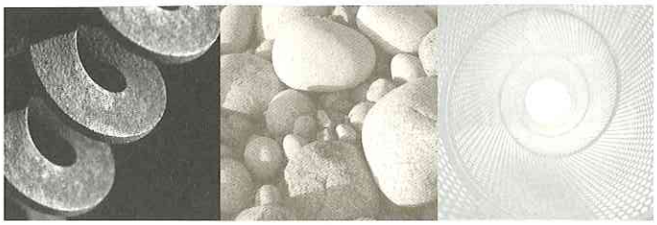

GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Scope of Work

Well Abandonment and Installation of Additional Monitoring Wells Former UGI Columbia Gas Plant Site

Columbia, Pennsylvania

Submitted to:
On behalf of:
Clean Sites Environmental Services, Inc.
46161 Westlake Drive, Suite 230-B
Potomac Falls, VA 20165

For:
PPL Electric Utilities
Allentown, PA 18101

and

UGI Utilities
Reading, PA 19611

Submitted by:
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March 2007
Project 013650-2-1001

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1. Introduction

GEI Consultants, Inc. (GEI) was contracted by Clean Sites Environmental Services, Inc. (Clean Sites) on behalf of PPL Electric Utilities Corp. (PPL-EU) and UGI Utilities, Inc. (UGI) to develop this work plan for well abandonment and installation and sampling of new monitoring wells at the former UGI Columbia Gas Plant, in Columbia, Pennsylvania. Installation of these wells is part of the action required by The Administrative Settlement Agreement and Order on Consent for Removal Response Action, EPA Docket No. CERC-03-2007-006DC.

1.1 Site Location and Description

The site location is presented in Figure 1. Figure 2 presents the current site conditions. The site is located in an area of mixed residential/industrial land use near the northeastern shore of the Susquehanna River. Nearby land use consists of the municipal wastewater treatment facility, a borough garage and highway department, residences, railroad right-of-ways, and a surface-water supply facility. The site is currently vacant, but was used for retail boat sales and repair as recently as March 1994. Two former gas holders, capped with concrete slabs, are present on site. A fire-damaged building of cinder block and wood construction is also present on site.

1.2 Site History

The former MGP operated from April 1851 until approximately 1950. Gas was initially produced by wood carbonization, but carbonization was replaced by the Lowe process of carbureted water gas circa 1886. A limited volume of gas manufacturing by-products was disposed on the site and within the immediate site vicinity.

2. Scope of Work

2.1 Well Abandonment

To prepare for site remedial work, well MW-03D will be abandoned. Well MW-03S was abandoned in 1995. MW-03D will be abandoned to help facilitate the installation of the asphalt cap.

In general, well abandonment will follow guidance provided in Chapter 7 of the Pennsylvania Department of Environmental Protection (PADEP) December 1, 2001 *Groundwater Monitoring Guidance Manual*.

MW-03D was originally constructed as an "open rock" hole, with a permanent steel casing grouted into bedrock. Therefore, once the flush-mount manhole is located, soil will be excavated from around it to approximately 1 foot below ground surface. The overburden casing will be cut off at that depth. Then a 1-inch polyvinyl chloride pipe will be fed into the well. When the pipe reaches total depth it will be used to tremie grout from the bottom of the well to the top of casing. Grout will be pumped into the well until it reaches the top of the steel casing.

Groundwater or non-aqueous phase liquid (NAPL) will be recovered and containerized as it rises with the grout. The excavated area around the casing will be back-filled.

2.2 Additional Monitoring Wells

Four new bedrock wells will be installed in the approximate locations presented in Figure 2. In addition, existing monitoring well MW-07D is damaged. It will be replaced.

The new well locations were chosen based on review of geophysical and bedrock characterization information presented in the 1998 Remedial Investigation Report (RIR) [GEI]. One conclusion of the RIR is that the vertical and horizontal extent of bedrock groundwater impacts is strongly influenced by bedrock fracture patterns. These patterns were characterized using surface seismic refraction studies and confirmatory drilling at the site during the RI. These proposed well locations are outside of the bedrock groundwater zone known to be affected by MGP residuals.

Initially, one 150 foot deep bedrock boring (LTMW-1) will be completed near at the Lancaster Water Authority (LWA). A suite of borehole geophysical tests (borehole caliper, fluid temperature, fluid conductivity, optical or acoustic televiewer, heat-pulse flowmeter) will be conducted in the completed borehole. The data and information acquired will be used to identify fractures and fracture zones within the borehole. Mid-Atlantic Geosciences (MAG) in Lancaster, Pennsylvania is the proposed geophysical contractor.

The potentially transmissive zones identified by MAG will be subjected to packer testing to evaluate actual transmissivity and allow for collection of groundwater samples from discreet water bearing zones. The samples will be collected to determine whether bedrock groundwater in each zone has sustained MGP-related impacts, and support decisions about wellscreen placement.

The table below presents the recommended well depths and screened intervals. The recommendations are based on existing groundwater analytical results at the nearest impacted wells, and the depths of the monitoring intervals in those wells. The proposed depths are not currently informed by geophysical data. However, if the geophysical work and packer testing described above validates the proposed screened interval for LTMW-1 in the table below, then geophysical testing will not be used at additional borings and the information in the table below will guide screen placement. Regardless, no borehole geophysics or packer testing will be conducted in the new borehole for replacement well MW-07DR. It is a replacement for MW-07D, which has known specifications. Therefore, MW-07DR will be installed to the same depth (60 feet) and screened interval (50 – 60 feet).

The final screened intervals are also contingent on whether bedrock groundwater is apparently present (based on the presence of water blown to ground surface along with drill cuttings).

New Well ID	Recommended Depth	Screened Interval
LTMW-1	150 feet	70 - 80
LTMW-2	70 feet	60 - 70
LTMW-3	50 feet	40 - 50
LTMW-4	50 feet	40 - 50
MW-07DR	60 feet	50 - 60

2.3 Packer Testing

When the information from borehole geophysical tests has been evaluated, double-packer testing will be conducted in the 150 foot borehole. In general, 10 foot borehole intervals that contain potential transmissive fractures (based on geophysics) will be isolated and tested, beginning at or below the static water level in the borehole (depending on the location of

bedrock features). Since the water level is expected to be approximately 20 feet below ground surface, as many as 12 packer tests may be conducted.

Packer testing will include pumping of intervals to evaluate whether fractures are transmissive, and the rate at which they produce water. A two-inch or four-inch submersible pump will be used. When a water producing interval has been pumped long enough to reduce potential turbidity, a sample will be collected directly from the pump outlet at the slowest rate possible. The sample will be analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX) and polycyclic aromatic hydrocarbons (PAHs). Analytical details are described below in subsection 2.4.3.

Packer testing equipment will be pressure-washed with hot water and Alconox detergent before being used in any borehole. Unless physical evidence (tar, odor, sheen) of contamination is observed, the packer testing equipment will be used for testing in the entire borehole. The submersible pump, however, will be decontaminated between sample collection in each bedrock interval with potable water and Alconox detergent, followed by copious rinsing with, and pumping through, of potable water. All wastewater will be containerized and properly disposed.

2.4 Drilling Methods

Air rotary drilling methods will be used at each location, consistent with methods applied during the RI, as follows:

- A ten-inch diameter overburden boring will be advanced to the top of bedrock.
- A temporary steel casing will be used to keep the overburden from collapsing into the boring.
- Boring will continue for two feet, until a bedrock "socket" is completed.
- A permanent 6-inch steel casing will be introduced within the temporary casing, set in the bedrock socket, and tremie grouted from the base of the socket to ground surface. The temporary casing will be removed as the 6-inch casing is tremie grouted.
- Installation of the overburden casing at the next well location will commence, while grout at the completed location is allowed to cure for a minimum of 24 hours.

When the grout for the permanent 6-inch overburden casing has cured, bedrock boring with a 5 ⅝-inch cutter head will commence inside the overburden casing and into bedrock. Boring will continue until the target depth is acquired *and* groundwater is obviously present.

Soil and rock cuttings will be visually screened for evidence of contamination and an organic vapor meter will be used to screen the cuttings as well. Field logs of soil and rock cuttings will be recorded during site operations. Digital photographs will also be acquired.

All soil and rock cuttings will be containerized and stored on site until the field program is completed.

2.5 Well Installation Methods

When the total well depth is achieved and the screened interval has been determined, 2-inch diameter, flush-thread, schedule 40, polyvinyl chloride (PVC) riser and well screen will be used to construct the well. Well screens will be 10 feet in length, and consist of 0.010-inch slotted screen. The annular space between the well screen, the borehole wall, and approximately 2 feet above the screen will be backfilled with a washed, uniform silica sand filter pack. A 2- foot bentonite clay seal will be placed above the sand pack. The remaining annular space will be tremie-grouted to grade with a cement-bentonite grout slurry. A flush-mounted well cover or locking protective standpipe will be installed.

If well screens are to be placed at an interval shallower than the total depth of the borehole, bentonite chips will be used to seal the lower portion of the borehole, up to two feet below the planned depth of the well. Washed, uniform silica sand will then be used to fill the remaining two feet, up to the total depth of the well. Well construction will then be completed as described above.

Eichelbergers, Inc. (Mechanicsburg, Pennsylvania) is the proposed drilling/well installation subcontractor.

2.5.1 Well Development

The grout at each well will be allowed to cure for a minimum of 48 hours before well development is conducted. Development of the newly installed monitoring wells will be performed by alternately surging and pumping, for a maximum of 1 hour or until the turbidity of the development water is less than 50 nephelometric turbidity units (NTUs). A field turbidity meter will be used to monitor NTU levels. Measurements of pH will also be made to ensure that grout is not present in the screened interval. Wastewater (subsection 2.6) will be containerized and stored on site until the field program is completed.

2.5.2 Dedicated Bladder Pumps

When well installation and well development is completed, each well will be fitted with a dedicated 1-inch by 18-inch stainless steel bladder pump with teflon bladder, a 2-inch well head assembly and ¼-inch by ¼-inch tubing fittings, ¼-inch teflon lined polyethylene bonded tubing, and 1/16-inch nylon coated stainless steel pump support cable. The bladder pumps are driven by compressed inert gas.

Durham Geo in Stone Mountain, Georgia will supply the certified clean bladder pump equipment.

2.5.3 Groundwater Sampling

Groundwater purging and sampling of the existing and new monitoring wells will be conducted using dedicated bladder pumps according to the low-flow procedures set forth in ASTM Standard D 6771-2 (2002). This method has been shown to be most appropriate by recent studies (Varljen, et al 2006; and Puls and Paul, 1998). The ASTM Method is consistent with EPA's recommendation to follow *Low-Flow Purging and Sampling of Groundwater Monitoring Wells, Recommended Procedure for Low-Flow Purging and Sampling of Groundwater Monitoring Wells,* Bulletin No. QAD023, EPA October 1997. However, as described below, sample collection bottles will be pre-preserved by the laboratory.

The wells will be purged and sampled at rates that minimize or eliminate significant draw down through continual water level monitoring and adjustment of flow rate. Water quality will be monitored for pH, temperature, specific conductivity, oxidation-reduction potential (Eh), dissolved oxygen, and turbidity. These parameters will be recorded at five-minute intervals to determine well stability. A water sample for chemical analysis will be collected only after stability is demonstrated for pH, Eh, specific conductivity and turbidity or dissolved oxygen and a minimum purge volume is evacuated from the well. The criteria for stabilization is defined as three consecutive measurements that are within 0.1 standard units for pH, within $\pm$10 % for turbidity or DO, within 10 mv for Eh and within $\pm$ 3 % for specific conductivity. The minimum purge volume at each well will be defined as the volume of water contained in the tubing length plus the volume of water resulting from drawdown using the diameter of the well borehole to estimate the drawdown volume. The well sampling form presented in Appendix A will be used during groundwater sampling to document these criteria. A maximum of one well volume will be purged before sampling in the case that discharge parameters do not stabilize. All purge water will be containerized and stored on site until the field program is completed.

When stability is attained, samples will be collected directly from the pump tubing. Groundwater samples will be placed directly into pre-cleaned and appropriately preserved sample containers provided by Analytical Laboratory Services, Inc. (ALS - Harrisburg, Pennsylvania).

Groundwater samples have been collected at the site in numerous events since 1996 and groundwater quality is well characterized. Existing data demonstrate that the primary, most abundant, and most relevant MGP-related compounds are the BTEX and the PAHs (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene,

dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, acenaphthene, acenaphthylene, anthracene, benzo(ghi)perylene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene). Therefore, the groundwater samples will be analyzed for BTEX by EPA Method 8260B and PAHs by EPA Method 8270C. Groundwater sample results will be validated based on the CLP-like data package provided by the laboratory. Samples collected during packer testing will be analyzed for the same parameters using the same methods. However, the groundwater data generated via packer testing will not be validated. Accelerated turn-around on results of the packer testing samples may be requested.

In addition to the primary groundwater samples, the following QA/QC samples will be collected.

- One trip blank sample per day.
- One duplicate sample.
- One matrix spike/matrix duplicate (MS/MSD) sample will be collected.

No equipment rinsate blank is required because the sampling equipment is certified clean by the supplier.

Each QA/QC sample will be analyzed for BTEX and PAHs by the methods described above.

2.6 Decontamination Procedures

Drilling equipment will arrive at the site clean. Overburden soil at the new well locations is expected to be clean, and the interval for groundwater monitoring is in bedrock. As such, installation of overburden casings does not carry of the risk of cross-contaminating bedrock intervals targeted for monitoring. However, the overburden at replacement well MW-07DR may have impacts. Therefore, the permanent overburden casing will be installed at MW-07DR *after* all the other new wells casings are completed. After all overburden casings are installed, the equipment will be decontaminated before and after any bedrock boring is conducted.

However, if visual or olfactory evidence of contamination is observed during installation of other casings, the rig and drilling tools will be decontaminated before proceeding to the next installation.

Decontamination of drilling equipment will be conducted with a pressure washer. Wastewater will be containerized for appropriate off-site disposal when the project is completed.

2.7 Waste Management

Significant volumes of soil/rock cuttings and wastewater will be generated. The likelihood of encountering contamination is small, but the possibility does exist. Therefore, complete containment measures will be instituted at each boring location, as follows:

- Hay bales will be placed around each boring location to create a rectangular dam structure.
- Heavy duty plastic sheeting will be used to line the interior of the dam structure.
- Soil and rock cuttings at each boring location will be contained within the dam.
- Groundwater ejected from each bedrock boring will also be contained in the dam.
- Soil and rock cuttings and/or groundwater will be removed from the dam during on-going operations or at the end of operations, as necessary, and containerized.

Containerized waste will be stored on site until appropriate disposal is determined and carried out. All well development, purge water, and decontamination wastewater will be containerized and stored on site until the field program is complete. When the field program is complete, soil and wastewater will be analyzed to determine the most appropriate disposal methods.

2.8 Data Validation

Analytical data will be validated based on US EPA CLP National Functional Guidelines for Organic Review (January 2005) and the USEPA Region III Organic Data Review Guidelines (1994), modified to accommodate the SW-846 methodologies.

2.9 Health and Safety Plan

A Health and Safety Plan (HASP) has been developed to identify and describe potential hazards and the methods and procedures to reduce their associated risks. The HASP is based on existing comprehensive site knowledge and the potential hazards posed by both physical and chemical sources.

The potential physical hazards are related to drilling equipment, train and road traffic, and slip, trip, fall issues. The potential chemical hazards are related to MGP-residuals. Drilling locations are outside of at the perimeter of areas known to be affected by the former MGP. Little or no contact with MGP-constituents is expected.

The HASP identifies local authorities and provides contact information. A copy of the HASP is presented in Appendix B. Prior to the start of field work at the site, a health and safety meeting will be convened by GEI to discuss potential hazards and contingencies with the investigation subcontractors. All site personnel will be required to attend the briefing and sign paperwork that indicates they received the briefing.

2.10 Schedule

Well installation at the site is tentatively scheduled for mid to late March 2007. The actual schedule will depend on acquiring the various access agreements and approval of the RAP Well installation, development, and waste management is expected to require 2 weeks. The wells will be sampled approximately two weeks later. A brief report will be provided eight weeks after groundwater sampling is completed.

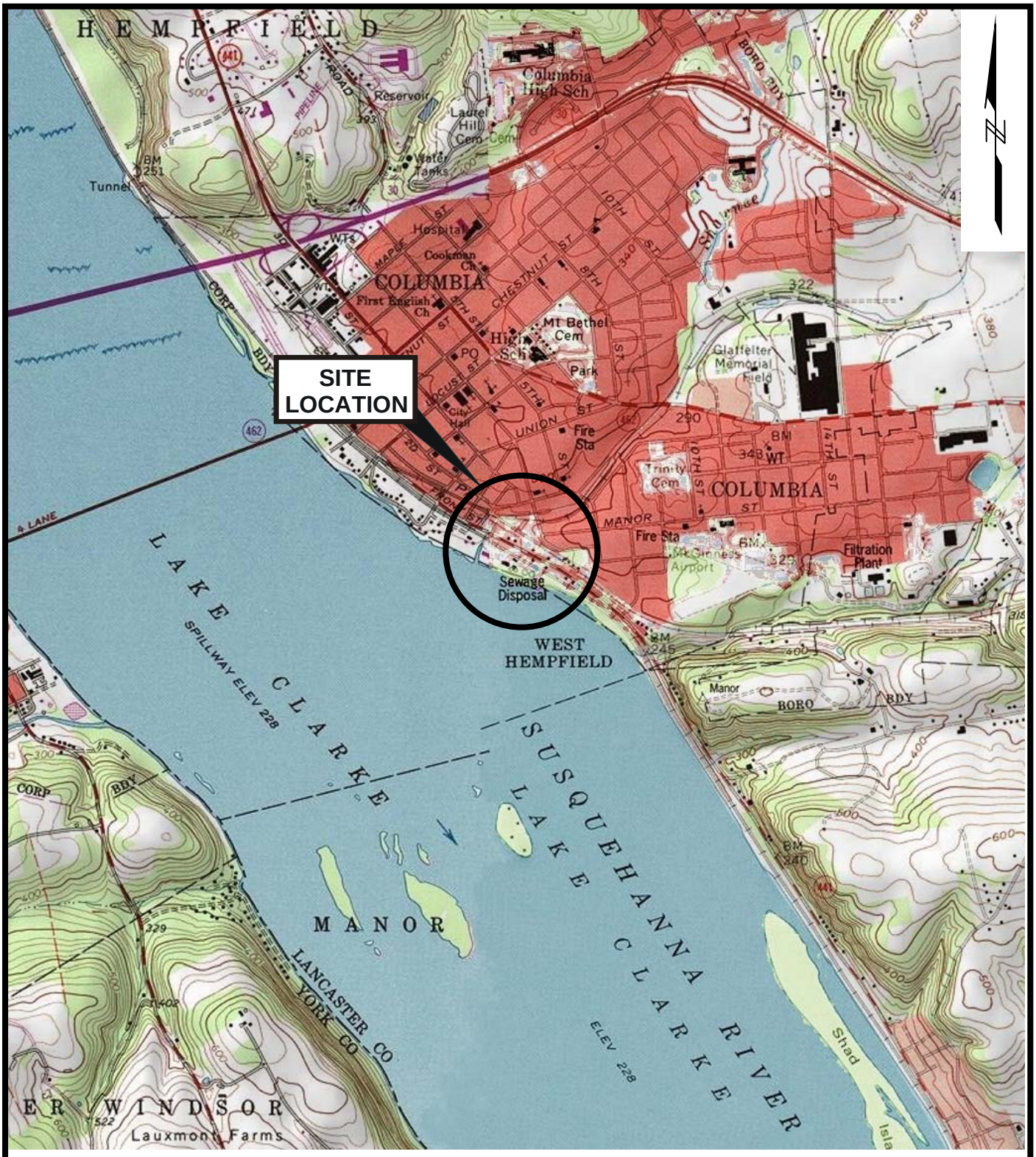
References

ASTM, March 2002. D 6771 – 02. *Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations.*

Puls, R.W. and C.J. Paul, 1998. Discrete-level Groundwater Monitoring System for Containment and Remedial Performance Assessment Objectives. Journal of Environmental Engineering 124, No. 6: 549-553.

Varljen, M.D., M.J. Barcelona, J. Obereiner and D.B. Kaminski, 2006. Numerical Simulations to Assess the Monitoring Zone Achieved During Low-Flow Purging and Sampling ; Ground Water Monitoring and Remediation, Vol. 26, No. 1 pp. 44-52.

Figures



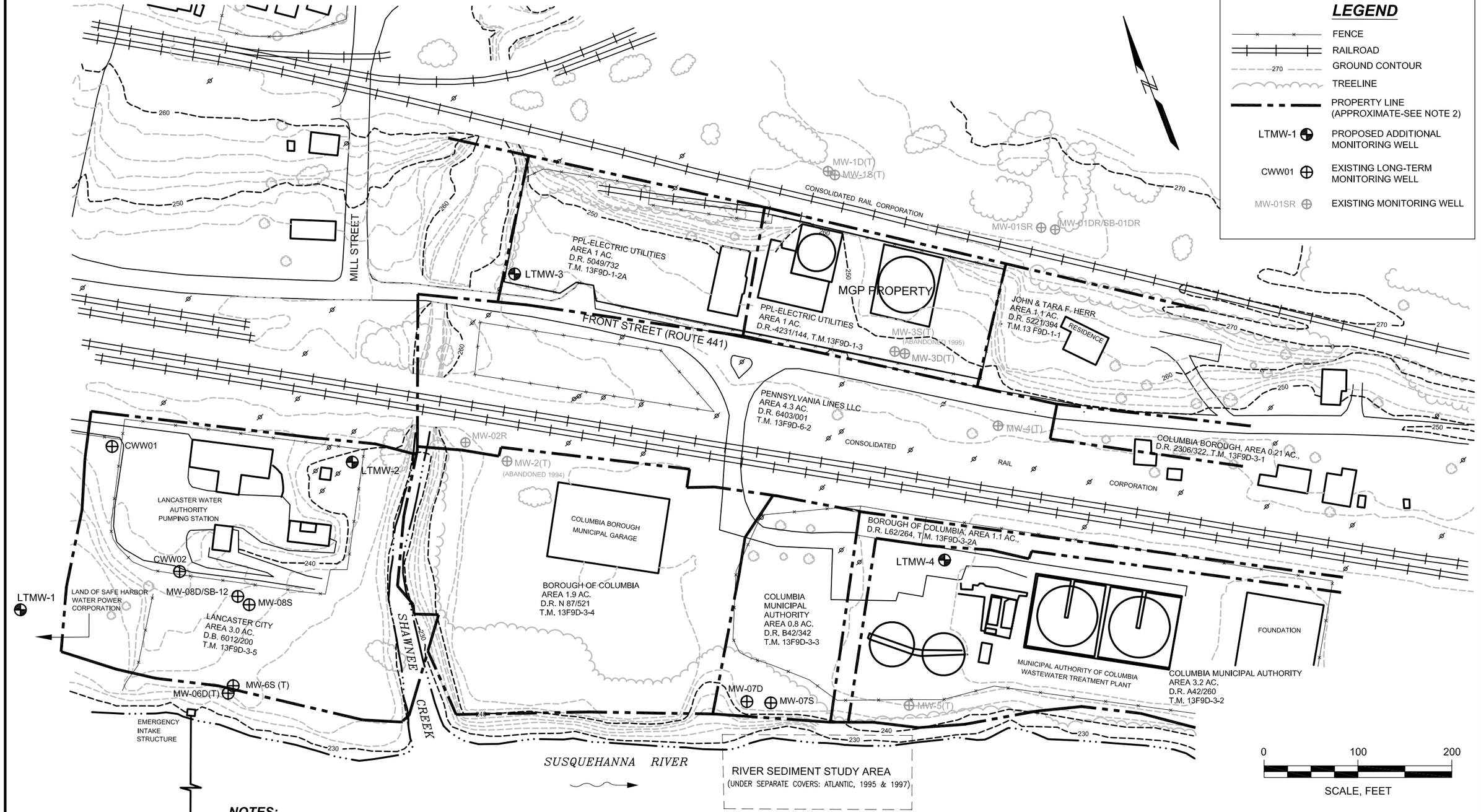
SOURCE: Map created with TOPO! ® ©2001 National Geographic (www.nationalgeographic.com/topo)

0 2000 4000

SCALE, FEET

FORMER UGI COLUMBIA MGP SITE COLUMBIA, PENNSYLVANIA	GEI Consultants	**SITE LOCATION MAP**
PPL-ELECTRIC UTILITIES, ALLENTOWN, PENNSYLVANIA UGI UTILITIES, INC., READING, PENNSYLVANIA	Project 013650-1-1002	October 2006 Figure 1

GEI\PPL\COLUMBIA\013650\REPORT\COLUMBIA-LOC.PPT



NOTES:

1. THIS DRAWING DEVELOPED BASED ON FIGURE 1-2 FROM THE REMEDIAL INVESTIGATION FOR THE FORMER UGI MANUFACTURING GAS PLANT, COLUMBIA, PA (APRIL, 1998), DEVELOPED BY GEI CONSULTANTS, INC. - ATLANTIC ENVIRONMENTAL DIVISION.
2. 2. PROPERTY LINES DEVELOPED BASED ON RESEARCH CONDUCTED BY WEBER SURVEYORS, INC. THE LINES SHOWN ARE APPROXIMATE & ARE BASED ON DEEDS & LANCASTER TAX RECORDS. NO FIELD SURVEYS HAVE BEEN CONDUCTED.

FORMER UGI COLUMBIA MGP SITE
COLUMBIA, PENNSYLVANIA

PPL-ELECTRIC UTILITIES, ALLENTOWN, PENNSYLVANIA
UGI UTILITIES, INC., READING, PENNSYLVANIA

GEI Consultants

Project 013650-2-1001

PROPOSED AND EXISTING MONITORING WELL LOCATIONS

October 2006 Figure 2

PPL\COLUMBIA\2006\COLUMBIA-PROPOSED.dwg

Appendix A

Monitoring Well Sampling Record

GEI Consultants

MONITORING WELL SAMPLING RECORD

OVM Reading _____ Job Name _____

Job Number _____ By _____ Date _____

Location _____ Measurement Datum _____

Well Number _____

Pre-Development Information Time (start) _____

Total Depth of Well

Water Level (prior to purging) _____ Measure only at end of sampling event for low flow sampling

One Purge Vol _____ Three Well Volume _____

Water Characteristics

Color _____ Clear ____ Cloudy ____

Odor ____ None ____ Weak ____ Moderate ____ Strong

Any films or immiscible material ____ None

Depth to Water (ft)	Volume (gal)	Time	pH	Temp (EC)	Spec. Conductance (ΦS/cm)	Turbidity (NTU)	DO Conc. (mg/L)	ORP (mV)	TDS

Demonstrate Stabilization of parameters

Total Volume Removed (gal)		pH (3 consecutive readings within 0.1 standard units)	
Temperature (EC)		Specific Conductance (ΦS/cm) (3 consecutive readings within +3%)	
DO Concentration (mg/L) (3 consecutive readings within +10%)		ORP (mV) (3 consecutive readings + 10 mv)	
Drawdown? How much?		TDS (3 consecutive readings within +10%)	
		Time (Finished)	
Minimum Purge Volume required (volume of tubing plus drawdown volume using borehole diameter) show calculation			
Water Level		Total Depth of Well	
Approximate Volume Removed (gal)		Does Volume removed exceed Minimum purge volume __ Yes ___ No	

Water Characteristics

Color				Clear		Cloudy	
Odor	None		Weak		Moderate		Strong
Any films or immiscible material				None			

Comments:

Appendix B

Health and Safety Plan

Health and Safety Plan

Installation of Monitoring Wells
Former UGI Columbia Gas Plant Site
Columbia, Pennsylvania

Submitted to:
On behalf of:
Clean Sites Environmental Services, Inc.
46161 Westlake Drive, Suite 230-B
Potomac Falls, VA 20165

For:
PPL Electric Utilities and UGI Utilities
Allentown, PA 18101 Reading, PA 19611

Submitted by:
GEI Consultants, Inc.
455 Winding Brook Drive
Glastonbury, CT 06033
860-368-5300

March 2007
Project 013650-2-1001

GEI HEALTH AND SAFETY PLAN (HASP)

Project Name: Former UGI Columbia Gas Plant
Well Installation

Project Location: Front Street, Route 441
Columbia, PA

PROPERTY DESCRIPTION

The site location is presented in Figure 1. Figure 2 presents the current site conditions. The site is located in an area of mixed residential/industrial land use near the northeastern shore of the Susquehanna River. Nearby land use consists of the municipal wastewater treatment facility, a borough garage and highway department, residences, railroad right-of-ways, and a surface-water supply facility. The site is currently vacant, but was used for retail boat sales and repair as recently as March 1994. Two former gas holders, capped with concrete slabs, are present on site. A fire-damaged building of cinder block and wood construction is also present on site.

The former MGP operated from April 1851 until approximately 1950. Gas was initially produced by wood carbonization, but carbonization was replaced by the Lowe process of carbureted water gas circa 1886. A limited volume of gas manufacturing by-products was disposed on the site and within the immediate site vicinity.

PROJECT DESCRIPTION

Four new bedrock groundwater monitoring wells will be installed at the site. In addition, well MW-07D will be replaced. Figure 2 presents the proposed locations. All five wells will be developed and sampled. GEI will supervise/conduct/direct the following general tasks:

- Utility mark-outs
- Installation of four new bedrock wells and replacement of a separate damaged bedrock well (MW-07D)
- Well development
- Groundwater sampling

Field activities are anticipated to require approximately two weeks for installation of the new and replacement well. Site-specific procedures are provided in the separate work plan.

SPECIAL PROCEDURES

- Prior to subsurface activities, including hand auguring, utilities must be cleared by a local utility location service and other applicable persons (i.e., water department, property owner).
- If site conditions suggest the existence of a situation more hazardous than anticipated, the site personnel shall evacuate the immediate area. The hazard and the level of protection shall then be reevaluated with the assistance and approval of the Health and Safety Specialist and Project Manager.
- GEI will conduct an on-site health and safety meeting prior to the start of well installation activities. Potential risks and associated response actions will be discussed.

General On-Site Equipment: First aid kit, adequate supply of drinking water, hardhat, work boots, safety glasses, respirator, extra disposable gloves, disposable wash clothes, antibacterial soap, portable phone, traffic cones, and caution tape.

POTENTIAL HAZARDS

The potential hazards for this project have been categorized into site and activity hazards. Site hazards are those hazards associated with site conditions and activity hazards are associated with GEI on-site activities. The potential hazards and control measures established to reduce the risk of injury or illness are identified in the following tables. Safe operating procedures established for routine hazards and common site conditions are included in the table below or contained in the GEI Corporate Health and Safety Manual.

PHYSICAL/BIOLOGICAL HAZARDS AND CONTROL	
Potential Hazard	**Control Measures**
▪ Construction Safety	Identify yourself and your work location to heavy equipment operators, so they may incorporate you into their operations. Coordinate hand signals with operators. Stay Alert! Pay attention to equipment backup alarms and swing radii. Wear a high visibility vest when working near equipment or motor vehicle traffic. Position yourself in a safe location when filling out logs and talking with the contractor. Notify the contractor immediately if any problems arise. Do not stand or sit under suspended loads or near any pressurized equipment lines.

PHYSICAL/BIOLOGICAL HAZARDS AND CONTROL	
Potential Hazard	**Control Measures**
▪ Heat Stress	Increase water intake while working. Increase number of rest breaks and/or rotate workers in shorter work shifts. Rest in cool, dry areas. Watch for signs and symptoms of heat exhaustion and fatigue. Plan work for early morning or evening during hot months. Use ice vests when necessary. In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures.
▪ Cold Stress	Take breaks in heated shelters when working in extremely cold temperatures. Wear loosely layered clothing to promote heat convection and absorption of perspiration. Drink warm liquids to reduce the susceptibility to cold stress.
▪ Physical Injury	Prevent slips, trips, and falls by: - Wearing work boots in good condition with non-slip soles. - Maintaining good visibility of the work area. - Avoiding walking on uneven or debris ridden ground surfaces.
▪ Back Injury	Use a mechanical lifting device or a lifting aid where appropriate. If you must lift, plan the lift before doing it. Check your route for clearance. Bend at the knees and use leg muscles when lifting. Use the buddy system when lifting heavy or awkward objects. Do not twist your body while lifting.
▪ Noise	Wear hearing protection when equipment such as a drill rig, jackhammer, cut saw, air compressor, blower or other heavy equipment is operating on the site. Wear hearing protection whenever you need to raise your voice above normal conversational speech due to a loud noise source; this much noise indicates the need for protection.

PHYSICAL/BIOLOGICAL HAZARDS AND CONTROL	
Potential Hazard	**Control Measures**
▪ Vehicular and Railroad Traffic	Use cones, flags, barricades, and caution tape to define work area if located in an otherwise active area. Use a "spotter" to locate oncoming vehicles. Use vehicle to block work area. Engage a police detail if necessary. ALWAYS note highway or railroad traffic before crossing.
▪ Utilities	A thorough underground utility survey must be conducted prior to all intrusive activities. Coordination with utility locating services, property owner(s) or utility companies must be conducted. Utilities are to be considered 'live' or active until documented otherwise. For overhead utilities within 50 feet, determine with the utility company the appropriate distance. Minimum distance for clearance is based on voltage of the line.
▪ Inclement Weather	Stop outdoor work during electrical storms and other extreme weather conditions such as extreme heat or cold temperatures. Take cover indoors or in vehicle. Listen to local forecasts for warnings about specific weather hazards such as tornados, hurricanes, and flash floods.
▪ Insects	Tuck pants into socks. Wear long sleeves. Use insect repellent.

ACTIVITY HAZARDS		
Activity	**Potential Hazards**	**Protective Equipment**
Well Installation	Heavy equipment, contaminant contact, vapor inhalation, noise	Hard hat, hearing protection, steel-toed, steel-shank boots, safety glasses, latex/neoprene gloves
Groundwater Sampling Well Development Water Level	Contaminant contact, vapor inhalation	Latex gloves, safety glasses, steel-shank, water- resistant boots, (Tyvek recommended)
Personal protective equipment (PPE) has been selected based on activity hazards and site conditions. PPE listed for each activity is the *initial level of protection to be worn. An upgrade to respiratory protection may be required based on the designated action levels.*		

AIR MONITORING

Air monitoring will be conducted with an organic vapor meter to evaluate whether potential hazardous organic vapors are present in the work area. The results from air monitoring provide the basis for a work area evacuation or an increase in the degree of respiratory protection. Air monitoring for organic vapor concentration will be conducted using a photoionization detector (PID) calibrated to benzene. Monitoring shall be conducted for all intrusive activities and periodically (half-hourly) throughout the workday.

The following table identifies the compounds that are to be monitored and their associated action levels, and the contingency measures to be taken if action levels are exceeded.

REQUIRED MONITORING AND ACTION LEVELS			
Contaminant	**Equipment**	**Action Level**	**Contingency**
VOCs	PID	Greater than 5 ppm in breathing zone*	Monitor for benzene (see below)
VOCs	PID	Greater than 10 ppm*	Evacuate area
*Action level shall be based on sustained readings of greater than 1 minute.			

If the PID has a sustained reading of 5 ppm, the Draeger CMS Analyzer with a benzene chip will be used to determine the benzene level. If benzene is present at a sustained level above 5 ppm, a full-face respirator will be used.

SITE CONTROL

Buddy System: GEI personnel should be in line-of-site or communication contact with another on-site person. The other on-site personnel should be aware of their role as a "buddy" and be able to provide assistance in the event of an emergency. A copy of this plan shall be given to any person acting as a GEI "buddy" for informational purposes.

Decontamination: A decontamination area will be established if physical contamination (coal tar or sheen) is observed during drilling efforts at such a level that it poses the potential for adherence to clothing or footware and transport from the work area, such that personnel are decontaminated prior to leaving the area. *Decontamination shall consist of a detergent wash and water rinse and be conducted in the following order: wash footwear, rinse footwear. Properly dispose of disposable gloves or other personal protective equipment.*

Personnel shall wash hands with disinfectant soap (e.g., liquid Dial) and rinse with water:

prior to breaks
leaving the site
when potentially contaminated material comes in direct contact with skin.

In general, however, work will be initiated in modified level D (hard hat, safety gloves, safety glasses, steel toed boots, and hearing protection).

SITE PERSONNEL

Project Manager: The Project Manager (Jerry Zak) has the overall responsibility for the safety of operations and health and safety of all project personnel.

Health and Safety Specialist: The Health and Safety Specialist (Laurie Wylie or designee) is responsible for evaluating the project operations and identifying procedures to reduce the risk of injury and illness of project personnel. The Health and Safety Specialist shall be a resource to the project staff and shall be consulted on all related health and safety issues that arise in the field, including any changes in the scope of work.

Project Staff: All GEI personnel are responsible for the health and safety of themselves and other GEI project personnel and must adhere to the procedures established in this plan. Personnel shall maintain an awareness of site conditions and exercise good judgment when confronted with hazardous or unsafe conditions. If the safety procedures identified in this plan do not address the hazardous or unsafe condition, then personnel shall follow the safest course of action and seek the advice of a GEI Health and Safety Specialist.

Training Requirements: Personnel conducting the site work shall have completed an initial 40 hours of classroom-style health and safety training and three days of on-site training, as required by OSHA 29 CFR 1910.120. In addition, on-site supervisors shall receive an additional eight hours of supervisory training. All site employees shall receive a minimum of eight hours of refresher training annually. A pre-entry briefing, given by the Project Manager and/or the Corporate Health and Safety Specialist, will serve to familiarize on-site personnel with the procedures, requirements, and provisions of this HASP. In addition, all GEI personnel shall sign the plan to document that they understand the hazards and control measures presented and agree to comply with the procedures established in the HASP.

Medical Surveillance Requirements: Participation in the medical surveillance program is required for all GEI personnel conducting activities on-site. The medical surveillance program is in compliance with the provisions set forth in OSHA 29 CFR 1910.120, and other applicable federal and state regulations. Medical surveillance requirements are outlined in the GEI Corporate Health and Safety Manual and have been reviewed by a Board-Certified Occupational Physician.

SITE EMERGENCY CONTINGENCY PLANS

The following table outlines the actions to be taken for specific emergency situations, emergency phone numbers, and directions to the local hospital:

CONTINGENCY PLANS FOR SITE EMERGENCIES	
Situation	**Action**
Evacuation	Notify all on-site personnel of an emergency requiring evacuation. Leave the dangerous area and report to a designated rally point. Notify Emergency Services, as appropriate. Account for all personnel. Contact the PM soon as possible. Maintain site security and control measures for community safety until emergency responders arrive.
Medical Emergency	1. Only perform assistance that does not jeopardize your safety. Establish the patient's level of consciousness. Contact Emergency Medical Services and inform them of patient's condition. Call for help. 2. While awaiting EMS perform first aid to the level of your training.

CONTINGENCY PLANS FOR SITE EMERGENCIES	
Situation	**Action**
	Check conscious level. Open airway. Check breathing. Check circulation.
Medical Emergency (cont.)	Check for bleeding: control with direct pressure. Do not move patient (unless location is not secure). Remain with the patient until EMS arrives. Contact the PM and Health & Safety as soon as possible. Document the incident on GEI Accident/Incident form.
Fire Emergency	1. Evacuate the area. 2. Notify the Emergency Services. 3. Extinguish small, contained fires. 4. Contact the PM and Health and Safety. 5. Document the incident using the Accident/Incident Form.

Important Phone Numbers		**Directions to Hospital**
Local Police and Ambulance	911	Go northeast on South Front Street (Rt. 441). Go right on Locust Street (still Rt. 441). Take left on North Third Street (still Rt. 441). Take left on Cedar Street. Take entrance ramp onto Route 30 east. Take the Manheim Pike exit. Go right at end of ramp onto Manheim Pike (Rt. 72). Follow Route 72 (it becomes Route 222 and Prince Street). Go left on East Frederick Street. Take 4th right onto North Duke Street. Hospital is on the left.
Fire Department and Ambulance	911	
Lancaster General Hospital 555 N Duke St, Lancaster, 17602	(717) 290-5511	
Safety Specialist, Jared Lewis	(860) 368-5414 (office)	
Project Manager, Jerry Zak	(860) 368-5404 (office) (860) 558-3866 (cell)	
Client Contact, Scott Miller	(703) 519-2142 (office) (703) 868-0710 (cell)	
Utility Clearance Permit #		
Nearest Telephone Location:	Cellular phone	

Once the site-specific health and safety form has been read, complete this sign-off sheet and return it to GEI Corporate Health and Safety.

SAFETY PLAN SIGN-OFF

All GEI personnel conducting site activities shall be familiar with the requirements of this plan and agree to its implementation.

Site Name: Former UGI Columbia Gas Plant Project No: 013650

Name: _____ Signature: _____

Name: _____ Signature: _____

Name: _____ Signature: _____

Name: _____ Signature: _____

Name: _____ Signature: _____

Name: _____ Signature: _____

Safety Specialist: _____

Project Manager: _____