Remedial Investigation/ Alternatives Analysis Report Work Plan

251 Homer Street Redevelopment Site
Olean, New York
BCP Site No. 905037

January 2011 0225-001-100

Prepared For:

Benson Construction and Development, LLC

Prepared By:

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WORK PLAN
FOR
REMEDIAL INVESTIGATION/ ALTERNATIVES ANALYSIS REPORT

251 HOMER STREET REDEVELOPMENT SITE

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RI/AAR WORK PLAN

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1.0 INTRODUCTION

1.1 Remedial Investigation/Alternatives Analysis Report Objective

This Remedial Investigation/Alternatives Analysis Report (RI/AAR) Work Plan addresses the 16.68 acre parcel of vacant land identified as the 251 Homer Street Redevelopment project in Olean, New York (Site). It is associated with the New York State Department of Environmental Conservation (NYSDEC), Brownfield Cleanup Program (BCP) #C905037. A Site Locus plan is included as Figure 1. The objective of this Work Plan is to develop a frame-work for the investigation of the above referenced 16.68-acre parcel of vacant land situated in the City of Olean. The RI/AAR Work Plan identifies the scope of the planned remedial investigation, including sampling and reporting requirements, as well as identification and evaluation of remedial options for impacted media on-site.

1.2 Report Organization

This RI/AAR Work Plan was developed to meet the NYSDEC Site investigation requirements. The report is organized into the following sections.

- Section 1.0 contains an introduction, objective, and report organization details;
- Section 2.0 contains a Site description and Site history;
- Section 3.0 includes the RI Scope of Work and description of field activities to be completed;
- Section 4.0 includes the quality assurance/quality control (QA/QC) protocols;
- Section 5.0 contains the Site specific health and safety protocols;
- Section 6.0 including reporting requirements and schedule; and,
- Section 7.0 is a description of proposed citizen participation activities;

Additional information used in the preparation of the RI/AAR Work Plan or that are referenced are included in the following attached appendices.

- Appendix A – Field Operating Procedures (FOPs)
- Appendix B – Site-specific Health and Safety Plan (HASP)

2.0 SITE DESCRIPTION AND HISTORY

This section provides a historic description and information on previous investigations completed. The following previous work has been completed at the Site.

1) Historic and Current Site Conditions Report – prepared by AMEC Earth & Environmental, Inc. (AMEC) for ExxonMobil Refining & Supply – Global Remediation (ExxonMobil) for the refinery site located in Olean, New York.

2) Phase I Site Assessment – 251 Homer Street, Olean, New York completed by Neeson- Clark Associates, Inc., Technical & Environmental Services for Benson Construction & Development, LLC, dated October 4, 2007.

3) Supplemental Environmental Services – 251 Homer Street (Portion of the ExxonMobil Legacy Site (EMLS)) Olean, New York completed by GZA GeoEnvironmental of New York (GZA) for Benson Construction & Development, LLC dated November 21, 2007.

4) Preliminary Investigation and Sampling – 251 Homer Street, Olean, New York completed by GZA for Benson Construction & Development, LLC dated November 11, 2009.

2.1 Site Description

The subject property, located at 251 Homer Street, is situated in an industrially zoned area of the City of Olean, Cattaraugus County, New York. The Site currently consists of approximately 16.68 acres of vacant land that was originally developed in 1890 for the oil industry and used for refinery purposes and as a petroleum storage tank farm. Historically, nearby adjoining properties were also developed and utilized in association with oil refining operations and petroleum storage as well. Three easement agreements currently exist for the Site property for the purpose of constructing a commercial sign or billboard.

The Site was formerly part of the ExxonMobil Legacy Site's (EMLS) Work Area #3 where most of the oil refining took place. The EMLS operated as an oil refinery under several different names from approximately 1880s to the 1950s. Initially, two separate refineries operated on the EMLS from 1882 to 1902. Vacuum Oil merged with the Standard Oil Company, Inc. and in 1934 changed its name to Socony-Vacuum Oil Company (Socony). These companies were predecessors of ExxonMobil Oil Corporation.

The Socony refinery was divided into three sections. The #3 Works was located at the Site and included the area where most of the refining took place after the addition of a two stage Crude Pipe Still. Socony operated until 1954.

The 115-acre refinery was purchased by Mr. CJ Simpson in 1954 and ultimately Swan Finch Oil Company Olean Industries, which used the refinery tanks for storage of grain. In 1958, Swan Finch declared bankruptcy and sold the facility to Felmont Oil in 1964. The old refinery tanks and buildings were removed in 1964. Felmont Oil sold the property to County of Cattaraugus IDA in 1981, which sold it to Benson Construction & Development in 2005. Homer Street Properties, LLC purchased the Site in January 2008.

The Site in situated within the Allegheny Plateau province of western New York. The Site elevation is approximately 1,430 feet above mean sea level and dips very gently to the south and southwest toward the Allegheny River. The subject property is located near the valley walls of the Valley-Fill aquifer where the saturated thickness is typically less than 20 feet. Uninhibited groundwater flow, with no significant pumping from wells, is expected to flow southwest from the Olean Creek valley to the Allegheny River. The groundwater table at the Site is estimated to be at approximately 6 feet below ground surface. Overburden soils are generally artificial fill material underlain by sequences of outwash sand and gravel and lacustrine silt and clay. Depth to bedrock at the Site is approximately 100 feet below ground surface. Additionally, Two Mile Creek adjoins the Site to the north and traverses the west portion of the Site.

2.2 Previous Site Assessments and Investigations

The following previous Site assessments and investigations have been completed.

2.2.1 Historic and Current Site Conditions Report

AMEC Earth & Environmental, Inc. (AMEC) prepared a historic and current Site conditions report for ExxonMobil Refining & Supply – Global Remediation (ExxonMobil) for the refinery site located in Olean, New York. Pertinent findings of this report regarding site operations at the subject property are as follows:

- The Vacuum Oil Company (Vacuum Oil) and the Socony-Vacuum Oil Company, Inc., which were predecessors of the Mobil Oil Corporation, previously owned the refinery site;
- The refinery was divided into three sections known as the #1 Works, #2 Works and the #3 Works. The subject property is located within the #3 Works area;
- Most of the initial refining took place at the #3 Works after the addition of a two stage Crude Pipe Still;
- The #3 Works is situated along the southern and eastern banks of Two Mile Creek, which flows in a south and southwest direction and discharges to the Allegheny River. The creek is described as a Class D stream;
- The supply of crude oil for the refinery came from the Tuna Valley through a single pipeline;
- By the early 1920s, each Works area had their own separate shop buildings such as boiler shops, carpenter shops, machine shops, pipe shops, and a lead shop;
- The Claflin Manufacturing Company Tannery (1888) adjoined the western border of the former #3 Works area;
- The Erie Railroad opened their line in Olean in 1851. The Erie track traversed the former Socony Vacuum refinery into a northern (#3 Works) and southern (#1 and #2 Works) section;
- The Olean Chemical Works (1893) was located adjacent to the eastern border of the former Socony-Vacuum #3 Works refinery area. The Olean Chemical Works plant manufactured, sulphuric, nitric, mixed and muriatic acids, aqua ammonia, extra distilled glycerine, etc.

2.2.2 Phase I Site Assessment

A Phase I Environmental Site Assessment (ESA) for 251 Homer Street, Olean, New York was completed by Neeson- Clark Associates, Inc., Technical & Environmental Services for Benson Construction & Development, LLC, dated October 4, 2007. Pertinent findings of this report are as follows:

- The Site is approximately 16.68 acres in size;
- The Site was originally developed in 1890 for the oil industry and used as a petroleum storage tank farm. In 1962, Felmont Oil took down numerous structures on and off-Site, including aboveground storage tanks (ASTs);
- The Site is currently vacant land with minor amounts of residential fill material. A large steel object is on-Site;
- Surface staining and discoloration were observed and appeared to be petroleum based;
- A New York State Department of Environmental Conservation (NYSDEC) spill #8701580 was opened 5/27/87 and closed 12/16/87. The database report indicated that oil was found during excavation for a proposed New York State Department of Transportation (NYSDOT) building. Limited information was provided in the database. It indicated that no further work was possible by the spill unit and the surface was clean.

2.2.3 Supplemental Environmental Services

GZA GeoEnvironmental of New York (GZA) completed additional Supplemental Environmental Services for Benson Construction & Development, LLC dated November 21, 2007 for 251 Homer Street (Portion of the ExxonMobil Legacy Site (EMLS)) Olean, New York. Pertinent findings of this report are as follows:

- The Site was formerly part of the EMLS, identified as Socony Vacuum and Felmont Oil. The area of the Site was included within the Works #3 area of the EMLS, in which much of the refining took place. Additionally, the Site was used for oil storage in large aboveground tanks.
- Historic documentation from the North Olean area indicated that significant leakage occurred from the storage tanks in 1922, enough that nearby

residences were able to retrieve barrels of oil from depths of 18 feet below the ground surface.

- The Site is within the City of Olean Brownfield Opportunity Area (BOA), and identified within the BOA as being within the EMLS Works #3 area. According to the BOA, these areas likely contain some level of petroleum contamination in the subsurface.
- Several buildings, storage tanks, berm areas, and areas of possible fill were apparent on 1938 and 1955 aerial photographs.
- Areas of black "petroleum like material" were observed at several locations on the Site. The black material appeared to be petroleum related. Additionally, these areas can be seen in the 2006 aerial photograph and were also present in the 1995 and 2002 aerials. The source of the black petroleum material is not known, and may be from the subsurface. Its presence on the Site may be related to historic petroleum impact from previous operations at the Site.
- Several areas of surface debris, including concrete, brick, rebar, etc. were present in the southwestern portion of the Site. The areas of the surface debris appeared to correlate with the location of possible filling observed in the 1938 and 1955 aerial photographs.

2.2.4 Preliminary Investigation and Sampling

GZA also completed a Preliminary Investigation and Sampling for 251 Homer Street, Olean, New York for Benson Construction & Development, LLC dated November 11, 2009. As part of the preliminary investigation, GZA observed, documented and photographed soil conditions to approximately 6 to 7 feet below ground surface at three test pit locations. Two soil samples were collected and analyzed for volatile organic compounds (VOCs), semi-volatile compounds (SVOCs), polychlorinated biphenyls (PCBs), target analyte list (TAL) metals, and total petroleum hydrocarbons (TPH). Based on GZA's findings, one soil sample was analyzed by toxicity characteristic leaching procedure (TCLP) for lead. Pertinent findings of this report are as follows:

- Site subsurface soil from ground surface to 3 feet bgs was identified as fill material that generally contained a heterogeneous cohesive and coarse-grained soil matrix intermixed with a pungent black petroliferous "tar-like" material. Within the soil and petroleum mixture, GZA also observed the presence of fill material bricks and brick fragments, organics (wood), cinders, shale fragments, and metal piping. Fill soil encountered from 3 to 6 feet bgs was predominantly a fine to coarse-grained sand and bricks intermixed with the "tar-like" material. GZA observed a strong petroleum odor during completion of the test pits.

- Thirteen VOCs were detected in concentrations above method detection limits in each of the two soil samples collected. Six VOCs were identified in each sample exceeding their respective Part 375 Unrestricted Use soil cleanup objectives (SCOs).
- Sixteen metals were detected in concentrations above method detection limits in each of the two soil samples collected. Lead was identified at a concentration of 7,800 ppm at TP-1 (2-4) and 7,300 pm at TP-3 (4-6) which exceeds its respective Part 375 Restricted Commercial Use and Industrial use SCOs. Toxicity characteristic leaching procedure (TCLP) testing identified lead at a concentration of 0.95 mg/L, which is below than EPAs Maximum Toxicity Concentration of 5 mg/L.
- PCBs were not detected above method detection limits (MDLs) in the two samples selected. However, due to petroleum product present within the sample, the MDLs were elevated to values which exceeded the Part 375 Unrestricted and Restricted Use SCOs.
- Due to the high levels of petroleum product in each sample collected, SVOC analysis was performed following several dilutions to comply with instrument calibration procedures as required by the test method. As a result, the specific concentrations of semi-volatile analytes were not able to be detected above the elevated MDLs.
- Due to the inability to detect SVOCs as a result of petroleum interference, each sample was analyzed for TPHs. As with the SVOC analysis, samples TP-1 (2-4) and TP-3 (4-6) were analyzed following a dilution process due to the high level of petroleum product present in both samples. TPHs were detected in samples TP-1 (2-4) and TP-3 (4-6) at concentrations of 50,000 ppm and 46,000 ppm respectively.

- The characteristics of the chromatograms for samples TP-1 (2-4) and TP-3 (4-6) in combination with the physical characteristics of the samples indicate a petroleum product in the boiling range of Fuel Oil #6.
- Upon the completion of test pit excavations, based on visual observations and OVM readings, GZA contacted NYSDEC and spill #0907933 was assigned to the Site.

3.0 REMEDIAL INVESTIGATION SCOPE OF WORK

The objective of the RI is to investigate the subject Site, which isa 16.68-acre parcel of vacant land situated in the City of Olean. Aesthetic and environmental impacts as a result of historical oil refining operations at the subject property and vicinity have impeded opportunities for economic development and growth. Based on our review of Site documents, Site-specific areas from historical use include: (1) area of former refinery buildings; (2) area of surficial petroleum contamination; and (3) area of former oil storage tanks as shown on the attached Figure 3.

Benson is proposing to complete the RI in a phased approach. Limited information is available regarding the exact location of various former Site activities (i.e., former refinery buildings, surficial petroleum contamination, former oil storage, etc.), with the exception of visual Site observation. Therefore, it is difficult to select specific locations of exploration to address these concerns without completing the RI in a phased approach. A phased approach will help limit exploration locations that may provide little or no value to the overall investigation, minimizing the number of analytical samples needed and focusing on potential areas of concern identified during the investigation.

The first phase of the RI (Phase I RI) will involve test pit excavations, test borings, monitoring well installation and analytical sample collection. The thicknesses of fill soils and surficial petroleum contamination encountered at the exploration locations will be measured in order to help quantify the amount of material that may need to be mitigated/disposed. In addition, the area of the former refinery operations and former oil storage will require investigation. The specific objectives of this phase of the project are as follows:

- Assess the lateral and vertical extent of petroleum and/or other contamination;
- Assess Site geology;
- Assess hydrogeology;
- Evaluate transport mechanisms;
- Assess the source(s) of contamination and assess impact to environmental media;

- Identify potential pathways for human exposure as part of a qualitative risk assessment; and,
- Identify areas that may require additional investigation.

The subtasks described below are intended to accomplish the project objectives. Additional information, including the methodologies to be used, is provided in the Site-specific Quality Assurance Project Plan (QAPP) in Section 4. Field activities will be completed in accordance with the Site-specific Health and Safety Plan (HASP), included as Appendix B.

3.1 General Field Activities

General field activities include site meetings, mobilization, implementing the health and safety plan, test pits, test borings, monitoring well installation, sampling and analytical testing, decontamination and handling of investigation wastes and surveying. Subcontractors will be used for test pits, drilling, analytical testing and surveying.

3.1.1 Site Meeting

A Site "kick-off" meeting will be held prior to initiating field work to orient field team members and subcontractors with the Site and to familiarize TurnKey personnel and our subcontractor personnel with Site background, scope of work, potential dangers, health and safety requirements, 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.

3.1.2 Mobilization

Following approval of the RI Work Plan by NYSDEC, the Underground Facilities Protection Organization (UFPO) will be contacted at 1-800-962-7962 to clear exploration locations. Utility clearance will require three working days by UFPO. TurnKey and its subcontractors then will mobilize necessary materials and equipment to the Site.

3.1.3 Health and Safety

It is anticipated that the work to be completed at the Site will be done at level D personal protection with the potential to upgrade to level C. Field workers will be instructed to keep level C equipment available should it be needed. Should health and safety monitoring during field activities indicate a threat to field personnel or warrant an upgrade beyond level C protection, work will stop and Site conditions will be re-evaluated by NYSDEC, NYSDOH and TurnKey. See Section 5.0 for additional information on Health and Safety.

3.1.4 Decontamination and Handling of Investigation 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 QAPP. Personal protective equipment (i.e., latex gloves) and disposable sampling equipment (i.e., polyethylene tubing) will be placed in plastic garbage bags for disposal as a solid waste at the Site.

Excess soil cuttings, not returned to the borehole, will be drummed and stored on-Site for future disposal unless the soil appears to be uncontaminated based upon measurements from an organic vapor meter (OVM) that is equipped with a photoionization detector (PID). These measurements should be less than 1 part per million (ppm) in headspace screening[1] and the soils should appear to be visually clean. If less than 1 ppm, the material will be placed on the ground near the exploration location.

Purge water will be placed on the ground adjacent to the well from which it was removed, provided it shows no sign of contamination (elevated PID readings, etc), it infiltrates back into the ground rather than run-off to surface water and it is placed onto soils that are already of similar composition regarding contaminant levels. If the discharge of water onto the soil will result in contamination of soils or groundwater that are "clean", then the water will be drummed. Well development water shall be containerized in 55-gallon drums and stored on-Site, within a fenced area (if available), until analytical results are received. If analytical results are non-detect, the drummed water will be discharged to the ground surface at the Site. If minor contaminants are present but meet the requirements of the Town of Olean wastewater treatment facility, drummed water will be discharged to the

[1] Headspace screening involves field measurements of the adjacent air during soil sampling plus measurements of the air volume or headspace above a soil sample placed in a plastic baggie, plastic or glass jar. Field measurements are made for total volatile organic compounds using a PID properly calibrated.

sanitary sewer. If analytical results do not permit discharge to the storm or sanitary sewer, drummed water will be sampled and characterized for proper disposal.

The volume of material to be disposed from drums is unknown, if any. TurnKey will coordinate with the Benson if drums need to be tested and disposed. TurnKey will collect samples for testing, if requested.

3.1.5 Survey

Following completion of the RI investigation, a professional land surveying firm will be subcontracted to locate exploration locations and prepare a Site base map.

3.2 RI Field Investigations

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

3.2.1 Surface Sampling

3.2.1.1 Grossly Contaminated Surface Soil

Certain areas of the Site have historically been observed to contain petroleum-like products and visual/olfactory evidence of contamination in surface soils. These surface soils can be characterized as "Grossly Contaminated Soil" (GCS), as defined by 6NYCRR Part 375. During the RI, surface soil containing GCS will delineated by visual/olfactory observations and PID screening. These areas will not be sampled for analytical testing as such testing provides little value to the overall assessment of impacts on-Site; these areas will be considered a media of concern subject to evaluation of remedial alternatives in the AAR. These areas will be depicted in the RI report and quantified to the extent feasible.

3.2.1.2 Site-Wide Surface Sampling

Collection of up to 15 surface soil/fill samples, including five samples in the area of former refinery buildings, seven samples in the area of surficial petroleum contamination and three samples in the area of former oil storage tanks will facilitate evaluation of potential health risks to current Site receptors that may be exposed to soil/fill via direct contact, incidental ingestion, or inhalation of airborne particulates. For each surface soil/fill grab sample, a dedicated stainless steel hand trowel or stainless steel spoon will be used to collect a representative aliquot of soil. If an area is vegetated, then the surface soil sample will be collected from 0 to 2 inches below ground surface (bgs) following removal of the sod/vegetation. Representative samples will be described in the field by qualified TurnKey personnel, scanned for total volatile organic vapors with a calibrated Photovac 2020 PID equipped with a 10.6 eV lamp (or equivalent), and characterized for impacts via visual and/or olfactory observations. Samples will be transferred to laboratory-supplied, pre-cleaned sample containers for analysis of TCL SVOCs and TAL metals (all samples) and PCBs, pesticides and herbicides (select samples) using USEPA SW-846 methodology (see Table 1). If elevated PID readings (i.e., sustained readings greater than 5 ppm) are observed in any sample, that sample will also be analyzed for TCL VOCs.

3.2.2 Surface Water and Sediment Sampling

Four sediment and four surface water samples will be collected, including two samples from the drainage ditch which traverses the northern portion of the Site, as well as two samples from Two Mile Creek located near the eastern and southern property limits. Sediment and surface water samples will be collected from the upstream and downstream location of each water body as shown on Figure 4. Dedicated stainless steel sampling tools will be used to collect representative sediment samples from 0-6 inches below the face of the stream/ditch. Surface water samples will be collected by slowly submerging each sample bottle at the designated location with minimal surface disturbance. Grab samples from each medium will be placed into laboratory-supplied, pre-cleaned sample containers for analysis of TCL VOCs, TCL SVOCs, TAL metals, Total Petroleum Hydrocarbons (TPH) and PCBs using USEPA SW-846 methodology.

3.2.3 Test Pits Excavations

Test pits excavations will be completed in areas of potential concern or where specific surficial petroleum material was identified during the previous investigation work. TurnKey is proposing approximately 48 test pit excavations during the first phase of the investigation. Figure 4 shows the approximate location of proposed test pits. A track excavator with an approximate 16 to 18 foot reach will be used complete the test pits.

Additional test pit locations will be based on findings from the initial effort and engineering judgment. The reach of the machine or the water table may also limit the test pit depth(s).

A field engineer/scientist/geologist will observe the excavations and create a field log (including photograph) for each test pit location. Real time air and particulate monitoring will be conducted while the excavations are open using a PID and particulate monitor. Excavated soil will be placed on plastic sheeting near the test pit location. Soil samples will be collected from the excavations for classification, laboratory analysis and screening with the PID. Soil samples will be collected at two-foot intervals to the bottom of the test pit for observation, classification and PID screening. Select samples collected for analytical testing will typically be collected from contaminated soils or material, based on visual, olfactory, field screening techniques and engineering judgment that warrant analysis. Excavated soil shall be returned to the test pit in the general order that it was excavated. Photographs of each excavated test pit will be taken as documentation.

3.2.4 Test Boring, Monitoring Well Installation and Sampling

Eight (8) test borings will be completed, which will be converted to permanent monitoring wells as part of the Phase I RI. Figure 4 shows the planned test boring and monitoring well locations identified for purposes of scoping. Actual well locations and depths will be based on the findings of the test pit exploration efforts. Test boring and/or monitoring well locations will be extended to depths through the fill material, and into the underlying native soils.

Test borings for monitoring well installation will be advanced into the overburden soils using a track or truck mounted rotary drill rig using 4 ¼ - inch inside diameter hollow stem augers (HSA). 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 HSA, in general accordance with ASTM D1586. Drilling fluids will not be used while advancing the HSA so overburden groundwater can be identified, if encountered. TurnKey assumes the soil spoils generated from the test borings will not require containerization and can remain on the ground at the Site in the vicinity of the monitoring well location.

The test borings will be observed by a field engineer/geologist and a field log for each boring/monitoring well will be created. Real time air monitoring will be conducted while test borings are being completed using a PID. Soil samples will be collected at two-foot intervals to the bottom of the boring for classification and screening with the PID equipment. Select soil samples collected for analytical testing will typically be collected from contaminated soils or material, based on visual, olfactory, field screening (PID) and engineering judgment that warrant further assessment.

Groundwater monitoring wells will be constructed of 2-inch inner diameter flush coupled PVC riser and screen. The screened interval shall intercept the water table extending approximately 7-10 feet below and 3-5 feet above the water table. Based on observed geology and field conditions, the screen will consist of an approximate 10 or maximum of 15 foot long section of machine slotted pipe. 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 overlying overburden conditions. Depending on field conditions, properly hydrated bentonite chips or a mixture of cement/bentonite grout will extend from the bentonite seal to approximately 1-feet bgs. If groundwater at a particular monitoring well location is less than 10 feet bgs, the well construction will be modified accordingly. The monitoring well will be completed by placing locking stick-up casing over the riser. Concrete will be placed in the boring around the protective casing and sloped away from the casing.

The monitoring wells will be developed to remove the fines and develop the filter pack. Hydraulic conductivity testing, using either rising or falling head test method, will be done to assess whether the monitoring well is functioning and provide hydrologic information that will aid in evaluating subsurface conditions. Water level measurements will be collected and used with the monitoring well information to interpret groundwater flow direction within the overburden soils.

3.2.5 Exploratory Trenching

During the excavation of planned test pits and completion of soil borings/monitoring wells, it is likely that subsurface piping, tanks, and/or foundations will be encountered based on the historical use of the Site. If such infrastructure is encountered, it will be photo documented and mapped for future tracing and removal.

In addition to planned test pits and soil borings/monitoring wells, up to six exploratory trenches are proposed to evaluate the potential presence of subsurface infrastructure at the Site. The location of the trenches will be selected based on actual conditions (i.e., subsurface obstructions such as old foundations) encountered during test pits, soil borings, and/or trenching. If subsurface obstructions are not encountered during test pits or soil borings/monitoring wells, trench locations will be completed in areas to provide reasonable coverage of the entire Site. The trenching procedure will include the following:

- Excavate trench approximately 3-feet wide down to approximately 6-feet deep;
- As the trench progresses, the trench will be continued laterally away from the principal trace of the trench to facilitate exploration of encountered subsurface piping and/or infrastructure, as necessary;
- Encountered pipes will be traced using a metal detector and/or visual observations, exposed, tapped, and drained to the extent practicable;
- Any liquids contained within the encountered piping will be visually characterized, removed, and containerized. Upon completion of the trenching, all of the recovered liquid will be characterized and properly disposed off-site;
- The proposed trenching will be completed in sections and backfilled accordingly; and,
- The subsurface conditions will be documented and photographed.

3.3 Environmental Analytical Testing Program

The environmental testing program is summarized in Table 1. The location for sample collection will be determined based upon the results of the field screening and engineering judgment. The samples collected as part of this RI will be subject to analytical testing methodologies that follow United State Environmental Protection Agency (USEPA) SW-846 methods with an equivalent Category B deliverables package and third-party data validation. Further information regarding sampling and testing methodologies can be found in the QAPP (see Section 4.0).

3.4 Survey

The survey will be done after completion of the fieldwork to locate test pit, soil boring locations and monitoring wells. This will allow measurement of the actual exploration locations and elevations.

A licensed land surveyor will be subcontracted to do the survey. Vertical measurements will include a ground surface elevation, plus top of casing and top of riser for monitoring wells. The top of riser will serve as the water level monitoring point. Vertical measurements will be made relative to the National Geodetic Vertical Datum (NGVD). Monitoring point measurements and top of protective casing measurements will be accurate to within 0.01 foot. Horizontal measurements and ground surface elevations will be accurate to within 0.1 foot.

The base map for the Site will include pertinent Site features and the investigation exploration locations.

3.5 Phase II RI Field Explorations

Contingent field explorations or a Phase II RI, if determined to be necessary, may be conducted. This work may consist of additional test pits, soil borings and monitoring well installations for supplemental soil and groundwater data to complement or fill in data gaps from the initial or Phase I RI. In addition and based on results of the first Phase of site investigation, a soil vapor assessment may be required. If needed, a Phase II RI scope of work will be developed by TurnKey and submitted to NYSDEC for review and comment. The work activities will be completed according to the procedures described in this RIWP and its subsequent approved modification.

4.0 QUALITY ASSURANCE/ QUALITY CONTROL

A Quality Assurance Project Plan (QAPP) has been prepared in support of the RI activities. The QAPP dictates implementation of the investigation tasks delineated in this Work Plan. A Sampling and Analysis Plan (SAP) identifying methods for sample collection, decontamination, handling, and shipping, is provided as below.

The QAPP will assure the accuracy and precision of data collection during the Site characterization and data interpretation periods. The QAPP identifies procedures for sample collection to mitigate the potential for cross-contamination, as well as analytical requirements necessary to allow for independent data validation. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the EPA Region II CERCLA Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

4.1 Scope of the QAPP

This QAPP was prepared to provide quality assurance (QA) guidelines to be implemented during the RI activities. This document may be modified for subsequent phases of investigative work, as necessary. The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when.
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations).
- A historical record that documents the investigation in terms of the methods used, calibration standards and frequencies planned, and auditing planned.
- A document that can be used by the Project Manager's and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data.
- A plan to document and track project data and results.

- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be defended.

QA refers to the conduct of all planned and systematic actions necessary to perform satisfactorily all task-specific activities and to provide information and data confidence as a result of such activities. The QA for task-specific activities includes the development of procedures, auditing, monitoring and surveillance of the performance.

QC refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field (e.g., verification that the items and materials installed conform to applicable codes and design specifications). QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

4.2 QAPP Organization and Responsibility

The principal organizations involved in verifying achievement of data collection goals for the 251 Homer Street Redevelopment Site include: the New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH), Benson Construction and Development, LLC (Volunteer, Applicant), TurnKey Environmental Restoration, LLC (Volunteer's Consultant), the drilling subcontractor(s), the independent environmental laboratory, and the independent third party data validator. Roles, responsibilities, and required qualifications of these organizations are discussed in the following subsections.

4.2.1 NYSDEC and NYSDOH

It is the responsibility of the New York State Department of Environmental Conservation (NYSDEC), in conjunction with the New York State Department of Health, to review the RI Work Plan and supporting documents, for completeness and conformance with the site-specific cleanup objectives and to make a decision to accept or reject these documents based on this review. The NYSDEC also has the responsibility and authority to review and approve all QA documentation collected during brownfield cleanup construction and to confirm that the QA Plan was followed.

4.2.2 Benson Construction and Development, LLC

Benson ("Applicant") will be responsible for complying with the QA requirements as specified herein and for monitoring and controlling the quality of the Brownfield cleanup construction either directly or through their designated environmental consultant and/or legal counsel. The Applicant will also have the authority to select Contractor(s) to assist them in fulfilling these responsibilities. The designated Benson Project Manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements.

4.2.3 TurnKey Environmental Restoration, LLC

TurnKey Environmental Restoration, LLC (TurnKey) is the prime consultant on this project and is responsible for the performance of all services required to implement each phase of the RI/AAR Work Plan (hereafter referred to as the Work Plan), including, but not limited to, field operations, laboratory testing, data management, data analysis and reporting. Any one member of TurnKey's staff may fill more than one of the identified project positions (e.g., field team leader and site safety and health officer). The various quality assurance, field, laboratory and management responsibilities of key project personnel are defined below.

- *TurnKey Project Manager (PM):* *Michael Lesakowski*

  The TurnKey PM has the responsibility for ensuring that the project meets the Work Plan objectives. The PM will report directly to the Benson Project Coordinator and the NYSDEC/NYSDOH Project Coordinators and is responsible for technical and project oversight. The PM will:

  - o Define project objectives and develop a detailed work plan schedule.
  - o Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.

- o Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.
- o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- o Review the work performed on each task to assure its quality, responsiveness, and timeliness.
- o Review and analyze overall task performance with respect to planned requirements and authorizations.
- o Review and approve all deliverables before their submission to NYSDEC.
- o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- o Ultimately be responsible for the preparation and quality of interim and final reports.
- o Represent the project team at meetings.

- *TurnKey FTL/SSHO:* *Bryan Hann*

  The Field Team Leader (FTL) has the responsibility for implementation of specific project tasks identified at the Site, and is responsible for the supervision of project field personnel, subconsultants, and subcontractors. The FTL reports directly to the Project Manager. The FTL will:

- o Define daily develop work activities.
- o Orient field staff concerning the project's special considerations.
- o Monitor and direct subcontractor personnel.
- o Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
- o Assure that field activities, including sample collection and handling, are carried out in accordance with this QAPP.

For this project the FTL will also serve as the Site Safety and Health Officer (SSHO). As such, he is responsible for implementing the procedures and required components of the Site Health and Safety Plan (HASP), determining levels of protection needed during field tasks, controlling site entry/exit, briefing the field team and subcontractors on site-specific health and safety issues, and all other responsibilities as identified in the HASP.

4.3 Quality Assurance (QA) Responsibilities

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and TurnKey policies, and NYSDEC requirements. The QA Officer has sufficient authority to stop work on the investigation as deemed necessary in the event of serious QA issues.

- *Project QA Officer:* *Ray Laport*

  Specific function and duties include:
  - Performing QA audits on various phases of the field operations
  - Reviewing and approving QA plans and procedures
  - Providing QA technical assistance to project staff
  - Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations
  - Responsible for assuring third party data review of all sample results from the analytical laboratory

4.4 Field Responsibilities

TurnKey field staff for this project is drawn from a pool of qualified resources. The Project Manager will use staff to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

4.5 Quality Assurance Objectives for Measurement Data

The overall objectives and criteria for assuring quality for this effort are discussed below. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented. The objectives of this QAPP are to address the following:

- The procedures to be used to collect, preserve, package, and transport groundwater samples.
- Field data collection.
- Record keeping.
- Data management.
- Chain-of-custody procedures.
- Precision, accuracy, completeness, representativeness, decision rules, comparability and level of quality control effort conformance for sample analysis and data management by TestAmerica under EPA analytical methods.

The goals for precision, accuracy, and completeness intended for use on this project are discussed below. All data will be reported completely. No data will be omitted unless an error occurred in the analyses or the run was invalidated because of QC sample recovery or poor precision.

4.5.1 Precision

Precision is a measurement of the degree to which two or more measurements are in agreement, which is quantitatively assessed based on the standard deviation. Precision in the laboratory is assessed through the calculation of relative percent difference (RPD) and relative calculation of relative standard deviations (RSD) for three or more replicate samples. General precision goals are provided in Table 2.

Laboratory precision will be assessed through the analysis of matrix spike/matrix spike duplicate (MS/MSD) and field duplicate samples for organic parameters. For inorganic parameters, precision will be assessed through the analysis of matrix spike/ duplicates field duplicate pairs. Precision for field parameters, including pH, turbidity, specific conductance, and temperature will be determined through duplicate analysis of 1 in every 20 samples. Precision control limits for field-measured parameters are provided in Table 3.

4.5.2 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference of true value. Accuracy in the field is assessed through the use of field blanks and trip blanks and through the adherence to all sample handling, preservation and holding times. One trip blank will accompany each batch of water matrix sample containers shipped to the laboratory for volatile organic chemical analysis. Laboratory accuracy is assessed through the analysis of a matrix spike/matrix spike duplicate (MS/MSD) (1 per 20 samples), standard reference materials (SRM), laboratory control samples (LCS), and surrogate compounds, and the determination of percent recoveries.

Accuracy for field measured parameters including pH, turbidity, specific conductance, and temperature will be assessed through instrument calibration standards discussed in instrument calibration and maintenance FOPs (see Appendix A).

4.5.3 Completeness

Data completeness is a measure of the amount of valid data obtained from a prescribed measurement system as compared with that expected and required to meet the project goals. Laboratory and field completeness will be addressed by applying data quality checks and assessments to ensure that the data collected are valid and significant.

As shown on Table 4, the laboratory completeness objectives for the RI will be 90 percent or greater. A third party data validator will assess the completeness and validity of laboratory data deliverables. For the RI, 100 percent of all laboratory analytical results will undergo third party data review. The completeness of an analysis will be documented by including in the report sufficient information to allow the data validator to assess the quality of the results.

Raw data such as chromatograms, spectra, calibration data, laboratory worksheets and notes, etc will not be produced with the analytical data reporting package but will be stored with the sample results in the laboratory and made available upon request, if necessary, to substantiate analytical results. The raw data will be archived for at least two years by the laboratory. The laboratory will retain all analytical information; regardless of whether TurnKey requests the substantiation of results.

4.5.4 Data Representativeness

Data representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. All proposed field-testing and measurement procedures were selected to maximize the degree to which the field data will represent the conditions at the Site, and the matrix being sampled or analyzed.

Performance System Audits and the proper execution of field activities are the main mechanism for ensuring data representativeness. Representativeness in the laboratory is ensured through the use of the proper analytical procedures, appropriate methods, meeting sample holding times, and analyzing and assessing field duplicate samples.

4.5.5 Comparability

Data comparability expresses the confidence with which one data set can be compared to another data set. Procedures for field measurements, contained in Appendix A, will assure that tests performed at various locations across the Site are conducted using accepted procedures, in a consistent manner between locations and over time, and including appropriate QA/QC procedures to ensure the validity of the data. Sampling procedures for environmental matrices are provided to ensure that samples are collected using accepted field techniques.

Environmental samples will be analyzed by TestAmerica using consistent protocols for sample preservation, holding times, sample preparation, analytical methodology, and QC as described in USEPA SW-846.

Analytical data will be comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability is also dependent on similar QA objectives. The parameter units to be used for this investigation are listed in Table 4.

4.6 Level of QC Effort for Sample Parameters

Field blank, method blank, trip blank, field duplicate, laboratory duplicate, laboratory control, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. QC samples are discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

- Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic chemicals of a given matrix.

The general level of QC effort will be one field (blind) duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD or MS/Duplicate for every 20 or fewer investigative samples of a given matrix. One trip blank consisting of distilled, deionized water will be included along with each sample delivery group of aqueous VOC samples.

4.7 Sampling and Analysis Plan

The selection and rationale for the RI sampling program is discussed in previous sections of the Work Plan. Methods and protocol to be used to collect environmental samples (i.e., soil, sediment and groundwater) for this investigation are described in the TurnKey Field Operating Procedures (FOPs) presented in Appendix A.

The number and types of environmental samples to be collected is summarized on Table 1. Sample parameter lists, holding times and sample container requirements are summarized on Table 5. The sampling program and related site activities are discussed below. To the extent allowed by existing physical conditions at the facility, sample collection efforts will adhere to the specific methods presented herein. If alternative sampling locations or procedures are implemented in response to facility specific constraints, each will be selected on the basis of meeting data objectives. Such alternatives will be approved by NYSDEC before implementation and subsequently documented for inclusion in the project file.

4.7.1 Custody Procedures

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site. The following section and FOPs for Sampling, Labeling, Storage, and Shipment, located in Appendix A, describe procedures for maintaining sample custody from the time samples are collected to the time they are received by the analytical laboratory.

4.7.2 Sample Receipt

A sample custodian is responsible for receiving samples, completing chain-of-custody records, determining and documenting the condition of samples received through the Cooler Receipt and Preservation Form (CRPF), logging samples into the LIMS system based upon the order of log-in, and storing samples in appropriate limited-access storage areas. Chain-of-custody documentation is also maintained for the transfer of samples between TestAmerica, and for shipment of samples to subcontracted laboratories.

Upon sample receipt, an inventory of shipment contents is compared with the chain-of-custody record, and any discrepancies, including broken containers, inappropriate container materials or preservatives, headspace in volatile organic samples, and incorrect or unclear sample identification, are documented and communicated to the appropriate project manager.

Each sample is given a unique laboratory code and an analytical request form is generated. The analytical request contains pertinent information for each sample, including:

- Client name

- Project number
- Task number
- Purchase order number
- Air bill number
- Chain-of-custody number
- Number of samples
- Sample descriptions
- Sample matrix type
- Date and time of sampling
- Analysis due dates
- Date and time of receipt by lab
- Client sample identification
- Any comments regarding special instructions or discrepancies

4.7.3 Sample Storage

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4°C, ± 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary.

4.7.4 Sample Custody

Sample custody is defined by this document as when any of the following occur:

- It is in someone's actual possession.

- It is in someone's view after being in his or her physical possession.

- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering.

- It is placed in a designated and secured area.

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

Laboratory documentation used to establish COC and sample identification may include the following:

- Field COC forms or other paperwork that arrives with the sample.
- The laboratory COC.
- Sample labels or tags are attached to each sample container.
- Sample custody seals.
- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.
- Sample storage log (same as the laboratory COC).
- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

4.7.5 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the COC (e.g., sample breakage or depletion).

4.7.6 Sample Disposal

A minimum of 30 days following completion of the project, or after a period of time specified by any applicable project requirements, sample disposal is performed in compliance with federal, state, and local regulations. Alternatively, samples may be returned to the client by mutual agreement. All available data for each sample, including laboratory analysis results and any information provided by the client, are reviewed before sample disposal.

All samples are characterized according to hazardous/non-hazardous waste criteria and are segregated accordingly. All hazardous waste samples are disposed of according to formal procedures outlined in TestAmerica's Standard Operating Procedure (SOP). It should be noted that all waste produced at the laboratory, including the laboratory's own various hazardous waste streams, is treated in accordance with all applicable local and Federal laws.

Complete Internal Chain of Custody documentation is maintained for some samples from initial receipt through final disposal. This ensures that an accurate history of the sample from "cradle to grave" is generated. Internal Chain Documentation through disposal is in place at TestAmerica.

4.8 Calibration Procedures and Frequency

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

4.8.1 Field Instrument Calibration

Quantitative field data to be obtained during groundwater sampling include pH, turbidity, specific conductance, temperature, and depth to groundwater. Quantitative water level measurements will be obtained with an electronic sounder or steel tape, which require no calibration. Quantitative field data to be obtained during soil sampling include screening for the presence of volatile organic constituents using a photoionization detector (PID).

FOPs located in Appendix A describe the field instruments used to monitor for these parameters and the calibration methods, standards, and frequency requirements for each instrument. Calibration results will be recorded on the appropriate field forms and in the Project Field Book.

4.9 Analytical Procedures

Groundwater, soil, sediment and surface water samples collected during this investigation field sampling activities will be analyzed by TestAmerica Analytical Testing Corporation (TestAmerica), 10 Hazelwood Drive, Amherst, New York 14228, (716) 691-2600.

4.9.1 Field Analytical Procedures

Field procedures for collecting and preserving groundwater and soil samples are described in FOPs located in Appendix A. A summary of the FOPs is presented at the beginning of Appendix A.

4.10 Data Usability Evaluation

Data usability evaluation procedures shall be performed for both field and laboratory operations as described below.

4.10.1 Procedures Used to Evaluate Field Data Usability

Procedures to validate field data for this project will be facilitated by adherence to the FOPs identified in Appendix A. The performance of all field activities, calibration checks on all field instruments at the beginning of each day of use, manual checks of field calculations, checking for transcription errors and review of field log books is the responsibility of the Field Team Leader.

4.10.2 Procedures Used to Evaluate Laboratory Data Usability

Data evaluation will be performed by the third party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program, *National Functional Guidelines for Inorganic Data Review*. The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

5.0 HEALTH AND SAFETY PROTOCOLS

Based on the previous investigation information, it is anticipated that the work to be completed at the Site will be done at level D personal protection. Should health and safety monitoring during field activities indicate a threat to field personnel or warrant an upgrade to level C protection, work will stop, site conditions will be re-evaluated, and the health and safety plan updated prior to further investigation activities. The Health and Safety protocols for the 251 Homer Street Redevelopment BCP are discussed in the Health and Safety Plan, attached as Appendix B.

6.0 REPORTING AND SCHEDULE

At the completion of the field work, a RI/AAR Report will be prepared.

6.1 Remedial Investigation Reporting

The RI section of the RI/AAR report will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

- Introduction and background;
- A description of the site and the investigation areas;
- A description of the field procedures and methods used during the RI;
- A discussion of the nature and rationale for any significant variances from the scope of work described in this RI Work Plan;
- The data obtained during the RI and historical data considered by TurnKey to be of useable quality. This will include geochemical data, field measurements, etc;
- Comparative criteria that may be used to calculate cleanup levels during the alternatives analysis report (AAR) process, such as NYSDEC Soil Cleanup Objectives and other pertinent regulatory standards or criteria;
- A discussion of contaminant fate and transport. This will provide a description of the hydrologic parameters of the Site, and an evaluation of the lateral and vertical movement of groundwater;
- Conclusions regarding the extent and character of environmental impact in the media being investigated;
- The conclusions of the qualitative human health and environmental risk assessments, including any recommendations for more detailed assessments, if applicable; and
- Supporting materials for RI data. These will include boring logs, monitoring well construction diagrams, laboratory analytical reports, and similar information.

In addition, TurnKey will require third-party data review by a qualified, independent data validation expert. Specifically, a Data Usability Summary Report (DUSR) will be prepared, with appropriate data qualifiers added to the results. The DUSR will follow NYSDEC format per the NYSDEC's September 1997 DUSR guidelines and DER-10 guidance. The DUSR and any necessary qualifications to the data will be appended to the RI report.

6.2 Alternative Analysis Report

The results of the RI work will be utilized to establish remedial goals and remedial action objectives (RAOs). A list of potentially applicable remedial technologies will be developed and screened. Criteria used to initially evaluate how the remedy would be protective of public health and the environment is included below.

1. Protection of Human Health and the Environment;
2. Standards, Criteria & Guidance (SCG);
3. Short-term Effectiveness & Impacts;
4. Long-term Effectiveness and Permanence;
5. Reduction of Toxicity, Mobility, or Volume;
6. Implementability;
7. Cost Effectiveness;
8. Community Acceptance;
9. Land Use

Based on the results of the AAR, in addition to public comments on the RI/AAR Report, a remedy will be recommended.

6.3 Schedule

The following schedule is associated with the 251 Homer Street Redevelopment field activities and RI/AAR report preparation. Please note, that due to harsh winter conditions, open field conditions of the Site and need to make surficial observations of petroleum contamination, the field work will beginin Spring 2011.

Submit Revised RI Work Plan:	January 2011
Perform RI field investigations:	April through June 2011
Submittal of RI/AAR Report:	August 2011

7.0 CITIZEN PARTICIPATION ACTIVITIES

The Citizen Participation (CP) activities for the 251 Homer Street Redevelopment are discussed in the "Brownfield Cleanup Program, Citizen Participation Plans for 251 Homer Street, Site ID #C905037, 251 Homer Street, Olean, Cattaraugus County, New York" dated September 2010. The CP Plan outlines how members of the affected and interested public are provided with information about how NYSDEC will inform and involve them during the investigation and remediation of the Site. Information such as project contacts, document repositories, site contact lists, and CP activities are provided in the CP Plan.

TABLES

TABLE 1

ANALYTICAL TESTING PROGRAM SUMMARY

RI / AAR WORK PLAN

251 Homer Street Site

Olean, New York

Location	Number of Proposed Locations	Matrix	Parameter[1]						
			TCL VOCs	TCL SVOCs	TAL Metals	Total Petroleum Hydrocarbons	PCBs	Herbicides	Pesticides
Area 1 - Area of Former Refinery Buildings									
Surface Samples	5	Surface Soil	-	5	5	-	1	1	1
Test Pits	18	Soil	10	10	10	10	1	1	1
Blind Duplicate[3]	-	Soil	1	1	1	1	1	1	1
MS/MSD[3]	-	Soil	1	1	1	1	1	1	1
Soil Boring/MW	2	Soil	2	2	2	2	1	1	1
Monitoring Well (MW)	2	Groundwater	2	2	2	2	-	-	-
Subtotal			16	21	21	16	5	5	5
Area 2 - Area of Surficial Petroleum Contamination									
Surface Samples	7	Surface Soil	-	7	7	-	1	1	1
Test Pits	14	Soil	7	7	7	7	1	1	1
Soil Boring/MW	2	Soil	2	2	2	2	1	1	1
Blind Duplicate[3]	-	Soil	1	1	1	1	1	1	1
MS/MSD[3]	-	Soil	1	1	1	1	1	1	1
Monitoring Well	2	Groundwater	2	2	2	2	-	-	-
Subtotal			13	20	20	13	5	5	5
Area 3 - Area of Former Oil Storage Tanks									
Surface Samples	3	Surface Soil	-	3	3	-	1	1	1
Test Pits	6	Soil	3	3	3	3	1	1	1
Soil Boring	4	Soil	4	4	4	4	1	1	1
Monitoring Well	4	Groundwater	4	4	4	4	-	-	-
Blind Duplicate[3]	-	Groundwater	1	1	1	1	-	-	-
MS/MSD[3]	-	Groundwater	1	1	1	1	-	-	-
Trip Blank[2]	-	Water	2	-	-	-	-	-	-
Subtotal			15	16	16	13	3	3	3
Former 2-Mile Creek On-Site Footprint									
Test Pits	10	Soil	5	5	5	5	1	1	1
Subtotal			5	5	5	5	1	1	1
Existing 2-Mile Creek (on-site portion) & Drainage Ditch									
Surface Water	4	Surface Water	4	4	4	4	4	-	-
Blind Duplicate[3]	-	Surface Water	1	1	1	1	1	-	-
MS/MSD[3]	-	Surface Water	1	1	1	1	1	-	-
Trip Blank[2]	-	Water	1	-	-	-	-	-	-
Sediment	4	Sediment	4	4	4	4	4	-	-
Blind Duplicate[3]	-	Sediment	1	1	1	1	1	-	-
MS/MSD[3]	-	Sediment	1	1	1	1	1	-	-
Subtotal			13	12	12	12	12	0	0
Sampling Totals			**62**	**74**	**74**	**59**	**26**	**14**	**14**

Notes:

1. Analyses will be performed via USEPA SW-846 methodology w/ equivalent Category B deliverables package.
2. Trip blanks will be submitted to the laboratory each day aqueous volatile organic samples are collected.
3. Blind duplicate and MS/MSD samples will be collected at a frequency of 1 per 20 samples/media collected.
4. Dedicated sampling equipment will be used for groundwater, soil/fill and sediment sample collection; therefore, an equipment blank is not required.

TABLE 2

PROJECT GOALS FOR PRECISION, ACCURACY & COMPLETENESS FOR LABORATORY MEASUREMENTS

RI / AAR WORK PLAN

251 Homer Street Redevelopment Site
Olean, New York

Analytical Method	Precision Goal [1] (RPD) [2]	Accuracy Goal (% R) [3]		Completeness Goal (%)
	Soil & Water	Soil	Water	
STARS 8021B or EPA 8260B	± 30	± 50	± 30	90
EPA 8270C	± 30	± 50	± 30	90
EPA 6010B and EPA 7470A/7471A	± 30	± 50	± 30	90
EPA 8082	± 30	± 50	± 30	90
Water Quality Parameters	± 30	NA	± 30	90

Notes:

1. Precision goals vary depending on the compound being analyzed; the precision goals presented are general in nature.
2. RPD = Relative Percent Difference
3. %R = Percent Recovery

TABLE 3

PROJECT GOALS FOR PRECISION, ACCURACY & COMPLETENESS
FOR FIELD MEASUREMENTS

RI / AAR WORK PLAN

251 Homer Street Redevelopment Site
Olean, New York

Measurement	Units	Precision Goal	Accuracy Goal	Completeness Goal
pH	pH units	± 0.2 unit	± 0.2 unit	90%
Temperature	degrees Celsius (^oC)	± 0.2 deg. C	± 0.4 deg. C	90%
Turbidity	NTU	± 0.05 NTU	± 0.05 NTU	90%
Specific Conductance	μS/cm at 25^{o}C mS/cm at 25oC	± 100 uS/cm ± 0.1 mS/cm	± 100 uS/cm ± 0.1 mS/cm	90%
Dissolved Oxygen	ppm	± 0.3 ppm	± 0.3 ppm	90%
Water Level	fbTOR	± 0.01 unit	± 0.01 unit	90%

Acronyms/Abbreviations:

fbTOR = feet below top of riser
mS = milli-Siemans
NTU = nephelometric turbidity unit
ug/L = micrograms per liter

TABLE 4

DATA MEASUREMENT UNITS FOR
FIELD & LABORATORY PARAMETERS

RI / AAR WORK PLAN

251 Homer Street Redevelopment Site
Olean, New York

Parameter	Units
Water Level	feet below top of riser (fbTOR)
pH	pH units
Temperature	degrees Celsius (^{o}C)
Turbidity	Nephelometric Turbidity Unit (NTU)
Specific Conductance	microsiemens per centimeter at 25^{o}C (μS/cm) millisiemens per centimeter at 25^{o}C (mS/cm)
Dissolved Oxygen (DO)	parts per million (ppm)
Concentration of parameter in soil sample	micrograms per kilogram (μg/kg) organic milligrams per kilogram (mg/kg) inorganic
Concentration of parameter in groundwater sample	micrograms per liter (μg/L) organic milligrams per liter (mg/L) inorganic
Hydraulic Conductivity	centimeters per second (cm/sec)
Photoionization Detector (PID)	parts per million by volume (ppmv)

TABLE 5

SAMPLE CONTAINER, VOLUME, PRESERVATION & HOLDING TIME REQUIREMENTS

RI / AAR WORK PLAN

251 Homer Street Redevelopment Site
Olean, New York

Matrix	Parameter [1]	Method [1]	Container Type	Minimum Volume	Preservation (Cool to 2-4 °C for all samples)	Holding Time from Sample Date
Soil/Sediment	TCL VOCs	8260B	WMG	16 oz.	Cool to 2-4 °C, Zero Headspace	14 days
	TCL SVOCs	8270C	WMG	16 oz.	Cool to 2-4 °C	14 days extrac./40 days
	TAL Metals	6010B	WMG	4 oz.	Cool to 2-4 °C	6 months/Hg 28 days
	Total Petroleum Hydrocarbons (GRO/DRO)	8015	WMG	4 oz.	Cool to 2-4 °C	14 days extrac./40 days
	Pesticides	8081	WMG	8oz	Cool to 2-4 °C	14 days extrac./40 days
	Herbicides	8151	WMG	8oz	Cool to 2-4 °C	14 days extrac./40 days
	PCBs	8082	WMG	4 oz.	Cool to 2-4 °C	14 days extrac./40 days
Groundwater/ Surface Water	TCL VOCs	8260B	glass vial	40 ml	Cool to 2-4 °C, HCl to pH<2,Zero Headspace	14 days
	TCL SVOCs	8270C	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days
	TAL Metals	6010B	plastic	600 ml	HNO_3 to pH<2, Cool to 2-4 °C	6 months/Hg 28 days
	PCBs	8082	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days
	Total Petroleum Hydrocarbons (GRO)	8015	glass vial	40 ml	Cool to 2-4 °C, HCl to pH<2,Zero Headspace	14 days
	Total Petroleum Hydrocarbons (DRO)	8015	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days

References:
1. Test Methods for Evaluating Solid Wastes, USEPA SW-846, Update III, 1991.

Notes:
1. EPA-approved methods published in Reference 1 above may be used. The list of analytes, laboratory method and the method detection limit for each parameter are included in Tables 1 and 2 of the QAPP.

Acronyms:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
TCL = Target Compound List
TAL = Target Analyte List
WMG = Wide Mouth Glass

FIGURES

APPENDIX A

FIELD OPERATING PROCEDURES

APPENDIX B

HEALTH AND SAFETY PLAN

ATTACHMENT A

EMERGENCY RESPONSE PLAN

ATTACHMENT B

HOT WORK PERMIT FORM

ATTACHMENT C

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN