Activity Hazard Analysis and the specific TtFW EHS Procedures.

- Heavy Equipment/Drill Rigs
- Hand and Power Tool Usage
- Fire Hazards
- Electrical Equipment
- Slips/Trips/Falls
- Punctures/Cuts
- Lifting/Materials Handling
- Handling Storage of Fuels.

10.5 High Loss Potential Hazards

Activities to be conducted at the Site will involve operations that have the potential for a serious injury to occur, including the following:

- Drilling/Intrusive activities
- Contact with underground utility lines
- Exposure to energized electric lines
- Heavy Equipment/Drill Rigs

10.5.1 Drill Rigs

Follow TtFW EHS 6-2, "Drill Rigs" and use the "Drill Rig Inspection Checklist" for daily inspections (see Appendix A).

10.5.2 Underground Utilities

Follow TtFW EHS 3-15, "Underground Utilities."

11.0 WASTE DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed by the Regulatory Compliance Specialist.

12.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff are essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

12.1 Responsibilities

12.1.1 Program Health and Safety Manager (PHSM)

The PHSM for the Vestal Water treatment plant is Grey Coppi, CIH, CSP. The PHSM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The PHSM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

12.1.2 Emergency Coordinator

The Emergency Coordinator is the Water Treatment Plant Operator.

The Emergency Coordinator shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the Emergency Coordinator will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The Emergency Coordinator shall locate emergency phone numbers and identify hospital routes prior to beginning work on site. The Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator shall implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action. The Emergency Coordinator is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The Emergency Coordinator is required to immediately notify the PHSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the PHSM can notify OSHA within the required time frame. The PHSM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of \$500 within 24 hours.

12.1.3 Site Personnel

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency.

12.2 Communications

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

12.2.1 Telephone Communications

A telephone will be maintained in the water treatment facility. An automatic telephone dialer is installed with the facility's alarm system that automatically dials the preprogrammed operator number and reports the condition. A voice message "alarm" could mean any equipment failure. Another voice message is "chlorine leak."

12.2.2 Air Horns

Air horns will be used to alert site personnel of emergencies. The following signals will be used:

- One continuous blast - site evacuation
- Two short blasts - shut down equipment, clear radio channels, await instructions
- Three short blasts - injured employee, first-aid providers respond

The procedure to activate the air horns consists of depressing the air horn button or switch while pointing it in the direction of the area to be signaled. Air horns should be tested at least monthly to ensure that they are working properly.

12.2.3 Hand Signals

Hand signals will be employed by downrange field teams where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

12.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during remedial activities at the site, Table 12-1 will be posted prominently in the field office and in all places where telephone service is available.

A route map from the site to the nearest hospital is provided in Appendix B. This map will be posted adjacent to the above emergency telephone numbers in the field office and in all places where telephone service is available. It should also be placed in all on site vehicles.

12.4 Pre-emergency Planning

TtFW will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency.

12.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the PM immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit:	The support zone
Emergency Eye Wash:	Water pump room-meets ANSI std Z.358-1998 for a 15 minute continuous flow
Drench Showers:	Water pump room and Well house operating floor

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

Only in **non-emergency** situations will an injured person be transported to the hospital by means other than an ambulance.

Table 12-1
Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police	Vestal	911
Fire	Vestal	911
Hospital (Primary)	Wilson Memorial Regional Hospital	(607)763-6000
Hospital (Secondary)	Lourdes Hospital	(607)798-5111
Ambulance	Vestal	911
Heidemarie Roldan Project Manager	Tetra Tech FW	(973)- 630-8197
Grey Coppi, CIH, CSP PHSM	Tetra Tech FW	(973) 630-8101
Poison Control Center		(607) 737-4357
Medical Consultant (Dr. Greaney)	WorkCare	(800) 455-6155
Chemtrec		(800) 424-9300
National Response Center		(800) 424-8802

TABLE 12-2

DIRECTIONS TO HOSPITAL

Primary Hospital Route to Wilson Hospital: North Main St. or Rte 26 South to Vestal Parkway make left onto Vestal Parkway and take exit for Rte 201 North. Continue on Rte 201 North across the C. Fred Johnson Memorial Bridge until you reach a traffic circle. Proceed half way around the circle and take Floral Ave. exit. Continue on Floral Ave. for 8 blocks. Turn left onto Baldwin Street and hospital will be approximately 1/4 mile. Follow signs to the emergency room. See Section I - Emergency Phone Numbers, Wilson Hospital, 36 Baldwin Street, Binghamton, NY 13790.

Backup Hospital Route to Lourdes Hospital: North Main Street or Rte 26 South to Vestal Parkway, make left onto Vestal Parkway and take exit for Rte 201 North. Continue on Rte 201 North across the C. Fred Johnson Memorial Bridge until you reach a traffic circle. Bear right onto Riverside Drive heading east towards Binghamton. Hospital will be approximately one mile on right hand side. Follow signs for Emergency Entrance.

12.6 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air horn will be sounded on the site. The horn will sound continuously for one blast, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the designated meeting location.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. A map showing evacuation routes, meeting places, and location of emergency equipment will be posted in the treatment plant and used during site-specific training.

12.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

12.7.1 Fire Prevention

The major workplace fire hazards are bulk storage of chlorine gas.

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials, per MSDSs;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located in the treatment plant and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

A map of all fire extinguisher locations shall be made upon arrival at the facility and will be displayed in a prominent position.

Two smoke sensors are located within the water treatment facility. The first is located within the blower room and the second is located within the finished water pump room. Both are equipped with audible alarms and lights.

Type C-dry chemical fire extinguishers are located within the finished water pump room, blower room, chlorine room, and are on both levels of the well house.

12.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE

CONTACT: Use copious amounts of water. Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.

INHALATION: Move to fresh air. Decontaminate and transport to hospital or local medical provider.

INGESTION: Decontaminate and transport to emergency medical facility.

PUNCTURE WOUND

OR LACERATION: Decontaminate and transport to emergency medical facility.

12.9 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or postponed. The EC will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

12.10 Accident/Incident reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- Project Health and Safety Manager, Grey Coppi, CIH, CSP
- Project Manager, Heidemarie Roldan
- The employer of any injured worker who is not a TtFW employee.

Written confirmation of verbal reports are to be submitted within 24 hours. The accident/incident report is found in the TtFW EHS 1-7. If the employee involved is not a TtFW employee, his employer shall receive a copy of the report.

12.11 Adverse Weather Conditions

In the event of adverse weather conditions, the Project Superintendent or designee will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);
- Limited visibility (fog);
- Potential for electrical storms; and
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The Project Superintendent or designee will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

12.12 Spill Control And Response

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed as hazardous waste. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

The following steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- Make sure all unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the PHSM;
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use nonsparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and
- Remove all surrounding materials that can react or compound with the spill.

A chlorine gas detector, electronic system is designed to rapidly detect and warn of hazardous chlorine gas concentrations in the chlorine room. The unit consists of a gas sensor and alarm module. The sensor is located in the hazard area. The alarm has the control switches and two adjustable alarm points within 1 to 10 ppm chlorine concentrations. It is also equipped with a power failure alarm

A centrifugal fan is installed in the chlorine room to exhaust the room in case of a chlorine leak. The blower room and the finished water room are also equipped with exhaust fans.

12.13 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on-site.:

- Industrial first aid kit;
- Burn kit;
- Portable eye washes (one per field team);
- Emergency 15 minute continual flow eye wash;
- Air horns (one per field team);
- Fire extinguishers (one per vehicle and located at work stations);
- Fire Blanket; and

- Absorbent Material.

12.14 Postings

The following information shall be posted at various, conspicuous locations throughout the site:

- Emergency telephone numbers; located next to all phones;
- Diagrams showing the location of fire extinguishers and emergency equipment; and,
- Emergency exit, evacuation routes and staging area

12.15 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers;
- Refilling medical supplies;
- Recharging eyewashes and/or showers;
- Replenishing spill control supplies; and,
- Replacing used air horns.

13.0 TRAINING

13.1 General Health and Safety Training

In accordance with TtFW corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

13.1.1 Three Day Supervised On the Job Training

In addition to the required initial hazardous waste operations training, each employee shall have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

13.2 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for field work. The training will cover a review of 1910.120 requirements and related company programs and procedures

13.3 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

13.4 On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily during plant operations, sampling visits and inspections by the Project Superintendent to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the Project Superintendent to periodically update the crews on monitoring results. Prior to starting any new activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

13.5 First Aid And CPR

The Project Superintendent will identify those individuals requiring first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association.

13.6 Hazard Communication

Hazard communication training will be provided in accordance with the requirements contained in the TtFW EHS 4-2.

14.0 LOGS, REPORTS AND RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

14.1 Field Change Request

A Field Change Request is to be completed for initiating a change to the HASP. The PHSM and Project Manager or designee approval is required. The original will be kept in the project file. Approved changes will be reviewed with affected field personnel at a safety briefing.

14.2 Medical and Training Records

Copies or verification of training (40 hour, 8 hour, supervisor, site specific training and documentation of three day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained on-site. Records for all subcontractor employees will also be kept on-site. All employee medical records will be maintained by the Corporate Medical Consultant - WorkCare in accordance with TtFW EHS 1-8.

14.3 Weekly Safety Reports

The Project Superintendent shall complete and submit weekly safety reports to the PHSM. The report is provided in Appendix A.

14.4 Accident/Incident Reports

The incident reporting and investigation during site work will follow TtFW EHS 1-7.

14.5 Health and Safety Logbooks

The Project Superintendent will maintain logbooks during site work. The daily site conditions, personnel, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

14.6 Hazard Communication Program/MSDS

Material Safety Data Sheets (MSDS) will be obtained for applicable substances used on-site and included in the site hazard communication file. The hazard communication program will be maintained on-site in accordance with 29 CFR 1910.1200 and TtFW EHS 4-2.

APPENDIX A
HEALTH & SAFETY FORMS

TABLE 6-1

PERSONAL PROTECTIVE EQUIPMENT SELECTION

ACTIVITY:

TASK	HEAD	EYE/FACE	EEB/H	HANDS	BODY	HEARING	RESPIRATORY PROTECTION



Tetra Tech FW, Inc.

MEDICAL DATA SHEET

The brief medical data sheet shall be completed by all on-site personnel and will be kept in the Support Zone by the HSO as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project: _____

Name: _____ Home Telephone: _____

Address: _____

Age: _____ Height: _____ Weight: _____ Blood Type: _____

Name and Telephone Number of Emergency Contact: _____

Drug or Other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide A Check List Of Previous Illnesses: _____

What Medications Are You Presently Using? _____

Do You Have Any Medical Restrictions? _____

Name, Address, And Phone Number Of Personal Physician: _____

TETRA TECH FW, INC.
WEEKLY HEALTH AND SAFETY REPORT

Project Name: _____	
Location: _____	
Delivery Order No. _____	
SITE INFORMATION	INJURIES AND ILLNESSES
Week Ending _____	Yes _____ No _____
Hours Worked _____	Describe and attach reports: _____
Level of Protection B__ C__ D__	_____
MAJOR ACTIVITIES CONDUCTED THIS WEEK: (drum handling, sampling, excavation, abatement/T&D, etc.) _____ _____ _____	
SIGNIFICANT EVENTS THIS WEEK: (regulatory visits, equipment malfunctions, process start-up or shutdown): _____ _____ _____	
FUTURE ISSUES: (schedule, manpower allocation, monitoring equipment, other resources needed) _____ _____ _____ _____ _____ _____	
SITE AUDIT/INSPECTIONS CONDUCTED (describe outstanding findings and attach results)	Yes _____ No _____
_____ _____ _____ _____	

AIR MONITORING:						
Real Time						
Major Activity	Location(s)	Worker Occupation	FID/PID Range	CGI/O2 Range	PDM Range	Other
PERSONAL AIR MONITORING						
Analyte	Activity Monitored	Occupation	Location	Result	Type of Sample*	
SUBCONTRACTORS ON SITE						
Company Name	Task or Function	Return to Site Next Week (Y/N)				
Health and Safety Officer - Signature _____						Date _____

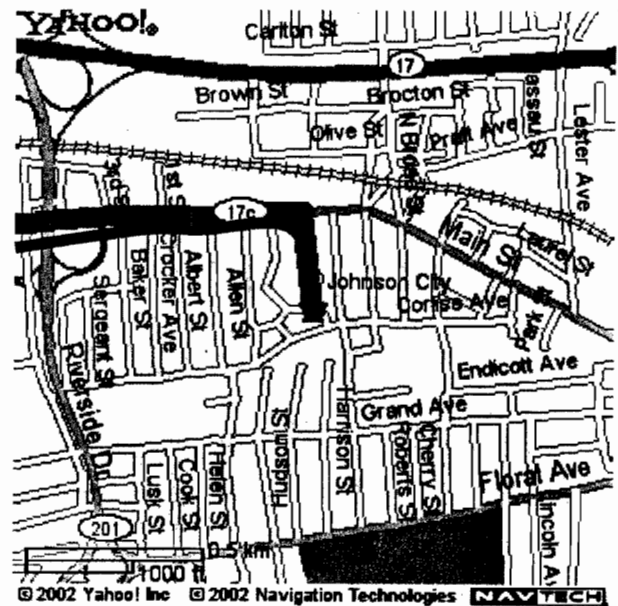
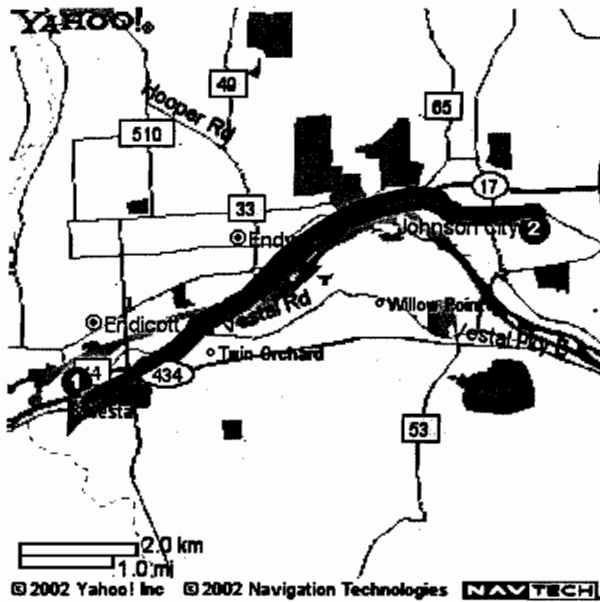
APPENDIX B

SITE MAPS AND HOSPITAL ROUTE

Wilson Memorial Regional Hospital

57 Harrison St., Johnson City, NY

Phone: (607) 763-6000



Directions

- | | Miles |
|--|--------------|
| 1. Start on N MAIN ST | 0.3 |
| 2. Turn Left on VESTAL PKY E | 0.7 |
| 3. Turn Right towards RT-26 NORTH | 0.2 |
| 4. Continue on RT-26 NORTH | 0.1 |
| 5. Take the RT-17 EAST ramp towards BINGHAMTON | 0.3 |
| 6. Merge on RT-17 EAST | 2.2 |
| 7. Take the RT-17C EAST exit towards WESTOVER , exit #69 | 0.2 |
| 8. Continue on RT-17C EAST | 2.3 |
| 9. Turn Right on HARRISON ST | 0.2 |

APPENDIX C
CHEMICAL DATA SHEETS

APPENDIX D

ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSES

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
<p>Project: Vestal Well Site Activity: General Site Hazards</p> <p>1. General Site Hazards</p>	<p>a. Back Injuries</p> <p>b. Slips/Trips/Falls</p> <p>c. Vehicular Traffic</p> <p>d. Overhead Hazards</p> <p>e. Dropped Objects</p> <p>f. Noise</p> <p>g. Eye Injuries</p> <p>h. Heavy Equipment (overhead hazards, spills, struck by or against)</p>	<p style="text-align: right;">Location: Vestal, New York</p> <p>a. Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques; ◆ Mechanical devices should be used to reduce manual handling of materials; ◆ Team lifting should be utilized if mechanical devices are not available. <p>b. Slips/Trips/Falls</p> <ul style="list-style-type: none"> ◆ Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards. <p>c. Vehicular Traffic</p> <ul style="list-style-type: none"> ◆ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. <p>d. Overhead Hazards</p> <ul style="list-style-type: none"> ◆ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ◆ All ground personnel will stay clear of suspended loads. ◆ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ◆ All overhead hazards will be identified prior to commencing work operations. <p>e. Dropped Objects</p> <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn. <p>f. Noise</p> <ul style="list-style-type: none"> ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers <p>g. Eye Injuries</p> <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. <p>h. Heavy Equipment</p> <ul style="list-style-type: none"> ◆ Equipment will have seat belts. ◆ Operators will wear seat belts when operating equipment. ◆ Do not operate equipment on grades that exceed manufacturer's recommendations. ◆ Equipment will have guards, canopies or grills to protect from flying objects. ◆ Ground personnel will stay clear of all suspended loads. ◆ Spill and absorbent materials will be readily available.

Project: Vestal Well Site
 Activity: General Site Hazards

Location: Vestal, New York

MAJOR STEPS

POTENTIAL HAZARDS

PROTECTIVE MEASURES/CONTROLS

		<ul style="list-style-type: none"> ◆ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ◆ Ground personnel will stay out of the swing radius. ◆ Eye contact with operators will be made before approaching equipment. ◆ Operator will acknowledge eye contact by removing his hands from the controls. ◆ Equipment will not be approached on blind sides. ◆ All equipment will be equipped with backup alarms.
	<p>i. Struck by vehicle/equipment</p> <p>j. Struck by tools</p> <p>k. Caught in/on/between</p> <p>l. Contact with Electricity/Lightening</p>	<p>i. Struck by</p> <ul style="list-style-type: none"> ◆ Be aware of heavy equipment operations. ◆ Keep out of the swing radius of heavy equipment. ◆ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times. ◆ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ◆ Ground personnel will not stand directly behind heavy equipment when it is in operation. ◆ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! <p>j. Struck by tools</p> <ul style="list-style-type: none"> ◆ Cut resistant kevlar work gloves will be worn when dealing with sharp objects ◆ All hand and power tools will be maintained in safe condition ◆ Guards will be kept in place while using hand and power tools <p>k. Caught in/on/between</p> <ul style="list-style-type: none"> ◆ Workers will not position themselves between equipment and a stationary object. ◆ Workers will not wear long hair or jewelry if working with tools/machinery. <p>l. Contact with Electricity/Lightening</p> <ul style="list-style-type: none"> ◆ All electrical tools and equipment will be equipped with GFCI. ◆ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ◆ All electrical work will be conducted by a licensed electrician. ◆ All utilities will be marked prior to excavation activities proceeding, follow EHS 3-15 "Underground Utilities". ◆ All equipment will stay a minimum of 15 feet from overhead energized electrical lines (50 kV). this distance will increase 4 inches for each 1 kV above 50 kV. ◆ Outside work will stop on the approach of an electrical storm. Work will not resume until 30 minutes after the last report of lightning.

Project: Vestal Well Site
Activity: General Site Hazards

Location: Vestal, New York

MAJOR STEPS EQUIPMENT USED	POTENTIAL HAZARDS INSPECTION REQUIREMENTS	PROTECTIVE MEASURES/CONTROLS TRAINING REQUIREMENTS
<ol style="list-style-type: none">1. Heavy Equipment2. Appropriate PPE3. First Aid Kits4. Portable Eyewash	<ol style="list-style-type: none">1. Inspections will be performed on equipment prior to each use.2. Inspections will be performed on PPE prior to each use.3. Weekly inspections will be performed on first aid kits.4. Portable eye wash will be inspected weekly	<ol style="list-style-type: none">1. Personnel have read and comply with SHSP2. Site specific training.3. Qualified operators will be used for equipment operation4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training

ACTIVITY HAZARD ANALYSES

Project: <u>Vestal Well Site</u> Activity: <u>Mobilization/Demobilization and Site Preparation</u>		Location: <u>Vestal, New York</u>
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Mobilization/Demobilization of Equipment and Supplies	<p>a. Struck by Heavy Equipment/Vehicles</p> <p>b. Struck by Equipment/Supplies</p> <p>c. Overexertion Unloading/Loading Supplies</p> <p>d. Caught in/on/between</p> <p>e. Slip/Trip/Fall</p>	<p>a. Struck by</p> <ul style="list-style-type: none"> ◆ Be aware of heavy equipment operations. ◆ Keep out of the swing radius of heavy equipment. ◆ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times. ◆ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ◆ Ground personnel will not stand directly behind heavy equipment when it is in operation. <p>b. Struck by Equipment/Supplies</p> <ul style="list-style-type: none"> ◆ Workers will maintain proper space around their work area, if someone enters it, stop work. ◆ When entering another worker's work space, give a verbal warning so they know you are there. <p>c. Overexertion Unloading/Loading Supplies</p> <ul style="list-style-type: none"> ◆ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. <p>d. Caught in/on/between</p> <ul style="list-style-type: none"> ◆ Do not place yourself between two vehicles or between a vehicle and a fixed object. <p>e. Slip/Trip/Fall</p> <ul style="list-style-type: none"> ◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas ◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ◆ Drivers will check surface before stepping, not jumping down.
2. Site Preparation	<p>a. Slip/Trip/Fall</p>	<p>a. Slip/Trip/Fall</p> <ul style="list-style-type: none"> ◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas ◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ◆ Drivers will check surface before stepping, not jumping down.

Project: Vestal Well Site Activity: Mobilization/Demobilization and Site Preparation			Location: Vestal, New York
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
<ol style="list-style-type: none"> 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Fire Extinguishers 6. Air Monitoring Equipment 	<ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Weekly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected weekly 5. Weekly inspections will be performed on fire extinguishers. 6. Air monitoring equipment will be pre- and post calibrated according to manufacturer's specifications. 	<ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Qualified individuals will use air monitoring equipment. 	

ACTIVITY HAZARD ANALYSES

MAJOR STEPS		POTENTIAL HAZARDS		PROTECTIVE MEASURES/CONTROLS	
<p>Project: <u>Vestal Well Site</u> Activity: <u>Install Wells Using Hollow Stem Auger and Repair Existing Wells</u></p>					
<p>1. Install monitoring wells</p>	<p>a. Contact with underground utilities</p>	<p>a. Contact with underground utilities</p> <ul style="list-style-type: none"> ◆ Follow EHS 3-15, use checklist in 3-15. ◆ All underground utilities will be identified prior to operations. ◆ Contact the One Call Center for assistance in identifying underground utilities that may be a problem. ◆ White line the area of excavation for the locating service. ◆ Keep all reference numbers on file in the site files, update as needed. ◆ Do not use aggressive digging methods in buffer zone (36" on either side of located utility) hand dig or use air spade. ◆ Protect utilities as necessary using plywood, wood mats. ◆ On private property a private locating service must be used or a geophysical survey must be conducted. 	<p>a. Contact with underground utilities</p> <ul style="list-style-type: none"> ◆ Follow EHS 3-15, use checklist in 3-15. ◆ All underground utilities will be identified prior to operations. ◆ Contact the One Call Center for assistance in identifying underground utilities that may be a problem. ◆ White line the area of excavation for the locating service. ◆ Keep all reference numbers on file in the site files, update as needed. ◆ Do not use aggressive digging methods in buffer zone (36" on either side of located utility) hand dig or use air spade. ◆ Protect utilities as necessary using plywood, wood mats. ◆ On private property a private locating service must be used or a geophysical survey must be conducted. 	<p>Location: <u>Vestal, NY</u></p>	<p>a. Contact with underground utilities</p> <ul style="list-style-type: none"> ◆ Follow EHS 3-15, use checklist in 3-15. ◆ All underground utilities will be identified prior to operations. ◆ Contact the One Call Center for assistance in identifying underground utilities that may be a problem. ◆ White line the area of excavation for the locating service. ◆ Keep all reference numbers on file in the site files, update as needed. ◆ Do not use aggressive digging methods in buffer zone (36" on either side of located utility) hand dig or use air spade. ◆ Protect utilities as necessary using plywood, wood mats. ◆ On private property a private locating service must be used or a geophysical survey must be conducted.
<p>2. Drill Rig Fueling</p>	<p>b. Fire</p>	<p>b. Fire</p>	<p>b. Fire</p> <ul style="list-style-type: none"> ◆ All fuel tanks/trucks shall be grounded during fueling operations. ◆ Smoking and open flames are not permitted within 50 feet of fueling/greasing areas. ◆ All equipment shall be equipped with 10 lb. ABC type fire extinguishers. ◆ 10 lb. ABC type fire extinguishers shall be readily available during fueling/greasing operations. ◆ Fuel tanks and equipment will be grounded and bonded during fueling operations. 	<p>b. Fire</p> <ul style="list-style-type: none"> ◆ All fuel tanks/trucks shall be grounded during fueling operations. ◆ Smoking and open flames are not permitted within 50 feet of fueling/greasing areas. ◆ All equipment shall be equipped with 10 lb. ABC type fire extinguishers. ◆ 10 lb. ABC type fire extinguishers shall be readily available during fueling/greasing operations. ◆ Fuel tanks and equipment will be grounded and bonded during fueling operations. 	<p>b. Fire</p> <ul style="list-style-type: none"> ◆ All fuel tanks/trucks shall be grounded during fueling operations. ◆ Smoking and open flames are not permitted within 50 feet of fueling/greasing areas. ◆ All equipment shall be equipped with 10 lb. ABC type fire extinguishers. ◆ 10 lb. ABC type fire extinguishers shall be readily available during fueling/greasing operations. ◆ Fuel tanks and equipment will be grounded and bonded during fueling operations.
	<p>c. Chemical Exposure (fuel)</p>	<p>c. Chemical Exposure (fuel)</p>	<p>c. Chemical Exposure (fuel)</p> <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves and chemical goggles) will be worn during fueling operations. ◆ Skin will be rinsed with water if contact with hazardous material occurs. 	<p>c. Chemical Exposure (fuel)</p> <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves and chemical goggles) will be worn during fueling operations. ◆ Skin will be rinsed with water if contact with hazardous material occurs. 	<p>c. Chemical Exposure (fuel)</p> <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves and chemical goggles) will be worn during fueling operations. ◆ Skin will be rinsed with water if contact with hazardous material occurs.
	<p>d. Spills</p>	<p>d. Spills</p>	<p>d. Spills</p> <ul style="list-style-type: none"> ◆ Spill and absorbent materials will be readily available. ◆ Employees will be instructed as to proper fueling techniques. ◆ Fuel nozzle and hose will be secured in holder after use. ◆ Fuel caps will be secured after fueling operations. ◆ Secondary containment will be provided in fuel storage areas. 	<p>d. Spills</p> <ul style="list-style-type: none"> ◆ Spill and absorbent materials will be readily available. ◆ Employees will be instructed as to proper fueling techniques. ◆ Fuel nozzle and hose will be secured in holder after use. ◆ Fuel caps will be secured after fueling operations. ◆ Secondary containment will be provided in fuel storage areas. 	<p>d. Spills</p> <ul style="list-style-type: none"> ◆ Spill and absorbent materials will be readily available. ◆ Employees will be instructed as to proper fueling techniques. ◆ Fuel nozzle and hose will be secured in holder after use. ◆ Fuel caps will be secured after fueling operations. ◆ Secondary containment will be provided in fuel storage areas.
	<p>e. Fuel Cans</p>	<p>e. Fuel Cans</p>	<p>e. Fuel Cans</p>	<p>e. Fuel Cans</p>	<p>e. Fuel Cans</p>

Location: Vestal, NY

Project: Vestal Well Site
Activity: Install Wells Using Hollow Stem Auger and Repair Existing Wells

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
3. Drill Rig Set-up	a. Rollovers b. Back Injuries c. Overhead Hazards	◆ Fuel cans must have flashback protection (standard safety can type). a. Rollovers ◆ Equipment shall be setup on stable ground and maintained level. ◆ Cribbing will be used when necessary. ◆ Outriggers shall be extended per the manufacturer's specification. b. Back Injuries ◆ Site personnel will be instructed on proper lifting techniques. ◆ No person shall lift more than 50 lbs. unassisted. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used in lieu of mechanical devices. c. Overhead Hazards ◆ All personnel will wear hard hats meeting ANSI standard Z89. ◆ All ropes will be rated for the load in which it is expected to lift. ◆ All ropes will be inspected at the beginning of each work shift. ◆ All ground personnel will stay clear of all suspended loads. ◆ All equipment will stay a minimum of 15 feet from energized electrical lines. This distance will increase as the voltage of the powerlines increases. ◆ The drill rig must not be moved with the mast raised.
4. Drill Rig Operations	a. Struck By/Against/ Caught By	a. Struck By/Against/ Caught By ◆ No loose clothing, gauntlet-type gloves, rings, or watches will be worn by personnel operating drill rig equipment. ◆ Personnel will be trained as to the manufacturer recommended procedures prior to commencing operations. ◆ Auger guides will be used on hard surfaces. ◆ Personnel will understand and review hand signals. ◆ Drill rigs and support equipment will be equipped with backup alarms. ◆ The drill rig operator will verbally alert employees and visually ensure employees are clear from dangerous parts of the equipment prior to starting or engaging equipment. ◆ All drill rig equipment shall be equipped with emergency shutoff

Location: Vestal, NY

Project: Vestal Well Site
Activity: Install Wells Using Hollow Stem Auger and Repair Existing Wells

MAJOR STEPS

POTENTIAL HAZARDS

PROTECTIVE MEASURES/CONTROLS

- Internal combustion engines will be equipped with an ignition or grounding switch. Diesel engines will be equipped with quick closing valves which will shut off air to the intake manifold. Electric motors will be equipped with suitable switch in motor circuits.
- ◆ Gears will be enclosed by a well constructed metal guard and securely installed. These guards shall be maintained in place when machinery is in use.
 - ◆ Maintain a minimum of 18" of clearance between the operating hand and the cat head drum when driving samplers or casing.
- b. Flying Objects and Debris
- ◆ Safety glasses meeting ANSI Standard Z87 will be worn.
 - ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable.
 - ◆ A portable eye wash station will be located adjacent to the work area.
- c. Welding of casing
- ◆ A Hot-work permit should be filed prior to any welding
 - ◆ All procedures in EHS 6-5 (Welding/Hotwork) should be followed, hotwork precautions must be taken prior to welding, including removal of combustibles 50 feet from the welding area, availability of an ABC fire extinguisher, proper PPE (Welding Leathers, Helmet with proper tinted lens and/or goggles.)
 - ◆ A fire watch is assigned for a minimum of ½ hour after welding.
 - ◆ Proper grounding of welder and casing will be provided.
 - ◆ Keep plastic sheeting away from welding/hotwork area.
- d. Noise
- ◆ All equipment will have manufacturers required mufflers.
 - ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or plugs).
 - ◆ Hearing protection will be worn when within 15' of the drill rig when it is operating.
 - ◆ Hearing protection will be worn during hammer percussion activities.

Project: Vestal Well Site
 Activity: Install Wells Using Hollow Stem Auger and Repair Existing Wells

Location: Vestal, NY

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	<p>e. Heat Stress</p>	<p>e. Heat Stress</p> <ul style="list-style-type: none"> ◆ Follow EHS 4-6 "Temperature Extremes". ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three square meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85 °F.
	<p>f. Cold Stress</p>	<p>f. Cold Stress</p> <ul style="list-style-type: none"> ◆ Wear adequate number of dry layered clothing. ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress.
	<p>g. Struck By</p>	<p>g. Struck by</p> <ul style="list-style-type: none"> ◆ All drill rig equipment shall be equipped with emergency shutoff devices. Internal combustion engines will be equipped with an ignition or grounding switch. Diesel engines will be equipped with quick closing valves which will shut off air to the intake manifold. Electric motors will be equipped with suitable switch in motor circuits. ◆ No work will be performed on engines, motors, hoists, etc. until it has been properly locked and tagged out. ◆ After clutches have been disengaged, the bypass valve should be opened to divert air from the clutches. ◆ Machinery will not be lubricated while it is in operation or running. ◆ Equipment will be blocked and cribbed if needed.
<p>2. Repair existing wells</p>	<p>a. Hand and Power Tools</p> <p>b. Overexertion</p>	<p>a. Hand and Power Tools</p> <ul style="list-style-type: none"> ◆ All hand and power tools will be inspected for safe operation daily prior to use. ◆ All power tools must have proper guards in place before use. <p>b. Overexertion</p> <ul style="list-style-type: none"> ◆ Personnel to be trained in proper postures and not bending and twisting at the waist while lifting or exerting force.

Project: Vestal Well Site Activity: Install Wells Using Hollow Stem Auger and Repair Existing Wells		Location: <u>Vestal, NY</u>	
MAJOR STEPS		POTENTIAL HAZARDS	
EQUIPMENT USED		INSPECTION REQUIREMENTS	
1. Drill Rig 2. Hand and Power Tools	1. Inspect Drill Rig on arrival at site and daily prior to use, use "Drill Rig Checklist" in Appendix D. 2. Inspect Hand and Power Tools daily prior to use.	PROTECTIVE MEASURES/CONTROLS	TRAINING REQUIREMENTS
			1. Qualified drillers shall operate drill rig. 2. Workers to be familiar with the safety features of the Hand and Power tools they are to use.

ACTIVITY HAZARD ANALYSES

Project: Vestal Well Site Activity: Video Inspection of Wells, Surveying of Wells and IDW Management		Location: Vestal, NY	
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS	
1. Video Inspection of Wells	<ul style="list-style-type: none"> a. Overexertion Lowering/Retrieving Camera b. Contact with Contaminated Groundwater 	<ul style="list-style-type: none"> a. Lowering/Retrieving Camera into Well <ul style="list-style-type: none"> ◆ Train workers on proper posture, do not bend at the waist as you lower camera into well or when pulling out. b. Contact with Contaminated Groundwater <ul style="list-style-type: none"> ◆ Wear PPE, poly or saran tyveks, nitrile gloves, ANSI approved safety glasses, booties. 	
2. Surveying of Wells	<ul style="list-style-type: none"> a. Slip/Trip/Fall During Well Survey 	<ul style="list-style-type: none"> a. Slip/Trip/Fall During Well Survey <ul style="list-style-type: none"> ◆ Mark holes, low spots and uneven areas as well as drop offs. ◆ Advise workers to avoid these areas. 	
3. IDW Management	<ul style="list-style-type: none"> a. Exposure to contaminated soil 	<ul style="list-style-type: none"> a. Exposure to contaminated soil <ul style="list-style-type: none"> ◆ Minimize handling of soil samples. ◆ Wear appropriate PPE – Tyvek coveralls, safety glasses, nitrile gloves, booties. ◆ Place soil cores in drum as soon as possible after determination that an adequate sample has been collected. 	
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
<ul style="list-style-type: none"> 1. Video equipment 2. PPE 3. Surveying equipment 	<ul style="list-style-type: none"> 1. Inspect Video equipment for safety daily prior to use. 2. Inspect PPE daily prior to use. 3. Inspect survey equipment daily prior to use. 	<ul style="list-style-type: none"> 1. Site specific training. 	

ACTIVITY HAZARD ANALYSES

Project: Vestal Well Site Activity: Well Abandonment		Location: <u>Vestal, NY</u>
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Well Abandonment	<p>a. Fall from same level</p>	<p>a. Fall from same level</p> <ul style="list-style-type: none"> ◆ Locate and mark holes in work area. ◆ Maintain walking areas of site free of debris
2. Bentonite/ Concrete Mixing and Pumping	<p>a. Contact with Bentonite/Grout</p> <p>b. Struck by material being placed</p> <p>c. Overexertion</p> <p>d. Fall while mounting /dismounting Vehicle</p> <p>e. Struck by Vehicle</p>	<p>a. Contact with Bentonite/Grout</p> <ul style="list-style-type: none"> ◆ Exclusion zone areas will be identified and marked. ◆ Protective clothing (Saranex coated Tyvek, booties, nitrile inner gloves, and nitrile outer gloves) will be worn in exclusion zone areas. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hoses and couplings will be inspected prior to pumping operations. <p>b. Struck by material being placed</p> <ul style="list-style-type: none"> ◆ Workers will maintain sufficient space to work without danger of striking someone working nearby. <p>c. Overexertion</p> <ul style="list-style-type: none"> ◆ Employees will practice safe lifting techniques, lift with legs, do not bend, twist at waist while lifting, use mechanical assistance when possible. <p>d. Fall while mounting /dismounting Vehicle.</p> <ul style="list-style-type: none"> ◆ Drivers and others will observe ground surface to make sure a clear, safe area is available before stepping down. <p>e. Struck by Vehicle</p> <ul style="list-style-type: none"> ◆ Drivers will maintain workers on foot in their vision at all times, if you lose sight of someone, Stop!
3. Travel To Location of Each Well to be Closed.	<p>a. Fall from Vehicle</p>	<p>a. Fall from Vehicle</p> <ul style="list-style-type: none"> ◆ Driver and passenger to wear seat belts during movement of Vehicle. ◆ Vehicle will be driven slowly (5 mph or less) on rough terrain.

Location: Yestel, NY

Project: Yestel Well Site
 Activity: Well Abandonment

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
4. Handling Tremie Pipe	a. Back Injuries	a. Back Injuries ♦ Site personnel will be instructed on proper lifting techniques. ♦ No person shall lift more than 50 lbs. unassisted. ♦ Mechanical devices will be utilized to reduce manual material handling. ♦ Team lifting will be utilized in lieu of mechanical devices.
1. Mixing Bentonite and Grout	a. Struck by tools while mixing	a. Struck by tools while mixing ♦ Workers will maintain sufficient space to work without danger of striking someone working nearby
2. Handling Tremie Pipe (Continued)	a. Struck by piping while handling.	a. Struck by piping while handling. ♦ Each worker will maintain space around his work area, do not enter someone's work area without making verbal contact first..
3. Pump Grout And Bentonite into Well	a. Struck with grout while pumping	a. Struck with grout while pumping ♦ Wear hard hat, tyvek coveralls, safety glasses, face shield and nitrile gloves while pumping grout. ♦ Use safety clips on all connections between pump and pipe, and pipe and pipe.
4. Collecting water and debris from wells	a. Exposure to Contaminants	a. Exposure to contaminants in pumped water from well. ♦ Perform air monitoring if well is contaminated using PID, see Tables 7-1 and 7-2. ♦ Upgrade to level C protection if action level is exceeded.
5. Remove Tremie Pipe, Reload Vehicle	a. Overexertion Lifting Tremie Pipe	a. Overexertion Lifting Tremie Pipe ♦ Drain tremie pipe as much as possible before attempting to lift. ♦ Use team lifting or a mechanical device.
	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Vehicle	1. Inspect vehicle daily prior to use.	1. Site specific training.
2. Pump	2. Inspect pump and generator daily prior to use.	2. Workers shall be familiar with operation of pump and generator and all safety features.
3. Tremie Pipe	3. Inspect Tremie pipe and connections prior to pumping.	

Project: Vestal Well Site
 Activity: Hand Augering

Location: Vestal, NY

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Auger Set-up	Back Injuries	Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ No person shall lift more than 50 lbs. unassisted. ◆ Mechanical devices will be utilized to reduce manual handling of materials, if needed. ◆ Team lifting will be used in lieu of mechanical devices.
2. Auger Operations	Struck By/Against/ Caught By	Struck By/Against/ Caught By <ul style="list-style-type: none"> ◆ No loose clothing, gauntlet-type gloves, rings, or watches will be worn by personnel operating drill rig equipment. ◆ Personnel will be trained as to the manufacturer recommended procedures prior to commencing operations. ◆ Auger guides will be used on hard surfaces.
	Contact with underground utilities	Contact with underground utilities <ul style="list-style-type: none"> ◆ Follow EHS 3-15, use checklist in 3-15. ◆ All underground utilities will be identified prior to operations. ◆ Contact the One Call Center for assistance in identifying underground utilities that may be a problem. ◆ White line the area of excavation for the locating service. ◆ Keep all reference numbers on file in the site files, update as needed. ◆ Do not use aggressive digging methods in buffer zone (36" on either side of located utility) hand dig or use air spade. ◆ Protect utilities as necessary using plywood, wood mats. ◆ On private property a private locating service must be used or a geophysical survey must be conducted.

Project: Vestal Well Site
 Activity: Hand Augering

Location: Vestal, NY

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	Heat Stress	<p>Heat Stress</p> <ul style="list-style-type: none"> ◆ Follow EHS 4-6 "Temperature Extremes". ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three square meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted according to the provisions of EHS 4-6.
	Cold Stress	<p>Cold Stress</p> <ul style="list-style-type: none"> ◆ Wear adequate number of dry layered clothing. ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Follow EHS 4-6 "Temperature Extremes."
	Hand Tools	<p>Hand Tools</p> <ul style="list-style-type: none"> ◆ All hand tools will be inspected for safe operation daily prior to use.
	Overexertion/Repetitive Motion Injury	<p>Overexertion</p> <ul style="list-style-type: none"> ◆ Personnel to be trained in proper postures and not bending and twisting at the waist while lifting or exerting force. ◆ The auger operator will switch to a different activity and let another person operate the auger (in order to minimize chance for repetitive motion injury); if only one person is augering, frequent breaks from the operation will be taken to minimize risk of repetitive motion injury.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Hand Auger	1. Inspect Hand Auger daily prior to use.	1. Workers to be familiar with auger operation and to know when to take breaks from operation.
2. Hand Tools	2. Inspect Hand Tools daily prior to use.	2. Workers to be familiar with the safety features of the Hand Tools they will use.

Location: Vestal, NY

Project: Vestal Well Site
Activity: Hand Operation of Direct Push Soil Probe

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Direct Push Soil Probe Set-up	Tipovers Back Injuries Overhead Hazards	Tipovers ◆ Equipment shall be setup on stable ground and maintained level. Cribbing will be used when necessary. ◆ Outriggers shall be extended per the manufacturer's specification. Back Injuries ◆ Site personnel will be instructed on proper lifting techniques. ◆ No person shall lift more than 50 lbs. unassisted. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used in lieu of mechanical devices. Overhead Hazards ◆ All personnel will wear hard hats meeting ANSI standard Z89. ◆ All ropes will be rated for the load in which it is expected to lift. ◆ All ropes will be inspected at the beginning of each work shift. ◆ All ground personnel will stay clear of all suspended loads. ◆ All equipment will stay a minimum of 15 feet from energized electrical lines. This distance will increase as the voltage of the powerlines increases. ◆ The probe unit must not be moved with the mast raised.
2. Direct Push Manual Operations	Struck By/Against/ Caught By	Struck By/Against/ Caught By ◆ No loose clothing, gauntlet-type gloves, rings, or watches will be worn by personnel operating probe equipment. ◆ Personnel will be trained as to the manufacturer recommended procedures prior to commencing operations. ◆ Personnel will understand and review hand signals. ◆ Probe unit and support equipment will be equipped with backup alarms, if mobile.

Project: Yestial Well Site
 Activity: Hand Operation of Direct Push Soil Probe

Location: Yestial, NY

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
Direct Push Manual Operations (cont'd)	Contact with underground utilities	Contact with underground utilities <ul style="list-style-type: none"> ◆ Follow EHS 3-15 and use checklist in 3-15. ◆ All underground utilities will be identified prior to operations. ◆ Contact the One Call Center for assistance in identifying underground utilities that may be a problem. ◆ White line the area of excavation for the locating service. ◆ Keep all reference numbers on file in the site files, update as needed. ◆ Do not use aggressive digging methods in buffer zone (36" on either side of located utility) hand dig or use air spade. ◆ Protect utilities as necessary using plywood, wood mats. ◆ On private property a private locating service must be used or a geophysical survey must be conducted. ◆ The probe operator will verbally alert employees and visually ensure employees are clear from dangerous parts of the equipment prior to starting or engaging equipment. ◆ All probe equipment shall be equipped with emergency shutoff devices or other means of immediate stoppage of equipment movement. ◆ Maintain a minimum of 18" of clearance between the operating hand and the cat head drum (or other such lifting mechanism) when driving samplers or casing.
	Flying Objects and Debris	Flying Objects and Debris <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable. ◆ A portable eye wash station will be located adjacent to the work area.

Project: Vestal Well Site
 Activity: Hand Operation of Direct Push Soil Probe

Location: Vestal, NY

MAJOR STEPS

Direct Push Manual Operations (cont'd)

POTENTIAL HAZARDS

Noise

PROTECTIVE MEASURES/CONTROLS

Noise

- ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or plugs).
- ◆ Hearing protection will be worn when within 15' of the probe when it is operating.
- ◆ Hearing protection will be worn during hammer percussion activities if applicable.

Heat Stress

Heat Stress

- ◆ Follow EHS 4-6 "Temperature Extremes".
- ◆ Drink adequate amounts of liquids throughout the workday.
- ◆ Eat three square meals a day to supply nourishment.
- ◆ Seek cool area and rest when needed.
- ◆ Watch fellow workers for signs of heat stress.
- ◆ Institute work/rest regimens as necessary.
- ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85 °F.

Cold Stress

Cold Stress

- ◆ Wear adequate number of dry layered clothing.
- ◆ Seek heated area when needed.
- ◆ Watch fellow workers for signs of cold stress.

Hand and Power Tools

Hand and Power Tools

- ◆ All hand and power tools will be inspected for safe operation daily prior to use.

Overexertion/Repetitive Motion Injury

Overexertion

- ◆ All power tools must have proper guards in place before use.
- ◆ Personnel to be trained in proper postures and not bending and twisting at the waist while lifting or exerting force.
- ◆ The probe unit operator will switch to a different activity and let another person operate the probe (in order to minimize chance for repetitive motion injury); if only one person will be operating the probe, frequent breaks from the operation will be taken to minimize risk of repetitive motion injury.

Project: Vestal Well Site Activity: Hand Operation of Direct Push Soil Probe		Location: Vestal, NY	
MAJOR STEPS		POTENTIAL HAZARDS	
EQUIPMENT USED		INSPECTION REQUIREMENTS	
1. Manual Direct Push Probe Unit		1. Inspect probe unit on arrival at site and daily prior to use, use "Drill Rig Checklist" in Appendix D, as applicable.	
2. Hand and Power Tools		2. Inspect Hand and Power Tools daily prior to use.	
		PROTECTIVE MEASURES/CONTROLS	
		TRAINING REQUIREMENTS	
		1. Only qualified personnel shall operate probe unit.	
		2. Workers to be familiar with the safety features of the Hand and Power tools they will use.	