GZA GeoEnvironmental

Engineers and Scientists

April 10, 2012
File No. 21.0056127.10

Mr. Frank Evangelisti
Broome County - Dept. Planning and Economic Development
44 Hawley Street, 5th Floor
Binghamton, NY 13902-1766

Re: Site Remedial Activities Work Plans
312 Maple Street
Endicott, New York

Dear Mr. Evangelisti:

GZA GeoEnvironmental of New York (GZA) is providing the attached Work Plans for the Site Investigation at the above referenced Site.

535 Washington Street
11th Floor
Buffalo, New York
14203
716-685-2300
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www.gza.com

The following attached Work Plans are included as Attachments to this letter.

- Field Activities Plan
- Quality Assurance Plan
- Health and Safety Plan

Please do not hesitate to contact the under signed if you have any questions or require any additional information.

Sincerely,

GZA GEOENVIRONMENTAL OF NEW YORK

Daniel Troy, P.E.
Project Manager

Bart A. Klettke, P.E.
Associate Principal

Attachments:
A Field Activities Plan
B Quality Assurance Plan
C Health and Safety Plan

cc: Mr. Gary Priscott (NYSDEC)

ATTACHMENT A

FIELD ACTIVITIES PLAN

SITE REMDIAL ACTIVITIES
312 MAPLE STREET
ENDICOTT, NEW YORK
SITE NO. B00168-7

SITE REMEDIAL ACTIVITIES
FIELD ACTIVITIES PLAN

312 MAPLE STREET
ENDICOTT, NEW YORK
SITE NO. B00168-7

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1.0 INTRODUCTION

1.1 PURPOSE

This Field Activities Plan (FAP) has been developed by GZA GeoEnvironmental of New York (GZA), on behalf of Broome County Department of Planning and Economic Development (Broome County), for remedial activities to be conducted at the facility located at 312 Maple Street, Endicott, New York (Site). Site remedial activities to be completed under this FAP will include work that will be performed at both on and off-Site locations. A locus plan for the Site is included as Figure 1 and a Site Plan as Figure 2.

The remedial actions required for the Site are based on previous findings and conclusions presented in the Remedial Investigation and Remedial Alternatives Report (RI/RAR)[1] prepared by GZA for Broome County (done under the New York State Department of Environmental Conservation (NYSDEC) Environmental Restoration Program (ERP)) and in accordance with the findings of the NYSDEC January 2011 Record of Decision[2] (ROD) for the Site.

1.2 SITE DESCRIPTION

The Site is located at 312 Maple Street in Endicott, New York on the southwest corner of Maple Street and North Duane Avenue. Surrounding property is mixed residential/commercial. Norfolk Southern railroad tracks border the Site to the south. The Site is currently occupied by a manufacturer of wood cabinetry. Previous owners/operators include shoe companies, coal companies, electronic assemblers and a metal finishing job shop.

The Site is about 0.9 acres in size and includes three adjoining Site buildings (Buildings 1, 2, and 3 as shown on Figure 2). Building 1 is a single story masonry structure. Building 2 is a steel framed and sided structure with a concrete slab-on-grade floor. Building 3 is a masonry and wood-framed two-story building with a basement.

Based on previous studies performed by GZA, two contaminant source areas were originally identified at the Site. The first was an area of unsaturated soils contaminated with trichloroethylene (TCE), a chlorinated solvent, located southeast of Building 2 (see attached Site Plan). The second were three dry wells located inside Buildings 2 and 3. Subsequent meetings and conversations with NYSDEC defined the surface soils east of Building 3 and south of Building 2 as areas of concern that may also require additional investigation/remediation. The groundwater at the Site has also been identified as contaminated with TCE although not

1. Remedial Investigation & Remedial Alternative Report, 312 Maple Street, Endicott, New York, NYSDEC Site # B-00168-7, prepared for Broome County Development of Planning and Economic Development, Binghamton, NY, prepared by GZA GeoEnvironmental of New York, Dated October 2009.

2. Record of Decision, 312 Maple Street, Environmental Restoration Project, Village of Endicott, Broome County, NY Site Number B00168, prepared by NYSDEC, dated January 2011.

considered to be a source area.

TCE Contaminated Unsaturated Soils: As part of Interim Remedial Measures (IRM), an approximate 130 tons of TCE-impacted soil was excavated from an on-Site area in 2006 and approximately 49 tons of TCE-impacted soil was excavated from on off-Site area located on the adjacent Norfolk Southern railroad property in 2011. The excavated soils were disposed of at facilities permitted to accept the waste with on-Site soils disposed as a non-hazardous waste and the off-Site soils disposed of as a hazardous waste for TCE. The results of the confirmatory soil sample results from IRM excavations indicate the remaining unsaturated soils associated with the Site have been remediated to concentrations below their respective unrestricted soil cleanup objectives (USCOs) as defined in 6 New York Code Rules and Regulation Part 375-6 Remedial Programs Soil Cleanup Objectives (Part 375 SCOs). Based on these findings, the on-Site soils and soils adjacent to the site along the railroad easement have been successfully remediated.

Three Dry Wells: As part of the 2006 IRM activities, soils below the respective drywells were excavated to remove potential contaminated soils and were disposed as a non hazardous waste at a facility permitted to accept the waste soil. Confirmatory soil samples indicated the remaining soils associated with the drywells have been remediated to concentrations below their respective USCOs as defined in 6 New York Code Rules and Regulation Part 375 SCOs and no further action is required. The drywells were backfilled with concrete up to the existing floor grade.

Sub-Slab Soil Vapor: Based on the subsurface soil vapor testing results identified during the RI portion of the work, sub slab depressurizations systems (SSDS) were installed inside the three on-Site buildings. The installed SSDSs generally included either a typical depressurization fan or a high suction fan depending on location and sub-slab soil conditions. The depressurization fans were mounted with protective covers at either exterior locations or at interior areas with the vent stacks extended to a point above the respective roof line. These units were installed to remove the potential exposure to TCE vapors in the occupied areas of the site building from subsurface soils.

Contaminated Groundwater: TCE was the only volatile organic compound (VOC) identified in the groundwater samples at concentrations exceeding its respective NYSDEC Class GA[3] criteria value of 5 parts per billion (ppb). Specifically, TCE concentrations were identified ranging from 2.3 ppb to 1,600 ppb in samples collected from various locations at the Site.

Additionally, hexavalent chromium (Cr^{+6}) was identified in groundwater samples at concentrations ranging from 48 ppb to 1,200 ppb. The Class GA value for hexavalent chromium is 50 ppb.

1.3 RECORD OF DECISION

The remedial activities to be completed at the Site, based on the findings of the final RI/RAR for the

3. Division of Water Technical and Operational Guidance Series (TOGS 1.1.), dated October 1993, revised June 1998, errata January 1999 and amended April 2000 (Class GA)

Site, are outlined in NYSDECs ROD. The ROD identifies seven (7) elements of the selected remedy as follows.

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, and maintenance and monitoring of the remedial program.
2. Enhanced anaerobic bioremediation will be applied through a network of injection wells to target the primary contaminants of concern in groundwater.
3. Operation, maintenance and monitoring of existing SSDSs will be required.
4. The operation of the components of the remedy will be continued until the remedial objectives have been achieved, or until NYSDEC determines that continued operation is technically impractical or not feasible.
5. Implementing an institutional control in the form of an environmental easement for the controlled property that:

    a) Requires the remedial party or site owner to complete and submit to the NYSDEC a periodic certification in accordance with Part 375-1.8(h)(3);
    b) Allows the use and development of the controlled property for restricted residential, commercial, and/or industrial use (land use is subject to local zoning laws);
    c) Restricts the use of groundwater as a source of potable or process water, without necessary water treatment as determined by NYSDEC, New York State Department of Health (NYSDOH) or Broome County Department of Health (BCDOH);
    d) Prohibits agriculture or vegetable gardens on the controlled property; and
    e) Requires compliance with the NYSDEC-approved Site Management Plan (SMP).

6. Since the remedy results in contamination remaining at the Site that does not allow for unrestricted use, an SMP is required, which includes the following:

    - Description of the provisions of the environmental easement including any land use and groundwater use restrictions;
    - Provisions for the management and inspection of the identified engineering controls;
    - Maintaining site access controls and NYSDEC notification; and
    - The steps necessary for the periodic reviews and certifications of the institutional and/or engineering controls.

    The following are the main components of an SMP.

    - An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the Site and details the steps and media-specific requirements necessary to assure the following institutional and/or engineering controls remain in place and effective:

        - Institutional Controls – Environmental Easement as discussed in Element 5

above.

- Engineering Controls – Operation, maintenance and monitoring of the on-site SSDSs discussed in Element 3 above.

- An Excavation Management Plan which details the provisions for the management of future excavations in areas of remaining contamination;

- A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but is not limited to:

  i) Monitoring of groundwater to assess the performance and effectiveness of the remedy;
  ii) A schedule of monitoring and frequency of submittals to NYSDEC;
  iii) Provisions to evaluate the potential vapor intrusion for any building newly constructed on the site, including provisions for mitigation of impacts identified;
  iv) Provisions to evaluate the potential of soil vapor intrusion for existing buildings if building use changes significantly or if a vacant building becomes occupied.

- An Operation and Maintenance Plan to assure continued operation, maintenance, monitoring, inspection and reporting of any mechanical or physical component of the remedy. The plan includes, but is not limited to:

  i) Compliance monitoring of treatment systems to assure proper operation and maintenance (O&M) as well as providing the data for any necessary permit or permit equivalent reporting;
  ii) Maintaining site access controls and NYSDEC notification; and
  iii) Providing NYSDEC access to the Site and O&M records.

7. Green remediation and sustainability efforts are considered in the design and implementation of the remedy to the extent practical, including:

   - using renewable energy sources
   - reducing green house gas emissions
   - conserving natural resources

1.4 PROJECT MANAGEMENT AND ORGANIZATION

1.4.1 Personnel

The general responsibilities of key project personnel for the remedial activities at the Site are listed below.

NYSDEC Project Manager – Gary Prescott, a project manager for NYSDEC Region 7,

will have the responsibility for regulatory oversight for the work associated with ERP Site No. B00168-7.

Broome County Project Manager – Frank Evangelisti will have the responsibility for implementing the project and has the authority to commit funding necessary to meet the objectives and requirements.

GZA Project Manager - Daniel Troy P.E., will be responsible for managing the implementation of the Site remedial activities and coordinating the collection of data during the project. Mr. Troy will be responsible for technical quality control and project oversight.

GZA Quality Assurance (QA) Officer – Christopher Boron will report to the Project Manager and be responsible for checking that QA/QC procedures are being followed. Mr. Boron will be responsible for overseeing the review of field and laboratory data and monitor the performance of the laboratory to check that Data Quality Objectives for the project are met.

GZA Field QA Officer – John Beninati will be responsible for the overall operation of the field team and reports directly to the Project Manager.

1.4.2 Specific Tasks and Services

GZA will sub-contract specialists for services relating to monitoring well installation/decommissioning, subsurface injections, laboratory/analytical services, data validation services and SSDS maintenance/servicing (if necessary).

2.0 DESCRIPTION OF FIELD ACTIVITIES

The field activities described below are intended to accomplish the Site remedial objectives.

2.1 GENERAL FIELD ACTIVITIES

General field activities include project coordination, mobilization, implementing the health and safety plan, monitoring well installation and decommissioning, groundwater sampling and analytical testing, decontamination and handling of investigation wastes, and surveying. Subcontractors will be used for monitoring well installation/decommissioning activities, bioremedial injections, analytical testing, and data validation.

2.1.1 Project Coordination

GZA will notify Broome County, Site personnel, and NYSDEC of scheduled Site remedial activities prior to mobilization. Prior to the commencement of field activities, GZA

field personnel will conduct a field meeting with project subcontractors to discuss the scope of work, Site background, potential dangers, health and safety requirements, Site-specific security and safety protocols, emergency contingencies and other field procedures. NYSDEC staff are welcome to attend and will be notified at least seven (7) days in advance of the meeting.

2.1.2 Mobilization

Prior to the commencement of Site remedial activities, the Underground Facilities Protection Organization (UFPO) will be contacted at 1-800-962-7962 to clear planned locations for monitoring well installation/decommisioning and bioremedial injections. Utility clearance will require three working days by UFPO. GZA and its drilling subcontractor will then mobilize necessary materials and equipment to the Site.

2.1.3 Health and Safety

It is anticipated that the work to be completed at the Site will be done at level D personal protection. Although unlikely, should health and safety monitoring during field activities warrant an upgrade to level C protection, work will stop and Site conditions will be re-evaluated prior to resuming further remedial activities. See Section 6.0 for additional information on Site specific Health and Safety.

2.2 SITE REMEDIAL ACTIVITIES (PRE-BIOREMEDIATION APPLICATION)

Remedial field work will generally be done in compliance with NYSDEC's DER-10 "Technical Guidance for Site Investigation and Remediation", dated June 2010.

2.2.1 Monitoring Well Installation and Decommissioning

One (1) test boring will be performed to relocate the existing groundwater monitoring well MW-3, which is currently located within the Maple Street right-of-way, to a location within the Site property, approximately 10 feet south of the property line (see Figure 2). Relocation of this monitoring well will reduce the potential for future damage from vehicular traffic including trucks and snow plows and will be safer to sample.

The test boring for the relocated MW-3 monitoring well installation will be advanced in the overburden soils using a track or truck mounted rotary drill rig using 4 ¼-inch inside diameter hollow stem augers (HSA). Overburden soil samples will be obtained by driving a 1 3/8-inch inside diameter by 24-inch long split spoon sampler 24-inches ahead of the lead cutting shoe of the HSAs. GZA assumes the soil spoils generated from the test boring will not require containerization and can be spread on the ground over non-paved areas of the Site.

The test boring will be observed by a GZA field engineer/geologist and a field log for the boring/monitoring well will be prepared. Soil samples from the test boring will be collected from the split spoon sampler which will be opened at ground surface after retrieval. Soil samples will be collected for classification and field-screening with an organic vapor meter (OVM) equipped with a photo-ionization detector (PID).

The HSAs will be advanced to approximately 20 feet bgs, 5 feet into the upper groundwater zone encountered, or until refusal is encountered, whichever occurs first. Drilling fluids will not be used while advancing the HSAs, so groundwater can be identified when encountered.

After the designated depth has been reached, the completed test boring will be converted to a groundwater monitoring well (tentatively identified as MW-3R). The well will be constructed of 2-inch inner diameter flush coupled PVC riser and screen. The screen will consist of an approximate 10-foot long section of machine slotted, schedule 40 PVC. A sand filter will be placed in the boring around the annulus space of the well screen such that the sand extends a minimum of 1-foot above the top of the screen. An approximate 3-foot thick layer of bentonite will be placed above the sand filter to provide a seal from the overburden conditions above the screen. A mixture of cement/bentonite grout will extend from the bentonite seal to approximately 1foot bgs. The monitoring well will be completed by placing a flush mounted road box over the riser. Concrete will be placed in the boring around the protective casing and sloped away from the casing.

Following well installation, MW-3 will be decommissioned in accordance with NYSDEC requirements. HSAs will be used to over-drill the well riser through the grout and overburden. The augers will be advanced to the bottom of the recorded well depth, as depicted on the well installation log, and the corresponding well materials will be removed. Following removal of the well materials, the remaining borehole will be filled to within 4-inches of ground surface with cement/bentonite grout using tremie methods. Once the grout has set, the remaining void will be filled with asphalt patch material to ground surface. The well decommissioning will be observed by a GZA field engineer/geologist and a field log will be prepared.

2.2.2 Monitoring Well Development

The newly installed MW-3R monitoring well will be developed, prior to sampling, to remove fines that may have accumulated within the well during drilling and to develop the sand filter. A polyethylene bailer will be used to develop the well until visible fines are minimized in the observed discharge. A water quality meter will be used to measure water quality parameters (pH, temperature, turbidity, dissolved oxygen (DO), oxidation reduction potential (ORP) and conductivity) during development. An initial reading will be collected from the first bailer removed. Subsequent readings will be collected after each well volume removed, with development continuing, for a minimum of three (3) well volumes, and until water quality has stabilized for all parameters as follows.

PARAMETER	STABILIZATION CRITERIA
pH	±0.1
Conductivity	±3%
ORP	±10mV
DO	±10%
Turbidity	<50 NTUs

No more than 10 well volumes will be removed during development.

Hydraulic conductivity testing, using either rising or falling head methods, will be attempted to assess that the monitoring well is functioning and to provide hydrologic information that will aid in evaluating subsurface conditions. However, these test methods may not be practical due to the sandy nature or the soils resulting in rapid groundwater recovery rates.

2.2.3 Monitoring Well Purging and Sample Collection

A groundwater sampling event will be completed prior to the start of the bioremediation application to assess the Site baseline conditions, as the last sample round was completed in April 2008. The following nine (9) monitoring well locations will be sampled as part of the baseline assessment.

- Five (5) on-Site monitoring wells (MW-1, MW-2, MW-3R, MW-4, and MW-5);
- Three (3) off-Site wells (MW-6, MW-7 and MW-8), and
- One (1) upgradient off-Site well previously installed as part of an environmental investigation for a different site will be sampled to provide current baseline groundwater concentration and water quality data ("Existing Well (by others)" located southeast of Site as shown on Figure 2). For purposes of this remediation work, this well will be identified as MW-9.

Prior to collecting groundwater samples, a static water level will be measured from the top of the monitoring well riser and recorded on the monitoring well sampling log. Static water level data from the monitoring wells will be used to determine groundwater flow direction.

Low-flow sampling techniques will be used to collect groundwater samples to assess water quality data. A peristaltic pump will be used, with new, dedicated polyethylene tubing at each well location.

The peristaltic pump will be turned on and the first set of water quality readings will be collected when the flow-through cell is completely full and water begins to flow out. Readings will be recorded once a constant head is established and continued until water quality readings stabilized for three successive readings. If readings stabilize prior to removing one well volume, purging/monitoring will continue until one well volume is removed while maintaining a constant head. Once a constant head is established, pumping flow rates will be maintained as constant as possible. Sampling flow rates will be kept consistent with purging/monitoring flow rates. Altering the flow rates could likely change the chemistry within the well (i.e., stagnant water within the well will mix with formation water coming into the well).

Once the water quality readings have stabilized and at least one well volume has been removed after a constant head has been established, groundwater analytical samples will be collected for VOCs and hexavalent chromium. After the appropriate sample containers have been filled, the pump will be shut off and the tubing removed from the monitoring well and pump head, and will be properly disposed of as solid waste.

2.2.4 Decontamination and Handling of Remediation Derived Waste

The sampling methods and equipment selected limit both the need for decontamination and the volume of waste material to be generated. Decontamination procedures specific to each of the field activities are described in the Quality Assurance Plan (QAPP). Personal protective equipment and disposable sampling equipment will be placed in plastic garbage bags for disposal as a solid waste.

Soil cuttings generated as part of monitoring well installation and decommissioning activities are not anticipated to be contaminated based on historical analytical data collected. Regardless, GZA will field-screen soil cuttings with the use of the OVM. These measurements are anticipated to be less than 1 part per million (ppm) during field-screening. If less than 1 ppm and the soils appear to be visually clean, the material will be placed across un-paved areas of the Site.

Purge water and well development water will be containerized in 55-gallon drums and stored on-Site, within a designated area, until analytical results are received. If analytical results are identified below Class GA criteria, the drummed water will be discharged to the ground surface at the Site. Should contaminants be present at concentrations exceeding Class GA criteria, GZA will coordinate with the Town of Endicott wastewater treatment facility for proper disposal, as previously done following similar groundwater sampling events.

2.2.5 Survey

GZA will collect elevation data (i.e., ground surface and top of well riser) following monitoring well installation with the use of a survey stadia rod and level. GZA will utilize known elevation data from a nearby permanent monitoring well location as a reference point.

2.3 SITE REMEDIAL ACTIVITIES (BIOREMEDIATION APPLICATION)

Following the baseline sampling event, anaerobic bioremediation application injections will be completed to stimulate a reductive dechlorination environment to remediate the TCE and Cr^{+6} present in the groundwater at the Site. The in-situ treatment will assist in breaking down or "polishing" the TCE and Cr^{+6} to concentrations below their respective Class GA criteria and reduce the potential for additional downgradient groundwater contaminant migration. It is assumed that the previously completed on and off-Site soil excavation IRMs have removed the main source of the TCE contamination and have assisted in improving the groundwater conditions at the Site. Analytical data collected during the baseline assessment from the groundwater well located upgradient of the Site (i.e., MW-9) will be used to evaluate potential for upgradient groundwater sources.

The bioremediation application will consist of chemical injections using a product developed by Plant Products Co. Ltd (Plant Products): BioStryke® Electron Reduction Dechlorination (ERD Enhanced™). This product will be mixed with water to makeup the solution to be injected. The ERD Enhanced™ will require an upgradient slurry concentration of 25% using 940 gallons of water (slurry volume of 1,110 gallons) and a downgradient slurry concentration of 20% using 1,620 gallons of water (slurry volume of 1,840 gallons). GZA assumes the water required will

be obtained from a municipal fire hydrant located along Maple Street. The proper permission and permits will be obtained prior to using the hydrant.

The solution injections will occur along two linear barrier walls using direct push technology at the Site. The attached Figure 2 shows the approximate locations of the two linear barriers (total of 18 injection locations). Row 1 is located in the southeastern portion of the Site between existing monitoring wells MW-1 and MW-2. There are seven injection points in Row 1 spaced approximately 15 feet apart. Row 2 is located along the western and northwestern property line in the vicinity of existing monitoring wells MW-4, MW-5 and MW-7. There are eleven injection points in Row 2, spaced approximately 15 feet apart. Injections will not be performed inside the facility due to work activities and machinery associated with cabinet manufacture.

The injections at the 18 locations will occur at 1-foot intervals for an approximate 10-foot thickness within the upper groundwater zone. Therefore, based on an average Site groundwater depth of about 14 feet below ground surface (bgs), injections will be completed from about 15 to 25 feet bgs.

GZA is estimating that the injection event can be completed in 4 to 5 days, assuming the mixture of materials can be injected into the subsurface at a rate of about 4 gallons per minute. An environmental subcontractor will be used to complete the soil probes and injections, which will be overseen by GZA.

2.4 SITE REMEDIAL ACTIVITIES (POST-BIOREMEDIATION APPLICATION)

Following the bioremediation application, three rounds of groundwater sampling will be completed from the nine (9) monitoring wells discussed in Section 2.2.3 to assess the effectiveness of the applications. Considering the remedial goals of the project to be significant contaminant reduction within 2-3 years, sample rounds completed one, two and three years after the application will monitor the effects of ERD Enhanced™ on the groundwater contamination.

The monitoring wells will be purged and sampled via the techniques discussed in Section 2.2.3 and in the Site QAPP (see Appendix A).

2.5 OPERATION, MAINTENANCE AND MONITORING OF EXISTING SSDS

Four SSDS were installed by Enviro Testing (GZAs subcontractor) of Binghamton, NY within the three on-Site buildings and three off-Site SSDSs installed as part of previous IRM activities. Broome County will be responsible for operation, maintenance and monitoring (OM&M) associated with the four on-Site SSDS. The OM&M associated with the on-Site SSDS is as follows.

- Operation: The SSDSs are hardwired into the electrical system at the Site and designed to operate continuously. If power loss occurs, the SSDSs will shut down. Upon power restoration, the system will restart automatically.
- Maintenance: If an SSDS is no longer operating, malfunctioning or there is a loss of vacuum noted, maintenance of the SSDS will be required. The type of maintenance

could vary depending upon the identified problem. It will require a visit to the Site by a knowledgeable vendor to assess the problem.

- Monitoring: The on-Site SSDSs will be inspected annually. This inspection will coincide with the annual groundwater sampling event and be documented in the Institutional and Engineering Control Report that will be required to be submitted annually.

NYSDEC requires that the OM&M for the on-Site SSDSs be outlined in detail to describe the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected in the SMP. The SSDSs are an Engineering Control of the selected remedy and will be required to be operated until the remedial objectives (NYSDEC groundwater standards have been achieved and vapor intrusion is no longer a concern) have been achieved or until NYSDEC/NYSDOH determines that the continued operation is technically impractical or not feasible.

2.6 ENVIRONMENTAL ANALYTICAL TESTING PROGRAM

The proposed environmental testing program is summarized in Table 1. The samples collected as part of Site remedial activities will be subject to analytical testing methodologies that follow NYSDEC Analytical Service Protocol (ASP) Category B deliverables and data validation. Further information regarding sampling and testing methodologies can be found in the Site QAPP (see Section 4.0).

3.0 DATA DOCUMENTATION

Field notes will be kept in a Site-specific field book during remedial activities, in addition to field logs that will be generated summarizing the field work and become part of the project file. Field notes will include the following daily information for remedial activities:

- Date;
- Meteorological conditions (temperature, wind, precipitation);
- Site conditions (e.g., dry, damp, dusty, etc.);
- Identification of crew members (GZA and subcontractor present) and other personnel (e.g., agency or site owner) present;
- Description of field activities;
- Location(s) where work is performed;
- Sampled collected;
- Problems encountered and corrective actions taken;
- Records of field measurements or descriptions recorded; and
- Notice of modifications to the scope of work.

Photographic documentation of the remedial activities will be done for inclusion in the Certification report.

4.0 REPORT

4.1 PERIODIC CERTIFICATION REPORT

A periodic Certification Form is required to be submitted by the remedial party or site owner to NYSDEC in accordance with NYSDEC Part 375-1.8(h)(3) which states:

"The owner or the remedial party at a site at which institutional or engineering controls are employed as part of a remedy, must annually submit, unless an alternate certification period is provided in writing by the Department, a written certification by a professional engineer, or by such other qualified environmental professional as the Department may find acceptable as set forth in ECL 27-1415(b)."

GZA will prepare the annual Periodic Certification Report, on behalf of Broome County, for submittal to NYSDEC. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in the Metes and Bounds description as to be attached to the SMP. This Periodic Certification Report is a component of the SMP.

After the last inspection of the reporting period, a Professional Engineer (PE) licensed to practice in New York State will prepare the certification. GZA is assuming there will be one inspection per reporting period to observe the institutional and engineering controls at the Site. For each institutional or engineering control identified, it must be certified that the following statements are true:

- The inspection of the site confirmed the effectiveness of the institutional and engineering controls required by the remedial program was performed under direction of the PE;
- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by NYSDEC;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the Site will continue to be provided to NYSDEC to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the Site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of the PE's knowledge and belief, the work and conclusions described in the certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices; and

- The information presented in this report is accurate and complete.

4.2 SITE MANAGEMENT PLAN

An SMP is required to be developed as the selected remedy results in contamination remaining at the Site. As a requirement of the SMP, a Periodic Review Report must also be submitted to NYSDEC. GZA has assumed NYSDEC will require the report annually, as groundwater sampling will be completed annually.

GZA will develop a site-specific SMP utilizing the most current version of NYSDEC's SMP template (dated May 2010). The template was developed for remedial projects performed under the oversight of NYSDEC's Division of Environmental Remediation. The template will assist in the development of the site-specific SMP by providing format and general content guidelines and is intended to increase the predictability of format and content required for NYSDEC approval. Implementation of the SMP and environmental easement will be the requirement of the Site property owner. If the property is sold or transferred to a new entity, the new owner and/or entity will be responsible for its implementations. Therefore, the document generated is comprehensive to act as a stand-alone document that transfers with the property.

The main components of the SMP are as follows.

- Description of the Remedial Program including site background information, a summary of the remedial investigation findings and remedial actions completed.

- Institutional and Engineering Control Plan that identifies use restrictions and engineering controls for the site. This section will detail the steps and media-specific requirements necessary to check the institutional and/or engineering controls established remain in place and effective. Also included in the Institutional and Engineering Control Plan are an inspection and notification schedule, and a contingency plan. The contingency plan outline steps to be taken if it is determined that the institutional and/or engineering controls established are no longer effective.

- A Site Monitoring Plan to assess the performance and effectiveness of the selected remedy (bioremediation application). This plan will include:

    - groundwater monitoring requirements to assess the performance and effectiveness of the remedy,
    - a schedule of monitoring and frequency of submittals to NYSDEC,
    - provision to evaluate the potential vapor intrusion for buildings that may be constructed on the site, including provisions for mitigation of impacts identified; and
    - provisions to evaluate soil vapor intrusion for existing buildings if building use changes significantly or if a vacant building becomes occupied.

- An Operation and Maintenance Plan to assure continued operation, maintenance,

monitoring, inspection and reporting of the mechanical and/or physical components of the selected remedy. The plan will be developed to allow individuals unfamiliar with the site to operate and maintain the SSDS; include an operation and maintenance contingency plan; and will be updated periodically to reflect changes in site conditions or the manner in which the SSDSs are operated and maintained.

- An Inspection, Reporting and Certification section will identify the frequency of required inspections and reporting submittals. Two reporting requirements of the SMP are the Periodic Certification Report, discussed in the Periodic Review Report.

- Excavation Management Plan will be developed to detail the management of future excavations where contamination (soil and/or groundwater) may be encountered at the Site. Some of the key elements to be detailed in this plan will include: NYSDEC notification requirements, soil screening, material disposal and re-use, backfill material requirements, fluids management, stormwater pollution prevention, and community air monitoring.

4.3 ANNUAL PERIODIC REVIEW REPORT

The Periodic Review Report will be submitted to the Department every year, beginning eighteen months after the Certificate of Completion or equivalent document is issued by NYSDEC. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in the Metes and Bounds description. The report will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the end of each certification period. Media sampling results (e.g., annual groundwater sample results) will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;
- Results of the required annual site inspections and severe condition inspections, if applicable;
- Applicable inspection forms and other records generated for the Site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (i.e., groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A site evaluation will be prepared which will include the following:

- The compliance of the remedy with the requirements of the ROD;
- The operation and the effectiveness of remedial actions and engineering controls, including needed repairs or modifications;
- New conclusions or observations regarding site contamination based on inspections or data generated by the Site Monitoring Plan for the media being monitored;
- Recommendations regarding any necessary changes to the remedy and/or Site Monitoring Plan; and
- The overall performance and effectiveness of the selected and implemented remedy.

The Periodic Review Report will be submitted, in hard-copy and electronic format, to the NYSDEC Central Office and NYSDEC Regional Office and in electronic format to the NYSDOH Bureau of Environmental Exposure Investigation.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The Quality Assurance Project Plan (QAPP) to be used for the Site remedial activities is the "Quality Assurance Project Plan, Site Remedial Activities, 312 Maple Street, Endicott, New York, Site Number: B00168-7" dated April 2012 (see Appendix A). The QAPP presents the sampling procedures, analytical methods and QA/QC procedures associated with the Site remedial activities planned for the Site. Protocols for sample collection, sample handling and storage, Chain of Custody procedures, and laboratory and field analyses are described or specifically referenced to related investigation documents.

6.0 HEALTH AND SAFETY PROTOCOLS

The health and safety protocols to be used for the Site remedial activities are in the "Health and Safety Plan, Site Remedial Activities, 312 Maple Street, Endicott, New York, Site Number: B00168-7" dated April 2012. The Health and Safety Plan (HASP) presents the specific health and safety protocols associated with the activities planned for ERP Site (see Appendix B).

TABLES

Table 1

On-Site Remediation Activities
Proposed Analytical Testing Program Summary
312 Maple Street
Endicott, New York

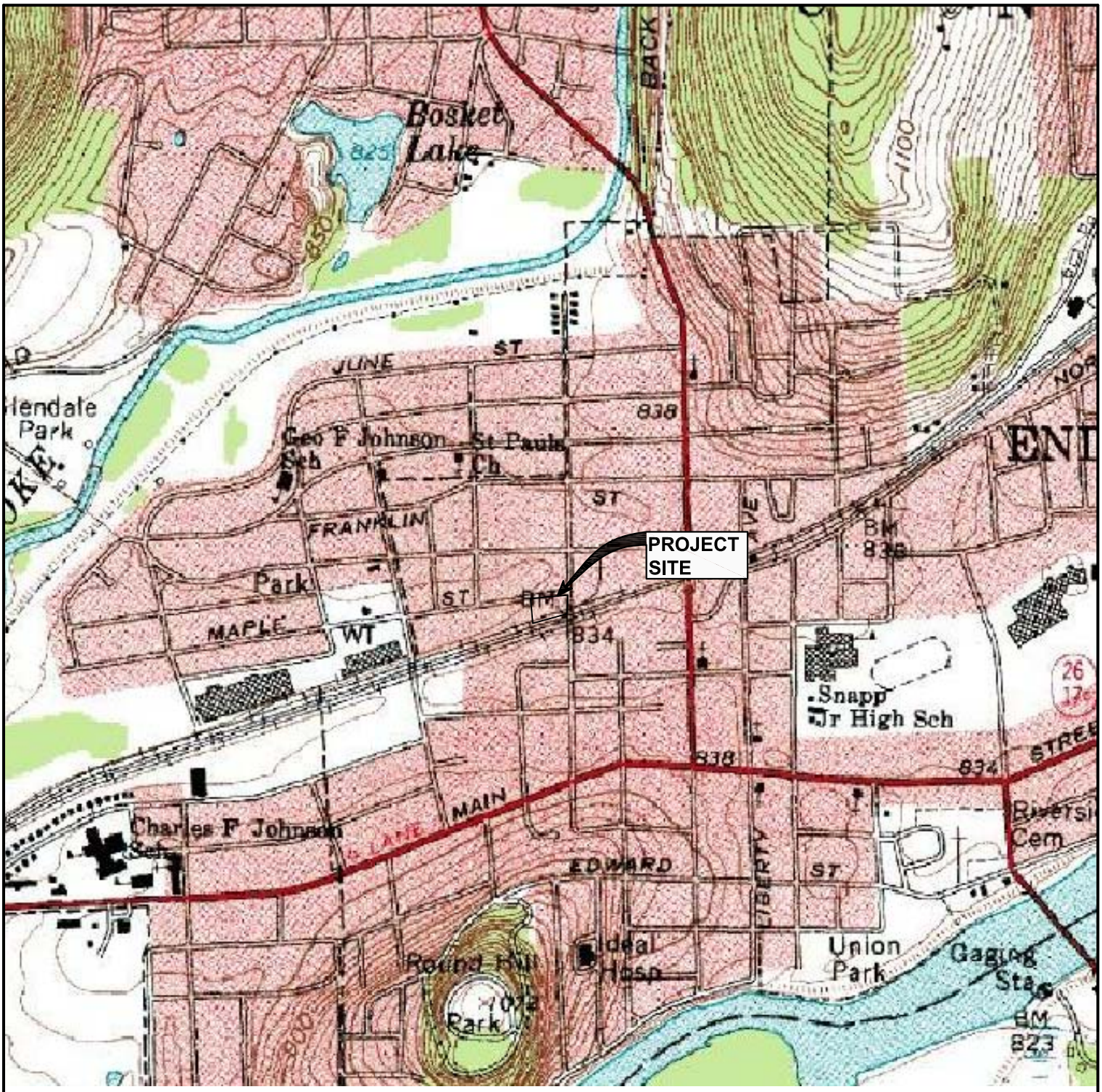
Location	Matrix	Pre-Injections TCL VOCS and Cr^{+6}	Year 1 TCL VOCS and Cr^{+6}	Year 2 TCL VOCS and Cr^{+6}	Year 3 TCL VOCS and Cr^{+6}
Groundwater Samples					
Monitoring Wells	Groundwater	9	9	9	9
QA/QC Samples	Groundwater	3	3	3	3
Trip[3]	Water	1	1	1	1
Total		13	13	13	13

Notes:

1) QA/QC Samples include blind duplicate, matrix spike, matrix spike duplicate.
TCL VOCs - Target Compound List Volatile Organic Compounds.

2) Trip - Trip Blank sample

FIGURES



NOTE:
BASE MAP ADAPTED FROM U.S.G.S. TOPOGRAPHIC MAPS DOWNLOADED FROM TERRASERVER.MICROSOFT.COM

0 500 1000 2000
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
BUFFALO, NEW YORK 14203
(716) 685-2300

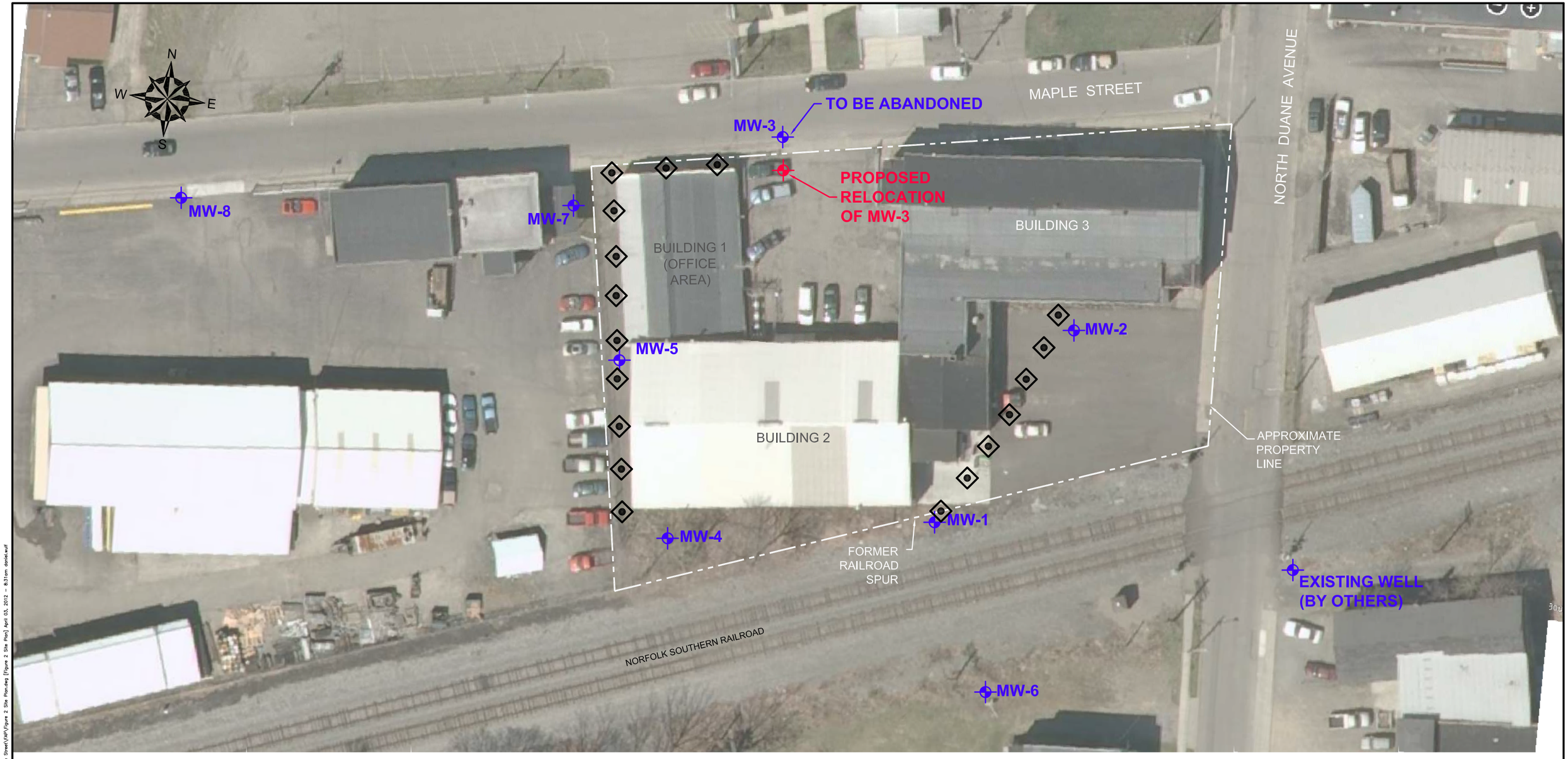
PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
FIELD ACTIVITIES PLAN
LOCUS PLAN

FIGURE 1

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	APRIL 2012	21.0056127.10	



0 20 40 80

SCALE IN FEET

LEGEND:

MW-5 APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL.

APPROXIMATE LOCATION OF PROPOSED IN-SITU CHEMICAL OXIDATION INJECTIONS CONSISTING OF REGENISIS 3D MICRO EMULSION™ (3DMe) & HRC™ "PRIMER" (ALTERNATIVE NO. 3)

PROPOSED MONITORING WELL

NOTES:

1. BASE MAP ADAPTED FROM A 2011 AERIAL PHOTO DOWNLOADED FROM http://www.nysgis.state.ny.us/gateway/mg/index.html AND FIELD OBSERVATIONS.

2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

NO.	ISSUE/DESCRIPTION	BY	DATE

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
FIELD ACTIVITIES PLAN
SITE PLAN

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
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(716) 685-2300

PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	FIGURE 2
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	
DATE APRIL 2012	PROJECT NO. 21.0056127.10	REVISION NO.	

ATTACHMENT B

QUALITY ASSURANCE PROJECT PLAN

SITE REMEDIAL ACTIVITIES
312 MAPLE STREET
ENDICOTT, NEW YORK
SITE NO. B00168-7

SITE REMEDIAL ACTIVITIES
QUALITY ASSURANCE PROJECT PLAN
312 MAPLE STREET
ENDICOTT, NEW YORK
SITE No. B00168-7

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1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPP) is to document planned remediation activities and establish the criteria for performing these activities at a pre-determined quality, and to review and summarize such work performed by others at the 312 Maple Street Site in Endicott, New York (See Figure 1). The work will be completed by GZA GeoEnvironmental of New York (GZA) in a similar manner to the previous remedial investigation work done between 2005 and 2011 under a New York State Department of Environmental Conservation (NYSDEC) Environmental Restoration Project (ERP) agreement with Broome County.

1.2 PROJECT BACKGROUND

The Site is located at 312 Maple Street in Endicott, New York on the southwest corner of Maple Street and North Duane Avenue. Surrounding property is mixed residential/commercial. Norfolk Southern railroad tracks border the Site to the south. The Site is currently occupied by a manufacturer of wood cabinetry. Previous owners/operators include shoe companies, coal companies, electronic assemblers and a metal finishing job shop.

The Site is about 0.9 acres in size and includes three adjoining Site buildings (Buildings 1, 2, and 3 as shown on Figure 2). Building 1 is a single story masonry structure. Building 2 is a steel framed and sided structure with a concrete slab-on-grade floor. Building 3 is a masonry and wood-framed two-story building with a basement.

Based on previous studies performed by GZA, two source areas were originally identified at the Site. The first was an area of unsaturated soils contaminated with trichloroethylene (TCE), a chlorinated solvent, located southeast of Building 2 (see attached Site Plan). The second was three dry wells located inside Buildings 2 and 3. Subsequent meetings and conversations with NYSDEC defined the surface soils east of Building 3 and south of Building 2 as areas of concern that may also require additional investigation/remediation. The groundwater at the Site has also been identified as contaminated with TCE although not considered to be a source area.

TCE Contaminated Unsaturated Soils: As part of Interim Remedial Measures (IRM), an approximate 130 tons of TCE impacted soil was excavated from an on-Site area in 2006 and approximately 49 tons of TCE impacted soil was excavated from on off-Site area located on the adjacent Norfolk Southern railroad property in 2011. The excavated soils were disposed of at facilities permitted to accept the waste with on-Site soils disposed as a non-hazardous waste and the off-Site soils disposed of as a hazardous waste for TCE. The results of the confirmatory soil sample results from IRM excavations indicate the remaining unsaturated soils associated with the Site have been remediated to concentrations below their respective unrestricted soil cleanup objectives (USCOs) as defined in 6 New York Code Rules and Regulation Part 375-6 Remedial Programs Soil Cleanup Objectives (Part 375 SCOs). Based on these findings, the on-Site soils and soils adjacent to the site along the railroad easement have been successfully remediated.

Three Dry Wells: As part of the 2006 IRM activities, soils below the respective drywells were excavated to remove potential contaminated soils and were disposed as a non hazardous waste at a facility permitted to accept the waste soil. Confirmatory soil samples indicated the remaining soils associated with the drywells have been remediated to concentrations below their respective USCOs as defined in 6 New York Code Rules and Regulation Part 375 SCOs and no further action is required. The drywells were backfilled with concrete up yo the existing floor grade.

Sub-Slab Soil Vapor: Based on the subsurface soil vapor testing results identified during the RI portion of the work, sub slab depressurizations systems (SSDS) were installed inside the three on-Site buildings. The installed SSDS generally included either a typical depressurization fan or a high suction fan depending on location and sub-slab soil conditions. The depressurization fans were either mounted with protective covers at exterior locations or interior areas and the vent stacks extended to a point above the respective roof line. These units were installed to remove the potential exposure to TCE vapors in the occupied areas of the site building from subsurface soils.

Contaminated Groundwater: TCE was the only volatile organic compound (VOC) identified in the groundwater samples at concentrations exceeding its respective NYSDEC Class GA[1] criteria value of 5 part per billion (ppb). Specifically, TCE concentrations were identified ranging from 2.3 ppb to 1,600 ppb in samples collected from various locations at the Site.

Additionally, hexavalent chromium (Cr^{+6}) was identified in groundwater samples at concentrations ranging from 48 ppb to 1,200 ppb. The Class GA value for hexavalent chromium is 50 ppb.

1.3 PROJECT DESCRIPTION

This QAPP is the quality control basis for the scope of work completed as part of the on-Site remedial activities. The major tasks comprising for this work are:

- Work Plan Development (Field Activity Plan, Health and Safety Plan, Citizens Participation Plan and Quality Assurance Project Plan).
- Anerobic bioremediation chemical injections to target contaminants of concern within the groundwater at the Site.
- Pre and post chemical injection groundwater sampling to monitor effectiveness of the groundwater remediation efforts.
- Annual Operation and Maintenance Inspection of the existing Sub Slab Depressurization systems (SSDS) located within the on-Site buildings.

1. Division of Water Technical and Operational Guidance Series (TOGS 1.1.), dated October 1993, revised June 1998, errata January 1999 and amended April 2000 (Class GA)

1.4 PROJECT MANAGEMENT AND ORGANIZATION

1.4.1 Personnel

The general responsibilities of key project personnel are listed below.

Project Advisor	Bart A. Klettke, P.E., Program Manager will have responsibility for overall program management.
Project Manager	Mr. Daniel Troy, P.E., Project Manager, will have responsibility for overall project management and coordination with NYSDEC and Broome County Department of Planning and Economic Development and of implementing and coordinating the Site remediation project activities and coordination of subcontractors to complete the work.
Field Team	Mr. John Beninati, will have overall responsibility for on-Site implementation of the on-Site remedial activities.
QA Officer	Mr. Chris Boron will serve as Quality Assurance Officer, and will be responsible for laboratory and data validation subcontractor procurement and assignment, as well as data usability reports.
H & S Officer	Mr. Todd Schara will be responsible for the preparation of the project health and safety plan, and tracking of its implementation.

1.4.2 Specific Tasks and Services

GZA has obtained subcontractor specialists for services relating to drilling and monitoring well installation, laboratory/analytical services, data validation services, field surveying, and chemical injections. The planned subcontractors for utilization for the 312 Maple Street in Endicott, New York are:

Laboratory Analysis – Spectrum Laboratory

Data Validation - Data Validation Services (WBE)

Drilling and Injection Services - Natures Way Environmental (WBE)

Surveying - Shumaker Consulting Engineering & Land Surveying, P.C. (WBE)

2.0 REMEDIAL ACTIVITY PROCEDURES AND RATIONALE

The 312 Maple Street Site has previously been identified as containing a source of TCE detected in the soil. As part of previous investigation work, on-Site and on off-Site IRM activities were completed involving the excavation and disposal of TCE impacted soils which effectively removed the TCE contamination source in soil. However, TCE impacted groundwater remains on-Site. The field work proposed by GZA is focused on removing a source of contaminated soil and supplementing data from previous investigations to obtain a better understanding of Site specific conditions. Environmental sampling and other field activities will be performed in general accordance with the appropriate techniques presented in the following guidance documents.

Final Program Policy, DER-10, Technical Guidance for Site Investigations and Remediation, NYSDEC, Division of Environmental Remediation, May 2010.

Table 1 contains a list of the various media to be sampled and the expected number of samples for each matrix.

Field activities are described in the following sections.

2.1 AIR SURVEILLANCE AND MONITORING

Air surveillance screening of volatile compounds for health and safety concerns will be performed with a portable organic vapor meter (OVM), equipped with a photoionization detector (PID). Monitoring will be done during invasive activities such as drilling, monitoring well installation, well development, and groundwater sampling. Additional details are presented in the Site specific Health and Safety Plan.

2.2 GROUNDWATER SAMPLING

Groundwater sampling of monitoring wells includes initial recording of data, purging of the well, and collection of the sample. The text below addresses these items. Installation of monitoring wells is discussed in Section 2.10. Groundwater sampling of monitoring wells installed as part of this work will also be completed in general accordance with this section.

2.2.1 Initial Data Recording

Groundwater sampling begins by locating the well to be sampled and recording the appropriate field data, as summarized below:

- Observations of the well (conditions of cap, collar, casing, etc.) and the ambient conditions (weather; surrounding area; date and time; sampling crew members and observers if any. See also Section 5.1 for information to be recorded in the field notebook.).
- Unlocking the well cover, assessing ambient air, upwind air, and air directly at the

top of the well.

- Taking a water level measurement, noting the reference point from which the measurement is made (typically a notch on the inner casing).
- Sounding the bottom of the well and agitating/loosening accumulated silt/sediment (this assumes sounding indicates minimal sediment accumulation and no need for well development).
- Calculate the volume of standing water present within the well.

2.2.2 Well Purging/Evacuation

After the initial observations are recorded, the well is then purged of at least three volumes of standing water. Purging will be accomplished by bailing or pumping to remove water from the wells. Prior to removal of the first volume of water, and after each subsequent volume of water removed, field parameters (pH, turbidity, temperature and specific conductance) will be measured and recorded to document the presence of representative water in the well (i.e., equilibration to steady readings), or as an indicator that conditions have not reached a steady state. Prior to sample collection, the variability of field testing results between successive well volumes should not vary by more than 10% for turbidity and specific conductance, $\pm$0.2 units for pH, and $\pm$0.5 ^{o}C for temperature, with a minimum of three well volumes purged, and an upper limit of five volumes. The turbidity objective is less than 50 nephelometric turbidity units (NTU); if other parameters are stable but turbidity is still greater than 50 NTU, purging will continue until 50 NTU is achieved, or five well volumes are evacuated (whichever comes first).

In the event that recharge is slow, the purging process will continue until the well is purged to dry-like conditions. After the water level has returned to its pre-purge level (or within a maximum of two hours, if the well has recharged sufficiently to allow sampling), samples will be collected from the middle of the screened portion of the well for overburden wells. If the water level is slow to recharge and does not reach to its pre-purge level within two hours, then samples can be collected after sufficient water has recharged, and the degree of recharge indicated in field notes with time and depth to water noted.

2.2.3 Groundwater Sampling

Low flow sampling pumps will be used for sample collection. Pumps will be equipped with dedicated, disposable high density polyethylene (HDPE). Equipment will be clean upon arrival at the Site; therefore Site decontamination will not be necessary. Tubing will be lowered gently with minimal water agitation into the well

Two or three (depending on laboratory-specific requirements) 40-ml glass vials (with Teflon septa) will be used to collect samples for volatile organic analysis (VOA). The vials will be filled by gently pouring water into the vial until overflowing and a convex meniscus is formed. The vial will then be capped, inverted and inspected for air pockets/bubbles that may be present on the inside surfaces of the vial. If any bubbles or aggregate of bubbles are observed, then a new sample will be obtained either using a new vial or the same vial.

Subsequently sampled water will be collected for Hexavalent chromium (Cr^{+6}) as specified in the Field Activities Plan (FAP), and field parameter testing.

Sample bottles are discussed in more detail in Section 3.2.

2.3 MONITORING WELL INSTALLATION

Monitoring wells will be constructed of 2 inch I.D. flush coupled Schedule 40, polyvinyl chloride (PVC) riser and screen. The actual installation depth of the screen will be selected based upon observation of subsurface materials and headspace screening test results. The screen will consist of a maximum 10 foot long section. The actual length of the well screen may vary depending upon subsurface conditions encountered. Attempts will be made to limit the well screen to the zone being monitored. A schematic of the well construction detail is provided as Figure 3.

Well materials will have the following specifications:

- Well screens shall be 0.01 inch factory slotted.
- Filter material shall have a D-30 (i.e., the soil particle size at which 30 percent of the soil particles are finer) of about 0.2 mm.

Following determination of the monitoring zone and placement of the assembled screen and riser, the borehole will be backfilled. Generally, this will include the placement of a sand filter around the well screen such that the sand extends a minimum of 1 foot above the top of the screen. A minimum 3 foot layer of bentonite pellets will be placed above the sand filter and allowed to hydrate. A mixture of cement/bentonite water extending to about 3 feet below the ground surface will be placed above the bentonite seal. The monitoring well will be completed by placing a locking steel casing or flush mount cover (4-inch diameter) over the riser. Concrete will be then placed in the borehole around the protective casing and sloped away from the casing.

Materials used in well installation will be stockpiled in an on-Site storage area (unless there is a possibility for vandalism) or brought on-Site for use as necessary. These items will be brought to the Site clean and in like-new condition and kept clean and in satisfactory condition for potential use. Well materials (screen and riser pipe), regardless of their condition when brought to the Site will be cleaned on-Site prior to use. The cleaning procedure is described in Section 2.9.4. Following cleaning, well materials will be wrapped in clean plastic sheeting for transportation to the well location. Site personnel handling well equipment after cleaning are required to wear clean gloves.

2.4 MONITORING WELL DECOMISSIONING

Groundwater level and the depth to well bottom shall be measured to confirm the dimensions shown on the well logs. The well shall be overdrilled via hollow-stem augers and/or over-drilling with flush-joint casing to the borehole bottom. The well materials shall be removed from the hole. The length of well riser and screen removed shall be measured by GZA to check that these items have been removed. Following removal of the well materials the borehole shall be backfilled with cement/bentonite grout using tremie methods.

2.5 HYDRAULIC ASSESSMENT

Hydraulic assessment includes the completion of hydraulic conductivity tests and measurement of water levels in installed monitoring wells if practical.

Hydraulic conductivity testing will be done using either variable head methods or single well pump test methods if the wells are found to recover rapidly. Variable head tests will be completed using a stainless steel slug to displace water within the well or by removing water from the well with a bailer. The recovery of the initial water level is measured with respect to time. Single well pump tests will be completed by pumping the well at a constant rate and measuring the response of the water level within the well with respect to time. Data obtained using these test procedures will be evaluated using procedures presented in "The Bouwer and Rice Slug Test - An Update", Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989.

Water level measurements will include measuring the depth of water within the wells/well points from a monitoring point of known elevation established at the top of the well riser. The depth to water will be measured relative to the monitoring point. The water elevations will then be calculated based on the known elevation and measured depth to water. Wells will be allowed to equilibrate a minimum of 24 hours after purging or testing prior to measuring the water level.

2.6 EQUIPMENT DECONTAMINATION

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures outlined below.

2.6.1 Non-Dedicated Reusable Equipment

Non-dedicated reusable equipment such as split spoons, stainless steel mixing bowls; pumps used for groundwater evacuation (and sampling, if applicable) etc. will require field decontamination. Acids and solvents will not be used in the field decontamination of such equipment. Decontamination typically involves scrubbing/washing with a laboratory grade detergent (e.g. alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute. Equipment should be allowed to dry prior to use. Steam cleaning or high pressure hot water cleaning may be used in the initial removal of gross, visible contamination Tubing will not be re-used (new tubing will be used for each application).

2.6.2 Disposable Sampling Equipment

Disposable sampling equipment includes disposable bailers; tubing associated with groundwater sampling/purging pumps; etc. Such equipment will not be field-decontaminated; equipment other than bailers may be rinsed with laboratory-provided analyte-free water prior to use. Disposable spoons or spatulas purchased from non-environmental equipment vendors (such as restaurant supply houses) will be decontaminated by scrubbing/washing with a laboratory

grade detergent followed by potable water and analyte-free water rinse; or by using steam or high pressure hot water rinse, followed by analyte free water rinse. The equipment will be allowed to air dry prior to use.

2.6.3 Heavy Equipment

Certain heavy equipment such as drilling augers, soil probe equipment, etc. may be used during remedial activities at the Site. Such equipment will be subject to high pressure hot water or steam cleaning between uses. A member of the sampling team will visually inspect the equipment to check that visible contamination has been removed by this procedure prior to sampling. The drilling augers and soil probe equipment will be cleaned between test borings/injections; decontamination between samples at a single test boring will not be done.

2.6.4 Monitoring Well Construction Materials

Well construction materials including well screens, well riser and end caps/tailpieces will be cleaned prior to installation by steam cleaning or high pressure hot water rinse.

2.7 STORAGE AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

The sampling methods and equipment have been selected to limit both the need for decontamination and the volume of waste material to be generated. Investigation-derived material (e.g., drill cuttings and purge water) generated during this project shall be presumed to be non-hazardous waste and will be disposed at the boring or well from which the material was derived. Excess auger cuttings will be drummed and stored on-Site for future disposal unless the PID readings are less than 1 ppm. If less than 1 ppm, the material will be placed at a location agreeable to Broome County and NYSDEC. If the water is grossly contaminated (e.g., presence of strong vapors or product), it will be drummed. The volume of material to be disposed from drums is unknown, and is not included in the Work Plan budget. Subsequent to generation of drummed waste materials and analytical testing, GZA will discuss disposition of drummed materials (assumed to be disposed of at the Endicott waste Water treatment plant as similarly done during previous investigation phases of work).

Personal protective equipment and disposable sampling equipment will be placed in plastic garbage bags for disposal as a non-hazardous waste.

Decontamination Fluids

Wash water and rinse water, including detergent, may be generated during Site work. Tap and analyte-free water used for rinsing will be allowed to percolate back into the ground, or will be disposed into the municipal sanitary sewer.

3.0 SAMPLE HANDLING

3.1 SAMPLE IDENTIFICATION/LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. Sample identification will be limited to seven alphanumeric characters to be consistent with the limitations of the laboratory tracking/reporting software. The general sample identification format follows.

e.g., MW-1-041712

Where:

SL = Location identifier (2 or 3 characters, as below)
- SP = Soil Probe (SP) with numeric character indicating boring number from which the sample was obtained.
- TB = Test Boring (TB) with numeric character indicating auger boring number from which the sample was obtained.
- SG = Soil gas or vadose zone gas sample
- MW = Groundwater Monitoring Well
- EB = Equipment (Field Rinsate) Blank
- TB = Trip Blank
- EX = Excavation (IRM)

XX = Numerical location identifier (2 or 3 characters). This will ordinarily be a number corresponding to the soil probe, well, etc. location or may indicate the wall (EA=East) or bottom (BT) of excavations.

YY = Numerical sample identifier (2 or 3 characters). This will ordinarily be an arbitrary, sequential number and will correspond to sample location information and numbering. However, for soil borings it will identify from which split spoon the sample was obtained (e.g., S1, S2, etc; the number will be the same as indicated on the boring log).

Quality Control (QC) field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original. The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. Sample containers will be labeled in the field prior to the collection of samples. Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink.

- Site name, location, and job number;

- Sample identification code;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., water, soil, air); and,
- Requested analyses.

3.2 SAMPLE, BOTTLES, PRESERVATION, AND HOLDING TIME

Table 2 specifies the analytical method, matrix, holding time, containers, and preservatives for the various analysis to be completed as part of remedial activities. Sample bottle requirements, preservation, and holding times are discussed further below.

3.2.1 Sample Bottles

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements and regulatory protocol requirements. Sample bottles will be provided by the analytical laboratory and will conform to the requirements of USEPA's Specifications and Guidance for Contaminant-Free Sample Containers.

3.2.2 Sample Preservation

Samples will be preserved as indicated below and summarized on Table 2.

Aqueous Samples:

Volatile Organics (VOCs) - cooled to 4 ^{o}C; no chemical preservatives added.
Hexavalent Chromium - NaOH; cool to 4 ^{o}C.

3.2.3 Holding Times

Holding times are judged from the verified time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 24 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC ASP; it should be noted that for some analyses, these holding times are more stringent than the holding time for the corresponding USEPA method.

Although trip blanks are prepared in the analytical laboratory and shipped to the Site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and

blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

3.3 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody form will trace the path of sample containers from the project site to the laboratory. A sample Chain of Custody is included in Attachment B1, Field Forms. Sample/bottle tracking sheets or the chain-of-custody will be used to track the containers from the laboratory to the containers' destination. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. All sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4 ^{o}C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

4.0 DATA QUALITY REQUIREMENTS

4.1 ANALYTICAL METHODS

Analyses for VOCs and Cr^{+6} will utilize NYSDEC Analytical Services Protocol (ASP) Superfund Contract Laboratory Program (CLP) methods:

CLP Volatile Organics	NYSDEC Method 95-1
CLP Metals	NYSDEC CLP-M Metals Methods

Analytical methods used during this project are presented in the NYSDEC Analytical Services Protocol (ASP), October, 1995. Specific methods and references for each parameter are shown above. It is the laboratory's responsibility to be familiar with this document and procedures and

deliverables within it pertaining to ERP work.

For the 312 Maple Street, a single laboratory (Mitkem) will be utilized for the soil and groundwater analysis. Mitkem laboratory is certified by the NYSDOH Environmental Laboratory Approval Program and to be in good standing for all the ASP/CLP parameter groups.

4.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPjP will be used in assessing the uncertainty associated with decisions related to this Site.

4.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is established by NYSDEC as part of the Analytical Services Protocol (ASP) Superfund Contract Laboratory Program (CLP). It is understood that such limits are dependent upon matrix interferences.

Volatile Organics (ASP method 95-1). The Contract Required Quantitation Limits (CRQLs) for all analytes is 10 µg/L (10 µg/kg for soil). The reporting limit for non-detected analytes is the CRQL. Based on laboratory method detection limit (MDL) studies, detected analytes will be reported down to 1 ug/L; analytes reported at concentrations below the CRQL will be flagged "J" (estimated) by the laboratory..

Inorganics (Metals). The CRDLs for inorganics are analyte-specific. The laboratory is required to perform an instrument detection limit (IDL) study quarterly; the reporting limit for non-detected metals is the IDL. Metals concentrations between the IDL and the CRDL are flagged "J" by the laboratory.

4.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Laboratory duplicate analyses will be performed once for every twenty samples for metals as specified in the NYSDEC ASP-CLP.

Relative Percent Difference (RPD) criteria, prescribed by the NYSDEC, and those determined from laboratory performance data, are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value

minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the relative percent difference (% RPD):

$$\% \text{ RPD} = 100 \times 2(X_1 - X_2) / (X_1 + X_2)$$

where:

X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is $\leq$ 50% RPD for all matrices.

4.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent recovery criteria, published by the NYSDEC as part of the ASP, and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike will be performed once for every sample delivery group (SDG) as specified in the ASP-CLP. This will apply to inorganics and volatile and semi-volatile organics analyses. Other method-specific laboratory QC samples (such as laboratory control samples for metals, and continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\%R = (SSR-SR)/SA \times 100,$$

where

SSR = Spiked Sample Result
SR = Sample Result, and
SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples.

Accuracy values can be presented in a variety of ways. Accuracy is most commonly presented as percent bias or percent recovery. Percent bias is a standardized average error, that is, the average error divided by the actual or spiked concentration and converted to a percentage. Percent bias is unitless and allows accuracy of analytical procedures to be compared.

Percent recovery provides the same information as percent bias. Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\% \text{ Recovery} = (R/S) \times 100$$

where

S = surrogate spike concentration
R = reported surrogate concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

4.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

4.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the U.S. Environmental Protection Agency (EPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,

- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

4.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data. The highest degree of completeness would be to find all deliverables flawless, valid and acceptable. The lowest level of completeness is excessive failure to meet established acceptance criteria and consequent rejection of data. The completeness goal is 95% useable data. It is acknowledged that this goal may not be fully achievable; for example, individual analytes (e.g., 2-hexanone) may be rejected within an otherwise acceptable analysis. The impact of rejected or unusable data will be made on a case-by-case basis. If remedial activities can be completed without the missing datum or data, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

4.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be "demonstrated analyte-free". The criteria for analyte-free water is based on the EPA assigned values for the Contract Required Detection Limits (CRDLs) and CRQLs. If the levels of detection needed on a specific site are lower than the CLP CRDLs/CRQLs, then those levels are used to define the criteria for analyte-free water.

Volatile organics	< 10 µg/l
Inorganics	< CRDL

However, specifically for the common laboratory contaminants (acetone and 2-butanone) the allowable limits are five times the respective CRQLs. For methylene chloride, the limit is 2.5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

4.3.1 Equipment (Rinsate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

One rinsate blank will be collected for every 20 probe samples collected or one per week whichever is more frequent. The rinsate blanks will be collected from the probe soil sampler and probe groundwater sampling equipment.

4.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method. For soil samples, these samples are separate aliquots of the same sample; prior to dividing the sample into "sample" and "duplicate" aliquots, the samples are homogenized (except for the VOC aliquots, which are not homogenized). Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day. The blind field duplicate Relative Percent Difference (RPD) objective will be $\pm$50% percent RPD for all matrices. Field duplicates will be collected at a frequency of 1 per 20 environmental samples for both matrices (aqueous and non-aqueous) and test parameters.

4.3.3 Split Samples

Split samples are used for performance audits or inter-laboratory comparability of data. A split sample will be defined as at least two separate sub-samples taken from a single original sample which has been thoroughly mixed or homogenized prior to the formation of the split samples. The exception to this is samples for volatile organics analysis which will not be homogenized. Collection of split samples is not planned.

4.3.4 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for volatile organic compounds (VOCs) analysis. Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

4.4 FIELD TESTING QC

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity) and turbidity are detailed below. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings.

4.4.1 pH

The pH meter (Horiba U22) is calibrated twice daily (prior to initial use and midday), using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds ± 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by ± 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used. A field pH Calibration Form is included in Attachment B-1.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

4.4.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter (Horiba U22) twice daily (prior to initial use and midday). Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride solutions in accordance with manufacturer's recommendations. A Field Specific Conductance Calibration Form is included in Appendix A.

4.4.3 Turbidity

The turbidity meter (Horiba U22) should be calibrated using a standard as close as possible to 50 NTU (the critical value for determining effectiveness of well development and evacuation). The turbidimeter will be calibrated/checked twice daily. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar). A Field Turbidity Calibration Form is included in Attachment B-1.

4.4.4 Temperature

Temperature probes (Horiba U22) associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument's temperature reading be checked against a NBS-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained. A Temperature Calibration Form is included in Appendix A.

4.5 LABORATORY QUALITY ASSURANCE

4.5.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. They are used to assess the background variability of the

method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every 20 samples analyzed or as otherwise specified in the analytical protocol.

4.5.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a Matrix Spike and a Matrix Spike Duplicate (MS/MSD) for volatile and semi-volatile organics, and as a Matrix Spike and Matrix Duplicate for metals.

4.5.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: Matrix Spikes and Matrix Spike Duplicates (MS/MSD) are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD will be analyzed at a frequency of one (pair) for every 20 samples. For metals, a matrix spike and matrix duplicate are analyzed for each set of 20 samples. In addition, matrix spike blanks (MSBs) will also be run by the lab as part of its NYSDEC CLP.

5.0 DATA DOCUMENTATION

5.1 FIELD NOTEBOOK

Field notebooks will be initiated at the start of on-site work. Each subcontractor in the field will have a notebook dedicated to record pertinent activities. In addition to any forms that will be filled out summarizing field work (and become part of the project file), legible photocopies of pertinent notebook pages will be submitted by the contractors with their finished written report or product. The field notebook will include the following daily information for site activities.

- Date;
- Meteorological conditions (temperature, wind, precipitation);
- Site conditions (e.g., dry, damp, dusty, etc.);
- Identification of crew members (GZA and subcontractor present) and other personnel (e.g., agency or site owner) present;
- Description of field activities;
- Location(s) where work is performed;

- Problems encountered and corrective actions taken;
- Records of field measurements, samples collected or descriptions recorded; and,
- Notice of modifications to the scope of work.

During drilling operations, the supervising field engineer/geologist will add the following information:

- Soil probe rig type;
- Documentation of materials used;
- Downtime;
- Time work is performed at an elevated or lowered level of respiratory protection;
- Description of soil or rock strata; and,
- Diagram of well or piezometer construction.

During sampling of wells and surface water, field samplers will add the following:

- Sampling point locations and test results such as pH, conductance, etc.
- Information about sample collection
- Chain of custody information, and
- Field equipment calibration.

During remedial excavations, field personnel will document excavation quantity, sampling measurements and soil disposal.

5.2 FIELD REPORTING FORMS

Field reporting forms (or their equivalent) to be utilized in this investigation are presented in Attachment B1. These include:

- Soil Probe & Piezometer Installation Log;
- Monitoring Well Field Measurements Log;
- Existing Well Assessment Form;
- Hydraulic Conductivity Test Form;
- Sample Collection Log;
- Chain of Custody Form;
- pH Calibration Log;

- Specific Conductance Calibration Log;
- Turbidity Calibration Log; and,
- Temperature Calibration Log.

These forms, when completed, will become part of the project file.

6.0 EQUIPMENT CALIBRATION AND MAINTENANCE

6.1 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples will include the Horiba U-22 water quality meter capable of measuring Oxygen Release Potential, Conductivity, Temperature, Salinity, Turbidity, and Dissolved Oxygen. See also Section 4.4 of this QAPP for additional discussion.

Calibration and standardization for the field water quality tests will be in conformance with the manufacturers recommendations.

The MiniRae 2000 (or equivalent organic vapor analyzer) use for soil screening and health and safety air monitoring will be calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut off for more than two hours, and at the field technician's discretion.

6.2 LABORATORY EQUIPMENT

Laboratory equipment will be calibrated according to the requirements of the 1995 Revised NYSDEC ASP, Superfund Contract Laboratory Program for each parameter or group of similar parameters, and maintained following professional judgment and the manufacturer's specifications.

7.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its total quality management program, GZA makes the results of laboratory audits and data validation reports available to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made in subsequent NYSDEC ASP work.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

8.1 LABORATORY DATA REPORTING AND REDUCTION

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 1995 revision of the NYSDEC ASP CLP. Laboratory data reports for non-CLP data will conform to NYSDEC Category B deliverable requirements. With full CLP documentation, deliverables will include, but not be limited to:

Organics	**Inorganics**
Chains of Custody	Chains of Custody
Blanks	Holding Times
Holding Times	Blanks
Internal Standards	Furnace AA QC
Laboratory Duplicates	CRDL Standards
Tentatively Identified Compounds	ICP Serial Dilutions
GC/MS Instrument Performance Check	Laboratory Control Samples
System Monitoring Compound Recovery	Laboratory Duplicates
Matrix Spike & Matrix Spike Duplicates	ICP Interference Check
GC/MS Tuning	Spiked Sample
Surrogate Recoveries	Recovery

Copies of the laboratory's generic Quality Assurance Plan (QAP), and the audit performed by Copies of the laboratory's generic Quality Assurance Plan (QAP) will be on file at GZA. The laboratory's QAP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form on computer diskette. The diskette will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

8.2 DATA VALIDATION DATA USABILITY SUMMARY REPORT

CLP data will be validated by a standby subcontractor. Data validation will be performed by following guidelines established in the US EPA Region 2 SOP No. HW-6, "CLP Organics Data Review" (Revision No. 8, January 1992); and SOP No. HW-2, "Evaluation of Metals Data for the Contract Laboratory Program (CLP)" (based on SOW 3/90; January 1992). These documents are check lists which are designed to formally and rigorously assess the quality and completeness of CLP data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements). Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, Publication 9240.1-05, EPA-540/R-94/012, February, 1993; and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Publication 9240.1-05-01; EPA-540/R-94/013, PB94-963502, February, 1994).

Validation reports will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text.

There may be some analyses for which there is no established USEPA or NYSDEC data validation protocol. In such cases, validation will be based on the EPA Region II SOPs and EPA Functional Guidelines as much as possible, as well as the laboratory's adherence to the technical requirements of the method, and the professional judgment of the validator. The degree of rigor in such validation will correspond to the nature of the data and the significance of the data and its intended use. Unless otherwise requested, non-CLP data (e.g., total organic carbon) is not subject to validation.

8.3 DATA USABILITY

Subsequent to review of the items evaluated in the subcontractor data validator reports and accompanying tables, GZA's QA staff then prepares a brief data usability summary. The data usability summary, which will be provided as part of the RAR, encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or

analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets. The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement. Non-CLP data which has not been validated and field data used for the SI will be discussed in the data usability summary.

8.4 FIELD DATA

Field chemistry data collected during water monitoring (i.e., pH, turbidity, specific conductance, and temperature) will be presented in tabular form with any necessary supporting text. Unless activities resulted in significant unexpected results, field data comments can be added as footnotes to the tables.

9.0 PERFORMANCE AND SYSTEM AUDITS

As part of the laboratory subcontractor procurement process under the Broome County ERP, the laboratory assigned to this project has been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the analytical protocols to be used. Therefore, no audit of the laboratory(s) during remedial activities will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of GZA and NYSDEC.

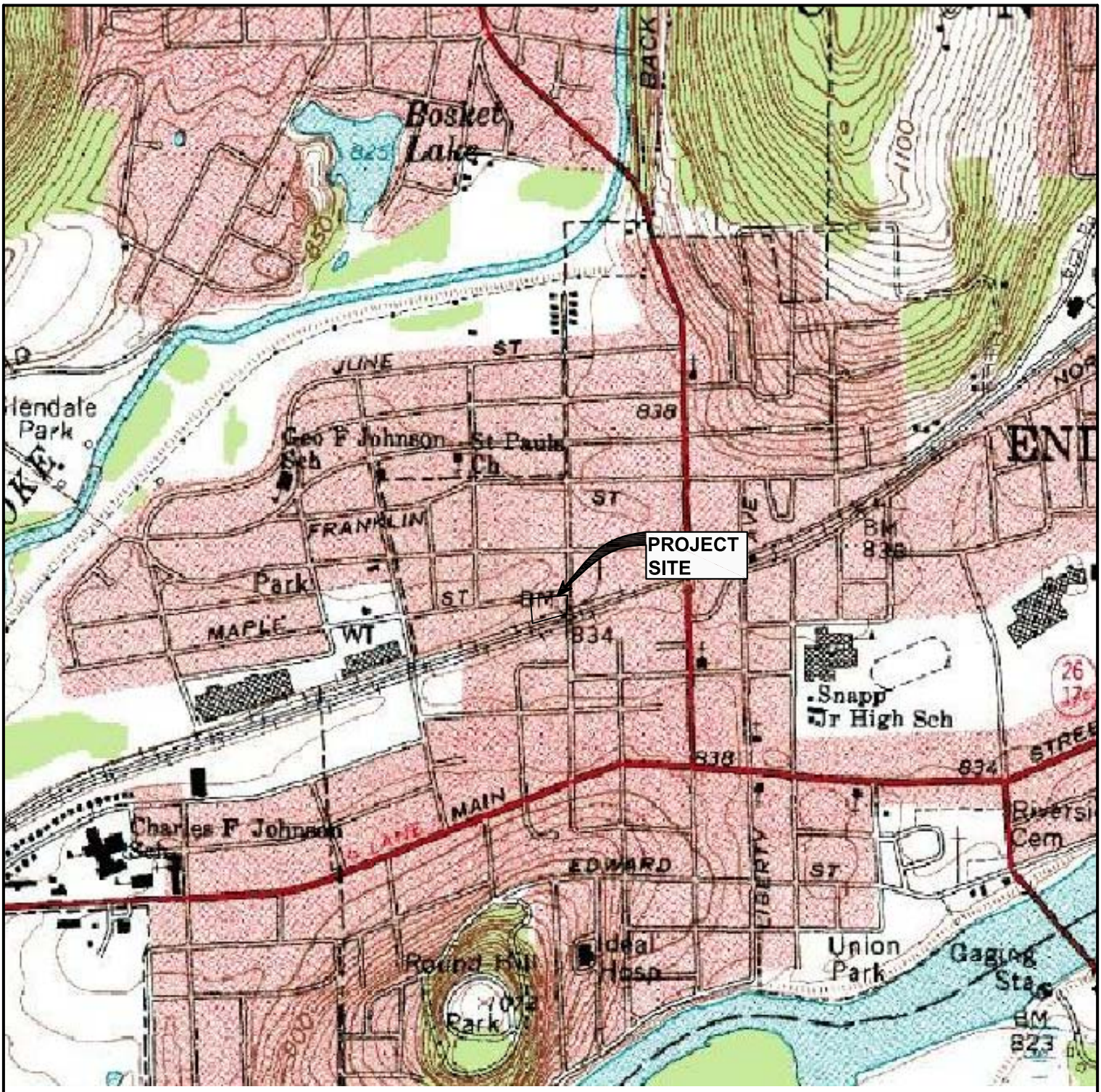
10.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Monthly project status reporting to the NYSDEC will include aspects of quality control that were pertinent during the month's activities. Problems revealed during review of the month's activities will be documented and addressed. These reports will include a description of completed and on-going activities and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to this project are stored appropriately and are retrievable.

The laboratory will submit memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

FIGURES



NOTE:
BASE MAP ADAPTED FROM U.S.G.S. TOPOGRAPHIC MAPS DOWNLOADED FROM TERRASERVER.MICROSOFT.COM

NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
BUFFALO, NEW YORK 14203
(716) 685-2300

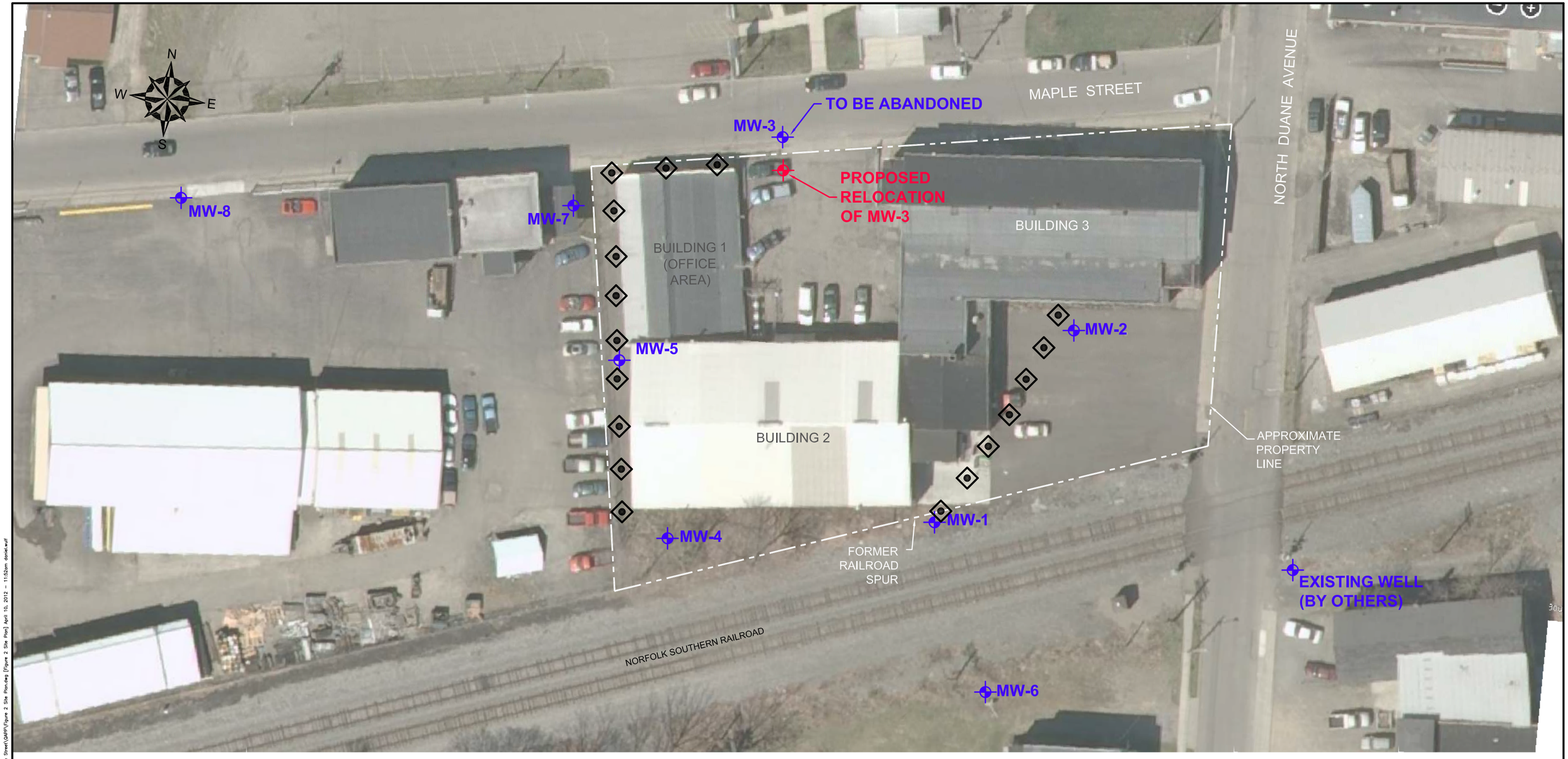
PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
QUALITY ASSURANCE PROJECT PLAN
LOCUS PLAN

FIGURE 1

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	APRIL 2012	21.0056127.10	



LEGEND:

- MW-5 — APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL.
- APPROXIMATE LOCATION OF PROPOSED IN-SITU CHEMICAL OXIDATION INJECTIONS CONSISTING OF REGENISIS 3D MICRO EMULSION™ (3DMe) & HRC™ "PRIMER" (ALTERNATIVE NO. 3)
- PROPOSED MONITORING WELL

NOTES:

1. BASE MAP ADAPTED FROM A 2011 AERIAL PHOTO DOWNLOADED FROM http://www.nysgis.state.ny.us/gateway/mg/index.html AND FIELD OBSERVATIONS.

2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

0 20 40 80

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
QUALITY ASSURANCE PROJECT PLAN
SITE PLAN

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
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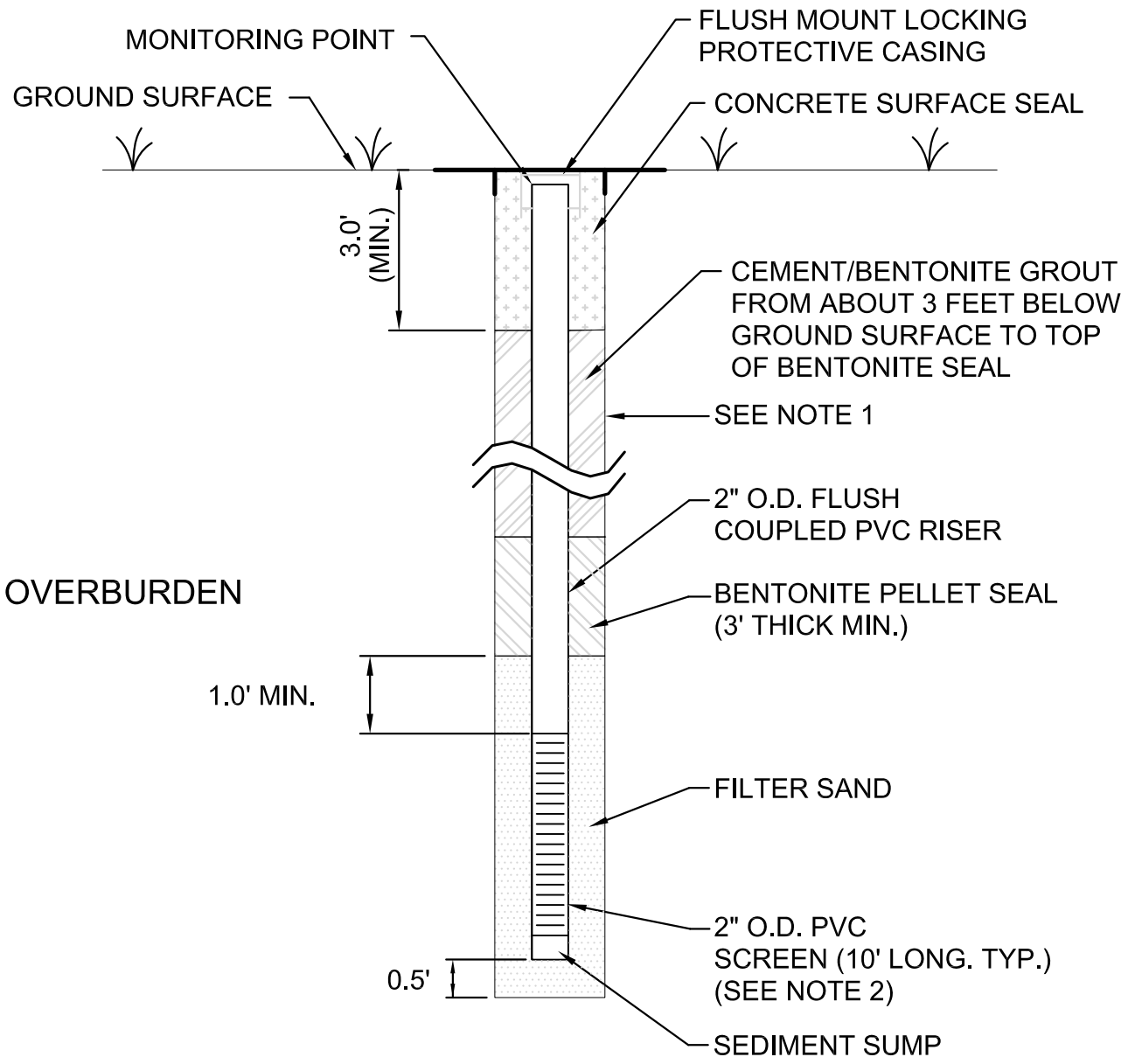
BUFFALO, NEW YORK 14203
(716) 685-2300

PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	FIGURE 2
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	
DATE APRIL 2012	PROJECT NO. 21.0056127.10	REVISION NO.	



NOTES:

1. OVERBURDEN DRILLED WITH 4-1/4 INCH HOLLOW STEM AUGERS ON A ROTARY RIG.

2. WELL SCREEN SHALL BE 0.01 INCH FACTORY SLOTTED.

0 NOT TO SCALE

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
BUFFALO, NEW YORK 14203
(716) 685-2300

PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
QUALITY ASSURANCE PROJECT PLAN
PROPOSED OVERBURDEN MONITORING WELL INSTALLATION DIAGRAM

FIGURE 1

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	APRIL 2012	21.0056127.10	

GZA-T:\PROJECTS\56100s\56127.1 Broome Co 312 Maple Street\QAPP\Figure 3 Well Inst Plan.dwg [Figure 3 QAP PLAN] April 10, 2012 - 11:55am daniel.wulf

ATTACHMENT B1

FIELD FORMS

WHITE COPY - Original (Accompanies Samples) YELLOW COPY - Collector

CHAIN-OF-CUSTODY RECORD

Station Number	Time (24 hr.)	Container ID	Sampler ID	Location Description	Sample Type	ANALYSES REQUIRED	Total # of Cont.	Note #
TOTAL NUMBER OF CONTAINERS								

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)

NOTES:

ANALYTICAL LABORATORY: _____

LABORATORY CONTACT: _____

GZA CONTACT: _____

GZA GeoEnvironmental of New York
364 Nagel Drive
BUFFALO, NY 14225
(716) 685-2300

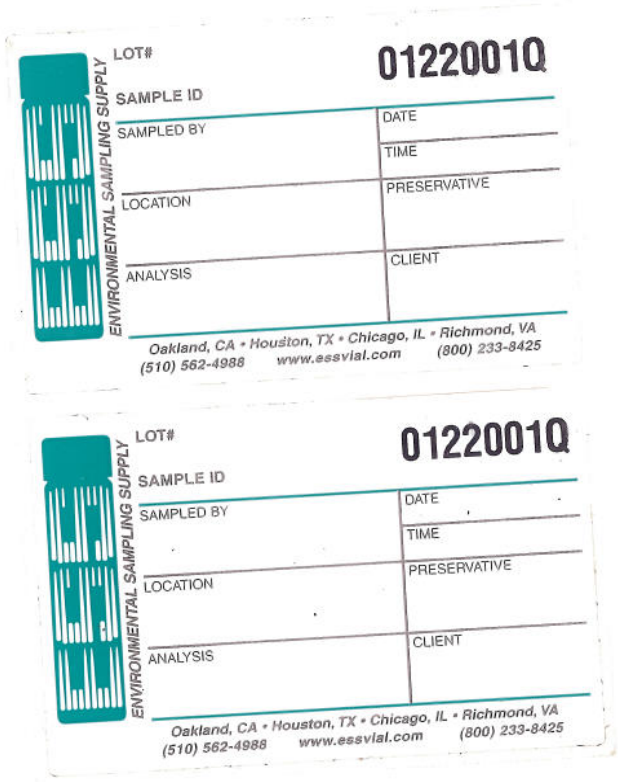
GZA FILE NO. _____ P.O. NO. _____

PROJECT _____

LOCATION _____

COLLECTOR _____

DATE OF COLLECTION _____ SHEET _____ OF _____



MITKEM CORPORATION

CHAIN OF CUSTODY SEAL

DAILY FIELD SUMMARY

DATE _____ FILE No. _____

REPORT No. _____ SHEET ____ of ____

PROJECT _____ LOCATION _____

OWNER _____ CONTRACTOR _____

WEATHER CONDITIONS _____

REMARKS _____

REPORT

Field Time _____
Travel Time _____
Office Time _____
Total Time _____

GZA

_____

PREPARED BY

GZA GEOENVIRONMENTAL OF NEW YORK
364 NAGEL DRIVE, BUFFALO, NEW YORK

ENGINEERS AND SCIENTISTS

PROJECT
[Site]
[Location]

BORING No.
SHEET 1 OF 1
FILE No.
CHECKED BY :

CONTRACTOR _____ BORING LOCATION _____

DRILLER _____ GROUND SURFACE ELEVATION _____ DATUM _____

START DATE _____ END DATE _____ GZA GEOENVIRONMENTAL REPRESENTATIVE _____

WATER LEVEL DATA

DATE	TIME	WATER	CASING	NOTES

TYPE OF DRILL RIG _____

CASING SIZE AND DIAMETER _____

OVERBURDEN SAMPLING METHOD _____

ROCK DRILLING METHOD _____

DEPTH	SAMPLE BLOWS (/6")	NO.	DEPTH (FT)	N-VALUE /RQD %	RECOVERY (%)	SAMPLE DESCRIPTION	EQUIPMENT DESCRIPTION		OVM (ppm)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									

S - Split Spoon Sample
C - Rock Core Sample

NOTES:

General Notes:
1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

File: 55191 Page: _____

Summary of Field Groundwater Quality Measurements

Well Identification		Well Elevation		Well Construction	
Monitoring Well :		Ground Surface Elevation:		Riser/Screen Material:	
Installation Date:		Protective Casing Elevation:		Top of Intake Depth:	
Installed By:		Monitoring Point Elevation:		Bottom of Intake Depth:	
		Elevation Datum:			

Date	Time	Depth to Water	Cumulative Volume Purged	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Color	Notes

File: 55191 Page: _____

Existing Well Assessment - _____

Historic Information

Boring Log Available (yes/no/attached):

Installation Log Available (yes/no/attached)

Summary

Monitoring Well :		Ground Surface Elevation:		Riser/Screen Material:	
Installation Date:		Protective Casing Elevation:		Top of Intake Depth:	
Installed By:		Monitoring Point Elevation:		Bottom of Intake Depth:	
		Elevation Datum:			

Previous Field measurement Information Available (yes/no/attached)

Ranges of Previous Field Measurements

Depth to Water (ft)	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Color

Notes:

Field Observations

Exterior Observations: _____

Interior Observations _____

Signs of Damage/Tampering:

Locked (yes/no)	Well Cap (yes/no)	Surface Seal Intact (yes/no)	PID Measurement:	Odors:

Well Development

Date	Time	Depth to Water	Cumulative Volume Purged	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Color	Notes

File: 55191 Page:

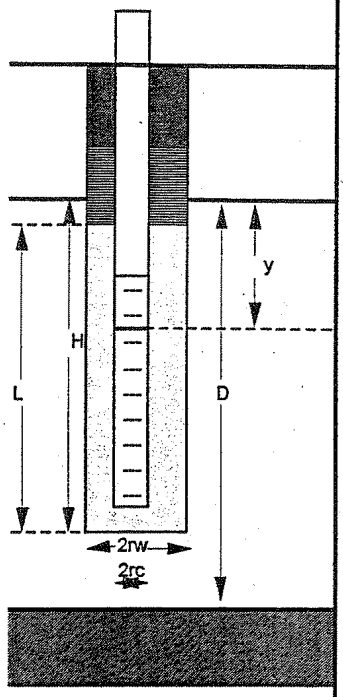
Hydraulic Conductivity Test - _____

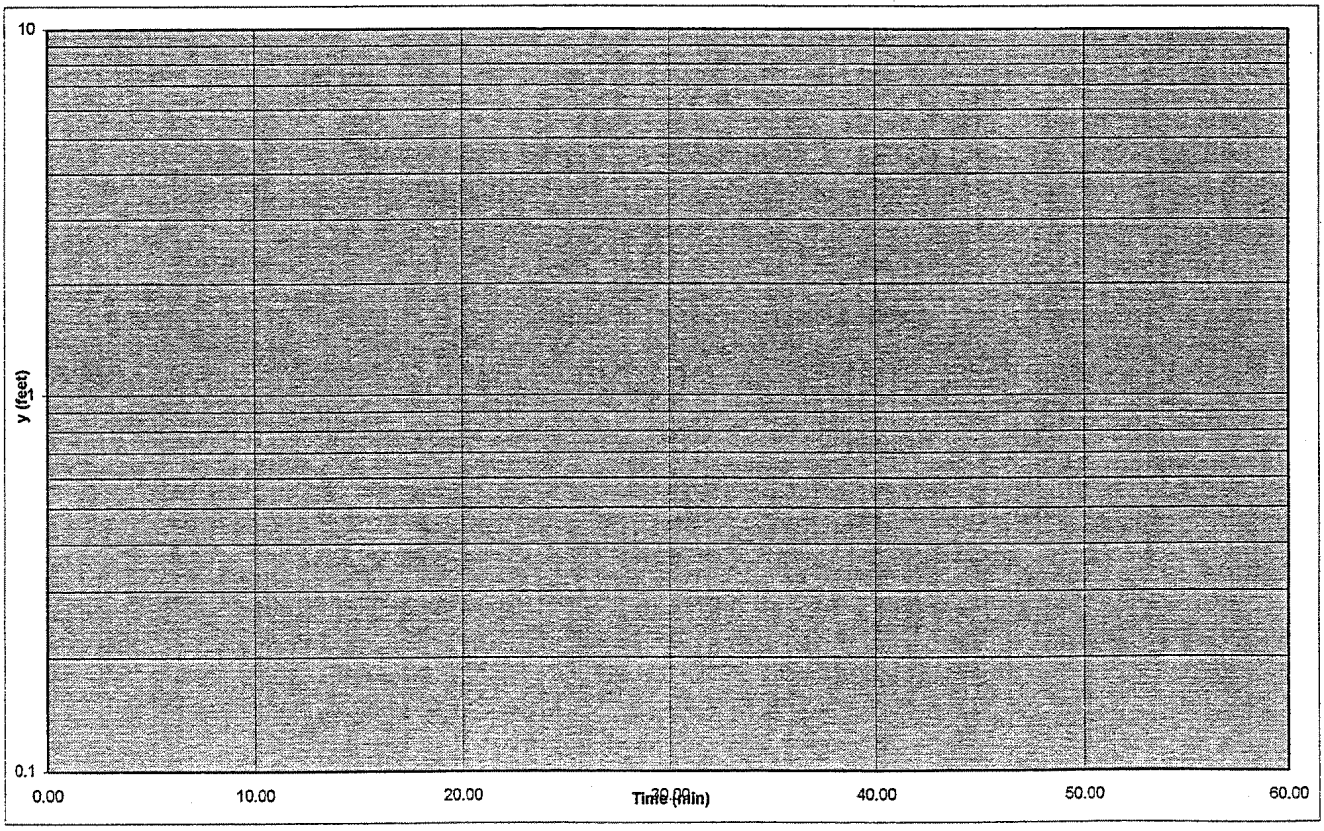
Well Identification		Test Information		Well Construction	
Monitoring Well :		GZA Representative:		Top of Intake Depth:	
Installation Date:		Test Date:		Bottom of Intake Depth:	
Installed By:		Weather Conditions:		Screened Zone:	
				Confined/Unconfined	

Test Data

Time (hr/min/sec)			Time (min)	Water Level (feet)	Drawdown = y (feet)

Well Configuration	
L (ft) =	
H (ft) =	
D (ft) =	
rw (ft) =	
rc (ft) =	





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Sample Collection Log

Sample Identification		Miscellaneous	
Sample Location		Weather Conditions	
Sample Type		Chain-of-Custody Completed (yes/no)	
Sample Code		Sample Containers Labeled (yes/no)	
Date		Shipping Containers Sealed (yes/no)	
Time		Trip Blank Identification	
GZA Representatives:		Field Blank Identification	

General

Sample Collection Equipment

Decontamination Procedure

Sample Collection Procedure

Field Measurement Equipment Used and Calibration Information

pH

Specific Conductance

Temperature

Turbidity

Other Equipment

Requested Testing

Container	Preservative	TCL VOCs	TCL Semi-VOCs	TCL PCBs	TCL Pesticides	8 RCRA Metals	Hardness	TOC											

Summary of Field Measurements

Depth to Water	Cumulative Volume Purged	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Other

Notes

Turbidity Meter Calibration Worksheet

Project:	**GZA File :**
Location:	**Sample Collection Date:**

Turbidity Meter Model:

Calibration (1)

Date	Target Value (2) (üMhos/cm)	Actual Reading (uMhos/cm)	Analyst's Initials	Remarks

Notes:

1) Calbration done in accordance with manufacturers recommendations.
2) Target value of standards provided by manufacturer.

pH Meter Calibration Worksheet

Project:	GZA File :
Location:	Sample Collection Date:

pH Meter Model:

Calibration (1)

Date	Set Points (2) (pH units)	Target Value (3) (pH units)	Actual Reading (4) (pH units)	Analyst's Initials	Remarks

Notes:

1) These calibrations were done in accordance with the NYSDOH's Environmental Laboratory Approval Program (ELAP manual, item 231 revised as of April 1, 1986)

2) For a one point calibration, the set point is the pH of the standard buffer solution used to initially calibrate the meter. For a two point calibration, the set points are the pH of the standard buffers used to calibrate the slope of the pH meter.

3) For a one point calibration, the target values are the pH of the standard buffers used to check the slope of the pH meter. For a two point calibration, the target value is the pH of the standard buffer used to check the initial calibration.

4) The accepted accuracy for the readings using a one point calibration is +/- 0.2 pH units. The accepted accuracy for the actual reading using a two point calibration is +/- 0.05 pH units of the target value.

Conductivity Meter Calibration Worksheet

Project:	**GZA File :**
Location:	**Sample Collection Date:**
Conductivity Meter Model:	

Calibration (1)

Date	Temperature (C)	Target Value (2) (uMhos/cm)	Actual Reading (uMhos/cm)	Analyst's Initials	Remarks

Notes:

1) Calibrations done in accordance with manufacturers recommendations and are completed by adjusting the meter to a standard of known specific conductance. The standard is selected to be as close to the sample measurement as possible.
2) Target value is the specific conductance of the standard solution.

Thermometer Calibration Worksheet

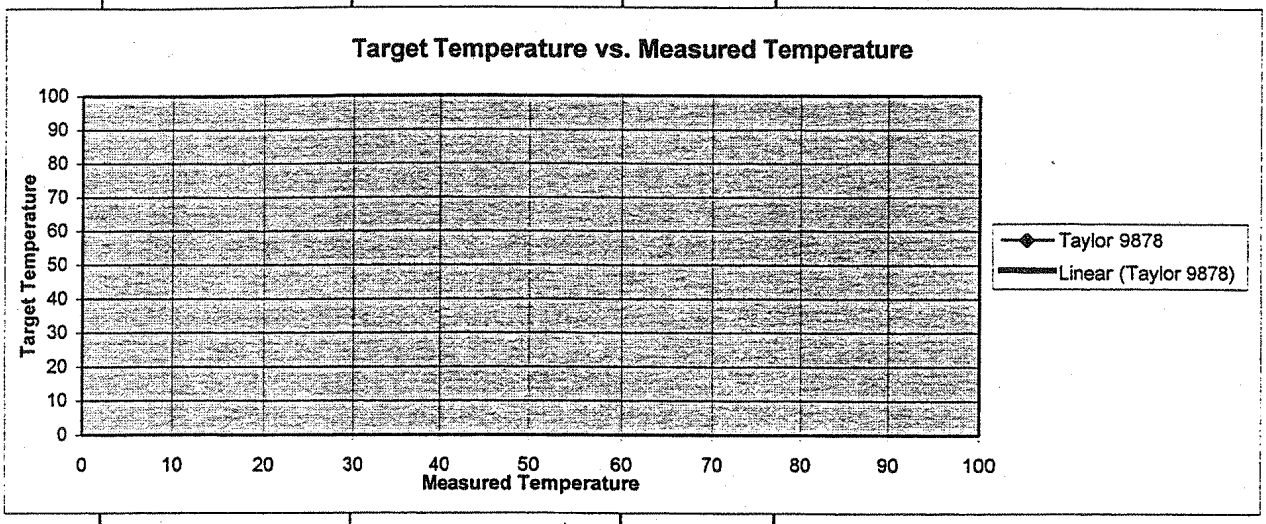
Project: **GZA File :**

Location: **Sample Collection Date:**

Thermometer Model:

Calibration (1)

Date	Target Temperature (C)	Observed Temperature (C)	Analyst's Initials	Remarks



Notes:

1) These calibrations were done in accordance with the NYSDOH's Environmental Laboratory Approval Program (ELAP manual, item 231 revised as of April 1, 1986).
2) Target temperature is the temperature of the National Bureau of Standards (NBS) traceable thermometer. The NBS thermometer was certified on July 11, 1985 and checked at the ice point on September 19, 1988.
3) The observed tempertature is the tempeature of the calibrated thermometer.
4) The correction factor of the calibrated thermometer is:

Corrected tamperature =1.0467 X Observed Temperature -0.8587

ATTACHMENT C

HEALTH AND SAFETY PLAN

SITE REMEDIAL ACTIVITIES
312 MAPLE STREET
ENDICOTT, NEW YORK
SITE NO. B00168-7

GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION PLAN

1. CLIENT/SITE/PROJECT INFORMATION		
Client: Broome County Department of Planning and Economic Development		
Site Address: 312 Maple Street, Village of Endicott, Broome County, New York		
Site Description, Work Environment: The Site is located at 312 Maple Street in Endicott, New York on the southwest corner of Maple Street and North Duane Avenue. A locus plan for the Site is included as Figure 1. Surrounding property is mixed residential/commercial. Norfolk Southern railroad tracks border the Site to the south. The Site is currently occupied by a manufacturer of wood cabinetry. Previous owners/operators include shoe companies, coal companies, electronic assemblers and a metal finishing job shop. The Site is about 0.9 acres in size and includes three adjoining Site buildings (Buildings 1, 2, and 3 as shown on Figure 2). Building 1 is a single story masonry structure. Building 2 is a steel framed and sided structure with a concrete slab-on-grade floor. Building 3 is a masonry and wood-framed two-story building with a basement.		
Job/Project#: 21.0056127.1	Estimated Start Date: April 2012	Estimated Finish Date: May 2012

2. EMERGENCY INFORMATION			
Hospital Name & Address: Binghamton General Hospital, 10-42 Mitchell Avenue, Binghamton, NY 13903			Hospital #: (607) 762-2200
Directions and Street Map of Route to Nearest Hospital Attached: ☒ Yes (required) See attached Figure 3.			
Fire #: 911	Ambulance #: 911		Police #: 911
Other Emergency Contact(s): Daniel J. Troy, P.E.		Phone #'s: Office # (716) 844-7034, Cell # (716) 570-6673	
Location of Nearest Phone: Field personnel will carry a cell phone(s).			
Site Specific Emergency Preparedness/Response Procedures/Concerns: Field personnel should be familiar with GZA s Preparedness, Emergency Action and Fire Program is included in Attachment A.			
IMPORTANT: All incidents (injuries, fires, chemical spills, property damage, and significant near misses) must be reported within 24 hours to your EHS Coordinator and the EHS Director and Insurance Coordinator, per GZA Incident Reporting Policy # 03-1005.			

3. SUB-SURFACE WORK, UNDERGROUND UTILITY LOCATION	
Will subsurface explorations be conducted as part of this work? ☒ Yes ☐ No	
Site property ownership where underground explorations will be conducted on:	Public Access Property ☒ Yes ☐ No Private Property ☒ Yes ☐ No
Have Necessary Underground Utility Notifications For Subsurface Work Been Made?	☐ Yes ☒ Yet to be conducted. Prior to the commencement of Site remedial activities, the Underground Facilities Protection Organization (UFPO) will be contacted at 1-800-962-7962 to clear planned locations for monitoring well installation/decommisioning and bioremedial injections. Utility clearance will require three working days by UFPO. GZA and its drilling subcontractor will then mobilize necessary materials and equipment to the Site.
Specify Clearance Date & Time, Dig Safe Clearance I.D. #, And Other Relevant Information:	
IMPORTANT! For subsurface work, prior to the initiation of ground penetrating activities, GZA personnel to assess whether the underground utility clearance (UUC) process has been completed in an manner that appears acceptable, based on participation/ confirmation by other responsible parties (utility companies, subcontractor, client, owner, etc.), for the following:	

Electric:	☒ Yes	☐ No	☐ NA	☐ Other_____
Fuel (gas, petroleum, steam):	☐ Yes	☐ No	☒ NA	☐ Other_____
Communication:	☒ Yes	☐ No	☐ NA	☐ Other_____
Water:	☒ Yes	☐ No	☐ NA	☐ Other_____
Sewer:	☒ Yes	☐ No	☐ NA	☐ Other_____
Other:_____	☐ Yes	☐ No	☐ NA	☐ Other_____

Comments:

4. SCOPE OF WORK

Any OSHA PERMIT-REQUIRED CONFINED SPACE entry?
☐ **YES** ☒ **NO**
If yes, use Site Specific H&S Plan/Confined Space Entry Permit for that portion of the work

Any INDOOR fieldwork? ☐ **YES** ☒ **NO**
If yes, explain: Bioremedial material will be stored inside the facility located at 312 Maple Street.

General project description, and phase(s) or work to which this H&S Plan applies.	Remedial activities will be performed at the Site, which include monitoring installation and decommissioning, groundwater sampling, and bioremedial injections based on previous findings and conclusions of GZAs previous Remedial Investigation/Remedial Alternatives Report (RI/RAR).
Specific Tasks Performed by GZA:	GZA will observe and document monitoring well installation and decommissioning activities, perform groundwater sampling, and observe and document bioremedial injection activities.
Concurrent Tasks to be Performed by GZA Subcontractors (List Subcontractors by Name):	A drilling subcontractor (Nature's Way Environmental Consultants and Contractors, Inc.) will be used for monitoring well installation/decommissioning activities and bioremedial injections.
Concurrent Tasks to be Performed by Others:	

IMPORTANT! Subcontractors may use GZA's plan for general informational purposes only. Each subcontractor is responsible for determining the adequacy and applicability of the information herein to its own activities on site. Each subcontractor engaged by GZA is responsible for all matters relating to the H&S of its personnel and equipment in performance of its work, as well as obligations for compliance with H&S regulations applicable to its work. GZA subcontractors are subject to GZA's review, recommendations, and contractual requirements pertaining to H&S.

5. DOCUMENTATION TO BE COMPLETED

- **Site Health and Safety Briefing/Site Safety Orientation Record** (Attachment B) must be completed prior to the initiation of on-site activities and at least once per week thereafter until the completion of GZA on-site activities. For some projects, daily safety briefings may be appropriate.
- **Site Inspection Log** (Attachment C) must be completed at the initiation of on-site activities and at least once per week thereafter until the completion of GZA on-site activities.
- **Incident Analysis Form** (Attachment D) must be completed for each accident, injury, incident, near miss.

6. SITE-SPECIFIC OVERVIEW OF H&S HAZARDS/ SAFETY MEASURES (Based on Hazard Assessment, Section 11)

For the hazards identified by the Hazard Assessment checklist, describe the specific nature of that hazard as it relates to your jobsite, and describe the safety measures to be implemented for worker protection. Use brief abstract statements or more detailed narrative as may be appropriate. See Attachment A for applicable Health and Safety Policies and Job Hazard Analysis Forms.

ON-SITE HAZARDS:	SAFETY MEASURES:
The primary hazards anticipated at the Site are the physical hazards associated with operation of mechanical equipment (e.g., drill rig, soil probe unit, etc.), including noise exposure.	GZA personnel will not be involved with the actual operation of large mechanical equipment but rather will provide oversight/supervision during remedial activities. Exposure to these hazards by GZA personnel can be controlled by keeping a safe distance from heavy equipment during operation and using the proper personal protective equipment (PPE).

Although not expected during site activities, potential inhalation hazards may result from the presence of compounds including chlorinated solvents (specifically trichloroethene {TCE}) and metals including, cadmium and copper, which were detected in soil samples analyzed during a previous site investigation at concentrations exceeding the NYSDEC unrestricted use soil guidance criteria.	Exposure to these hazards by GZA personnel can be controlled by visually monitoring for dust and standing upwind of drilling equipment during intrusive activities.
Potential ingestion/adsorption hazards may result from the presence of specific compounds including chlorinated solvents (i.e., TCE) and metals including, hexavalent chromium, iron, sodium, and thallium, which were detected in groundwater samples analyzed during a previous site investigation at concentrations exceeding NYSDEC groundwater and drinking water regulatory guidance criteria.	Exposure to these hazards by GZA personnel can be controlled by using the proper PPE (i.e., disposable nitrile gloves) and ensuring that hands and face are thoroughly washed prior to leaving the work area and before eating, drinking or any other activities.

7. HEALTH AND SAFETY EQUIPMENT AND CONTROLS

AIR MONITORING INSTRUMENTS (ensure instruments are calibrated)

- ☒ PID Type: Lamp Energy: 10.2 eV
- ☐ FID Type:
- ☐ Carbon Monoxide Meter
- ☐ Hydrogen Sulfide Meter
- ☐ O_2/LEL Meter
- ☐ Particulate (Dust) Meter
- ☒ Calibration Gas Type 100 ppb Isobutylene
- ☐ Others:

Discuss/Clarify, as Appropriate:

OTHER H&S EQUIPMENT & GEAR

- ☐ Fire Extinguisher
- ☐ Caution Tape
- ☒ Traffic Cones or Stanchions
- ☐ Warning Signs or Placards
- ☐ Decon Buckets, Brushes, etc.
- ☐ Portable Ground Fault Interrupter (GFI)
- ☐ Lockout/Tagout Equipment
- ☐ Ventilation Equipment
- ☐ Others:

Discuss/Clarify, as Appropriate:

PERSONAL PROTECTIVE EQUIPMENT

- ☐ Respirator Type:
- ☐ Resp-Cartridge Type:
- ☒ Hardhat
- ☒ Outer Gloves Type: Nitrile
- ☐ Inner Gloves Type:
- ☒ Steel-toed boots/shoes
- ☐ Coveralls Type:
- ☐ Outer Boots Type:
- ☒ Eye Protection with side shields
- ☐ Face Shield
- ☒ Traffic Vest
- ☐ Personal Flotation Device (PFD)
- ☐ Fire Retardant Clothing
- ☐ EH (Electrical Hazard) Rated Boots, Gloves, etc.
- ☒ Noise/Hearing Protection
- ☐ Others:

Discuss/Clarify, as Appropriate:

8. AIR MONITORING ACTION LEVELS Is air monitoring to be performed for this project? Yes ☒ No ☐

Make sure air monitoring instruments are in working order and have been calibrated prior to use. Depending on project-specific requirements, periodic field calibration checks may be necessary during the day of instrument use.

A. ACTION LEVELS FOR OXYGEN DEFICIENCY AND EXPLOSIVE ATMOSPHERIC HAZARDS (Action levels apply to occupied work space in general work area.)

☐ **Applicable, See Below.** ☒ **Not Applicable**

Parameter	Response Actions for Elevated Airborne Hazards
Oxygen	At 19.5% or below: initially discontinue activities and exit area. Assess alternatives to provide adequate ventilation, and/or proceed to Level B PPE. Verify presence of adequate oxygen (approx. 12% or more) before taking readings with LEL meter. If oxygen levels are below 12%, LEL meter readings are not valid.
LEL	Less than 10% LEL - Continue working, continue to monitor LEL levels Greater than or Equal to 10% LEL- Discontinue work operation and immediately withdraw from area. Resume work activities ONLY after LEL readings have been reduced to less than 10% through passive dissipation, or through active vapor control measures.

B. ACTION LEVELS FOR INHALATION OF TOXIC/HAZARDOUS SUBSTANCES (Action levels are for sustained breathing zone concentrations.)

☒ **Applicable, See Below.** ☐ **Not Applicable**

Air Quality Parameters (Check all that apply)	Remain in Level D or Modified D	Response Actions for Elevated Airborne Hazards
☒ VOCs	0 to 5 ppm	5 ppm to 50 ppm: Proceed to Level C, or Ventilate, or Discontinue Activities > 50 ppm: Proceed to Level B, or, Ventilate, or Discontinue Activities
☐ Carbon Monoxide	0 to 35 ppm	At greater than 35 ppm, exit area, provide adequate ventilation, or proceed to Level B, or discontinue activities.
☐ Hydrogen Sulfide	0 to 10 ppm	At greater than 10 ppm, exit area, provide adequate ventilation, or proceed to Level B, or discontinue activities
☐ Dust	0 to mg/m^3	

C. SPECIAL INSTRUCTIONS/COMMENTS REGARDING AIR MONITORING (IF APPLICABLE)

9. H&S TRAINING/QUALIFICATIONS FOR FIELD PERSONNEL

☒ Project-Specific H&S Orientation Required for All Projects, All Field Staff	☐ Fall Protection Training
☒ OSHA 40 Hr. Hazwoper/8 Hr. Refreshers	☐ Trenching & Excavation
☐ Hazard Communication (for project-specific chemical products)	Others: ☐ ☐
☐ First Aid/CPR (at least one individual on site)	☐
☐ General Construction Safety Training	☐
☐ Lockout/Tagout Training	☐
☐ Electrical Safety Training	☐
☐ Bloodborne Pathogen Training	☐

Discuss/Clarify, as needed:

10. PROJECT PERSONNEL - ROLES AND RESPONSIBILITIES		
GZA ON-SITE PERSONNEL:		
Name	**Project Title/Assigned Role**	**Telephone Numbers**
John Beninati	Site Supervisor	work: 716-844-7032 cell: 716-570-5737
John Beninati	Site Safety Officer	work: 716-844-7032 cell: 716-570-5737
Site Supervisors and Project Managers (SS/PM): Responsibility for compliance with GZA Health and Safety programs, policies, procedur applicable laws and regulations is shared by all GZA management and supervisory personnel. This includes the need for effective oversig supervision of project staff necessary to control the Health and Safety aspects of GZA on-site activities. **Site Safety Officer (SSO):** The SSO is responsible for implementation of the Site Specific Health and Safety Plan.		
OTHER PROJECT PERSONNEL:		
Name	**Project Title/Assigned Role**	**Telephone Numbers**
Christopher Boron	Senior Project manager	Work: 716-844-7046 Cell: 716-570-5990
Daniel J. Troy, P.E.	Project Manager	Work: 716-844-7034 Cell: 716-570-6673
Todd Schara	Health and Safety Coordinator (HSC)	Work: 716-844-7030 Cell: 716-570-7030
Jayanti Chatterjee	GZA Director of Health and Safety	Work: 973-774-3335 Cell: 973-303-9796
Senior Project Manager: Responsible of overall project oversight, including responsibility for Health and Safety. **Project Manager:** Responsible for day-to-day project management, including Health and Safety. **Health and Safety Coordinator:** General Health and Safety guidance and assistance. **Director of Health and Safety:** H &S technical and regulatory guidance, assistance regarding GZA H&S policies and procedures.		

11. HAZARD ASSESSMENT (CHECK ALL THAT APPLY)

A. GENERAL FIELDWORK HAZARDS: (Investigative, remedial or construction-related work; environmental, geological, geotechnical, geo-civil, wetland/upland/woodland work, etc.)

☐ Confined Space Entry – USE CONFINED SPACE H&S PLAN/ENTRY PERMIT (tanks, vessels, tunnels, misc. equipment enclosures)

☐ Enclosed Spaces (Non-Confined Spaces) – (trenches, basements, sub-basements, attics)

☒ General Housekeeping, Slip/Trip/Fall Hazards

☐ Unsanitary/Infectious Hazards (wastewater, sewage, landfill, medical waste, blood borne pathogens)

☒ Poisonous Plants, Plant Allergies

☒ Biting/Stinging Insects, Spiders, Lyme Disease

☐ Animal Hazards (snakes/rats/vermin, feral dogs/cats, urban dogs, wild animals, etc.)

☐ Water/Wetland Hazards (boating, barge, raft, wading, diving, ice/thin ice, hazardous currents, shoreline/tidewater hazards, dam release/flash floods, river/stream crossing, mud/silt, etc.)

☐ Remote Location/Navigation/Orientation Hazards (need for map/compass/GPS, limited communication/cell phone coverage, getting lost, distance from medical facility, lack of potable water)

☐ Rough Terrain Hazards (ledges, cliffs, high altitude, climbing, strenuous hiking, rip rap, holes, pits, mine shaft/sink holes, avalanche, falling rocks)

☒ Fall Hazards (ladders, stairs, scaffolds, towers, elevated work platforms, retaining walls, rope access work, use of areal lifts, pits, holes, etc.)

☒ Weather/Seasonal Hazards (heat/cold stress, sunburn, dehydration, wind/weather/lightning, snow/ice, hunting season)

☒ Roadway/Highway/Transportation Corridor Hazards (moving vehicles, traffic safety, railroad hazards, airport traffic)

☐ Motor Vehicle Operation Hazards (towing, hauling, transporting loads, etc.)

☒ Pedestrians/General Public (any need for special measures to protect bystanders, secure work area during off hours)

☒ Construction/Heavy Equipment, (operation of, or working near, loaders, excavator, backhoe, drill rig, geoprobe, cranes, etc.)

☐ Overhead Hazards (Falling tools, equipment, debris, rocks, tree limbs, etc.)

☐ Hand Tools/Power Tools/Equipment (tool use hazards, chips, blades, projectiles, electrical generators, compressors, hoists, etc.)

☒ Material Handling/Storage Hazards (manual handling, lifting, repetitive motion, mechanical transport, ropes/slings/chains, rigging, stacking, etc.)

☐ Gas Welding/Cutting, Arc Welding/Cutting

☐ Electrical Hazards (electrical equipment 120 volts or greater, low voltage electric shock hazards, etc.)

☐ Fire and/or Explosion Hazards (compressed gas, fuels, flammable materials, heat-producing equipment, unexploded ordnance, explosives, etc.)

☒ Noise and Noise Source Awareness

☐ Utility-Related Hazards (underground/overhead electric utilities, gas pipelines, water, sewer, fiber optic, etc.)

☐ Trenching & Excavation, Test Pits and Related Hazards

☐ Unexploded Ordnance and Related Hazards

☐ Long-Distance/Overnight Travel (distance driving/fatigue, unfamiliar territory, unfamiliar rental vehicles, etc.)

☐ Security/Personal Safety/Criminal Activity/Theft Concerns, High Crime Area

☐ Working Alone (in a manner requiring special considerations, notifications, etc.)

☐ Lack of Visibility (night work, poor lighting, etc)

☐ Chemical/Toxicity/Irritant Hazards

☐ Other:

B. BUILDING-RELATED FIELDWORK HAZARDS (Work in operating or abandoned facilities, including temporary remediation system facilities, or during construction/demolition/renovation/abatement activities)

☒ No Building-Related Work

☐ Operating or ☐ Abandoned/Vacant Building

☐ Confined Space Entry – USE CONFINED SPACE H&S PLAN/ENTRY PERMIT

☐ Enclosed Spaces (Non-Confined Spaces) – (trenches, basements, sub-basements, attics)

☐ General Environmental Conditions (degraded walking/working surfaces, housekeeping, poor lighting, too hot, too cold, etc., unsanitary)

☐ Fire, Hot Work, Explosion (welding/cutting, compressed gases, flammable/combustible liquids)

☐ Biological (mold, bird guano, medical waste, insects, vermin, unsanitary, sewerage, waste water, etc.)

☐ Ionizing/Non-Ionizing Radiation (radioactive materials, x-ray equipment, lasers, UV/IR from welding/process equipment, microwave, magnetic fields, radio frequency hazards)

☐ Fall Hazards (open pits, elevator shafts, working on roof, elevated work areas, elevated equipment access, stairs, ladders, scaffolding, powered boom lifts/scissors lifts)

☐ Electrical (operating equipment, power tools, extension cords, GFI, wet locations, abandoned electrical equip, batteries, capacitors, static electricity, arc flash/arc blast hazards, high voltage, need for lockout)

☐ Stored Energy Hazards (pneumatic/hydraulic pressure, hot surfaces, etc.)

☐ Mechanical/Moving Equipment/Machinery (cranes, operating equipment, conveyors, lockout hazards, robotic equipment, machine guarding hazards)

☐ Traffic/Vehicles/Pedestrian (moving fork trucks, parking lot, access road way, loading dock)

☐ Noise, Vibration Hazards

☐ Structural Hazards (unsafe floors/stairways/roof, deteriorated building components)

☐ Demolition/Renovation (overhead hazards, unstable building structures, heavy equipment, restricted access areas, etc.)

☐ Chemical/Toxicity/Irritant Hazards (See Part III for details)

☐ Other:

C. CHEMICAL/EXPOSURE HAZARDS

☐ No Chemical Hazards Anticipated

☐ Chemicals Subject to OSHA Hazard Communication (for commercial chemical products, attach MSDSs if applicable)

☒ Soil and/or Groundwater Contaminants

☐ Drums and Buried Drums

☐ Former Chemical Lagoon/Disposal Site

☐ Miscellaneous Residual "Urban Fill" Hazards and Similar Residual Hazard Conditions

☐ Contaminated Building Surfaces, Paint, Settled Dust, Accumulated Hazardous Substances

☐ Vapor/Fume/Particulate from Industrial/ Manufacturing or Welding/Cutting/Hot Processes

☐ Containerized Waste, Chemicals in Piping & Process Equipment

☐ Emissions from Gasoline-, Diesel-, Propane-fired Engine, Heater, Similar Equipment

☐ Spill, Potential for Spill

☐ General Work Site Airborne Dust Hazards

☒ Volatile Organic Compounds (VOCs), BTEX

☒ Chlorinated Organic Compounds

☐ Fuel Oil, Gasoline, Petroleum Products, Waste Oil

☐ Asbestos

☐ Oxygen Deficiency, Asphyxiation Hazards

☐ Methane Hazards

☐ Sulfides, Hydrogen Sulfide (H_2S)

☐ Cyanides, Hydrogen Cyanide (HCN)

☐ Carbon Monoxide

☐ Herbicides, Pesticide, Fungicide, Animal Poisons

☒ Metals, Metal Compounds (esp. heavy metals, toxic metals, etc.)

☐ Corrosives, Acids, Caustics, Strong Irritants

☐ Polychlorinated Biphenyls (PCBs)

☐ Polycyclic Aromatic Hydrocarbons (PAHs)

☐ Compressed Gases

☐ Cryogenic Hazard (hazards of extremely low temperature materials)

☐ Flammable/Combustible Liquids

☐ Explosives, Explosive Dust, Unexploded Ordnance, etc.

☐ Radiation Hazards (radioactive sealed/open source, x-rays, ultra violet, infrared, radio-frequency, etc.)

☐ Sensitizers

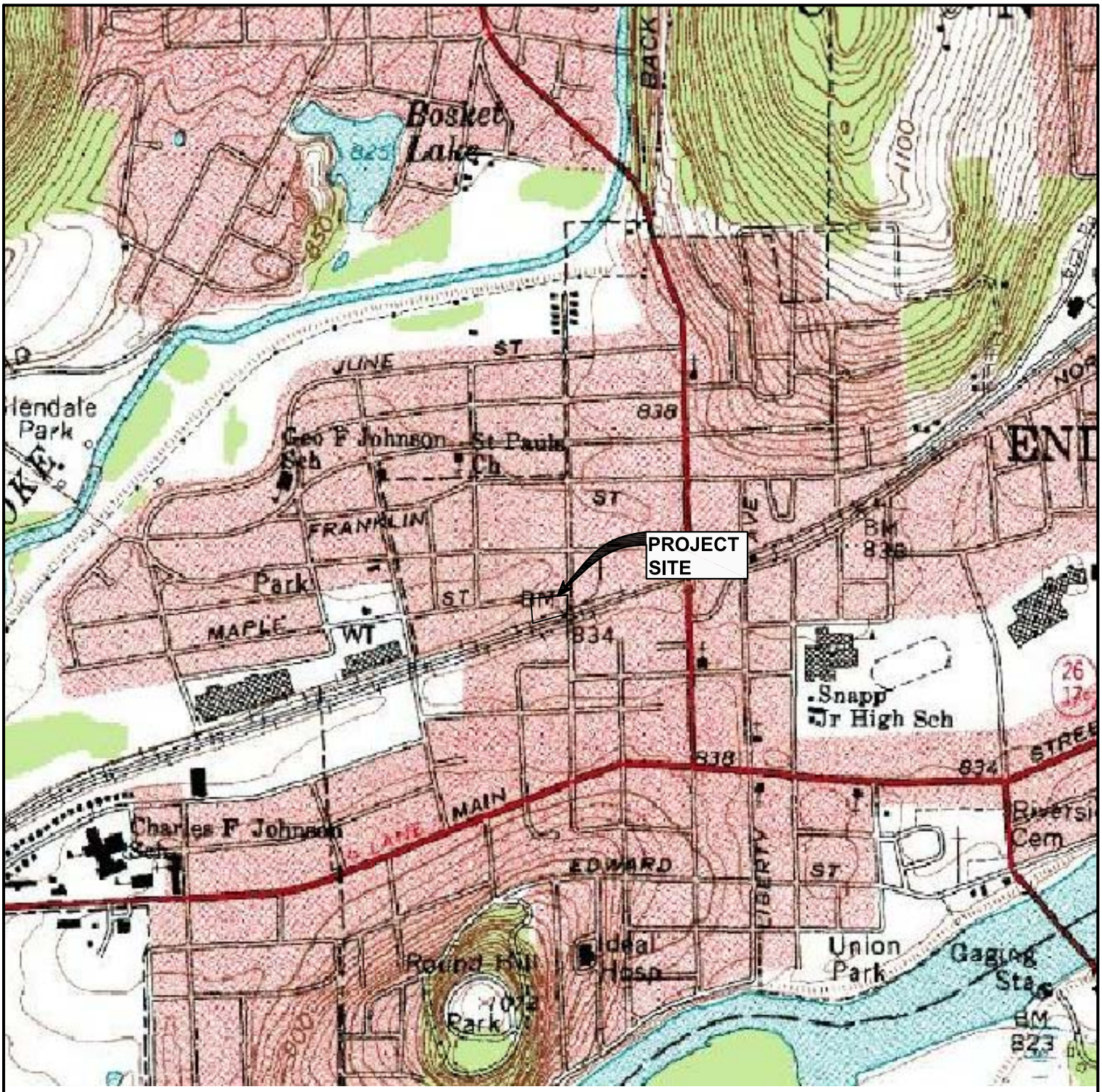
☐ Other:

12. PLAN AKNOWLEDGEMENT AND APPROVALS – The following individuals indicate their acknowledgement and/or approval of the contents of this Site Specific H&S Plan based on their understanding of project work activities, associated hazards and the appropriateness of health and safety measures to be implemented.

	Signature	**Date**
Prepared by:		
Project Manager:		
EHS Approval[1]:		
PIC:		

1. EHS Coordinator, EHS Director, or designated H&S Plan Reviewer

Attach additional information if required.



NOTE:
BASE MAP ADAPTED FROM U.S.G.S. TOPOGRAPHIC MAPS DOWNLOADED FROM TERRASERVER.MICROSOFT.COM

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SCALE IN FEET

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NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
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(716) 685-2300

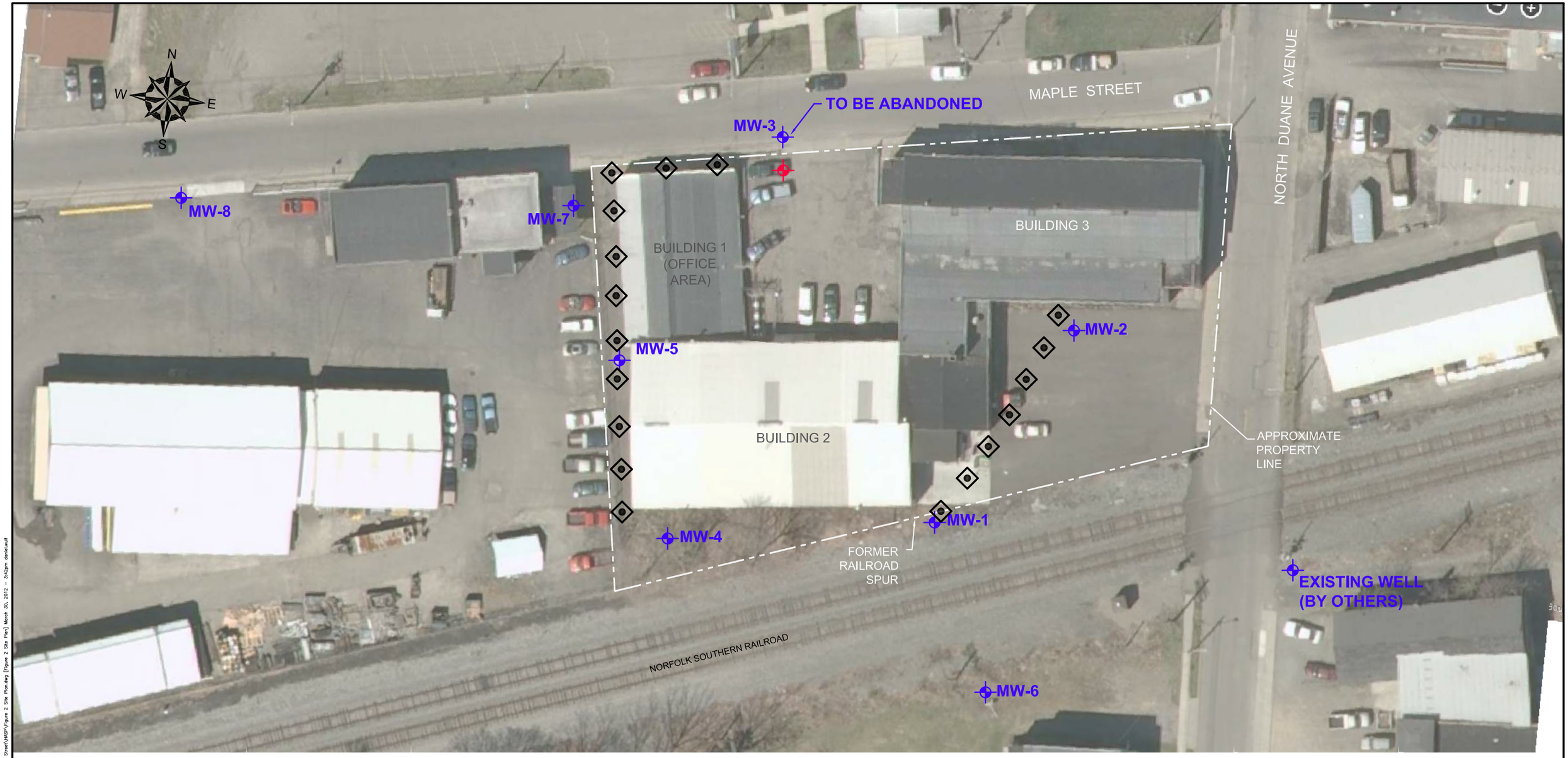
PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
HEALTH AND SAFETY PLAN
LOCUS PLAN

FIGURE
1

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	MARCH 2012	21.0056127.10	



LEGEND:

MW-5 APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL.

APPROXIMATE LOCATION OF PROPOSED IN-SITU CHEMICAL OXIDATION INJECTIONS CONSISTING OF REGENISIS 3D MICRO EMULSION™ (3DMe) & HRC™ "PRIMER" (ALTERNATIVE NO. 3)

PROPOSED MONITORING WELL

NOTES:

1. BASE MAP ADAPTED FROM A 2011 AERIAL PHOTO DOWNLOADED FROM http://www.nysgis.state.ny.us/gateway/mg/index.html AND FIELD OBSERVATIONS.

2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

0 20 40 80
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
HEALTH AND SAFETY PLAN
SITE PLAN

PREPARED BY:
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PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

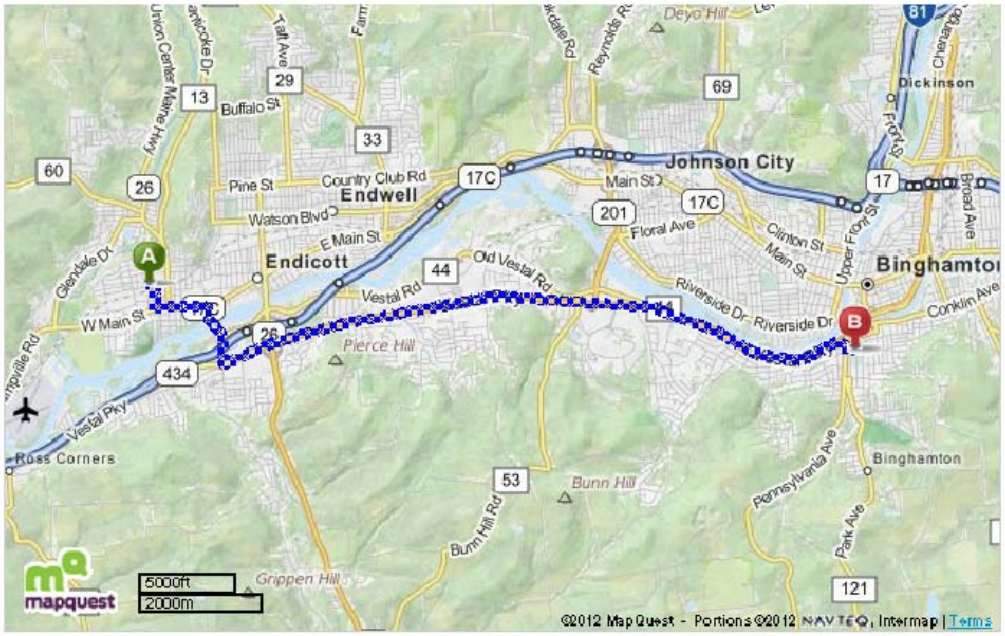
PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	FIGURE 2
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	
DATE MARCH 2012	PROJECT NO. 21.0056127.10	REVISION NO.	

mapquest

Trip to:
Binghamton General Hospital
10-42 Mitchell Ave
Binghamton, NY 13903
(607) 762-2200
9.20 miles / 16 minutes

N
W E
S

A		**312 Maple St**, Endicott, NY 13760-4023	
●		1. Start out going **east** on **Maple St** toward **N Duane Ave**. Map	**0.05 Mi**
↱		2. Turn **right** onto **N Duane Ave**. Map	**0.3 Mi**
↰	17C	3. Take the 2nd **left** onto **W Main St / RT-17C**. Map	**0.6 Mi**
↱		4. Turn **right** onto **Vestal Ave / CR-48**. Continue to follow **CR-48**. Map	**0.4 Mi**
↑		5. **CR-48** becomes **N Main St**. Map	**0.3 Mi**
↰	EAST 434	6. Turn **left** onto **Vestal Pky E / RT-434 E**. Map	**7.2 Mi**
RAMP		7. Take the **Pennsylvania Avenue** ramp. Map	**0.1 Mi**
↗		8. Turn **slight right** onto **Pennsylvania Ave**. Map	**0.04 Mi**
↰		9. Take the 1st **left** onto **Vestal Ave**. Map	**0.1 Mi**
↱		10. Take the 2nd **right** onto **Mitchell Ave**. Map	**0.08 Mi**
■		11. **10-42 MITCHELL AVE**. Map	
B		**Binghamton General Hospital** 10-42 Mitchell Ave, Binghamton, NY 13903 (607) 762-2200	



NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
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PREPARED FOR:
BROOME COUNTY DEPT. OF PLANNING AND ECON. DEV.

312 MAPLE STREET
VILLAGE OF ENDICOTT, NEW YORK

ENVIRONMENTAL RESTORATION PROJECT
HEALTH AND SAFETY PLAN
HOSPITAL ROUTE PLAN

FIGURE 3

PROJ MGR: DJT	REVIEWED BY:	CHECKED BY:	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DRAWN BY: DEW	SCALE: AS SHOWN	MARCH 2012	21.0056127.10	

ATTACHMENT A

GZA HEARING CONSERVATION PROGRAM

GZA HEAT-RELATED ILLNESS PREVENTION PROGRAM

GZA EMERGENCY PREPAREDNESS, EMERGENCY ACTION AND FIRE PREVENTION PROGRAM

GZA JOB HAZARD ANALYSIS WORKSHEETS

Number:	Vol. 03 No. 2006
Date:	June 18, 2010
Supercedes:	Vol. 03, No. 8002, 6/13/1994
Approved:	Kenneth Johnston Vice President, Risk Management
Sponsoring Function:	Risk Management Department Environmental Health and Safety
Page:	1 of 5

HEARING CONSERVATION PROGRAM

TABLE OF CONTENTS

1.0 INTRODUCTION

Certain operations involving GZA employees, particularly field operations involving the use of heavy equipment, may result in excessive noise levels. Overexposure to excessive noise levels can lead to the following adverse effects:

- temporary hearing losses where normal hearing returns after a rest period;
- interference with speech communication and the perception of auditory signals;
- interference with the performance of complicated tasks; and,
- permanent hearing loss due to repeated and/or excessive exposure resulting in nerve destruction in the hearing organ.

In accordance with OSHA requirements, GZA shall establish and administer a hearing conservation program (HCP) for employees who are exposed to noise in excess of 85 dB(A) as an 8-hour time-weighted average (TWA) This Program provides for:

- the monitoring of noise levels in the work area;
- audiometric examinations;
- hearing protection; and
- hearing conservation training.

2.0 PURPOSE

The purpose of this document is to provide a Hearing Conservation Program in accordance with the United States Occupational Health and Safety Administration's (OSHA) Occupational Noise Exposure Standard(s) (29 CFR 1910.95 and 1926.52) and so that GZA employees are protected from the hazardous effects of excessive noise exposure in the work place.

3.0 APPLICABILITY

The requirements of this program are applicable to all GZA facilities, activities and employees.

4.0 GLOSSARY

action level: For the purposes of this document, the action level refers to a personal 8-hour time-weighted average (TWA) noise exposure of 85 dB(A).

permissible exposure level: A personal 8-hour TWA noise exposure of 90 dB(A).

audiometric testing: The performance of tests and examinations designed to measure an individual's hearing ability or disability. The most common type of audiometric testing device is the audiometer.

audiogram: A chart or table relating hearing threshold levels measured at several different frequencies, usually from 500 to 6000 Hertz (Hz).

audiometer: An electroacoustical generator that provides pure tones of selected frequencies and of calibrated output, for the purposes of determining an individual's hearing threshold level at different frequencies. The output of the audiometer is the audiogram.

hearing protection: Devices which are designed to attenuate or reduce the transmission of ambient sound into the ear canal. Earmuffs fit over the entire ear and fit snug against the head. Ear plugs are inserted into the ear canal.

standard threshold shift: A change in hearing threshold, relative to the baseline audiogram, of an average of 10 dB(A) or more at 2000, 3000, 4000 and 6000 Hz in either ear.

decibel (dB): A nondimensional unit used to express sound levels. It is a logarithmic expression of the ratio of the sound pressure level to the reference level. In audiometry, a level of zero dB represents roughly the threshold of human hearing.

sound level meter: A device designed to provide real-time measurements of sound levels in dB.

noise dosimeter: A device designed to be worn by an individual to measure the accumulated sound exposure with regard to level and time.

5.0 PROCEDURES

5.1 HEARING CONSERVATION

In accordance with this program and OSHA requirements, GZA employees whose exposure to noise is at or above the action level of 85 dBA, 8 hr. TWA, be involved in a Hearing Conservation Program. The Hearing Conservation Program (HCP) must provide for exposure assessments, audiometric testing, hearing protection, and training as described in detail in Sections 5.1 through 5.5 of this document.

5.2 EXPOSURE ASSESSMENT

An exposure assessment (noise monitoring) is necessary to identify those employees who are exposed to noise at or above the action level for inclusion in the HCP and to enable the proper selection of hearing protection.

5.2.1 Monitoring Equipment

The required noise monitoring may be conducted using sound level meters for area monitoring and/or noise dosimeters for personal monitoring. However, where noise exposures are variable, area monitoring is inappropriate and personal monitoring (dosimetry) should be utilized.

To ensure calibration of monitoring equipment, dosimeters and sound level meters used to monitor employee noise exposure are to be calibrated before and after each day's use in accordance with the manufacturer's instructions.

5.2.2 Employee Notification of Monitoring

GZA employees included in the exposure assessment program are to be informed of the results of the monitoring within five days of the monitoring.

5.3 AUDIOMETRIC TESTING

Employees exposed to noise at or above the action level are required to participate in an audiometric testing program which provides for baseline and annual audiograms. Audiometric testing is included as part of the GZA Medical Surveillance Program.

Audiometric testing performed as part of the Medical Surveillance Program will be conducted in accordance with the requirements specified in 29 CFR 1910.95(h).

Within 6 months of an employee's first exposure to noise at or above the action level, GZA shall establish a baseline audiogram against which future audiograms can be compared. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise (or an individual may wear hearing protection during work practices to assist in meeting the 14-hour "noise free" requirement), to ensure accuracy and validity of baseline testing. Employees shall also be notified to avoid high levels of noise during this period.

At least annually after obtaining the baseline audiogram, GZA shall obtain a new audiogram for each employee exposed at or above an 8-hr. TWA of 85 dBA. Each employee's annual audiogram shall be compared to his/her baseline audiogram to determine if it is valid, and if a standard threshold shift (STS) has occurred.

5.3.1 Standard Threshold Shift Follow-up

If a comparison of the annual audiogram to the baseline indicates an STS, the employee shall be informed of this in writing within 21 days of the determination. If an STS has occurred, use of hearing protection shall be re-evaluated and/or refitted by the District Environmental Health and Safety Coordinator, and GZA's company physician shall be consulted to determine if a medical evaluation is recommended.

5.4 HEARING PROTECTION

Hearing protection devices shall be made available to all employees, at no cost to the employees, when employees' noise exposure is at or above 85 dBA, on an 8-hour time-weighted basis. For employees who are required to wear hearing protectors due to a specific elevated noise environment in which they work, hearing protectors must be evaluated and selected for the specific noise environment, taking into account the noise attenuation characteristics of the equipment (See Section 5.4.3)

5.4.1 Hearing Protection is to be Worn by Employees:

- whose noise exposure is at or above the permissible exposure level;
- whose noise exposure is at or above the action level and who have not yet had a baseline audiogram; or
- whose noise exposure is at or above the action level and who have experienced a standard threshold shift.

5.4.2 Rule of Thumb

In situations where excessive noise is encountered, an exposure assessment must be made. Wherever actual data from sound level meters or noise dosimeters is unavailable and it is necessary to raise one's voice above a normal conversational level to communicate with others within 3 to 5 feet away, hearing protection is to be worn.

5.4.3 Protective Devices

1. The proper selection of hearing protective devices (ear muffs, ear plugs, etc.) depends upon the noise reduction rating (NRR) of the hearing protective device and the actual noise levels encountered.
2. The following formula (29 CFR 1910.95 Mandatory Appendix B) must be used to determine the NRR needed:

(((dBA - 90) x 2) + 7) = minimal NRR.

As an example, if the exposure were recorded as 101 dB(A), the minimal NRR would be 29. This minimal NRR must be compared to the manufacturers listed NRR to assure that adequate protection is provided by the hearing protective devices selected.

5.5 TRAINING

Employees whose noise exposure is at or above the action level are to receive initial and annual training which includes information on:

- the effect of noise on hearing;
- the purpose of hearing protector;
- use, care and fitting procedures for hearing protection devices;
- the advantages, disadvantages, and attenuation of various types of hearing protectors;
- the purpose of audiometric testing and an explanation of the test procedures;
- updates regarding PPE, noise sources, work processes, etc.

6.0 RESPONSIBILITIES

1. The District Environmental Health and Safety Coordinators, with support/guidance from the Corporate Environmental Health and Safety Director, has the primary responsibility for:

- identifying employees within their area of responsibility who are to be included in the HCP through the implementation of a exposure assessment program as described in Section 5.2 of this document;
- conducting sufficient initial and ongoing noise monitoring within their area of responsibility so that all employees exposed above the action level are identified and included in the HCP, and
- implementing applicable sections of the HCP, based upon above considerations;
- maintaining accurate records of employee noise exposure measurements, and other records pertaining to training, hearing testing, etc.

7.0 PREPARED BY:

Prepared by Mark Malchik, Corporate Environmental Health & Safety Director.

OSHA OCCUPATIONAL NOISE EXPOSURE - HEARING PROTECTION

Determining the need to provide hearing protection for employees can be challenging. Employee exposure to excessive noise depends upon a number of factors, including:

- The loudness of the noise as measured in decibels (dB)
- The duration of each employee's exposure to the noise
- Whether employees move between work areas with different noise levels (decibel levels)
- Whether noise is generated from one or multiple sources

Generally, the louder the noise, the shorter the exposure time before hearing protection is required. For instance, employees may be exposed to a noise level of 90 dB for 8 hours per day (unless they experience a Standard Threshold Shift) before hearing protection is required. On the other hand, if the noise level reaches 115 dB hearing protection is required if the anticipated exposure exceeds 15 minutes. For a more detailed discussion of the requirements for a comprehensile hearing conservation program, see OSHA Publication 3074 (2002), "Hearing Conservation" or refer to the OSHA standard at 29 CFR 1910.95, Occupational Noise Exposure, section (c). The table, below, shows the permissible noise exposures that require hearing protection for employees exposed to occupational noise at specific decibel levels for specific time periods.

Noises are considered continuous if the interval between occurrences of the maximum noise level is one second or less. Noises not meeting this definition are considered impact or impulse noises (loud momentary explosions of sound) and exposures to this type of noise must not exceed 140 dB. Examples of situations or tools that may result in impact or impulse noises are powder-actuated nail guns, a punch press or drop hammers.

Permissible Noise Exposures

Duration per day, in hours	Sound level in dB* - Decibel level
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

*When measured on the A scale of a standard sound level meter at slow response. Source: 29 CFR 1910.95, Table G-16.

If engineering and work practice controls do not lower employee exposure to workplace noise to acceptable decibel levels, employees must wear appropriate hearing protection. It is important to understand that hearing protectors reduce only the amount of noise that gets through to the ears. The amount of this reduction is referred to as attenuation, which differs according to the type of hearing protection used and how well it fits. Hearing protectors worn by employees must reduce an employee's noise exposure to within the acceptable limits noted in the above table. Refer to Appendix B of 29 CFR1910.95, Occupational Noise Exposure, for detailed information on methods to estimate the attenuation effectiveness of hearing protectors based on the device's noise reduction rating (NRR). Manufacturers of hearing protection devices must display the device's NRR on the product packaging. If employees are exposed to occupational noise at or above 85 dB averaged over an eight-hour period, the employer is required to institute a hearing conservation program that includes regular testing of employees' hearing by qualified professionals. Refer to 29 CFR 1910.95(c) for adscription of the requirements for a hearing conservation program.

Some types of hearing protection include:

- **Single-use earplugs** are made of waxed cotton, foam, silicone rubber or fiberglass wool. They are self-forming and, when properly inserted, they work as well as most molded earplugs.
- **Pre-formed** or molded earplugs must be individually fitted by professional and can be disposable or reusable. Reusable plugs should be cleaned after each use.
- **Earmuffs** require a perfect seal around the ear. Glasses, facial hair, long hair or facial movements such as chewing may reduce the protective value of earmuffs.

Exposure to loud noise is the second most common cause of hearing loss. Approximately 30 million Americans are exposed to high intensity noise in their workplace in one in 4 of these workers (or 7.5 million Americans) a permanent hearing loss will develop. Much can be done to prevent noise-induced hearing loss but little can be done to reverse it. Sometimes a single exposure to loud noise is all that is needed, a single hunting trip without ear plugs. Loud noise damages the hair cells in the inner ear and can cause hearing loss, ear ringing and distortion of sounds.

The symptoms of noise induced hearing loss are subtle in the early stages. Hearing loss tends to occur first for high-pitched sounds only. Consequently, the volume of sound heard may be unchanged but the quality of it lessens. Speech may be heard but not completely understood. The presence of background noise can make speech hard to understand. Noise induced hearing loss has been reported to be accompanied by a ringing in the ears (tinnitus) in 23% of subjects (Phoon, 1993). Tinnitus can often be more annoying than the hearing loss itself. Treatment of tinnitus is often unsatisfactory. There has been an association between acoustic trauma (noise induced hearing loss) and Meniere's disease which has been reported in the a few research articles and text books.

Decibel Levels of Environmental Sounds

Source--Dangerous Level	**dBA SPL**
Produces Pain	120-140
Jet Aircraft During Takeoff (at 20 meters)	130
Snowmobile Tractor Without Cab	120
Rock Concert	110
Die Forging Hammer Gas Weed-Whacker Chain Saw Pneumatic Drill	100-105
Home Lawn Mowers	95 to 100 dB
Semi-trailers (at 20 meters)	90

Source--	**dBA SPL**
Discomfort Level	Above 80
Heavy Traffic	80
Automobile (at 20 meters)	70
Vacuum Cleaner	65
Conversational Speech (at 1 meter)	60
Quiet Business Office	50
Residential Area at Night	40
Whisper, Rustle of Leaves	20
Rustle of Leaves	10
Threshold of Audibility	0

Number:	Vol. 03 No. 3008
Date:	February 15, 2011
Supersedes:	
Approved:	Kenneth Johnston Vice President, Risk Management
Sponsoring Function:	Risk Management Department Environmental Health and Safety
Page:	1 of 5

HEAT-RELATED ILLNESS PREVENTION

TABLE OF CONTENTS

1.0 INTRODUCTION

Heat-related illness is a recognized occupational hazard and occurs when the body's natural defenses are overcome, resulting in a rise in temperature and possible heat-related illness. Very high body temperatures may damage the brain or other vital organs. Risk factors include hot temperatures, direct sunlight, high humidity, stagnant air (no breeze), and sustained strenuous activity. Other risk factors include age, physical condition, obesity, fever, dehydration, heart disease, poor circulation, sunburn, and prescription drug and alcohol use. Individuals with certain medical conditions, such as heart disease or high blood pressure, or individuals who take medications which require them to limit intake of fluids, may be at higher risk of heat-related illness and should consult their physician. This policy summarizes measures necessary to protect employees from heat-related illness.

2.0 DEFINITIONS

- **Dehydration,** occurs when the body loses water and electrolytes. This may be caused by various medical conditions (excessive vomiting, etc.) but is most commonly caused by strenuous work or exercise during hot weather and failure to replace fluids and take other heat stress precautionary measures. Warning signs of dehydration are:
  - Dryness or a sticky feeling in the mouth.
  - Urine that is a dark yellow color; less frequent urinating.
  - Inability to produce tears.
  - Eyes that appear sunken.
  - Feeling tired or having no energy.
  - Loss of elasticity of the skin (pinched doesn't immediately spring back to shape).

  To prevent dehydration, and other heat-related illnesses, drink plenty of fluids (sports drinks with electrolytes are best), and take heat stress precautions (frequent breaks, stay out of sun, avoid strenuous activities in the heat of the day, etc.)
- **Sunburn** is a burn to living tissue, such as skin, which is produced by overexposure to ultraviolet (UV) radiation, commonly from the sun's rays. Precautionary measures include minimizing exposure to sun, wear protective clothing and use sunscreen on exposed skin. Photokeratitis (or ultraviolet keratitis) is a painful eye condition caused by exposure of insufficiently protected eyes to UV rays. Symptoms include increased tears, a feeling of gritty pain in the eyes (like sand in the eyes).
- **Heat rash** (prickly heat), occurs when the skin's sweat ducts become blocked or swell, and cause discomfort and itching.
- **Heat cramps, swelling –** cramps may occur in muscles after exercise due to loss of water, salt, and minerals (electrolytes). Swelling in the legs and hands can occur when you sit or stand for a long time in a hot environment.
- **Heat syncope** (fainting), which occurs from low blood pressure when heat causes the blood vessels to expand (dilate) and body fluids move into the legs because of gravity.
- **Heat exhaustion** (heat prostration), which generally develops when a person is working or exercising in hot weather and does not drink enough liquids to replace those lost liquids. Heat exhaustion occurs when a person becomes dehydrated, and cannot sweat enough to cool the body. Symptoms of heat exhaustion include fatigue, hyperventilation, weakness, headache, dizziness/fainting, nausea, skin is pale, cool, and moist. Mild cases of heat exhaustion usually do not require medical treatment (unless there are medical complications). Moderate to severe heat exhaustion can sometimes lead to heatstroke, which requires emergency treatment.
- **Heatstroke** (sunstroke), which occurs when the body fails to regulate its own temperature and body temperature continues to rise, often to 105° F (40.6° C) or higher. **Heatstroke is a medical emergency. Even with immediate treatment, it can be life-threatening or cause serious long-term health effects.** Symptoms of heatstroke include:
  - Unconsciousness for longer than a few seconds.

- Confusion, severe restlessness, or anxiety.
- Convulsion (seizure).
- Symptoms of moderate to severe difficulty breathing.
- Fast heart rate.
- Profuse sweating (earlier symptom), or stopped sweating (later symptom).
- Skin that may be red, hot, and dry, even in the armpits.

3.0 HEAT STRESS PREVENTION

1. **Drink Plenty of Fluids** - Employees shall have access to potable drinking water. Where it is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift. During hot weather, employees will need to increase fluid intake regardless of their activity level. During strenuous activity in a hot environment, drink two to four glasses (16-32 ounces) of cool fluids each hour. Skip the coffee and caffeinated soft drinks – caffeine will dehydrate you faster. Sports drinks and lightly salted foods will help to replace lost salt and electrolytes. (If you are on a low salt diet, consult with your physician.)
2. **Frequent Breaks in the Shade** - Take frequent breaks out of the sun's heat! Establish work-rest cycles (short and frequent are more beneficial than long and seldom). Identify a cool, shaded area for breaks. If there are no shady areas, bring a shade tent to the worksite, or take breaks inside an air-conditioned building or your vehicle. At or below 85 degrees Fahrenheit the employee shall have timely access to shaded areas for breaks. For temperatures at or above 85 degrees Fahrenheit, one or more areas with shade shall be provided at all times while employees are present.
3. **At temperatures above 95 degrees Fahrenheit** – Ensure effective means of communication (by voice or electronically) with all employees are in place; supervisory personnel shall make periodic observations of employees for alertness and signs/symptoms of heat illness; supervisory personnel shall remind employees to drink water throughout the shift;
4. **Work Pace and Schedule** – If workers are not accustomed to working or exercising in a hot environment, start slowly and pick up the pace gradually. Save the most strenuous tasks for early morning or early evening
5. **Acclimatization** - Individuals not accustomed to hot environments may need one to two weeks to become acclimatized. New employees shall be closely supervised and monitored by their supervisors for the first two weeks of working in a hot environment.
6. **Proper Clothing** - Wear light weight, light colored, loose fitting clothing. Cover your head in direct sun…wear your hard hat (or at least wear a hat, if appropriate).
7. **Sun Screen** - Apply sun screen to exposed skin…use products with SPF 15 or higher (the most effective products say "broad spectrum" or "UVA/UVB protection" on their labels).
8. **Eye Protection –** wear sun glasses or tinted safety glasses when outdoors in direct sunlight for extended periods.
9. **Monitor Coworkers** - Monitor the condition of your co-workers and have someone do the same for you. Look for symptoms such as abnormal coloring (flushed or pale), confusion, lightheadedness (unsteady on their feet), heavy breathing, etc.

4.0 EMERGENCY PREPAREDNESS AND RESPONSE

4.1 HEAT EXHAUSTION

Cases of heat exhaustion (see above) require prompt action to prevent serious illness. Administer cool beverages (nonalcoholic/non-caffeinated) to the victim, discontinue work activities and rest in the shade or air conditioned environment, and instruct the victim to take a cool shower/splash water, wear lightweight clothing. Continue these efforts until symptoms subside. Alter work activities as needed. ***If symptoms of heat exhaustion are severe, seek immediate medical attention.***

4.2 HEAT STROKE

Heat Stroke is a Medical Emergency! If you see any of the signs of heat stroke, immediately call for medical assistance and begin cooling the victim:

- Get the victim to a shady area, or preferably to an air-conditioned environment.
- Cool the victim rapidly using whatever methods you can. For example, immerse the victim in a tub of cool water; place the person in a cool shower; spray the victim with cool water from a garden hose; sponge the person with cool water; or if the humidity is low, wrap the victim in a cool, wet sheet and fan him or her vigorously.
- If emergency medical personnel are delayed, call the hospital emergency room for further instructions.
- Do not give the victim fluids to drink.
- Sometimes a victim's muscles will begin to twitch uncontrollably as a result of heat stroke. If this happens, keep the victim from injuring himself, but do not place any object in the mouth and do not give fluids. If there is vomiting, make sure the airway remains open by turning the victim on his or her side.

5.0 TRAINING

5.1 GENERAL TRAINING

GZA employees who may be exposed to the hazards of heat-induced illness shall receive training on the company's heat illness prevention procedures. Training shall include:

- The environmental and personal risk factors for heat illness;
- Company procedures for complying with the requirements of this standard;
- The importance of frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties;
- The importance of acclimatization;
- The different types of heat illness and the common signs and symptoms of heat illness;
- The importance to employees of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers;

- Company procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary;
- Company procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider;
- Company procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders

5.2 SUPERVISOR TRAINING

Prior to supervision of employees working in the heat, supervisors will be trained in heat-related illness. Training should include:

- Review of the company's procedures for heat illness prevention, and procedures the supervisor is to follow to implement the applicable procedures to prevent heat illness;
- Procedures to be followed when an employee exhibits symptoms of heat illness;
- Emergency response procedures for heat related illness.

6.0 PREPARED BY

This document was prepared by Mark Malchik, Corporate Environmental Health and Safety Director. Please direct questions to the Risk Management Department.

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EMERGENCY PREPAREDNESS, EMERGENCY ACTION AND FIRE PREVENTION PROGRAM

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1.0 INTRODUCTION

The GZA GeoEnvironmental, Inc. ("GZA") Emergency Preparedness and Response Program addresses regulatory requirements per the Occupational Safety and Health Administration (OSHA) and industry consensus standards, and also provides general guidance on procedures to identify, prepare for, and respond to forseeable emergencies which may be encountered by GZA employees in the normal course of employment. This program, or portions thereof, applies to all GZA operating groups, and all facilities (to the extent applicable) owned or operated by GZA, including GZA offices, GZA storage/annex facilities, laboratories, project facilities (jobsite trailers, remediation system facilities, etc.), and jobsites. This Policy, as well as Emergency Action/Fire Prevention Plans prepared in GZA offices and facilities, shall be available for all employees to review by posting on the GZA Intranet.

2.0 EMERGENCY ACTION/EVACUATION/ FIRE PREVENTION PLANS

This section establishes emergency action, evacuation and fire prevention procedures to be used at GZA GeoEnvironmental, Inc. (GZA) facilities and jobsites, including GZA offices and associated facilities, and jobsite facilities and jobsites in accordance with the United States Occupational Safety and Health Administration's (OSHA's) Emergency Action Plan (29 CFR 1910.38), Fire Prevention Plan (29 CFR 1910.39) regulations. The minimum requirements of these regulations, include:

- Procedures for reporting a fire or other emergency;
- Emergency evacuation procedures (including types of evacuation, emergency signal/alarm, exit route assignments, accounting for employees after evacuation);
- Procedures for employees who perform rescue or medical duties, or who remain to operate critical plant operations before they evacuate;

- A list of major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard;
- Procedures to control accumulations of flammable and combustible waste materials;
- Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials;
- The name(s) or job title of employee(s) who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan, and of those responsible for the control of fuel source hazards and for maintaining equipment to prevent or control sources of ignition or fires.

The applicability of many of the elements of this program to specific facilities and/or jobsites will necessarily be determined on a facility- or project-specific basis in accordance with project-specific factors based on various factors including, applicability of regulatory requirements, contractual requirements, and nature and size of the jobsite, project duration, and the nature and severity of associated hazards.

2.1 GZA OFFICES AND FACILITIES

An Emergency Action/Evacuation/Fire Prevention Plan (also referred to as an "Emergency Action Plan," or "the Plan") shall be prepared for each GZA office and associated facility (annex, storage facility, etc.) in accordance with the above-referenced OSHA regulations. This plan shall be in writing, be kept in the work place in either hardcopy or electronic form, and readily available for employees to review, and at a minimum, shall contain the information discussed in the following sections:

2.1.1 Emergency Contacts and Reporting

Emergency contact information for reporting a fire, medical emergency, security incidents, chemical spill, or other emergencies shall be included in the Emergency Action Plan. This information shall include the identities, addresses, phone numbers, business contact information, and other relevant information for designated local emergency response organizations, as well as appropriate local, state and federal regulatory agency contact and reporting information. Contact information shall also include the names and contact information of key GZA management personnel (Office Manager, etc.) as well as individuals who have been assigned emergency preparedness or response duties (such as medical first responders, evacuation facilitators, fire extinguisher periodic checks, etc.).

The name or job title of employees who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan shall be included as well (such as the EHS Coordinator, or other designated individual).

Contact information shall also include, as applicable, the name or job title of employees responsible for maintaining equipment to prevent or control identified sources of ignition, fuel source hazards, including the EHS Coordinator, or other designated person with specific responsibilities related to specific fuel source hazards.

The contact information shall also include GZA's Company Physician or Medical Advisor, as well as contact information for the local medical clinic used by each office for medical monitoring and consultation, as well as the name, address and a map and directions to nearest hospital(s).

Procedures for reporting a fire or other emergency shall be specified in the Plan developed for each office. For imminent emergencies (medical, fire, chemical spill, security, etc.), all employees are encouraged to use their best judgment whether to directly summon outside responders (via 911), or to first consult with the local EHS Coordinator, designated first responders (as applicable), or management personnel. But, in the interest of life safety, all employees are encouraged to immediately contact outside responders if they see fit, without confirmation from other individuals. For lesser, non-critical emergencies, each Plan shall provide instructions pertaining to contacting in-house personnel who have designated responsibilities related to emergency response (for example in the case of minor injury, incidental chemical spill, incipient stage fire, or potential security incident).

2.1.2 Communication, Means of Alerting

The most simple and effective emergency communication system in most situations will be direct verbal communications. In offices and other indoor work places, verbal communication will likely be enhanced by an internal intercom system allowing communication to all occupants simultaneously during an emergency. In some GZA offices and facilities, unique verbal codes may be selected to facilitate prompt response actions from internal first responders (for example, verbal codes such as "code blue" or "code red" may be used to notify responders of different types of emergencies).

In each GZA office, an emergency alarm system shall be maintained, including periodic functional checks, in accordance with 29 CFR 1910.165 and applicable local codes. In most cases, it is anticipated that this will be accomplished by the facility owner (other than GZA), unless otherwise stated in the terms of lease, or unless GZA is the building owner.

2.1.3 Procedures for Emergency Evacuation and Response

The Emergency Action Plan shall delineate evacuation and exit route assignments, including designated evacuation assembly locations, which shall also be posted in appropriate strategic locations in the facility. Evacuation assembly locations shall be designated in locations away from major traffic route hazards, shall not interfere with emergency responders, and shall be accessible year round. Evacuation routes shall be determined based on analysis of the site-specific operations, site or facility configuration, number of individuals present, distance to places of refuge, and other factors. Often, routes for emergency egress are different from the route many individuals use for routine access to the facility, and employees must be apprised of the emergency routes in advance of an emergency,

The Plan shall state facility-specific requirements for ensuring that evacuation routes remain clear and unobstructed, and the requirement that all evacuation exits remain unlocked from the inside.

The Plan shall state the requirement that during an emergency evacuation drill or legitimate emergency evacuation, no individual shall remain in the building, except for the possible use of a "place of refuge" by mobility-restricted individuals. The Plan shall also state that following an emergency evacuation, no employee shall re-enter the facility until cleared for re-entry by the on scene emergency commander, or evacuation drill coordinator. The Plan shall specify procedures for accounting for employees after evacuation to ensure all employees have safely exited the building.

Prompt transportation of victims to a physician or hospital from GZA offices and related facilities in the case of critical or potential critical injuries or illness will be provided by local ambulance. For minor injuries, procedures for an authorized coworker to transport the victim shall be specified.

2.1.4 Designation of Special Employee Responsibilities

The Emergency Action Plan shall identify any employees who have been designated to assist in a safe and orderly evacuation of other employees. The number of such individuals and the nature of their assigned responsibilities will be based on facility specific factors. These responsibilities generally include directing employees to proper exit locations, or assisting with the evacuation of handicapped individuals (individuals with temporary or permanent impairment of hearing, vision or mobility). Individuals who have been designated as medical first responders shall also be identified in the Plan.

The Plan shall identify critical facility operations and employees who have been designated to remain in the building and conduct critical operations before they evacuate. It is anticipated that very few if any GZA facilities will require designated employees to remain to operate critical operations, although this determination shall be made on a case-by-case basis. In most GZA operations, whether on jobsites or in fixed offices and other facilities, all equipment and operations are required to cease in accordance with the established emergency alarm or alternate emergency signal procedure, and occupants immediately evacuate. The only exceptions to this rule will be as follows: 1) Certain individuals may be assigned to function as "evacuation facilitators" or "fire marshals" who will be responsible for remaining in a facility to direct occupants during an evacuation and otherwise assist in the process, and 2) in certain situations in which immediate stoppage of a piece of equipment,

process or employee activity could jeopardize the health and safety of personnel, task completion activities may be necessary prior to evacuation.

2.1.5 Emergency Equipment

The Emergency Action Plan shall include a listing of all emergency response equipment present and available for emergency use in each facility, including:

- the locations and types of fire extinguishers;
- first aid kits
- automatic external defibrillators (AEDs);
- fire alarm pull stations and control panel;
- emergency eyewash stations and emergency showers.

The Plan shall identify locations in your facility as risk of blockage of emergency response equipment (such as locations where shelving is in close proximity to sprinkler heads, or where materials are stored near pull stations or fire extinguishers). The Plan shall delineate measures to be implemented for periodic safety checks, maintenance and inspection of emergency equipment, as well as training, licensing, certification, and other requirements that may be specific to a geographic location.

2.1.6 Overview of Major Fire Hazards and Control Procedures

The written Emergency Action Plan shall contain a list of major fire hazards present in the facility, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard. Typical materials and concerns associated with GZA offices will include accumulations of ordinary combustibles (paper, etc.), flammable and combustible liquids, portable heaters, heat-producing kitchen appliances (toaster ovens, etc.), excess use of extension cords, heat or arc producing tools and equipment (propane torch, soldering iron, batteries, etc.), and similar equipment. The Plan shall delineate procedures to control accumulations of flammable and combustible waste materials, including trash, paper, housekeeping needs, and procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials.

2.2 JOB SITE FACILITIES AND JOB SITES

In accordance with GZA's policy requiring a Site-Specific Health and Safety Plan or Program (HASP) for each jobsite where fieldwork is conducted by GZA, an Emergency Plan shall be included in the HASP. The minimum elements of an Emergency Plan, particularly appropriate for small scale short duration jobsites, shall include:

- Emergency contact information (usually 911) for police, fire and ambulance, and appropriate job specific emergency contact information;
- Name, address and route to the nearest hospital;
- Project-specific/client-required emergency contacts or procedures, and
- Identification of unique project-specific emergency hazards and associated precautionary and response procedures.

The scope and nature of an Emergency Plan will be based on many project-specific factors such as nature of the jobsite, work scope, personnel, regulatory, and contractual factors, as well as practical, logistical considerations such as project duration, number of employees, etc. The Emergency Plan shall be a separate section of the site safety and health plan, or under separate cover, and shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies. For high risk or high profile field work (a site with unique recognized emergency risks, Superfund sites, work requiring air-supplied respirators, sites subject to government agency oversight, and other uniquely-regulated or high hazard jobsites), the emergency preparedness and response component of the HASP shall include elements required per contract terms, agency requirements, regulatory requirements, and general standard of care.

For projects involving activities regulated by the OSHA Permit-Required Confined Space Entry regulation (29 CFR 1910.146), provisions for rescue services shall be addressed in the Site Specific Health and Safety Plan/Confined Space Entry Permit. For projects regulated by the OSHA Hazardous Waste Operations and Emergency Response regulation (29 CFR 1910.120).120(1), at a minimum, an OSHA Emergency Action Plan (29 CFR 1910.38), outlined in Section 2.0 of this program shall be prepared. Where the potential exists for an emergency release of hazardous waste or other hazardous chemical substances, an emergency response plan shall be developed for the site or facility, in accordance with provisions of 29 CFR 1910.120(l).

2.2.1 Emergency Contacts and Reporting

Emergency contact information for reporting a fire, medical emergency, security incidents, chemical spill, or other emergencies shall be included in the Emergency Plan. While for most small scale short duration projects, listing "911" for emergency contact may be sufficient, but depending on various project specific factors, additional information including the identities, addresses, phone numbers, business contact information, and other relevant information for designated local emergency response organizations, as well as appropriate local, state and federal regulatory agency contact and reporting information may be appropriate. Contact information provided in the HASP shall also include the names and contact information of key project personnel, GZA management personnel (Office Manager, etc.), as well as the EHS Coordinator, EHS Director and other appropriate individuals.

As appropriate, contact information may also include, the name(s), job title(s) and contact information of GZA or Client employees responsible for special emergency preparedness and/or response functions (such as first aid/CPR, controlling or monitoring fuel source hazards, implementing control measures, etc). Appropriate contact information may also include GZA's Company Physician or Medical Advisor, as well as contact information for the local medical clinic used by each office for medical monitoring and consultation, as well as the name, address and a map and directions to nearest hospital(s).

2.2.2 Communications, Means of Alerting

On all jobsites, the availability of a cell phone signal shall be evaluated (usually at the time of first mobilization on site), and appropriate provisions addressed for summoning emergency services.

An emergency communication system must be in effect at all work site locations. Verbal communication will likely be the primary means of emergency communication on jobsites. However, on some jobsites, enhanced means of verbal communication may be necessary (using two way radio, cell phone, loudspeaker system, etc.) when voices may not be clearly heard above ambient noise levels (such as from operating heavy equipment), or if line of sight contact with co-workers is obstructed by site terrain, distance or other obstructions. In some client facilities and jobsites, unique emergency alarm signals or verbal codes may be in effect (for example an alarm signal for a chemical spill may be different from that for a fire, or verbal codes such as "code blue" or "code red" may be used for different types of emergencies). Such information shall be included in GZA's emergency response plan for the project.

Where two way radios are used for on-site communications and emergency alerting, all site personnel should be within hailing distance of the radios. The effect of two-way radio broadcast frequencies on other equipment and operations on-site must be carefully considered. Radios can interfere with remote control signals, detonation devices, and instrument readings.

When verbal or radio communication is ineffective, other means of initiating an emergency response shall be considered, such as hand-held portable air horns. A typical warning signal system is provided below:

- One Horn Blast: General Warning - One horn blast is used to signal relatively minor, yet important events on-site. An example of this type of event would be a minor chemical spill where there is no immediate danger to life or health, yet personnel working on-site should be aware of the situation so unnecessary problems can be avoided. If one horn blast is sounded, personnel must stop all activity and equipment on the site and await further instructions from the on-site project manager (PM), site health and safety officer (SHSO), or designated alternates.

- Two Horn Blasts: Medical Emergency - Two horn blasts are used to signal a medical emergency where immediate first aid or emergency medical care is required. If two horn blasts are sounded, all first aid and/or CPR-trained personnel should respond as appropriate, all other activity and equipment should stop, and personnel should await further instructions from the on-site PM, SHSO, or designated alternates.
- Three Horn Blasts Followed by One Continuous Blast: Immediate Danger to Life or Health - Three horn blasts followed by another extended or continuous horn blast signals a situation which could present an immediate danger to the life or health (IDLH) of on-site personnel. Examples of possible IDLH situations include fires, explosions, hazardous chemical spills or releases, hurricanes, tornadoes, blizzards, and floods. If three horn blasts followed by a continuous blast are sounded, all activity and equipment must stop, all personnel must evacuate the site to an appropriately designated site located either outside the CRZ or off-site. (NOTE: Unless otherwise specified, decontamination procedures should be limited to the rapid removal of gross contamination only.) All personnel must be accounted for by the PM, SHSO, or designated alternate, and other response actions determined by the PM, SHSO, or designated alternate must be observed.

2.2.3 Procedures for Emergency Evacuation and Response

On many small scale short duration jobsites, no special evacuation routes or procedures are necessary, based on apparent factors of small project area and minimal emergency risks. However, as part of the site specific hazard analysis required for each jobsite, the need for more elaborate procedures may become evident, based on severity of potential hazards and other site- or client-specific factors. On many jobsites and jobsite facilities (such as multi-employer sites, or temporary project facilities) emergency contact information including contact numbers, maps or diagrams of emergency escape routes shall be posted in appropriate locations.

On most GZA job sites, all equipment and operations are required to cease in accordance with the established emergency alarm or alternate emergency signal procedure, and occupants shall immediately evacuate. The only exceptions to this rule will be as follows: 1) Certain individuals may be assigned to function as "evacuation facilitators" who will be responsible for direct employees during an evacuation and otherwise assist in the process, and 2) in certain situations in which immediate stoppage of a piece of equipment or employee activity could jeopardize the health and safety of personnel, task completion activities may be necessary prior to evacuation.

A designated person shall be responsible for identifying all GZA personnel on-site at all times. On small, short duration jobs this can be done informally as long as accurate accounting is possible. Where informal accounting is unreliable, particularly on larger work sites and on multi-employer sites ,other procedures such as a sign-in/sign-out log must be maintained, or alternate procedures employed to account for all employees after an evacuation.

Prompt transportation of victims to a physician or hospital from a GZA job site and related job site facilities in the case of critical or potential critical injuries or illness will generally be provided by local ambulance if readily available. From job sites remote from emergency services, or for minor injuries, provisions shall be provided for alternate transportation to a hospital by a co-worker. Where job sites are located in a location inaccessible by vehicle, provisions and appropriate equipment shall be provided to transport the victim to a hospital (for example, a transport boat shall be available when working on a barge or an island).

2.2.4 Designation of Special Employee Responsibilities

Prior to initiation work at the site, a GZA field team member, usually the SHSO, must be appointed to activate emergency response actions. In the event an injury or illness requires more than first aid treatment, that individual will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined.

The individuals primarily responsible for coordinating all emergency response activities are the on-site PM and/or the SHSO. All personnel on site are responsible for compliance.

In remote jobsite locations, an assessment shall be made regarding the proximity and availability of emergency responders, and specific procedures delineated in the HASP. In such locations, jobsite employees may be designated to drive an injured person to a medical facility.

2.2.5 Emergency Equipment

Emergency equipment for each project shall be selected based on the site-specific hazard analysis conducted for preparation of a HASP, and shall be identified in the HASP. Special emergency equipment may include fire extinguishers, self-contained breathing apparatus, first aid kits, portable eyewash equipment, flotation vests and flotation "throw ring," special provisions (food, water, medical., etc.) for working in remote locations, and other equipment as may be deemed appropriate.

2.2.6 Overview of Major Hazards and Control Procedures

As may be appropriate for the job site, the HASP shall contain a list of major fire hazards present at the site, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard. Typical materials and concerns associated with GZA jobsites will include general housekeeping procedures, flammable and combustible liquid storage, use of portable heaters, use of heat- or arc-producing tools and equipment (propane torch, welding, etc.), and similar equipment. The Plan shall delineate procedures to control accumulations of flammable and combustible waste materials, including trash, paper, housekeeping needs, and procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials.

Unique medical emergencies (such as potential for drowning, or for venomous snake bites, or similar unique hazard) shall be addressed in the emergency response component of the HASP.

2.3 EVACUATION OF MOBILITY-IMPAIRED EMPLOYEES

For individuals with disabilities, the basic evacuation options should be considered in developing facility-specific procedures for their evacuation. Where mobility-impaired individuals need only evacuate "horizontally" on their existing ground level floor to an evacuation exit location, minimal assistance will be needed. However where "vertical" movement from an upper floor is necessary, the following options must be considered in developing an evacuation plan for individuals who will be unable to use a stairway (individuals with wheelchairs, crutches, etc.):

- Stay-in-Place: Unless danger is imminent, a mobility-impaired individual may remain in a room with an exterior window, a telephone, and a solid or fire resistant door. With this approach, the person may keep in contact with public safety officials and designated emergency coordinators, who will then implement pre-planned procedures for evacuation. Phone lines are expected to remain in service during most building emergencies. If the phone lines fail, the individual can signal from the window by waving a cloth or other visible object. The Stay in Place approach may be more appropriate for sprinkler protected buildings or buildings where an "area of refuge" is not nearby or available. It may also be more appropriate for an occupant who is alone when the alarm sounds. A "solid" or fire resistant door can be identified by a fire label on the jam and frame. Non-labeled 1 3/4 inch thick solid core wood doors hung on a metal frame also offer good fire resistance.
- Area of Refuge: With an evacuation assistant, going to an area of refuge away from obvious danger. The evacuation assistant will then go to the building evacuation assembly point and notify the onsite emergency personnel of the location of the person with a disability. Emergency personnel will determine if further evacuation is necessary. Usually, the safest areas of refuge are pressurized stair enclosures common to high–rise buildings, and open-air exit balconies. If a stair landing is considered as the area of refuge, note that many facilities have relatively small stair landings, and may necessitate that wheelchair users wait until the heavy traffic has passed before entering the stairway during an emergency. Other possible areas of refuge include: fire rated corridors or vestibules adjacent to exit stairs and pressurized elevator lobbies. Many facilities feature fire rated corridor construction that may offer safe refuge. Taking a position in a rated corridor next to the stair is a good

alternative to a small stair landing crowded with the other building occupants using the stairway. For false or needless alarms or an isolated and contained fire, a person with a disability may not have to evacuate. The decision to evacuate will be made by either the designated emergency coordinator or local fire officials.

Evacuation guidelines for various types of mobility impairments are provided below:

- Mobility Impaired - Wheelchair: Persons using wheelchairs should stay in place, or move to an area of refuge with their assistant when the alarm sounds. The evacuation assistant should then proceed to the evacuation assembly point outside the building and tell the local fire department on-scene commander the location of the person with a disability. If the person with a disability is alone, he/she should phone 911 and communicate their present location and the area of refuge they are headed to. Stairway evacuation of wheelchair users should be conducted by trained professionals. Only in situations of extreme danger should untrained people attempt to evacuate wheelchair users.
- Mobility Impaired - Non Wheelchair: Persons with mobility impairments, who are able to walk independently, may be able to negotiate stairs in an emergency with minor assistance. If danger is imminent, the individual should wait until the heavy traffic has cleared before attempting the stairs. If there is no immediate danger (detectable smoke, fire, or unusual odor), the person with a disability may choose to stay in the building, using the other options, until the emergency personnel arrive and determine if evacuation is necessary.
- Hearing Impaired: Persons with hearing impairments may not hear audio emergency alarms nor see fire alarm strobe lights and will need to be alerted of emergency situations. Emergency instructions can be given by writing a short explicit note to evacuate.
- Visually Impaired: Most people with a visual impairment will be familiar with their immediate surroundings and frequently traveled routes. Since the emergency evacuation route is likely different from the commonly traveled route, persons who are visually impaired may need assistance in evacuating. The assistant should offer their elbow to the individual with a visual impairment and guide him or her through the evacuation route. During the evacuation the assistant should communicate as necessary to assure safe evacuation.

3.0 EMERGENCY EQUIPMENT

3.1 FIRST AID KITS

GZA personnel must be provided with appropriate First Aid Kits for their workplace. First aid kits shall be available and maintained in GZA facilities, including offices, laboratory, annex/storage facilities, jobsite facilities (trailers, remediation system facilities, etc.), and GZA company vehicles. The locations of first aid kits and AEDs must be posted and communicated to all employees in offices and on job sites so that first aid can be provided promptly when needed. The size and contents of first aid kits shall be determined directly or indirectly (through a vendor) by qualified health care personnel. First aid kits shall be periodically inventoried and maintained by designated responsible individuals (project staff, Site Health and Safety Officer, EHS Coordinator, vendor, designated responsible party, as appropriate).

3.2 AUTOMATIC EXTERNAL DEFIBRILATORS

Automatic external defibrillators (AEDs) are maintained in GZA offices. EHS Coordinators, or other designated individuals, under the guidance of the EHS Director, shall maintain the device(s) in accordance with manufacture's requirements (pertaining to periodic replacement of batteries, pads, etc.), as well as other local, state and federal requirements pertaining to medical oversight and direction, training certifications, ongoing documented maintenance, state/local agency notification, written policies, prescription to purchase and AED (per the U.S. Food and Drug Administration requirements), and physician oversight of the AED program. Required AED maintenance may vary by manufacturer, depending largely upon the level of self-tests the device

automatically performs. In each GZA office where an AED is maintained, a schedule of routine inspections, at a minimum frequency of monthly, shall be conducted to ensure that the AED is present, in working order, pads and batteries are unexpired, and all accessories are present.

3.3 EMERGENCY EYEWASH AND SHOWER EQUIPMENT

Appropriate emergency eyewash and/or shower equipment shall be provided in GZA laboratory facilities and other jobsite facilities where serious employee splash exposure to corrosive/irritant materials is possible. Designated responsible individuals shall conduct regular (weekly) inspections of emergency eyewash and shower units, and where deficiencies in the function of the device is noted, ensure that repairs are conducted promptly.

Where permanently installed eyewash and/or shower stations are deemed appropriate and installed in GZA facilities, they shal be in accordance with OSHA requirements, and in consideration of more detailed non-regulatory consensus standard ANSI Z358.1/2004. OSHA has not adopted the ANSI standard by reference, but in letters of interpretation suggests that workplaces make their own appropriate decisions using the ANSI Standard as a guideline. Many workplaces adopt the ANSI standard verbatim as the current "standard of care". Key elements of the ANSI Standard include:

- Eyewash may be plumbed or self-contained, but should deliver 1.5 liters per minute for 15 minutes.
- Reachable within 10 seconds (approximately 50 feet)
- Path of travel free from obstructions
- Use tepid water (60 to 100 deg.F)
- Inspected periodically (weekly flow checks for plumbed systems, with more thorough evaluation annually)
- Self-contained unit replenished in accordance with manufacturers recommendations

Note that small portable squeeze-type eyewash bottles do not meet requirements in situations where an eyewash is required (due to the presence and use of caustics, acids, corrosives, etc.); they are only considered an interim measure. For example, at a work station from which a worker may need to travel 30 feet to a plumbed eyewash station, a squeeze bottle eyewash may be placed for initial immediate use while proceeding to the plumbed eyewash station. Further, in situations where minor hazards are not sufficient so as to require installation of an eyewash station capable of providing at least 15 minutes of flow, portable eyewash squeeze bottles would be deemed acceptable, for example on many GZA jobsites where the nature of the site contaminants, hazardous materials, or conditions of use do not represent a significant splash/injury hazard. The need for, and suitability of various types of eyewash and shower system shall be evaluated on a case-by-case basis as part of the site specific health and safety planning process.

3.4 FIRE EXTINGUISHERS

GZA makes fire extinguishers available for use in most offices, laboratories and facilities, including jobsite trailers, remediation system facilities, and similar facilities operated by GZA. They are also available in GZA-owned vehicles. In most cases, standard ABC type extinguisher is used. Where fire extinguishers are selected for specific hazard application, the appropriate type extinguisher shall be selected in accordance with standard guidelines. The use of fire extinguishers by GZA employees is on a strictly voluntary basis, and only for the purpose of fire fighting of incipient fires. An incipient fire is a small fire still contained within its point of origin (e.g. a trash can fire) and has not yet spread to adjacent combustible materials.

Where extinguishers are made available for general use in a facility, the number and distribution of extinguishers shall be in accordance with applicable fire protection/life safety codes. The locations of extinguishers in facilities shall also be clearly marked with appropriate placards, signs, etc.

In GZA locations where fire extinguishers are made available for employee use, GZA shall implement a training program to familiarize employees with the general principles of fire extinguisher use for the purpose voluntary

firefighting of incipient fires. Initial training shall be provided as part of New Employee Safety Orientation, and presented annually thereafter.

Fire extinguishers shall be checked annually by a qualified person (typically a vendor) for appropriate maintenance purposes. On a monthly basis, the District EHS Coordinator or designated individual shall perform a monthly check to ensure that the extinguishers are present in their designated locations, readily accessible for emergency use (not blocked), and still fully charged.

3.5 ALARM AND SPRINKLER SYSTEMS, EMERGENCY LIGHTING

Fire & smoke alarms, sprinkler systems and emergency lighting systems, and exit signs are maintained in each of GZA's offices on a periodic basis (annually) in accordance with applicable regulations. This function is typically carried out by the facility owner, and not by GZA, unless GZA is the facility owner, or where GZA has assumed this responsibility under the terms of lease.

GZA personnel shall ensure that appropriate clearance distances are maintained around all such emergency equipment, in order to provide ready access in case of an emergency, and to ensure un-restricted emergency lighting pattern and sprinkler spray patterns in case of a fire. Boxes and other materials shall not be stacked any closer than eighteen inches below a sprinkler head.

3.6 EMERGENCY SPILL EQUIPMENT

In GZA-operated facilities (offices, storage facilities, remediation system facilities and other temporary jobsite facilities), where chemical substances are used and/or stored, provisions shall be made in the appropriate plan or program (HASP, Emergency Action Plan, Emergency Plan, etc.) to have necessary equipment on hand in case of a release of chemical substance, including absorbent materials and pads, secondary containment, neutralizing agent, personal protective equipment, and related equipment. Note that only certain GZA personnel who are qualified to respond to incidental spills (per Hazard Communication training) are allowed to clean up such spills. In the case of an emergency release of chemical substance, no GZA employees are qualified as emergency spill responders, and must therefore respond to the release by notifying the appropriate spill response contractor, as well as required regulatory notifications. Procedures for responding to hazardous material incidental spills and emergency spills are delineated in related GZA Policies 03-2002 (Hazard Communication Program), and 03-2003 (Hazardous Material Safety and Emergency Response Program).

4.0 MAILROOM EMERGENCY PREPAREDNESS

With the advent of concerns related to potential hazards associated with the receipt and handling of packages in our facilities, this section provides guidelines for the safety and protection of GZA employees engaged in these activities.

4.1 GENERAL PRECAUTIONS FOR SAFE MAIL HANDLING

- Be on the lookout for suspicious letters or packages (see below).
- Do not eat, drink, or smoke when handling or processing mail. You may inadvertently transfer contaminants to your mouth, nose, or eyes.
- Wash your hands with warm soap and water before and after handling the mail.
- Consider wearing disposable gloves when you handle incoming mail. Disposable gloves made of light-weight nitrile or vinyl protect hands from contact with potentially contaminated dusts without compromising dexterity. A thin cotton glove can be worn inside a disposable glove to protect against dermatitis, which can

occur from prolonged exposure of the skin to moisture in gloves caused by perspiration. (Dermatitis can cause breaks in the skin.)
- Commonly available "dust masks" or "respirators" are not effective against biological contaminants. (Respiratory protection equipment should only be used when it is part of an overall occupational health program that includes training, fit testing, and appropriate decontamination procedures. Consult an industrial hygienist or safety professional for guidance.)
- Learn how to respond and who to contact if you should receive a suspicious letter or package (see below).

4.2 HOW TO IDENTIFY SUSPICIOUS PACKAGES AND LETTERS

Be suspicious of any unexpected or unusual mailings. Look for abnormalities in:

To Whom It Is Addressed

- Addressed to someone who is no longer with your organization
- Addressed to a specific position or title, but without a name
- Addressed to an incorrect title,
- Addressed to an outdated address

From Whom It Is Addressed

- Sent from someone unfamiliar to you
- Lacking a return address
- Having a return address that can't be verified as legitimate
- Showing a city or state in the postmark that does not match the return address
- Sent from any location reported to have been the source of recent problem items
- Sent from a foreign country (if you do not normally receive international mail)

How it is Addressed

Marked with restrictive endorsements ("Personal," "Confidential," "To Be Opened By Addressee Only," "Private," "Special Delivery," "Air Mail," "Foreign Mail")Handwritten; poorly written or poor handwriting

- Labels of cut-and-paste letters
- Poorly typed
- Misspelled (especially names or common words)
- Having a suspicious, threatening, or cautionary message on the outside ("Anthrax," "Watch Out," "Important Security Information" "Caution," "Fragile," Do Not Delay," "Handle With Care," "Rush")

How it is Packaged

- Including a threatening or nonsensical message or letter
- Secured with an unusual amount of tape or string
- Mailed with excessive postage
- Mailed with stamps rather than metered postage (metered postage is customary for most business mail)
- Messily sealed or wrapped
- Holes in envelope or wrapping

How it Looks

- Showing any powdery substance on the outside
- Lopsided, uneven, or oddly shaped
- Having soft spots or bulges

- Rigid, bulky, or lumpy envelope or package
- Showing protruding wires or aluminum foil
- Having visual distractions (drawings, unusual statements, hand-drawn postage)

How it Feels

- Unusual weight, given its size
- Strange odors
- Oily stains or other discoloration
- Excessive weight
- Ticking sound

Not all elements may apply to every suspicious package, and some problem items may not display *any* suspicious elements.

4.3 IF YOU RECEIVE OR SEE A SUSPICIOUS LETTER OR PACKAGE

4.3.1 Initial Response

- Do not handle the suspicious mail piece or package. Just set it down gently.
- Do not try to open the item! You may spill or disperse contaminants contained within the letter or package. In addition, a letter bomb may be triggered by a pressure release activated when the package is opened or when a string is cut.
- If you have already opened the item, do not empty it or try to look inside.
- Do not shake the item.
- Do not walk around with the item.
- Isolate the item; keep it away from people, and keep people away from it. Do not put it into an enclosed space (such as a drawer or cabinet) or under water.
- Do not discard the item or any packing, notes, etc. The proper authorities (probably law enforcement officials) will remove the letter/package safely.
- ***If any substance leaks or spills from the item, do not touch, taste, smell, or try to analyze the substance.***
- ***If any substance leaks or spills from the item, do not try to clean it up.*** Cover the spilled contents immediately with anything (e.g., clothing, paper, trash can, etc.) and do not remove this covering.

4.3.2 Secure the Area

- Make sure that damaged or suspicious packages are isolated.
- Isolate the specific area of the workplace so that no one disturbs the item.
- Evacuate the immediate area. (Evacuation of the entire workplace is not necessary at this point.)
- Leave the room and close the door.
- Alert others to stay away from the area.
- ***If any substance has leaked or spilled onto you or others,*** remove any contaminated clothing as soon as possible and place in a plastic bag, or in some other container that can be sealed. Give this clothing bag or container to the emergency responders for proper handling.
- ***If you think the room or area may have been contaminated by aerosolization*** (for example: if a small device was triggered, or if you receive a warning that air handling system is contaminated, or a warning that a biological agent was released in a public space):
  - Turn off local fans or ventilation units in the area.
  - Leave the area immediately.
  - Close the door, or section off the area to prevent others from entering (i.e., keep others away).
  - Shut down the air handling system in the building, if possible.

- If possible, list all people who were in the room or area. Give this list to both the local public health authorities so that proper instructions can be given for medical follow-up, and to law enforcement officials for further investigation.

4.3.3 Personal Protection

- Wash your hands with soap and warm water for one minute to prevent spreading any powder or other contaminant to your face.
- Ensure that all persons who have touched the suspicious item wash their hands with soap and water.
- ***If any substance has leaked or spilled***, shower with soap and water as soon as possible. Do not use bleach or other disinfectant on your skin.
- Do not allow anyone who might have touched the item to leave the facility.
- Make a list all people who were in the room or area when this suspicious letter or package was recognized, especially if powder was spilled. List anyone who might have had actual contact with the suspicious package or any of its packaging or contents. Give this list to both the local public health authorities so that proper instructions can be given for medical follow-up, and to law enforcement officials for further investigation.
- Place all items worn when in contact with the suspected mail piece in plastic bags and keep them wherever you change your clothes and have them available for law enforcement agents.

4.3.4 Emergency Contact

- Immediately notify the District Office Manager, Health and Safety Coordinator, or Facility/Security Manager, who should immediately contact the Postal Inspection Service, local police, or other designated contact.
- Indicate whether the envelope contains any visible powder or if any powder or other substance leaked or spilled.
- Do not panic. Wait for emergency personnel to arrive. They will provide further instructions on what to do to protect yourself.
- Do not contact other officials. Designated officials will notify local, county, and state health departments and the state emergency manager.
- The Postal Inspectors will assess the threat situation and coordinate with the FBI.

5.0 WORKPLACE VIOLENCE/SECURITY

Incidents of workplace violence, threats of workplace violence, or observations of workplace violence shall not be ignored by any GZA employee. Workplace violence should promptly be reported to the appropriate responsible party (see below). Additionally, all GZA employees are encouraged to report behavior they reasonably believe poses a potential for workplace violence in order to maintain a safe working environment.

Any person experiencing or witnessing imminent danger or personal injury or violence involving weapons or actual violence should call 911 immediately (in offices, first dialing "9" for an outside line).

Any person who is the subject of a suspected violence, threat of violence or personal injury, or is a witness to such incident, or has been told of such incident, should report the incident to his or her Supervisor, and District/Satellite Office Manager, and/or Human Resources Department.

The Human Resources Department is responsible for assisting supervisors in responding to workplace violence, facilitating appropriate responses to reported incidents of workplace violence, implementing the Employee Assistance Program to offer professional intervention, and implementing disciplinary actions.

Where the potential threat of violence is a component of jobsite/worksite assignments, such hazards shall be considered an occupational safety hazard, and addressed in the development of a site-specific health and safety plan. As needed, the Vice President of Risk Management and/or the Environmental Health and Safety Director

shall be consulted in order to ensure appropriate provisions are addressed in the project safety plan. Such provisions may include, but not be limited to, the following:

- Expressing concerns with the client;
- Police notification or hiring police/security detail;
- Rescheduling work activities (daytime instead of night time);
- Buddy system (preventing employees from working alone);
- Revision of the project scope of work;
- Providing adequate lighting in locations of concern;
- Improving jobsite security measures (locked fencing, designated parking areas, etc.)

Appropriate work site and job site security measures can only be determined on a case-by-case basis, based on project specific factors. Employees are encouraged to express your concerns pertaining to job assignment security to appropriate GZA personnel (senior project personnel, Office Managers, Human Resource Dept., EHS Director, VP of Risk Management, and other individuals as appropriate).

6.0 EMPLOYEE EMERGENCY TRAINING

6.1 EMERGENCY ACTION, FIRE PREVENTION PLANS

GZA employees working in facilities (GZA offices, laboratories, jobsite facilities, etc.) shall be instructed upon initial assignment (typically as a component of new employee health and safety orientation, or project safety orientation), and annually thereafter, on specific requirements of the emergency action/evacuation/fire prevention plan applicable to the specific facility within which they work. Where training is provided to personnel pertaining to GZA office or laboratory personnel on the emergency plans for that facility, training should be provided by EHS Coordinator, or by a designated person under guidance of EHS Coordinator, and records maintained of such training. On a jobsite, the emergency plan shall be reviewed as part of the overall training program for site operations, and shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information. Where training is provided per project safety orientation procedures, training shall be documented per project-specific training documentation procedures.

Training may consist of an appropriate combination of evacuation drills, formal training, electronic training, or other effective communication. Refresher or update training is required when escape routes or procedures are modified or personnel assignments are changed. On job-sites, employees shall be instructed in the specific aspects of emergency evacuation from the job-site (where applicable) as part of the site safety meeting prior to the commencement of regular on-site work activities.

Each employee covered by the emergency evacuation plan (each employee on the payroll of a specific office or assigned to work in an associated facility) shall be provided with a review of the emergency evacuation plan at the time the plan is developed or when the employee is initially assigned to a job, or when the employee's responsibilities under the plan change, and when the plan itself is changed.

6.2 FIRST AID/CPR/AED TRAINING

Local Environmental Health and Safety Coordinators in each GZA district are responsible for scheduling First Aid/CPR training for employees in their district, and for maintaining records of such training in employee health and safety files for their district.

The Occupational Safety and Health Administration ("OSHA") at 29 CFR 1910.120 clearly defines the need to provide specialized first aid training for several classifications of employees working at hazardous waste sites.

OSHA also defines the need for first aid training for other workers at 29 CFR 1910.151 for general industry and at 29 CFR 1926.23 for construction activities. At GZA facilities and jobsite locations where medical care from a hospital or ambulance is not readily and promptly available (defined by OSHA as within 3 to 5 minutes), at least one individual on site must have First Aid/CPR training for regulatory compliance. Thus it is GZA's policy to require first aid/CPR/AED training to its field employees, including field staff as well as to representative individuals in offices. First aid training shall be in accordance requirements of the U.S. Bureau of Mines, American Red Cross, or equivalent, and that can be verified by documentary evidence.

To achieve regulatory compliance, one or more individuals with first aid training must be present on jobsites regulated by HAZOPER-regulated jobsites, construction sites, and at locations where public emergency medical responders are not "readily available." First aid trained individuals may also be required for various projects per contractual requirements.

Where first aid trained individuals and first aid kits are provided by other parties (vendor, general contractor, host client, etc.) and made readily available to GZA personnel, GZA need not provide its own first aid trained individuals or first aid equipment.

7.0 INCIDENT REPORTING AND ANALYSIS

Prompt reporting of all incidents, including work-related injuries, illnesses, emergency events, use of automatic external defibrillator, property damage and significant "near misses," is required, in accordance with GZA Policy 03-1005, "Accident/Incident Reporting and Analysis Policy." .

8.0 INFORMATION RESOURCES, REFERENCES

- OSHA 29 CFR 1910.38 Employee Emergency Plans and Fire Prevention plans.
- OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response.
- OSHA 29 CFR 1910.165 Employee Alarm Systems
- GZA Policies 03-1005 (Accident/Incident Reporting and Analysis Policy), 03-2002 (Hazard Communication Program) and 03-2003 (Hazardous Material Safety and Emergency Response Program)

9.0 PREPARED BY

This document was prepared by Mark Malchik, Corporate Environmental Health and Safety Director.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling

Analysis By: Andrew Whitsitt	**Reviewed By: Michael McCoy, CIH, CHMM**	**Approved By: Kim Anderson, Ph.D.** **Jayanti Chatterjee, CIH**
Date: September 28, 2011	**Date: November 9, 2011**	**Date: December 9, 2011**

TASK 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS AND SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Observation of Deploying of Traffic Protection Equipment by Drilling Contractor (e.g., cones, signs, etc.)	Personal injury due to vehicle traffic	Wear high visibility vest at all times when out of vehicle.
		Park in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle.
		Use emergency flashers or other appropriate vehicle warning system when placing equipment.
		Confirm with contractor that police detail (if necessary) has been arranged to direct traffic while entering traffic safety zone.
Observation of Moving Drill Rig To Job Site and positioning at borehole by Drilling Contractor	Struck by	Stand clear of moving Drill Rig and away from any overhead utility lines until safely in position and rig has been parked properly and securely by the contractor.
		Wear high visibility vests. Make sure that the driver can see you or be aware of where you are at all times.
Observation of drilling operations and monitoring well installations	Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact	Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F. • Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks. • Check clothing for ticks frequently Check whole body immediately upon returning from field and shower.
		Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.
		Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellant.
		Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.
		Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.
	Underground utilities	Confirm that proper due diligence has been exercised for clearing utility location/clearance prior to breaking ground.
	Moving machinery, rotating parts, etc.	Maintain safe distance from rotating auger at all times. Observe operations from a safe distance.

TASK 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS AND SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Do not wear loose fitting clothing.
		Do not touch or operate or assist with any rig operations and maintenance work.
		Make eye contact with operator before approaching equipment.
		Be alert and take proper precautions regarding slippery ground surfaces and similar hazards near rotating auger.
		Do not engage the driller or helper when drill is in operation. Work out prearranged signals to get their attention before approaching them.
		Confirm prior to drilling operations that driller and helper communicate and coordinate their actions and movements.
	Falling objects, debris	Wear steel toed boots, hardhat and safety glasses/goggles.
		Stand clear of stacked drill rods. If stack appears unstable inform driller.
	Noise	Wear appropriate hearing protection.
	Roadway/traffic hazards	Be alert at all times; never step outside traffic cones.
		Wear high visibility vests at all times.
		Be familiar with escape routes at each location.
		Regularly inspect cone pattern to ensure proper setup.
		Modify traffic protection pattern as needed in response to "close call incidents."
	Adverse weather	Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.
		Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).
		Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.
		Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.
	Slips, trips and falls	Maintain clean and sanitary work area free of tripping/slipping hazards.
		Store any hand tools used for sampling in their proper storage location when not in use.
		Assure ample space for each employee to work safely with sound footing.
		Assure ample lighting.
	Emergency Conditions	Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.
		Ensure a first aid kit is present in field vehicle.
		It is required that at least one individual in the field has had first aid training.
		Discuss any worker physical conditions that may require medical attention.
		Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.
	Cuts, bruises, shocks, lacerations, sprains and strains during tool use	Do not use electrical tools with damaged cords or other electrical components.
		Observe proper electrical safety practices. Do not use electrical tools in wet areas.

TASK 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS AND SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Ensure tools are properly maintained; do not use damaged tools.
		Wear eye protection.
		Store and carry tools correctly.
		Use the correct tool for the job.
	Fire hazards	Be familiar with emergency procedures and where fire extinguishers are being placed on site.
		Inform contractor if you observe improper storage of used rags and unsafe storage of flammable/combustible liquids brought on site.
		Confirm with driller that a fire extinguisher is present with rig.
		If driller is welding or cutting on site confirm there are no flammables or combustible materials near the vicinity of welding machines or torches (such as debris, fuels, grass/weeds, etc.). Stand well clear of welding/cutting/burning areas.
		There is no smoking on GZA project sites.
	Exposure to Hazardous Substances	Become familiar with hazards associated with hazardous commercial products used in drilling (fuels, grout, cement, bentonite, etc.). Review MSDSs for such products. Do not handle drilling chemicals.
		Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Ensure that procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as needed.
Sampling Soil	Exposure to chemicals	Become familiar with drilling related hazards through review of comprehensive Job Hazard Analysis and participate in daily safety tailgate meetings.
		Coordinate activities with driller.
		Use proper personal protective equipment (PPE) as described in the HASP.
		Adhere to proper work practices and decontamination procedures specified in the HASP.
		Wash hands before eating and drinking.
	Strains and sprains due to manual lifting of sampling rods and breaking open rods and bending and standing activities.	Use proper lifting techniques when lifting rods. Seek assistance with heavy loads. Place rods at proper heights whenever possible to limit excessive bending and awkward positions.
		Use work gloves to handle rods to prevent hand injuries and slippage.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Groundwater Sampling

Analysis By: Andrew Whitsitt	**Reviewed By: Michael McCoy, CIH, CHMM**	**Approved By: Kim Anderson, Ph.D.** **Jayanti Chatterjee, CIH**
Date: September 30, 2011	**Date: November 9, 2011**	**Date: December 9, 2011**

TASK 4.2
GROUNDWATER SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Deploying Traffic Protection Equipment	Personal injury due to vehicle traffic; Collisions, injuries	All drivers shall be properly licensed. Abide by driving safety procedures. Inspect vehicle to ensure it is in safe operating condition.
		Park in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions.
		Utilize police detail (if present) to direct traffic while entering traffic safety zone, if applicable.
Working outdoors	Unescorted or vacant site /Working Alone	Do not assume that Site has been maintained for safety.
		Coordinate site visit with other personnel not present, so that your failure to return would be noticed. Sign out or call into the office to leave site specific information where you are working, the anticipated duration/hours of work on site. Do this for each site if multiple in one day. See GZA working alone policy.
	Hunters, Abutters, and Property Owners	Always wear high visibility safety vest and hat. Make deliberate noise
		Permission for field work on private and public lands must almost always be obtained in advance. When possible, contact the local landowners when on site. Leave the site immediately if threatened or made to feel uncomfortable.
		Always announce yourself and your business at the site.
		Leave the site immediately if threatened or made to feel uncomfortable.
		Understand local hunting seasons and requirements.
	Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact	Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F. • Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks. • Check clothing for ticks frequently • Check whole body immediately upon returning from field and shower.
		Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.
		Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellant.

TASK 4.2
GROUNDWATER SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.
		Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.
	Exposure to Hazardous Substances	Become familiar with the hazards associated with hazardous commercial products used while groundwater sampling (laboratory preservatives, decontamination solutions, etc.). Review MSDS for such products.
		Wear proper personal protective equipment (PPE)) as specified in the Health and Safety Plan (HASP) to avoid direct contact with Site contaminants, calibration solutions, decontamination supplies, and laboratory preservatives.
		Assure proper respiratory protection is available as specified by the HASP.
		Assure decontamination procedures are in place per the HASP.
	Emergency conditions	Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.
		Ensure a first aid kit is present in field vehicle.
		It is required that at least one individual in the field has had first aid training.
	Adverse Weather Conditions	Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.
		Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).
		Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.
		Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.
Handling Flammable Liquids	Fire Hazards	Use only approved fuel containers for fuel, heavy duty metal cans with stable base and self closing nozzle is recommended.
		Store flammable liquids in an appropriate area when not in use.
		Provide proper fire extinguisher with the sampling equipment.
		Observe GZA's "no smoking" policy at all work sites.
Mobilizing Equipment	Collision; struck by	Perform a pre-operation check of the vehicle, ensuring service brakes, parking brake, steering, lights, tires, horn, wipers mirrors, and glass are in good condition. Ensure that the vehicle is roadworthy.
		All vehicle occupants shall wear seat belts.
		Secure loose materials in the cab or bed of the vehicle.
		Keep the windows and lights clean.
		Do not operate the vehicle if it is in an unsafe condition.
		Abide by driving safety procedures and laws.
Positioning vehicle at monitoring well	Unstable, uneven terrain and ground obstacles	Locate the vehicle on stable ground.
		Avoid wet areas/mud when possible.
	Backing Collisions	If possible, avoid backing by using a route that allows you to pull through.
		If you must back, do a quality 360^0 walk around.
		Use a spotter to help guide the backing safely.
		Look over the right shoulder and glance back to make sure fenders are clearing objects.

TASK 4.2
GROUNDWATER SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Block/chock wheels.
Well Sampling	Hazardous material contact	Identify wells with hazardous concentrations of contaminants.
		Sample wells in order from least to most impacted.
		Wear proper gloves (nitrile, etc.) when handling jars, preservatives could leak during shipment from the laboratory.
	Cuts and bruises from Sample jar	Do not over-tighten glass jars (especially VOAs); they can break, causing a cut.
Sampling Equipment Operation	Splashes, electrical shocks, fires, caught by	Perform an equipment inspection before use; ensure that pumps, flow meters, and water quality meters are calibrated and are in good working condition.
		Use GFCI with all cords.
		Be sure all equipment (especially generators) is properly grounded.
		Completely shut down all equipment prior to conducting maintenance activities, fueling, servicing or repairs.
	Manual lifting, equipment handling	Use proper lifting techniques when lifting equipment (generators, pumps, air compressors, tubing, etc.). Seek assistance with heavy loads.
		Use work gloves where appropriate to prevent hand injuries.
		Wear steel toed boots.
	Noise	Wear appropriate hearing protection during activities that produce noise (running generators, pumps, air compressors, etc.).
	Slips, trips and falls	Maintain a clean and sanitary work area free of tripping/slipping hazards.
		Store hand tools in their proper storage location when not in use.
		Provide ample space for each employee to work safely with sound footing.
		Provide ample lighting.
		Provide adequate facilities/equipment/hand sanitizers for hand washing prior to eating.
	Tool-related hazards	Do not use electrical tools with damaged cords or other electrical components.
		Observe proper electrical safety practices.
		Ensure tools are properly maintained; do not use damaged tools.
		Wear eye protection.
		Store and carry tools correctly.
		Use the correct tool for the job.
		Protect from gouges, hammer blows, cutting tools, etc. Position your hands to prevent injury in case the tool slips while in use.

ATTACHMENT B
HEALTH AND SAFETY ORIENTATION/BRIEFING RECORD

CHECK ONE: _____ Initial H&S Orientation _____Periodic "Toolbox" Safety Meeting

Project Site/Location: 312 Maple Street, Endicott, NY

Date_____ Time_____ Job No._____

PM_____ PIC_____

The undersigned have attended a Health and Safety briefing, consisting of a review of the provisions of the Site Specific H&S Plan, and/or appropriate prior H&S events or concerns, and/or review of anticipated H&S concerns and safety measures for the project.

SUMMARY OF HEALTH AND SAFETY TOPICS COVERED

NAME (printed)	**SIGNATURE**	**COMPANY**

Conducted by: _____ Date:_____

Attachment C

Site Inspection Log

PROJECT NAME: 312 Maple Street	**LOCATION: Endicott, New York**
PROJECT NUMBER: 21.0056127.1	**DATE:**
PROJECT MANAGER: Daniel J. Troy, P.E.	**COMPLETED BY:**
SITE DESCRIPTION AND NATURE OF WORK:	

HAZARD COMMUNICATION
[ ]Chemical hazards identified
[ ]All containers properly labeled
[ ]MSDS/workplace notebook on site
[ ]Site safety briefing completed and documented

ACCIDENTS/EMERGENCY INFO
[ ]First aid personnel identified
[ ]Hospital location identified
[ ]Police/Fire/Ambulance phone numbers available
[ ]Incident investigation forms available
[ ]Fire extinguisher present

SANITATION
[ ]Washing facilities available
[ ]Toilet facilities available
[ ]Approved trash receptacle available
[ ]Water/refreshments available

STORAGE
[ ]Tools/Drill tooling/supplies safely stacked to prevent rolling or collapse
[ ]Work areas and passage ways kept clear

HOUSEKEEPING
[ ]Work areas clean and orderly
[ ]Storage areas clean and orderly
[ ]Combustible scrap/debris removed regularly
[ ]Waste containers of flammable or toxic materials covered

OVERHEAD HAZARDS
[ ]15ft minimum clearance maintained
[ ]All sources of falling objects/swinging loads/ rotating equipment identified
[ ]Barriers or other methods in place to prevent injury due to overhead hazards

POSTING
[ ]Emergency phone/contact info posted
[ ]OSHA poster displayed

UNDERGROUND HAZARDS
[ ]All underground hazards identified and communicated to workers on site
[ ]Utility/Dig-Safe clearance confirmed
[ ]Clearance dates: _____
[ ]Clearance ID#: _____

EXCAVATIONS and TRENCHES
[ ]All personnel and storage at least 2^{ft} from top edge of excavation
[ ]Ladder in place
[ ]Guarding/barriers in place

VEHICULAR TRAFFIC
[ ]All vehicular traffic routes which could impact worker safety identified and communicated
[ ]Barriers or other methods established to prevent injury from moving vehicles

PEDESTRIAN TRAFFIC/SITE CONTROL
[ ]All walkways which could be impacted by site activities identified and communicated
[ ]Barriers or other methods established to prevent pedestrian injury from site activities

ENVIRONMENTAL HAZARDS
[ ]Poisonous plants/stinging or biting insects/vermin/sewage/etc. identified and communicated

COMMENTS/OTHER HAZARDS_____
_____
_____
_____
_____
_____
_____

x = OK
NA = Not Applicable

ATTACHMENT D

GZA INCIDENT/ACCIDENT REPORT and ANALYSIS FORM

INCIDENT/ACCIDENT REPORT and ANALYSIS

For initial report to be submitted within 24 hours of the incident, fill in as much information as available in Sections 1 through 4, and submit to your EHS Coordinator, EHS Director (J. Chatterjee), and Property and Casualty Insurance Manager (S.Domko). Incident analysis to be completed ASAP thereafter, and distributed as appropriate.

Initial Incident Report Prepared/Submitted by:

Name	GZA Office	Date
		Click here to enter a date.

1. Classify Incident (check all that apply):

☐ Fatality	☐ Vehicle-Related
☐ Injury	☐ Fire or Explosion
☐ Illness	☐ Chemical Spill
☐ Property Damage	☐ Criminal/Vandalism/Theft/Security Incident
☐ Underground/Overhead Utility Hit	☐ Near Miss
☐ Unsafe Condition	☐ Other:

2. Description of Incident/Injury and Related Information (Attach photos, drawings, separate page if needed.)

a. Date of Incident:	b. Time of Incident:
b. Address Where Incident Occurred:	
c. If incident occurred on a project work site, provide project information (project number, project name, client info., etc.):	
d. GZA Supervisor/Project Manager/PIC:	
e. Work conducted out of which GZA office?	
f. EHS Coordinator in Your Office:	
g. Detailed Description of the Incident:	

3. For Work Place Injury or Illness, Fill in this Section (otherwise, skip to Section 4),

a. ☐ GZA Employee ☐ Other:	
b. Full Name of Injured:	
c. Injured Person's Mailing Address:	
d. Injured Person's Title, Department, etc.	
e. Home or Cell Phone No.	f. Date of Birth: Click here to enter a date.
g. Detailed Description of Injury (be specific):	
h. Was 1st aid administered on site? ☐ no ☐ yes i. If yes, who administered 1st aid, and describe actions:	
j. Did injured person receive emergency medical treatment or ambulance service? ☐ no ☐ yes k. If yes, describe:	
l. Did injured receive professional medical care and/or treatment? ☐ yes ☐ no m. If yes, what was the nature of care? ☐ outpatient ☐ hospitalized n. Date of first treatment or hospitalization: o. Identify name of clinic, hospital, doctor, specialty, (name, address, city, state, zip code, and phone): p. Describe the specific medical care or treatment (provide details, specific treatment, specific medications, over-the-counter or prescription, recommendations for follow up, etc.):	
q. Did injured person resume work on the same day of the incident? ☐ yes ☐ no	
r. Did injured person miss any days at work after the day of the incident? ☐ yes ☐ no	

s. If yes, first day missed: Click here to enter a date.
t. Total number of days of work missed:
u. Was injured person assigned any days of restricted duty at work? ☐ yes ☐ no
v. If yes, first day of restricted work duty: Click here to enter a date.
w. Total number of days of restricted work duty:

4. Names of Other Individuals Directly Involved or Witnesses (if any)

Name	Nature of Involvement	Contact Info. (Company, Phone No.

5. Contributory Factors

a. What was the apparent immediate or direct cause(s) of the incident?

b. Was any safety equipment provided? ☐ yes ☐ no
c. If yes, was it used?

d. Was an unsafe act being performed, or was an unsafe condition present?
e. If yes, describe:

f. Were any machine parts, tools, or equipment involved? ☐ yes ☐ no
g. If yes, describe:

h. Was the machine part/tool/equipment in proper working order? ☐ yes ☐ no
i. If no, explain:

j. Was a non-GZA party (subcontractor, public, etc.) involved in or responsible for the incident?
☐ yes ☐ no
k. If yes, explain and provide contact information:

l. Identify possible indirect causes, root causes of the incident:

m. Other Comments:

6. Corrective Actions, Recommendations, Follow-up (Attach separate page if necessary.)

a. Describe corrective or preventative actions implemented at the time of the incident:

b. Suggest additional corrective or preventative actions that may prevent recurrence of the incident:

c. Suggest additional follow-up actions (such as corrective actions needed for similar work, safety alert, information, or guidelines to be communicated company-wide, etc.):

7. Distribution

V.P. Risk Management: Kenneth Johnston
EHS Director: Jayanti Chatterjee
Property and Casualty Insurance Manager: Susan Domko
Regional Office Managers: William Hadge and Kim Anderson
District Office Manager:
Principal-in-Charge (if project-related):
Project Manager (if project-related):
Employee Supervisor:
Other:

8. Participants in Incident Analysis/Investigation

Name	Title	Role/Involvement

9. Incident Analysis Completion

OSHA-Recordable? ☐ Yes ☐ No Explain:

For hospitalization, have discharge papers been received? ☐ Yes ☐ No Explain:

For police involvement, has police report been received? ☐ Yes ☐ No Explain:

_____ _____

Susan Domko, Property & Casualty Insurance Manager Date

_____ _____

Jayanti Chatterjee, EHS Director Date

_____ _____

Kenneth Johnston, VP Risk Management Date