May 28, 2015

Mr. James Craft
NYSDEC Region 8
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414

Subject: Revised Submittals for Turk Hill Park (Site # 828161)
1000 Turk Hill Road, Fairport, NY

Dear Mr. Craft:

CB&I Environmental & Infrastructure, Inc. (CB&I), on behalf of New Coleman Holdings, LLC is submitting this Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the 1000 Turk Hill Park Site for your review and approval. This work plan has been revised to incorporate the comments included in your April 17, 2015 Comment Letter and the technical issues discussed during our site meeting of April 30, 2015.

As requested, we have included a conceptual site model (CSM) checklist in the Work Plan. The checklist will serve as both a cross reference table and guide to identified data gaps. The CSM and the checklist will be updated and refined as investigations at the site are completed and additional technical data is obtained.

The Work Plan has been expanded to include the laboratory analysis of volatile organic compounds (VOCs), semi-VOCs (SVOCs), metals, pesticides and polychlorinated biphenyls (PCBs) for soil and groundwater samples. Soil samples for VOC analysis will be collected via encore samplers, immediately placed on ice and couriered to the laboratory the same day. The necessity to continue to monitor for all of these constituents will be evaluated during the course of this assessment work.

As discussed and agreed upon during the site walk, this RI/FS Work Plan includes the advancement of soil borings, overburden monitoring wells and bedrock monitoring wells as well as the excavation of 10 test pits to characterize the nature and content of the "mounds" that have been identified in the wooded area.. Each monitoring well cluster includes a bedrock well that is anticipated to be completed 10-feet into bedrock, an overburden well screened 15 to 25-feet bgs and an overburden monitoring well from 10 to -15-feet bgs. The necessity and ability to complete these “nested” overburden wells will be evaluated in the field and obviously be dependent upon the water bearing/hydrogeologic and geologic properties and depth to water within the overburden material.

A Fish and Wildlife Resource Impact Analysis will also be conducted during Phase 2 of the proposed field activities.

A Community Action Monitoring Plan (CAMP), Field Activities Plan (FAP), Quality Assurance Project Plan (QAPP) and site-specific Health and Safety Plan (HASP) have been completed for this site. The CAMP is included as Appendix B in the RI/FS. The FAP is included as Appendix C. and QAPP as Appendix D. The HASP was provided to NYSDEC under separate cover.
Finally, a proposed schedule is included as Appendix E. The schedule is based upon field activities discussed in the RI/FS Work Plan. The schedule is subject to modifications based on Field conditions and/or investigation results. Work can begin within 45 days of NYSDEC approval of the RI/FS Work Plan, weather depending. The anticipated start of the project is the end of June, 2015 with completion of Phase 1 prior to snow fall.

Finally, we have also included the approved Final Interim Remedial Measure (IRM) Vapor Intrusion (VI) Work Plan as Appendix A to the RI/FS Work Plan. As you are aware, this IRM was implemented during the 2014-2015 heating season. Furthermore, CB&I completed the indoor air sampling in Building 2 and the one proposed indoor air sampling location in Building 1 during the 2014-2015 heating season with the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH). A draft final report summarizing these sampling activities will be submitted to you upon receipt of the validation report.

Please do not hesitate to contact me with any questions or concerns regarding any of the revised submittals. My contact information is provided below.

Sincerely,

Heather A. Fariello

Heather A. Fariello, CHMM
Project Manager
CB&I

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J. Mahoney / NYSDEC (correspondence only)

REMEDIAL INVESTIGATION / FEASIBILITY STUDY WORK PLAN, REV. 1

Turk Hill Park Site
1000 Turk Hill Road
Fairport, Monroe County, New York

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414

Prepared by:

CB&I Environmental & Infrastructure, Inc.
13 British American Boulevard
Latham, NY 12110

Project No. 152918
May 2015

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Acronyms and Abbreviations

ACM	Asbestos Containing Materials
AEI	AEI Consultants
ALS	ALS Environmental, Inc.
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
ASP	Analytical Services Protocol (ASP)
BEACON	BEACON Environmental Services, Inc.
bgs	below ground surface
°C	degrees Centigrade
CAMP	Community Action Monitoring Plan
CB&I	CB&I Environmental & Infrastructure, Inc.
Cis-1,2-DCE	Cis-1,2- dichloroethylene
Canal Corp	New York State Canal Corporation
CLP	Contract Laboratory Program
COC	Chain of Custody
COPCs	Contaminants of Potential Concern
CPP	Citizen Participation Plan
CSM	Conceptual Site Model
DAY	Day Environmental, Inc.
DER	Department of Remediation
DER-10	Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010)
DI	de-ionized
DO	Dissolved Oxygen
Draft RIWP	Draft Remedial Investigation Work Plan
DUP	Duplicate
DUSR	Data Usability Summary Report
EB	Equipment Blank

EDD	Electronic Data Deliverable
EDR®	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
EMIS	Environmental Information Management System
ERA	Ecological risk assessment
ESA	Environmental Site Assessment
FAP	Field Activities Plan
GRA	general response actions
GZA	GZA GeoEnvironmental of New York
FB	Field Blank
FS	Feasibility Study
Ft	Feet
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
Hg	Mercury
HHRA	Human Health Risk assessment
HSA	Hollow Stem Auger
IAQ	Indoor Air Quality
ID	Identification
IDW	Investigation Derived Waste
IP	interface probe
IRM	Interim Remedial Measure
$\mu g/m^3$	Micrograms per cubic meter
mg/kg	milligram per kilogram
mg/L	milligram per liter
MS	matrix spike
MSD	matrix spike duplicate
MW	Monitoring Well
NAD	North American Datum

NAVD	North American Vertical Datum
NCH	New Coleman Holdings, Inc.
NTU	nephelometric turbidity units
NYSDEC	New York State Department of Environmental Conservation
NYSGWQS	NYSDEC Groundwater Quality Standards
NYSDOH	New York State Department of Health
NYSDOH VI Guidance	New York State Department of Health *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006)
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PES	PES Associates, Inc.
PID	photoionization detector
PRG	preliminary remedial goals
PSG	Passive soil gas
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAL	Remedial Action Levels
RAO	Remedial action objectives
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIWP	Remedial Investigation Work Plan
RSCO	Recommended Soil Cleanup Objective
SCG	Standards, Criteria and Guidance
SDG	Sample Data Group
SED	sediment
SITE	Turk Hill Park, 1000 Turk Hill Road, Fairport, Monroe County, New York
SSDS	Sub-slab depressurization system
STARS	Spills Technology and Remediation Series (STARS)
SVOCs	Semi-volatile organic compounds

TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TBCs	To be Considered
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TCL	Target Compound List
TOGS	Technical & Operational Guidance Series
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
USTs	underground storage tanks
VI	Vapor Intrusion
VI WP	Vapor Intrusion Work Plan
VOCs	volatile organic compounds

I, Heather Fariello, CHMM, certify that I am currently a NYS Qualified Environmental Professional and that this Remedial Investigation/Feasibility Study Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Heather A. Fariello

Signature

5/28/15

Date

1.0 INTRODUCTION

CB&I Environmental & Infrastructure, Inc. (CB&I) is submitting this Remedial Investigation / Feasibility Study (RI/FS) Work Plan outlining the site investigative activities proposed for the 1000 Turk Hill Road, Fairport, Monroe County, New York (Site) (**Figure 1**). The scope of services discussed herein has been prepared based upon the technical and administrative requirements detailed in the Order on Consent Index No. B8-0823-14-01, dated March 26, 2014, between the New York State Department of Environmental Conservation (NYSDEC) and New Coleman Holdings, Inc. (NCH) and discussed during the July 29, 2014 meeting between CB&I, NYSDEC, New York State Department of Health (NYSDOH) and Greenberg Traurig, LLP representatives as well as several conference calls and the April 30, 2015 meeting between NYSDEC, CB&I and a Parratt-Wolff, Inc. (CB&I's driller) representative.

1.1 Background

To date, several investigations have been conducted at this Site. A summary of these investigations is contained in CB&I's September 2014 *Records Search Report* (provided under separate cover). The history of the site has been developed based on findings generated as part of various historic environmental investigations.

Based on the results of previous investigations, the site has been classified as a Class 2 Inactive Hazardous Waste Site (Order on Consent Index No. B8-0823-14-01). This classification indicates that the "disposal of hazardous waste has been confirmed and the presence of such hazardous waste or its components or breakdown products represents a significant threat to public health or the environment." Soils, groundwater, soil vapor, and indoor air media have been impacted at areas across the site from historic site operations.

Previous investigations completed by BEACON Environmental Services, Inc. (BEACON) and PES Associates, Inc. (PES), indicated the potential for soil vapor issues to exist at the Site. On January 25 and 26, 2011 BEACON deployed 97 passive soil gas (PSG) samplers around the site. Ninety-four of the 97 PSG samplers were retrieved on February 12, 2011. According to BEACON, three PSG samplers could not be retrieved due to site conditions. PSG samplers contain hydrophobic adsorbents that allow for a wide range of target analysis. After collection, BEACON thermally desorbed the PSGs and analyzed for volatile organic compounds (VOCs) by gas chromatography/mass spectrometry equipment. Results showed areas of high VOC impacts. According to the *Draft Remedial Investigation Work Plan* (RIWP) prepared by PES; in April 2011 PES collected a total 41 vapor samples, 19 sub-slab soil gas and indoor air samples (each), one ambient outdoor air sample and two duplicate samples in Buildings 1-3 at the site. Samples were collected in summa canisters with 24-hour regulators. Trichloroethene (TCE) was detected in samples above the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, 2006). Moreover, combinations of sub-slab soil gas and indoor air results in Buildings 1 and 3 were in the Matrix 1 action range that recommended mitigation. Three out of the four sets of samples collected in Building 2 recommended monitoring and one recommended mitigation. The BEACON Passive Soil Gas Survey and PES Vapor Intrusion Investigation (completed 2011) both suggest areas that may be sources of VOCs and/or hydrocarbons. These areas are defined as:

- The former paint line near Building 1
- The former location of a degreasing station near Building 3
- The area of the former underground storage tank (UST), (which illustrates vinyl chloride impacts) at the southeastern end of the property (Building 2).

CB&I prepared an *Interim Remedial Measure (IRM) Vapor Intrusion Work Plan (VI WP)* to address the indoor air quality issues observed in Buildings 1 and 3. The Work Plan was approved by NYSDEC on October 21, 2014 and implemented in December 2014 and January 2015. The Final IRM VI WP is included as **Appendix A**.

1.2 Work Plan Development

As previously discussed, the Site has been designated a Class 2 on the Registry of Inactive Hazardous Waste Disposal Sites. The Registry indicates that disposal of TCE and its breakdown products at this site, presents a "significant threat to public health or the environment".

The purpose of the RI/FS described herein is to:

a. characterize environmental conditions at the Site and the adjacent segment of the Erie Canal,
b. investigate whether and to what extent past or current conditions at the Site have caused or contributed to contamination of the Erie Canal,
c. assess current and potential risk to human health and environment posed by conditions at the Site, and
d. develop and evaluate potential remedial actions as dictated by site observations and conditions.

The areas of investigation may be adjusted or expanded during the course of the RI as warranted based upon the findings of this investigation.

2.0 PRELIMINARY CONCEPTUAL SITE MODEL

2.1 Introduction

This section presents the current understanding of the Site, including its physical, ecological, and human elements based upon historic site investigative activities that have been completed. The Conceptual Site Model (CSM) has been prepared to provide a representation of the physical, chemical, and biological processes that affect the transport of contaminants of potential concern (COPCs) from sources to receptors within the system (NYSDEC, 2010). As such, the CSM provides the current understanding of processes affecting the Study Area. As detailed in Department of Environmental Remediation (DER)-10/*Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010),* the CSM will be updated throughout the RI/FS process as new information becomes available and will eventually be used as a tool to help select appropriate remedies for the Site. Although this section of the work plan describes the current understanding of the CSM for the Site, it also identifies aspects of the CSM which will be further refined by the work proposed in this Work Plan.

A successful CSM describes:

- Sources of potentially significant impacts of COPCs
- Nature and extent of COPCs
- Important fate and transport characteristics
- Potential exposure pathways
- Potentially impacted receptors.

A preliminary CSM was developed to integrate the existing site information, including media-specific chemical data, contaminant source data, site physical characteristics, and site background information into a coherent model describing contaminant migration pathways and transport in the site environment. The following section describes the current extent of understanding for the CSM and identifies proposed activities in the RI designed to address gaps in that understanding. Data gaps for the development of the CSM are further discussed in Section 4. For ease of use, a CSM Checklist is presented below with the corresponding page numbers.

Conceptual Site Model Checklist Requirement	Status	Required action
Facility		
Identify current and historical structures (e.g., buildings, drain systems, sewer systems, underground utilities)	Completed, Figures 7A-7D	None
Identify process areas, including historical processing areas (e.g., loading/unloading, storage, manufacturing)	Completed, Section 2.1.2	Completed to the best of our ability. No records exist based upon existing historical information
Identify current and historical waste management areas and activities	Completed	Completed to the best of our ability. No records exist based upon existing historical information.
Other		
Land use and exposure		
Identify specific land uses on the facility and adjacent properties	Completed, Section 2.1.1	None
Identify beneficial resources (e.g., groundwater classification, wetlands, natural resources)	Partially Completed, Section 2.2.5	Need to conduct Ecological Study
Identify resource use locations (e.g., water supply wells, surface water intakes)	Completed, Sections 2.2.4, 2.2.6, and 2.2.7	None
Identify subpopulation types and locations (e.g., schools, hospitals, day care centers)	Completed, Section 2.2.9	None
Identify applicable exposure scenarios (e.g., residential, industrial, recreational, farming)	Partially Identified	IRM completed to address indoor air concerns
Identify applicable exposure pathways (e.g., contaminant sources, releases, migration, mechanisms, exposure media, exposure, routes, receptors)	Partially Identified	On-going; monitoring wells and soil borings proposed for RI; IRM completed to address indoor air concerns
Other		
Physical features		
Identify topographical features (e.g., hills, gradients, surface vegetation, or pavement)	Completed, Section 2.1.1	None
Identify surface water features (e.g., routes of drainage ditches, links to water bodies)	Completed, Section 2.2.3	None
Identify surface geology (e.g., soil types, soil parameters, outcrops, faulting)	Completed, Section 2.2.2	None

Conceptual Site Model Checklist Requirement	Status	Required action
Physical features continued		
Identify subsurface geology (e.g., stratigraphy, continuity, connectivity,	Completed, Section 2.2.1	None
Identify hydrogeology (e.g., water-bearing zones, hydrologic parameters, impermeable strata, direction of groundwater flow,	Partially Identified, Section 2.2.3	On-going; monitoring wells to be installed during RI
Identify existing soil boring and monitoring well logs and locations	Partially Identified	On-going; monitoring wells and soil borings proposed for RI
Release information		
Identify potential sources of releases	Completed, Section 2.4	None
Identify potential COCs associated with each potential release	Completed, Section 2.4	None
Identify confirmed source locations	Completed, Section 2.4	None
Identify confirmed release locations	Completed, Section 2.4	None
Identify existing delineation of release areas	Completed, Section 2.4	Installation of monitoring wells and advancement of soil borings to further delineate impacts, migration routes and fate/transport
Identify distribution and magnitude of COPCs and COCs	Completed, Section 2.4	
Identify migration routes and mechanisms	Not complete	
Identify fate and transport modeling results	Not complete	
Risk management		
Summarize the risks	Not complete	Will be determined after remedial investigation
Identify impact of risk management activities on release and exposure		
Identify performance monitoring locations and media		
Identify contingencies in the event performance monitoring criteria are		
Other		
Cleanup		
Identify study options	Not complete	Will be determined after remedial investigation
Identify study requirements		
Identify cleanup options		
Identify cleanup requirements		
Other		

Site Description

2.1.1 Physical Description

The Site is bounded by Turk Hill Road to the west and north, the western banks of the Erie Canal to the east and residential properties as well as the Rochester, Syracuse and Eastern Trail to the south. The area is comprised of a mixed commercial and residential area in the Village of Fairport. The Site, approximately 7.86 acres in size, has three buildings varying in age from 1908 to 2006. The buildings are subdivided as follows:

- Building 1 – 23 tenant spaces;
- Building 2 – 31 tenant spaces
- Building 3 – 17 tenant spaces.

Currently Turk Hill Park is operating at an 89% occupancy. The buildings are surrounded with asphalt-paved parking and landscaping. A 2^{+}-acre wooded lot is located on the southern portion of the property. A Site Plan depicting Buildings 1 – 3 is presented as **Figure 2**.

2.1.2 Site Background

As detailed in the Records Search Report, the Turk Hill Park buildings, located next to the Erie Barge Canal, were constructed in the late 1890s/early 1900s by Cobbs Canary, a food canning and processing company who operated at property until the 1950s. It is unknown whether barges were used for transportation of good manufactured on site. Prior to 1900, can tops were soldered on with lead solder, which contained up to 95% lead and 5% tin, as part of the manufacturing operations. The cans were constructed of tin and often the interior the interior was coated with zinc for corrosion protection. Lead and asbestos were reportedly widely used in lead-based paint and building materials used to construct and maintain the building post World War I based upon information provided to CB&I by the NYSDEC. For these reasons asbestos, lead, tin and zinc are considered possible sources of contamination at the Site. It is likely that coal and fuel oil were used as heating sources for the plant and steaming of the cans during manufacturing.

Turk Hill Park buildings, located next to the Erie Barge Canal, were constructed in the late 1890s by Cobbs Canary, a food canning and processing company that operated at the property until the 1950s. Crosman Arms used the site as a manufacturing facility from the 1950s into the 1980s. Historic operations included, but may not have been limited to, manufacturing, machine coating, plating operations, cooling, painting and degreasing. The East-West Bloomfield landfill received metal sludges from the mid-1970s to the early 1980s. In 1984, the improved structures at the site were divided into the multi-unit complex that is currently operated as Turk Hill Park.

Previous report indicated that presence of two 500-gallon underground storage tanks (USTs) located at this site. These USTs, reportedly located on the south side of Building 3 (current day Building 14), contained cutting oil and lube oil and were removed in 1994.

The following information on the site's early history is a compilation of documents from the Local History sections of the Rochester and Fairport Public Libraries (history books, Plat and Sanborn maps, annual City Directories, a collection of Crosman newspaper clippings dating back to 1926) and internet searches:

- *1952/53 – Moved to Fairport into old canning factory at 1000 Turk Hill Rd. Production ramped up driven by national accounts such as Sears Roebuck & Co., Montgomery Ward, and Western Auto. All sold Crosman's products under their respective brand names. In 1966, Crosman introduced its own Crosman branded airgun, the Pumpmaster 760 with more than 16 million rifles sold to date.*

Based upon the age of the buildings and historic site operations, the following are considered potential contaminants of concern:

- Various metals;
- Asbestos;
- Petroleum hydrocarbons / polycyclic aromatic hydrocarbons compounds / cutting oils/lube oils; and,
- Volatile organic compounds (including, but not limited to TCE).

A portion of Building 1 over the former paint line area was demolished in 2004. Approximately 280 cubic yards of contaminated soil from the former paint line area as well as the loading dock area was removed at this time. A new building was constructed in completed in 2006. Multiple investigations have been conducted at the site beginning around 1990; however, the majority of reports reviewed did not include figures depicting where data as collected. CB&I reviewed the reports and prepared a figure with sample results; this figure and apparent sampling locations was based upon the figures and data presented in both the Leader Professional Services, Inc. (Leader)'s March 1, 2006 <u>*Summary of Contaminant Delineation and Removal Activities*</u> letter report and AEI Consultants' (AEI) <u>*Supplemental Phase II Subsurface Investigation Report*</u> (February 26, 2009) as well as the data presented in Day Environmental, Inc.'s (Day) Phase II Environmental Study. The map is included as **Figure 3**.

2.2 Environmental Setting

2.2.1 Regional Geology

The United States Geologic Survey's (USGS's) Quaternary Geologic Map of the Fairport Quadrangle, the Site is located approximately 475 feet above mean sea level. The 1972 United States Department of Agriculture Soil Conservation Service's Soil Survey of Monroe County indicates that the Site is comprised of Ontario Loam; characteristics include moderate permeability and a medium acidic soil reaction. The Draft RIWP states that "the Halsey soil series is classified as a well-drained soil with an approximate depth of 50 inches below ground surface". Reportedly, seasonally high water table is 2 to 4 feet below ground surface (ft bgs).

The Site is located within the Lake Erie-Ontario Basin physiographic province of New York which is underlain by sedimentary rocks consisting mostly of shale and limestone (1987 Geologic Map of New York State, published by the State University of New York). No existing wells or borings have been advanced into these units based upon information provided to CB&I.

2.2.2 Local Geology

Based on information gathered from previous investigations, fill material is located on site near the shoreline of the Erie Canal. Native soils consist of mainly dark brown fine sandy to silty clays to refusal. On average, refusal has been encountered between 10 and 27-feet bgs. Portions of the site reportedly have been filled with sediments that were dredged and removed from the adjacent Erie Canal.

2.2.3 Hydrogeology

Based on information gathered from previous reports, groundwater on site ranges from approximately 1 to 24 ft bgs.

The Erie Canal is located immediately north of the Site and flows to the east. Since no monitoring wells exist at the Site, it is assumed that the Canal likely represents the regional groundwater discharge point based upon existing information.

2.2.4 Wells

According to the Environmental Data Resources, Inc. (EDR® Radius Map™ with GeoCheck® there are 16 United States Geological System (USGS) water wells within a mile of the site. None of water wells are located on the Site and the two closest wells are located approximately

1/8 to 1/4-mile upgradient of the Site. Additionally, there are no public water supply wells located within a mile of the Site.

2.2.5 Wetlands

There are no wetlands on or adjacent to the site according to the EDR® Radius Map™ with GeoCheck® and the National Wetlands Inventory Map.

2.2.6 Discharges

There is one stormwater outfall on-site near the southeast corner of Building 1. Mr. Cicero (CanalWorks General Manger), did not believe that the outfall was permitted. The outfall is connected to the stormwater drains on site. It discharges to the Erie Canal.

2.2.7 Utilities

The Monroe County Water Authority supplies water to the Site. Sewers on site are served by the Fairport Sanitary Sewer System. The site is powered by Fairport Electric (electric supplier) and Rochester Gas and Electric (supplies natural gas for heating).

Storm water drains into storm sewers on the site and eventually discharges to the Erie Canal. There are no known wells or septic systems on the site.

Hand drawn utility maps provided by the Site's current General Manager are included as **Figures 7A** through **7D**.

2.2.8 Climate

Fairport, New York receives approximately 32-inches of rain per year which is slightly less than the United States average (37-inches per year). Approximately 47-inches of snow, falls per year which is higher than the average United States city which receives 25-inches of snow. The summer high is around 82°F and the low is about 18°F.

2.2.9 Sensitive Receptors

According to the EDR® Radius Map™ with GeoCheck®, there are no sensitive receptors within a mile radius of the Site.

2.3 Data Evaluation

Screening criteria were selected to evaluate contaminants that have been detected in site media (soil, groundwater, surface water, sediments, indoor air and soil gas) during historic site investigations to support evaluation and identify gaps in the existing data. Whenever possible, established regulatory criteria, known as chemical-specific applicable or relevant and appropriate requirements (ARARs), were used for the screening criteria values. In addition to ARARs, regulatory guidance values, known as "to be considered" (TBC), were also used.

These screening criteria will be revised and updated during the course of the RI based on input from the NYSDEC, NYSDOH and pertinent stakeholders. Screening criteria were compiled from various sources as described below. Note that background values were not developed for this preliminary CSM and the existing data were not screened against background concentrations.

- Soils – DER-10 and Final Commissioner Policy CP-51/Soil Cleanup Guidance CP-51
- Groundwater – New York State Groundwater Quality Standards
- Sediment – Draft Screening and Assessment of Contaminated Sediment, January 2013
- Indoor Air and Soil Gas – New York Department of Health Guidance to Evaluating Soil Vapor Intrusion in the State of New York, October 2006.

Although all data were screened against site-specific screening criteria and summarized in this section, TCE, cis-1,2-dichloroethylene (DCE), and vinyl chloride were selected as indicator contaminants based upon historic site operations and previous reports which indicated that these constituents should be considered as the “contaminants of concern”. This approach was used to evaluate the existing soil, groundwater, air and soil gas data. Additionally, the following information was also considered in the selection of indicator contaminants.

- The frequency and magnitude of indicator contaminants in samples that exceeded screening criteria.
- The occurrence of other VOC compounds in the samples.

The evaluation of data gaps is focused on the extent and spatial distribution of indicator compound concentrations that exceed applicable screening criteria in site media.

2.4 Summary of Historical Data

This Site has been the subject of numerous environmental investigations data back to 1990. The previous investigations are summarized in CB&I’s *Record Search Report*, September 2014 (provided under separate cover). As shown on **Figure 3**, VOC impacts (TCE in particular) have been observed in soil at concentrations exceeding the unrestricted use soil clean up objective

(UUSCOs) and New York State Ground Water Quality Standards (NYSGWQS) based upon the data provided to CB&I.

In January 2002, DAY advanced 17 test borings to either evaluate potential releases to the subsurface from Building #1's drainage ditch or to evaluate the Erie Barge Canal fill material that was reportedly used to fill portions of the site to grade. No figures showing the test boring locations were included in the report reviewed by CB&I. A figure showing locations of test borings 1-4 and 10-17 were shown in the Leader report and have been included in **Figure 3**. Two samples [TB-1 (12-13') and TB-16 (6-7')] had TCE concentrations above the reported analytical laboratory detection limits but below the recommended soil cleanup objectives (RSCOs) contained in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046. Two other samples [TB-4 (6-8') and TB-4 (8-9.5')] detected six or more VOCs in each sample above the reported analytical laboratory detection limits but below RSCOs, with the exception of m,p-xylene which was above the RSCO in both samples.

According to the DAY report, four samples were also analyzed for SVOCs. Naphthalene was detected in one sample but the result was below the recommended soil cleanup objective in TAGM 4046. The other sample had 10 SVOC detections; however, only three constituents (benzo(a)anthracene, chrysene and benzo(a)pyrene) were detected above the TAGM 4046 recommended soil cleanup objectives.

Five or more metals were detected in each of the soil samples analyzed for metals. The detections were above the reported analytical laboratory detection limits; each sample had at least one metal constituent above the RSCOs. No PCBs were detected in any of the samples.

Also, DAY observed no staining near the drainage trench in Building 1 as reported in previous reports. Furthermore, DAY indicated that the test borings advanced in the drainage trench area did not show evidence of contamination and the staining previously observed was likely indicative of groundwater contamination and "not leakage from Building 1".

According to the 2004 Leader report seven soil and groundwater samples were collected in the alley between Buildings 1 and 2 during the spring of 2004. Soil borings were advanced to refusal in weathered shale (11 to 15.5-feet below ground surface). "No stains, odors, or volatile organic vapors were encountered in the soil samples…" (Leader, 2006). TCE detections in soil ranged from nondetect (Sample 6, furthest northwest sample) to 1,900 ppb (Sample B-10, directly south of the sump in the middle portion of Building 1 [Figure 1, Building 1 Sampling Results, Leader 2006]. TCE was detected (26 ppb) in the further western sample (Sample 1).

"Nine groundwater samples were collected during two sampling events in the alley south of Building 1. Groundwater samples were difficult to obtain because of the small amount of groundwater available for sampling and in many cases it took hours for the monitoring wells to recharge for sampling. TCE was found in the groundwater with the highest concentrations centered on the property's sewer pump station south of Building 1" (Leader, 2006).

In August 2004, Leader removed approximately 210 cubic yards of soil after a larger portion of Building 1 was demolished. According to *The Summary of Contaminant Delineation and Removal Activities Report* (Leader, 2006) the "contaminated soil extended from the ejector pump area to the east and north to areas beneath the former paint storage area... Contamination appeared to follow old foundations, buried floor slabs, and sandy soil….in general groundwater was not encountered…the excavator was directed to dig several deep holes to a depth of approximately 13 feet but groundwater was not observed. Contamination did not appear to extend beyond the 8 to 10 foot depth throughout the area." Figure 3 in the 2006 Leader Report shows the limits of excavation extending south of the original footprint of Building 1.

In the spring of 2004 Leader advanced borings to refusal between Building 1 and 2 to delineate TCE impacts in both soil and groundwater. According to the 2006 report, the highest VOC concentrations were observed near the site's sewer pump station and the loading dock at the east end of the building In April 2004, approximately 70 cubic yards of soil was removed adjacent to the eastern most loading dock at Building 1. No groundwater was observed during excavation activities; all soil samples collected were below the RSCOs

Additional detail on the historical data that was reviewed to prepare this preliminary CSM includes the following:

2.4.1 Environmental Audit, Lozier Architects/Engineers, March 1995.

2.4.1.1 Description

The report was a summary of the June 1994 UST removal project and presented the February 1995 sampling results of the suspected asbestos containing materials (ACM) at the site.

2.4.1.2 Findings

One UST stored cutting oil and the other lube oil. According to the report, the USTs were both partially filled with water and oily residue. During the removal process some contents were spilled into the excavation. Approximately 200 gallons of "oil water" was removed from the excavation and pumped back into the tanks. Two samples (one composite sample of each of the side walls and one grab from the bottom of the excavation) were collected and sent for VOC analysis via United States Environmental Protection Agency (USEPA) Method 8240 and semi-volatile organic compounds (SVOCs) via USEPA Method 8270. The results of the sampling were non-detect for VOCs and SVOCs. The excavation was backfilled with clean soil.

The oily water was disposed of by Bison Waste Oil Company. The soil samples collected from the stockpiled soil indicated that no target compounds were present; the stockpile was recommended for use on site.

Additionally, it was determined that there were ACM present at the property. The location and extent of this material was not noted in this report.

2.4.2 Phase I Environmental Site Assessment, GZA GeoEnvironmental of New York, June 2001

2.4.2.1 Description

GZA performed a Phase I Environmental Site Assessment (ESA) for the site.

2.4.2.2 Findings

The following concerns related to potential impacted media at the site included:

- Several chemical storage areas and/or poor housekeeping were noted throughout the various facilities. Historic information reviewed by GZA indicated that Crosman's manufacturing process generated hazardous wastes, which mainly consisted of zinc sludge and TCE. Reportedly, the zinc sludge was disposed at a local landfill and the TCE was taken to another Crosman facility for recycling.
- Heavy staining was noted near a drainage trench in Building 1. The report stated that drippings from stripping, staining, or refinishing were power washed into the drainage trench.

GZA made the following recommendations regarding soil and groundwater at the Site:

- Subsurface exploration to determine if impacts to soil and groundwater were present due to historic fill material, property use, generation of waste zinc sludge and TCE and use of drainage trenches.
- Dye testing the drainage trench in Building 1 to confirm discharge locations.

2.4.3 Phase II Environmental Study, Turk Hill Office Park, Fairport, New York, Day Environmental, Inc., April 2002.

2.4.3.1 Description

In January 2002, Day Environmental, Inc. (DAY) performed a Phase II ESA at the site to further evaluate the concerns noted in GZA's Phase I ESA. In the "Background and Previous Studies" section of the report, Day references the Environmental Site Investigation, Turk Hill Park, Fairport, New York 90577 report by North State Consultants, May 30, 1990. The summary of the North State Consultants report references the following environmental concerns: two USTs that formerly contained waste oil, historic site usage (chemical usage, paint booth compliance and suspected ACM). As part of the phase II, DAY personnel also completed a magnetic locator survey, reviewed utilities, advanced test borings and collected soil samples across the site.

The magnetic survey was completed to determine the presence of USTs and/or associated piping; none was found. Seventeen test borings were advanced in areas to either evaluate potential releases to the subsurface from Building #1's drainage ditch or to evaluate the Erie Barge Canal fill material that was reportedly used to fill portions of the site to grade. Soil samples collected from these borings were screened for one more of the following: USEPA Target Compound List (TCL) and NYSDEC Spill Technology and Remediation Series (STARS) list VOCs via USEPA Method 8260, NSYDEC STARS-list base/neutral SVOCs via USEPA Method 8270, polychlorinated biphenyls (PCBs) via USEPA Method 8082, metals via USEPA Methods 6010 and 7471.

2.4.3.2 Findings

Two samples detected TCE concentrations above the reported analytical laboratory detection limits but below the recommended soil cleanup objectives (RSCOs) (NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046). Two other samples detected six or more VOCs in each sample above the reported analytical laboratory detection limits but below RSCOs, with the exception of m,p-xylene which was above the RSCO in both samples.

Four samples were also analyzed for SVOCs. Naphthalene was detected in one sample but the result was below the recommended soil cleanup objective in TAGM 4046. The other sample had 10 SVOC detections; however, only three constituents (benzo(a)anthracene, chrysene and benzo(a)pyrene) were detected above the TAGM 4046 recommended soil cleanup objectives.

Five or more metals were detected in each of the soil samples analyzed for metals. The detections were above the reported analytical laboratory detection limits; each sample had at least one metal constituent above the RSCOs

No PCBs were detected in any of the samples.

Also, DAY observed no staining near the drainage trench in Building 1 as reported in previous reports. Furthermore, DAY indicated that the test borings advanced in the drainage trench area did not show evidence of contamination and the staining previously observed was likely indicative of groundwater contamination and "not leakage from Building 1".

2.4.4 Summary of Contaminant Delineation and Removal Activities, Leader Professional Services (Leader), March 1, 2006.

2.4.4.1 Description

Leader was retained to delineate contamination identified as part of DAY's 2002 Phase II ESA. In March through May of 2004 Leader advanced additional borings to refusal (~15.5 feet below ground surface) in the alley south of Building 1 as well as the area south of Building 10 to delineate the observed TCE impacts. Leader also collected a total of nine groundwater samples between two events in an attempt to further delineate the observed TCE contamination in groundwater. The report indicated that the "groundwater samples were difficult to obtain because of the small amount of groundwater available for sampling". The report was not clear as to why there was such a low groundwater yield. The report further states that highest VOC concentrations were observed near the site's sewer pump station, south of Building 1 and the northern loading dock of Building 8.

On April 5, 2004 Leader supervised the removal of approximately 70 cubic yards of soil from the east side of Building 8. These soils were removed due to elevated analytical results, staining, and evidence of cinder and ash. No groundwater was observed during soil removal activities. Additional soil samples were collected and no VOCs were detected above pertinent standards as detailed below.

2.4.4.2 Findings

Approximately 210 cubic yards of soil was removed on August 27, 2004, after the demolition of Building 1 and adjacent buildings. Contamination was observed from the "ejector pump area to the east and north to areas beneath the former paint storage area. Contamination appeared to follow old foundations, buried floor slabs and sandy soils." Groundwater was not encountered in the excavation with the exception of perched water that was observed adjacent to foundation walls. One soil sample collected as part of the Building #1 removal activities contained acetone concentrations above the NYSDEC soil cleanup guidelines. Approximately 5 cubic yards of soil removed from this area on September 7, 2004 to address the acetone impacts. This area was re-sampled and results showed no elevated concentrations of VOCs

2.4.5 Supplemental Phase II Subsurface Investigation, AEI, February 26, 2009.

2.4.5.1 Description

AEI Consultants (AEI) conducted a subsurface investigation to further evaluate the detection of TCE in AEI-B2 located in the central portion of the property, southeast of Building 1. A total of six soil borings were advanced at the Site and three sub-slab soil vapor samples were collected in each of the three Site buildings as part of this investigation. Borings were advanced to groundwater or refusal, whichever came first. Two of the soil borings (AEI-B8 and AEI-B9) were sent for laboratory analysis of VOCs.

2.4.5.2 Findings

In general, soils were dark brown fine sandy to silty clays. Bedrock was encountered in two of the borings (AEI-B8 and AEI-B9) at approximately 15 to 16 feet bgs. Groundwater was encountered between 20 and 23 ft bgs in the remaining four borings.

TCE was detected at 27 ppb (AEI-B8-15') and at 2,900 ppb in AEI-B9-15'. Toluene was also detected (71 ppb) in AEI-B9-15'. No other VOC constituents were detected in either soil sample.

The following analytes were detected in the groundwater samples:

- Trichlorofluoromethane – 35 ppb (AEI-B4)
- Cis-1,2-DCE – 6.0 ppb (AEI-B4, AEI-B5 and AEI-B6), 10 ppb (AEI-B7)
- TCE – 32 ppb (AEI-B5), 16 ppb (AEI-B6), 47 ppb (AEI-B7)

Additionally, antimony, beryllium, chromium, lead, and/or nickel were detected above their respective ambient water quality standards (AWQAS) in the groundwater samples AEI-B4, AEI-B5 and AEI-B6. No metals were detected above standards in AEI-B7.

TCE was detected above the NYSDOH air guidance value (5 micrograms per cubic meter [$\mu g/m^3$]) in soil vapor samples AEI-SV1, AEI-SV2, AEI-SV3. All detections of PCE were below the NYSDOH air guidance value (100 $\mu g/m^3$).

2.4.6 Passive Soil-Gas Survey – Analytical Report, Beacon Environmental Services, Inc., February 28, 2011.

2.4.6.1 Description

Between January 25, 2011 and February 10, 2011 ninety-four (94) passive soil-gas samples were collected in a grid pattern on site and sent to BEACON Environmental Services, Inc., (BEACON) for analysis or VOCs in accordance with USEPA Method 8260C (modified).

2.4.6.2 Findings

Twenty samples had detections for vinyl chloride, 45 for cis-1,2-DCE, and 32 results for TCE. The highest vinyl chloride and cis-1,2-DCE results were detected in sample #26 located in the southeastern end of Building 3. The highest concentrations were 61,594 nanograms (vinyl chloride) and 818,527 nanograms (cis-1,2-DCE). The highest TCE concentration (11,736 nanograms) was detected in sample #51 located on the south side of eastern section of Building 1.

2.4.7 Phase II Supplemental Investigation Report, Vapor Intrusion Survey, PES Associates, Inc., July 29, 2011.

2.4.7.1 Description

PES Associates, Inc. (PES) conducted a pre-audit survey and a Phase II vapor intrusion survey at the site between April 1 and 3, 2011 to determine what concentrations of soil vapor were present and if actions were necessary to address exposure issues based upon the data generated by Beach as detailed above. A total of 41 vapor samples (19 sub-slab soil gas samples, 19 indoor air samples, one ambient outdoor air sample and two duplicate samples) were collected in Summa canisters over a 24-hour period from Buildings 1 through 3 at the end of the 2011 heating season. Additionally, five sub-slab samples were collected from Building 2, six sub-slab samples were collected from Building 3 and seven sub-slab samples were collected from Building 1.

2.4.7.2 Findings

The pre-audit survey and sampling were completed in accordance with the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, October 2006 (NYSDOH VI Guidance). During the pre-audit survey hazardous materials (e.g., paints, varnishes, solvents, adhesives, oils, etc.) were identified as being present without their corresponding MSDS and Building 3 was found to have unrestricted airflow.

Analytical results for TCE, PCE, carbon tetrachloride and 1,1,1-TCA were compared to the applicable NYSDOH "Soil Vapor/Indoor Air Matrix" (either Matrix 1 or 2) in the NYSDOH VI Guidance to determine what further actions would be necessary. Recommendations based on the analytical results and risk-based decision matrices from the NYSDOH VI Guidance are as follows:

- Building 1: TCE concentrations ranged from 15 to 2,500 µg/m^3 in sub-slab samples and from 2.9 to 160 µg/m^3 in the indoor air samples. PCE concentrations ranged from 1.4 to 28 µg/m^3 in sub-slab samples and from 1.7 to 12 µg/m^3 in the indoor air samples. There were no detections for carbon tetrachloride in any of the indoor air samples; concentrations in sub-slab samples ranged from non-detect to 6.2 µg/m^3. 1,1,1-TCA was not detected in any of the indoor air samples; the corresponding sub-slab sample concentrations ranged from 1.4 to 43 µg/m^3. The NYSDOH Decision Matrix recommends mitigation of Building 1 because of the reported TCE concentrations. The NYSDOH Decision Matrices indicates that the source(s) of PCE and carbon tetrachloride should be identified and that no further action is necessary for 1,1,1-TCA.

- Building 2: TCE concentrations ranged from 6.4 to 170 µg/m^3 in sub-slab samples and from 0.71 to 9.7 µg/m^3 in the indoor air samples. PCE concentrations in both sub-slab and indoor air samples ranged from non-detect to 49 µg/m3. There were no carbon tetrachloride detections in any of the sub-slab samples; indoor air concentrations ranged from non-detect to 0.90 µg/m^3. 1,1,1-TCA was not detected in any of the indoor air samples; the corresponding sub-slab sample concentrations ranged from non-detect to 3.4 µg/m^3. According to the NYSDOH Decision Matrix #1 guidance, Building 2 should be mitigated because of the TCE concentrations. The NYSDOH Decision Matrices indicates that the source(s) of PCE and carbon tetrachloride should be identified and that no further action is necessary for 1,1,1-TCA.

- Building 3: TCE concentrations ranged from 21 to 7,600 µg/m^3 in sub-slab samples and from 1.7 to 9.8 µg/m^3 in the indoor air samples. PCE concentrations ranged from 27 to 45 µg/m^3 in sub-slab samples and from non-detect to 3.6 µg/m^3 in the indoor air samples. There was one carbon tetrachloride detection (0.83 µg/m^3) in the indoor air samples. Sub-slab sample concentrations for carbon tetrachloride ranged from non-detect to 1.5 µg/m^3. 1,1,1-TCA was not detected in any of the indoor air samples or sub-slab samples. The NYSDOH Decision Matrix #1 guidance recommends mitigation of Building 3 because of the reported TCE concentrations. The NYSDOH Decision Matrices indicates that the source(s) of PCE and carbon tetrachloride should be identified and that no further action is necessary for 1,1,1-TCA.

2.5 Investigation Areas

The Draft RIWP identified five areas of concern (AOCs). The AOCs are shown graphically on **Figure 3** and described below.

- AOC 1: TCE in groundwater west of Building 3
- AOC 2: TCE in soil (and groundwater) in the area of the sewer pump station near the Former Crosman Paint Line
- AOC 3: TCE vapor intrusion issues potentially of concern in all three buildings
- AOC 4: TCE, DCE, vinyl chloride soil (and groundwater) impacts along the eastern end of Building 3 near the former Crosman UST area; and
- AOC 5: TCE, DCE, and vinyl chloride soil and groundwater impacts along the northwestern side of Building 3 near the former degreasing area.

In the July 2014 NYSDEC comment letter, it was requested that two additional AOCs be added: The Erie Canal and the wooded area east of Building 3. Since there has been fragmented investigations performed at the site over the years and limited figures showing result locations, the above AOCs have been organized into the study areas below. Additionally the new organization of AOCs will include potential other contaminants of concern such as metals, SVOCs and PCBs as discussed in the comment letter.

- AOC 1: Building 1
- AOC 2: Building 2
- AOC 3: Building 3
- AOC 4: Banks of the Erie Canal
- AOC 5: Wooded Area

2.6 Data Gap Evaluation

As previously discussed there have been multiple investigations completed at the Site over the past 20^+ years. Although significant volumes of data has been collected the exact locations of some of the soil and groundwater sampling points and resulting data remains unknown. Specifically, no groundwater monitoring wells are currently present at the Site and minimal groundwater data, of suspect quality, has been generated over the course of the site assessment activities according to NYSDEC. The NYSDEC in recent correspondence has indicated that groundwater quality is a noticeable data gab that should be addressed as part of ongoing site assessment activities. Gaps in existing data by Site Area and recommendations to address those data gaps area described below.

2.6.1 AOC 1: Building 1

Contaminated soil was removed from this area during building demolition and reconstruction in 2004. Analytical results generated during the passive soil gas and indoor air investigations indicate that some adsorbed/impacted soil may remain under or adjacent to Building 1 (assuming that vapor phase impacts are originating from soil impacts). A sub-slab depressurization system (SSDS) was installed in Building 1 as part of an IRM (**Appendix A**) to address indoor air concerns that are likely originating from these soils.

Since there is limited groundwater data and no monitoring wells at the Site, seven soil borings advanced to bedrock or refusal (whichever comes first), are proposed in the area of Building 1 (**Figure 5**). One location is proposed for soil boring advancement only: southeast corner of Present day Building #2. The remaining six boring locations will be converted to monitoring wells as described in Section 4.1.5. Four soil borings will be advanced between Building 1 and the Erie Canal upgradient of the area of highest contamination observed during the passive soil gas survey as shown on Figure 5. The soil borings north of Present day Buildings #2 and 4 will be converted to overburden monitoring wells. A well cluster (shallow and medium overburden monitoring wells and a bedrock well) will be installed north of Present day Building #3 One boring/monitoring well will be installed near the northeast corner of the Building (Present day Building #8). The proposed fifth boring/monitoring well location is located east of present day Building #8 and northeast of present day Building #12. It is at the intersection of AOCs 1, 2 and 3. The last soil boring/monitoring well location is located adjacent south to Present day Building #1 (outside the former paint lines) in the sidewalk between the building and the alleyway. The ability to install soil boring and/or monitoring wells within Building 1 was not feasilble or safe, give the physical limitations imposed and use of the space for "clean" manufacturing, and shipping of medical devices. Soil from the boring/monitoring well installations will be screened using a handheld PID or similar screening device for VOCs and a sample will be collected and sent for laboratory analysis as described below in Section 4.1.4.

2.6.2 AOC 2: Building 2

Review of historic data and conversations with an employee who worked at the Site during use by Crosman indicated that Building 2 was used more for administrative purposes and less for operations in comparison to Buildings 1 and 3. Indoor air data suggests that low levels of contaminants may be present. An indoor air assessment of Building 2 was conducted during the

2014-2015 heating season. Results of the sampling will be presented to NYSDEC in a separate submittal.

Two soil borings will be advanced/installed in the vicinity of Building 2 during the first phase of work to aid in the determination of groundwater flow and evaluation of groundwater quality at the Site. One of the soil boring locations will be converted to a single overburden monitoring well. The other location will be converted to a monitoring well cluster (two overburden monitoring wells and one bedrock monitoring well). It is anticipated that the monitoring well clusters will be screened accordingly (based on the assumption that bedrock is at 25-feet bgs):

- MW-XS: 10 to 15-feet bgs,
- MW-XM: 15 to 25-feet bgs; and,
- MW-XD: 25 to 35-feet bgs.

Soil from the boring/monitoring well installations will be screened and a sample will be collected and sent for analysis as described below in Section 4.1.4.

2.6.3 AOC 3: Building 3

Review of historic data and conversations with an employee who worked at the Site by Crosman indicate that solvents were used in manufacturing activities that were completed in Building 3. The Draft RIWP identified two areas with elevated VOC impacts: the eastern end of Building 3 near the former Crosman UST and along the northwestern side of Building 3 near the former degreasing areas. Indoor air quality data suggested that VOC impacts are present in this area. The indoor air issue was addressed as part of the Interim Remedial Measure (IRM, **Appendix A**).

Eight soil borings will be advanced around Building 3. Two soil borings will be converted to overburden monitoring wells along the southeastern portion of Building 2 and will be used to evaluate the VOC impacts that were historically observed during closure of the former UST. One soil boring will be converted to an overburden monitoring well near the northeast corner of Building 3. Three soil borings will be advanced to refusal inside the loading dock (former degreaser area) and one soil boring will converted to a shallow monitoring well adjacent north of this loading dock. The third monitoring well cluster will be installed northwest of the loading dock at the edge of the asphalt near the bank of the Erie Canal. Soil from the boring/monitoring well installations will be screened and a sample will be collected and sent for analysis as described below in Section 4.1.4. After installation is complete, groundwater elevations will be measured and groundwater samples will be collected from each of the monitoring wells as described in Section 4.1.6.

2.6.4 AOC 4: Banks of the Erie Canal

Discussions with the New York State Canal Corporation (Canal Corp.) indicate that the Erie Canal in this area is not lined with clay but was created by excavating native material to the desired width and advancing the bottom to bedrock. According to discussion with the Canal Corp., the bottom of the Canal is approximately 12 to 14-bgs.

Three soil borings will be advanced to refusal along the southern bank of the Erie Canal. One location is northwest of Building 1, one between Buildings 1 and 3 and the third northeast of the Building 3 loading dock. This area is owned by the Canal Corp. and CB&I personnel will obtain all necessary permits prior to starting work.

In addition to the soil samples, CB&I personnel will collect sediment samples from site outfalls. The site has one existing outfall near the northeast corner of Building 1. Four catch basins (three in the alley between Buildings 1 and 3 and one near the Building 1 loading dock) collect groundwater which feeds the 15-inch steel outfall. A 4-inch PVC pipe leading from the center of Building 3 was also identified. According to Mr. Cicero, General Manager, the pipe has not been used in at least 25 years. One sediment sample will be collected from each outfall when the canal is drained for the winter. The monitoring wells installed near the northern portion of the Site to evaluate groundwater (flow and impacts) in AOCs 1 and 3 will be used in the initial evaluation of groundwater flowing toward the southern bank of the Erie Canal. Finally a Fish and Wildlife Resource Impact Analysis will be conducted to determine if the Site has (or is) caused(ing) impacts along the southern banks of the Erie Canal.

2.6.5 AOC 5: Wooded Area

Although there has been no documented history of "dumping" in the wooded area on the eastern portion of the Site, there is debris present. Also there are "mounds" present in the area adjacent to the eastern most parking lot that are not indicative of terrain observed in other parts of the wooded area. A geophysical survey will be completed in this area using ground penetrating radar (GPR) to locate any subsurface anomalies. Based on the results of the geophysical survey, up to ten test pits, as described in Section 4.1.8, will be excavated to determine if any debris and/or impacts exist.

Current boundary lines in this area are unclear. The site will be surveyed prior to starting test pitting in this area. If any part is owned by the Canal Corp. and CB&I personnel will obtain all necessary permits prior to starting work.

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3.0 WORK SCOPE

This scope of work is being completed to delineate soil and groundwater impacts at the Site as well as further characterize indoor air and soil vapor concentrations at select locations.

3.1 RI/FS Objective

The overall objectives of this RI/FS are to:

- Identify and characterize the overall distribution of contaminants on and adjacent to the Site;
- Based on the distribution of contaminants and groundwater flow patterns, determine the hydraulic relationship between the groundwater system and Erie Canal;
- Evaluate the potential for soil vapor intrusion into on-site buildings; and,
- Sufficiently characterize the geology and hydrogeology of the site to facilitate the evaluation of the necessity to complete interim and/or final remedial alternatives.

3.2 RI/FS Tasks

A list of RI/FS Tasks is presented below. A summary of the anticipated field activities are provided in Section 4.

3.2.1 Remedial Investigation

Preparation of the RI/FS Work Plan and modification of QAPP and HASP

- Preparation of this RI/FS Work Plan which includes a Site-Specific Health and Safety Plan (HASP [under separate cover]) and Community Air Monitoring Plan (CAMP, **Appendix B**).
- Preparation of a Site Specific Quality Assurance Project Plan (QAPP, **Appendix D**).
- Attendance at a meeting with NYSDEC and NYSDOH to develop the RI/FS Work Plan tasks.

Geophysical Survey

Geophysical survey of the southeastern (i.e. wooded) portion of Site, totaling approximately 2-acres using electromagnetic and ground penetrating radar devices. This survey is being completed to determine future excavation locations to characterize soil quality in this portion of the Site.

Interim Remedial Measure Evaluation

Continual evaluation of potential IRMs that may be implemented at the Site, as needed. IRM means a discrete set of activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate, or remedy human exposure and/or environmental damage or the consequences of human exposure and/or environmental damage attributable to a site. An IRM is an action taken to remove or mitigate contamination which may or may not end up being the final remedy at a site. The IRM work plan for vapor intrusion has been approved by NYSDEC (and the IRM implemented) included as **Appendix A** as requested or directed by the NYSDEC in their comment letter of July 3, 2014.

Soil/Sediment Sampling Program

- Collection of soil samples from the 20 soil borings, 13 of which will be converted into monitoring wells.
- Collection of two sediment samples along the southwestern bank of the Erie Canal.
- Evaluation of the nature and extent of soil impacts at the Site and sediment along the Erie Canal.

Groundwater Monitoring Program

- Installation of 15 overburden monitoring wells and three bedrock wells.
- Measurements of water levels in the newly installed monitoring wells.
- Collection and laboratory analysis of groundwater samples from newly installed monitoring wells.
- Evaluation of the nature and extent of site wide groundwater quality.

Test Pit Excavation

- Excavation of 10 test pits in the wooded area on the southwestern portion of the Site for characterization purposes of soil quality, type and presence of debris within the observed “mounds”.

Soil Vapor Intrusion Study

- Review existing soil vapor intrusion data for Building 2. (Completed)

- Collection of indoor air and sub-slab vapor samples from approximately six locations within Building 2 in accordance with the NYSDOH VI Guidance. (Completed)
- Installation of a SSDS system in Building 1 and Building 3 (**Appendix A**). (Completed)
- Collection of post system installation indoor air sampling in Buildings 1 and 3. (Completed)

Sample Analysis

- Laboratory analysis of groundwater, soil, and sediment samples for TCL VOCs, SVOCs, PCBs, Target Analyte List (TAL) metals and pesticides.
- Laboratory analysis of air, sub-slab vapor, and soil vapor samples by USEPA Method TO-15. Air, sub-slab vapor, and soil vapor samples will be collected in batch certified clean canisters. (Completed)

Site Survey and Base map Preparation

- A licensed surveyor will prepare a 1-foot topographic survey of the site location.
- Survey of relevant site features including, but not limited to, buildings, property boundaries, improvements (e.g. asphalt) and known utilities and manhole covers.
- Survey of newly installed monitoring wells and test pit locations.

Community Air Monitoring

Monitoring of air in accordance with NYSDOH guidance and approved project specific CAMP.

Remedial Investigation Report

An RI Report will include a summary of activities, a CSM, tables summarizing physical and analytical results, and conclusions and recommendations. The CSM will include a description of the site history, geology, hydrogeology, environmental setting, and nature and extent of observed soil, groundwater and vapor phase impacts, as appropriate. The CSM will also provide an evaluation of contaminant fate and transport, potential human exposure pathways, and environmental concerns. The conclusions and recommendations of the RI Report will discuss whether collection of additional data is required, if a Supplemental RI is necessary, or if sufficient data exists to determine whether site remediation is required, and, if so, what type of remedy may be developed as part of the FS.

3.2.2 Feasibility Study

The FS will use the information generated during the RI to develop and evaluate alternative remedies that will minimize the site's threat to public health or the environment should they be identified. Ideally, the chosen remedy will permanently reduce or eliminate the contamination should site remediation be required beyond the IRMs currently completed.

Each alternative will be “screened” to ensure that the remedy is technically suitable for the site. Following the initial screening, a detailed analysis and evaluation for each alternative will be performed using the following criteria:

- overall protection of public health and the environment;
- reduction in toxicity, mobility and volume of hazardous waste (e.g., by thermal destruction, biological or chemical treatments or containment wall construction);
- long-term effectiveness and permanence;
- short-term effectiveness and potential impacts during remediation;
- implementation and technical reliability;
- compliance with statutory requirements;
- community acceptance; and,
- cost.

<u>Standards, Criteria and Guidance</u>

Standards, Criteria and Guidance (SCGs) for each contaminant detected and those necessary for evaluation of remedial actions will be identified and compared to existing conditions on and off the site.

<u>Development of Remedial Action Objectives</u>

CB&I will develop remedial action objectives (RAOs) for all contaminants of concern and affected media and evaluate analytical results relative to appropriate guidance.

<u>FS Report Preparation</u>

An FS report, including discussions of each of the evaluation criteria of the alternatives (or technologies) being considered, will be prepared and submitted to the NYSDEC. A summary of the alternatives evaluated, including a comparative analysis, will be included in the report. A preferred remedy that is protective of public health and the environment, complies to the maximum extent practicable with SCGs and cleanup objectives, reflects a preference for treatment over simple disposal, and is cost effective will be recommended. A conceptual plan for implementing the preferred remedy and verifying its feasibility will be prepared. The report will include limited site background and site characterization data but will include a conceptual design of the preferred remedy, including a detailed engineer's cost estimate.

3.3 Site Health and Safety Plan

CB&I will follow Site Specific HASP (provided under separate cover) to include the field activities detailed in Section 4.0. The HASP will be consistent with CB&I policy, outline all health and safety procedures and protocols that must be followed during any Site activities, and will serve as the basis for daily tailgate safety meetings during Site sampling and redevelopment activities. All subcontractors will be required to review and sign this HASP prior to completing any activities at the Site.

4.0 FIELD ACTIVITIES

The purpose of this RI/FS is to assess the nature and extent of impacts in soil vapor, soil, sediment, and groundwater, to provide the necessary data to evaluate IRMs, if applicable, and prepare an FS to address any observed impacts. Field activities will be conducted in accordance with the Field Activities Plan (FAP, **Appendix C**) to acquire information necessary to identify, evaluate, and design potential remedial alternatives for the site should remedial actions be required. Field notes describing each day's activities will be recorded on field sheets and/or in bound field notebooks. Examples of field sheets are included in the FAP (**Appendix C**). All soil, sediment, and water samples will be analyzed for:

- TCL VOCs;
- SVOCs;
- TAL metals;
- PCBs; and,
- Pesticides.

The approximate number of samples (groundwater, soil, sediment, indoor air, outdoor air, sub-slab vapor, and soil vapor) to be collected during the RI/FS is listed in Table 1 of the QAPP (**Appendix D**). Field activities will be conducted in accordance with this Work Plan and the FAP (**Appendix C**).

4.1 Phase 1 Activities

4.1.1 Preliminary Site Survey

A preliminary site survey will be completed at the Site. This survey will be completed by a licensed surveyor and will include property boundaries, buildings, storm sewers, and similar site features. The survey company will provide CB&I with coordinates using a NY State Plane North American Datum (NAD) 1983, and monitoring well elevations using North American Vertical Datum (NAVD) 1988. CB&I will create a base map that will be used for all future figures using this information.

4.1.2 Pre-Drilling Activities

Prior to performing any intrusive work at the site, CB&I and/or the drilling subcontractor will mark all anticipated locations with white spray paint and then call the One-Call Center (811 or Dig Safely New York) in accordance with New York State Code Rule 753 to mark any known utilities entering the site. The call will be made a minimum of 72-hours prior to the start of field work. Prior to installation, each location will be cleared to a five foot depth to ensure that subsurface utilities or structures are not encountered. A geophysical survey (i.e. GPR) will also be conducted as detailed below. The GPR subcontractor will mark all utilities near the anticipated work with spray paint. In areas where the GPR survey indicates no subsurface utilities or anomalies are present, it may be used in lieu of pre-clearing to five feet bgs.

4.1.3 Geophysical Survey

A GPR survey will be conducted prior to any intrusive activities to determine locations of readily identifiable utilities and subsurface anomalies. GPR is a non-intrusive, non-destructive digital imaging technology used to determine the depth and location of underground objects and conditions. A control unit, antenna and power supply make up the GPR system. The control unit contains the electronics which triggers the pulse of radar energy that the antenna sends into the ground. The antenna receives the electrical pulse produced by the control unit, amplifies it and transmits it into the ground or other medium at a particular frequency.

GPR works by sending a tiny pulse of energy into a material and recording the strength and the time required for the return of any reflected signal. A series of pulses over a single area make up a scan. Reflections are produced whenever the energy pulse enters into a material with different electrical conduction properties or dielectric permittivity from the material it left. The strength, or amplitude, of the reflection is determined by the contrast in the dielectric constants in the dielectric constants and the conductivities the different materials.

Data is collected in parallel transects and then placed together in their appropriate locations for computer processing. The computer then produces a horizontal surface at a particular depth in the record that allows operators to interpret a plan view of the survey area.

Additionally, a GPR survey will be conducted in the wooded area east of Building 3 where several mounds have been observed to aid in determining where test pit excavations should be located. Anomalies will be marked with flags. It is anticipated that a maximum of 10 test pits will be excavated in areas exhibiting a positive GPR response. Details on the excavations are provided in following sections of this document.

4.1.4 Soil Borings

Twenty soil borings (to be designated SB-1 through SB-20) will be advanced at select locations around the Site (**Figure 5**). Borings will be advanced via split spoon samplers, using a hollow stem auger (HSA) drill rig. Prior to advancement of the boring, each location will be cleared for utilities (e.g. hand auger or air knife) to the required depth of 5-feet bgs as detailed above.

Each soil boring will be advanced either to refusal or bedrock (presumed to be approximately 25-feet bgs), whichever comes first. All recovered soils will be examined for visible signs of contamination, screened for volatile vapors with a photoionization detector (PID), and logged by a CB&I geologist according to the Unified Soil Classification System. An example of the typical soil boring log is provided in the FAP (**Appendix C**).

One soil sample will be collected from each soil boring either at the interval exhibiting the highest PID measurement or immediately above bedrock/ water table interface. VOC soil samples will be collected using EnCore™ samplers and in 2 to 4 ounce soil jars (dry weight). Samples will be packed on ice and couriered to the laboratory for analysis. A total of 24 samples including 20 soil samples, one duplicate sample, one matrix spike/matrix spike duplicate (MS/MSD) sample and one field blank sample will be analyzed for TCL VOCs, SVOCs, PCBs, TAL metals and pesticides as requested by the NYSDEC.

Upon completion of the boring, all soil cuttings will be placed in 55-gallon drums for characterization and appropriate disposal.

4.1.5 Monitoring Well Installation

Thirteen of the 20 soil boring locations will be converted to monitoring wells using HSA during techniques. Three of these locations will have nested monitoring wells (i.e. two overburden monitoring wells and one shallow bedrock well).

4.1.5.1 Overburden Monitoring Well Installation

Sixteen overburden monitoring wells will be installed via a 4-1/4 inch (inner diameter) hollow-stem auger will typically be employed to install 2-inch diameter wells. Thirteen boreholes will extend to top of bedrock (assumed to be approximately 25 feet bgs) and be constructed with a 10-foot section of 10 slot well screen and the appropriate length of schedule 40 PVC flush-joint casing to ground surface. The remaining three monitoring wells will be constructed with a 5-foot section of 10 slot well screen set to straddle the water table interface and the appropriate length of schedule 40 PVC flush-joint casing to ground surface.

The annular space between the boring wall and the screen will be backfilled with Morie Sand to at least 2 feet above the screened interval; at least two feet of bentonite chips will be placed above the sand pack and hydrated. The remaining annular space will be backfilled with a cement/bentonite grout mixture.

Monitoring wells will be completed at the ground surface with flush mounted protective roadboxes. Each well will have a cap and a locking cover. A concrete pad will be installed around each well casing and a weep hole will be drilled in the protective casing to allow any water between the inner and outer casing to drain.

All monitoring wells will be developed (no sooner than 24-hours after installation) by the drilling subcontractor and/or CB&I personnel. The wells will be developed to remove any drilling fluids or sediment that may have entered the well during installation and to "settle" the filter pack.

Monitoring wells will be developed using surging and/or pumping techniques. Well development will be considered complete when either 10 well volumes have been removed, the well has been purged "dry", or field readings of temperature, dissolved oxygen (DO), conductivity, oxidation-reduction potential and pH have stabilized and a turbidity of less than 50 nephelometric turbidity units (NTU) has been achieved (whichever comes first). The wells will be allowed to stabilize for at least two weeks after development prior to collecting samples for analysis as dictated by groundwater recharge, project schedule or NYSDEC requests. Development water will be containerized and sampled for waste characterization.

4.1.5.2 Bedrock Monitoring Well Installation

Three bedrock monitoring wells will be installed via a 4-1/4 inch (inner diameter) hollow-stem auger. The augers will be advanced to the top of competent bedrock. Bentonite chips will be installed around a 4-inch steel temporary casing set up to a wash tee at the ground surface. Drilling will continue using an H-size core bit 10-feet into bedrock. This will create a 3 7/8-inch rock core hole. The bedrock wells will be constructed with a 2-inch 10-foot section of 10 slot well screen and the appropriate length of schedule 40 PVC flush-joint casing to ground surface.

The annular space between the boring wall and the screen will be backfilled with Morie Sand to at least 2-feet above the screened interval; at least two feet of bentonite chips will be placed above the sand pack and hydrated. The remaining annular space will be backfilled with a cement/bentonite grout mixture.

Monitoring wells will be completed at the ground surface with flush mounted protective roadboxes. Each well will have a cap and a locking cover. A concrete pad will be installed around each well casing and a weep hole will be drilled in the protective casing to allow any water between the inner and outer casing to drain.

All monitoring wells will be developed (no sooner than 24-hours after installation) by the drilling subcontractor and/or CB&I personnel. The wells will be developed to remove any drilling fluids or sediment that may have entered the well during installation and to "settle" the filter pack.

Monitoring wells will be developed using surging and/or pumping techniques. Well development will be considered complete when either 10 well volumes have been removed, the well has been purged "dry", or field readings of temperature, dissolved oxygen (DO), conductivity, oxidation-reduction potential and pH have stabilized and a turbidity of less than 50 nephelometric turbidity units (NTU) has been achieved (whichever comes first). The wells will be allowed to stabilize for at least two weeks after development prior to collecting samples for analysis as dictated by groundwater recharge, project schedule or NYSDEC requests. Development water will be placed in containers and sampled for waste characterization.

4.1.6 Groundwater Sampling

After the two-week stabilization period, CB&I will collect groundwater samples from the newly installed monitoring wells. All monitoring wells will be gauged for depth to water, depth to bottom and depth to product, if encountered. Each sampled location will be purged of at least one well volume using low-flow techniques prior to collection of a groundwater sample. All groundwater samples will be collected via low-flow techniques until the parameters stabilize. Samples will be packed on ice and couriered under appropriate chain of custody to the laboratory for analysis of TCL VOCs, SVOCs, PCBs, TAL metals and pesticide analysis. Additionally, one set of QA/QC samples (Blind Duplicate, MS/MSD and Trip Blank) will be collected and analyzed via the methods mentioned above. The analysis will be completed under a standard turnaround time (15 business days), and the analytical results will be submitted for data validation after preliminary review by CB&I's Project Chemist.

4.1.7 Sediment Sampling

CB&I personnel will collect two sediment samples from the existing and former outfall locations (**Figure 4**). Sediment samples will be designated SED-1 and SED-2. The Canal Corporation owns this portion of the property. CB&I will contact them to secure proper permits before beginning any work. CB&I anticipates collecting these samples from the bank and that a boat will not be necessary to access the bank from the Erie Canal. All pertinent health and safety procedures will be followed during this sampling event.

Each sample will be collected and screened for VOCs with a PID. One set of QA/QC samples (one duplicate sample, one matrix spike/matrix spike duplicate set and one equipment blank) will be collected. A trip blank will also be included in the sample cooler. Once packed on ice, all samples will be couriered under proper chain of custody to the laboratory for analysis of VOCs via USEPA Method 5035A, SVOCs via USEPA method 8270, PCBs (USEPA method 8082), TAL Metals analysis (USEPA Method 6010) and pesticides (USEPA method 8081).

All pertinent information will be documented in the field logbook, including sample IDs, locations, and any changes to the Work Plan.

4.1.8 Test Pits

The purpose of advancing the test pits is to evaluate/identify the contents of the "mounds" that are located in the wooded area east of Building 3. The Canal Corp. may own a portion of the area where the proposed test pits are located. CB&I personnel will determine the property boundary and obtain permission to excavate on the Canal Corp. property if necessary. A maximum of ten test pits will be advanced to groundwater or a maximum depth of 8-ft bgs, whichever is encountered first, in and around identified anomalies (based on results from the GPR survey) to allow for visual characterization of site conditions. Soil removed for the excavation of the test pits will remain on-site, placed on plastic sheeting and utilized as backfill once visual characterization is complete. Materials will be stored at appropriate distances from the excavation to maintain compliance with slope stability and the CB&I HASP. At no time will any personnel enter any test pit unless all requirements of the HASP have been followed and it has been determined that the activity is necessary. The test pits will be backfilled prior to leaving the site each day.

Vapor readings will be collected on each sample using a PID and placed in the void space of a sample jar or "zip-lock" bag. One surface sample and one soil sample will be collected from each excavated test pit. Samples will be collected in accordance with the site-specific QAPP and sent for the analysis of VOCs via USEPA Method 5035A, SVOCs via USEPA method 8270, PCBs (USEPA method 8082), TAL metals analysis (USEPA Method 6010) and pesticides (USEPA method 8081).

Any drums (intact or carcasses) identified during excavation will be removed and stockpiled for further characterization and disposal.

The test pit will be backfilled in lifts with the excavated soils after the soils in each test pit have been characterized and sampled. The test pits will be compacted using the excavator bucket or "tracked in" by the excavator.

4.1.9 Decontamination

To reduce the potential for cross contamination during the investigation the augers and backhoe will be decontaminated between each sampling location (soil boring/Monitoring Well, test pit, sediment). New tubing will be used for the collection of groundwater samples at each location. All hand sampling tools and down hole, equipment will be cleaned before collecting each sample. Cleaning will utilize an Alconox® soap solution wash (scrub), a tap water rinse, and de-ionized (DI) water rinse. All down-hole sampling equipment (non-disposables) will be decontaminated between each sample interval.

4.1.10 Investigation Derived Waste (IDW)

Waste generated during the RI/FS is anticipated to include soil cuttings, decontamination fluids, groundwater purge and development water, and construction and debris (C&D), including personal protection equipment (PPE). Waste will be containerized in either closed-top (liquid) or open-top (soil and C&D) 55-gallon drums and stored in a predetermined location on the Site.

Drums will be properly labeled and composite samples will be collected from the soil and water drums for waste characterization analysis. Drums will be transported and disposed at a licensed disposal facility. Manifests for the waste will be included in the RI Report.

4.1.11 Indoor Air Sampling (Completed)

4.1.11.1 Building 2 Indoor Air Sampling

CB&I collected a total of 14 air samples; one sub slab and one indoor ambient air sample from seven locations within Building 2 to assess indoor air quality and the potential for vapor intrusion in this building. Additionally one sub-slab and indoor air sample was collected in the non-mitigated portion of Building 1. Sample locations are shown on **Figure 6**. One blind duplicate sample was also collected from both the sub-slab and indoor ambient air sample locations. Finally, one ambient outdoor air sample was collected during the sampling event.

Prior to sampling within the businesses, CB&I personnel interviewed the tenants to complete the NYSDOH Indoor Air Quality (IAQ) Questionnaire and Building Inventory and complete a survey in accordance with the NYSDOH VI Guidance. CB&I personnel took pictures to document preexisting conditions within the businesses. When completing the IAQ questionnaire, the interviewee was asked to disclose information regarding actions in and around the business that could potentially affect IAQ and subsequent analytical results. Answers to the IAQ questionnaire will be weighed against analytical results to determine if analytical results could potentially be biased due to chemical usage or storage in these areas.

Sub-slab soil vapor samples were collected using batch certified summa canisters fitted with a 24-hour flow regulator. Each sample was collected using the following procedures:

- Visually assessed the floor condition, line of traffic and selected sample locations that were not be in close proximity to major cracks and other floor penetrations (sumps, pipes, floor drains, etc.).
- Using an electric hammer drill, advanced a hole using a 0.75 inch drill bit through the concrete a depth not to exceed six inches below the bottom of the slab at the select location.
- Swept concrete dust away from the drill hole and wiped the floor with a dampened towel.
- Inserted laboratory or food grade polyethylene tubing into the hole, extending no further than 2-inches below the bottom of the floor slab.
- Placed non-toxic modeling clay around the tubing at the floor penetration to form an air tight seal around the tubing on the basement floor.
- Conducted helium leak detection test to insure that seal was "tight".
- Purged approximately one to three probe volumes at a flow rate of less than 0.2 liters per minute using a low-flow Gilian™ air pump. When a sufficient volume was removed, connected the 6-Liter batch certified summa canister with a 24-hour regulator to the sample tubing.
- Recorded the serial number of the canister and associated regulator on the Chain-of-Custody (COC) form and field notebook/sample form.
- Assigned sample identification on the canister identification tag and recorded this on the COC and field notebook/sample form.
- Recorded the gauge pressure; the vacuum gauge pressure read -28 +/-2 in mercury (Hg) or the canister was not used and was replaced.
- Recorded the sample start time on the air sampling form and took a digital photograph of canister setup and surrounding area.
- Continued sampling until approximately 5 ±1 inch Hg remained in the canister.
- Installed the plug on the canister inlet fitting and placed the sample container in the original box.
- Completed the sample collection log with the appropriate information, and logged each sample on the COC form.
- Couriered samples under proper COC.

- Removed the temporary subsurface probe and properly sealed the hole with hydraulic cement or similar material.

Sample locations for the indoor ambient air sample locations were chosen away from walkways and volatile chemicals. Purging for these samples was not a requirement; once a sample location was selected, the canister was set in place and the valve was opened for sampling to begin. All indoor and outdoor air samples were collected approximately four to five feet above the ground or floor surface, (at a height within the breathing zone). All summa canisters for these samples were batch certified with a 24-hour flow regulator. Photographs of the canister and surrounding area were taken for the project files to document the set-up. During the sampling, CB&I personnel recorded weather conditions, temperature, and PID readings on appropriate field forms for each locality. Examples of field form used during sampling activities are included in the FAP (**Appendix C**). Sampling continued until approximately 5 inches of Hg vacuum remained in the canister. Once sampling was completed, CB&I personnel installed the plug on the canister inlet fitting, place the sample container in the original box and completed the sample collection log. Additionally, the serial number of each canister and its associated regulator, starting and ending gauge pressures, and sample start and stop times was recorded on the sample collection log.

The canisters were sent via courier under proper chain of custody to the laboratory for analysis of VOCs by USEPA method TO-15 to an accuracy of 1 $\mu g/m^3$, and 0.25 $\mu g/m^3$ for TCE and carbon tetrachloride. The analysis had a standard turnaround time (15 business days), and the analytical results were submitted for data validation after preliminary review by CB&I's Project Chemist.

4.1.11.2 Post Mitigation Indoor Air Sampling – Buildings 1 and 3

CB&I collected nine indoor air samples from Building 1 and seven indoor air samples from Building 3 along with one duplicate sample and one ambient outdoor air sample for analysis one month after the SSDS systems were installed and considered operational.

The indoor ambient air samples were generally collected in the same locations as the indoor air samples collected by PES. The batch certified summa canisters were set in place and the valve will be opened for sampling to begin. All indoor and outdoor air samples were collected approximately four to five feet above the ground or floor surface, (at a height within the breathing zone) using batch certified summa canisters with a 24-hour flow regulator. Photographs of the canister and surrounding area were taken for the project files to document the set-up. During the sampling, CB&I personnel recorded weather conditions, temperature, and PID readings on appropriate field forms for each locality. Example forms are included as

Appendix C. Sampling continued until approximately 5-in Hg remained in the canister. Once sampling was complete, CB&I personnel installed the plug on the canister inlet fitting, placed the sample container in the original box and completed the sample collection log. Additionally, the serial number of each canister and its associated regulator, starting and ending gauge pressures, and sample start and stop times were recorded on the sample collection log.

The canisters were couriered under proper chain of custody for analysis of VOCs by USEPA method TO-15 to an accuracy of 1 $\mu g/m^3$, and 0.25 $\mu g/m^3$ for TCE and carbon tetrachloride. The analysis had a standard turnaround time (15 business days), and the analytical results were submitted for data validation after preliminary review by CB&I's Project Chemist.

4.2 Phase 2 Activities

4.2.1 Ecological Survey

An Ecological Survey will be conducted to identify actual or potential impacts to fish and wildlife resources at and within ¼-mile of the site along the Erie Canal. A desktop survey will be conducted to identify fish and wildlife resources based upon a search of NSYDEC records. After the desktop review is complete, CB&I personnel will conduct a site check for field verification purposes. CB&I will conduct the survey and prepare the reports and figures in accordance with *DFW&MR Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Site (1994)* and DER-10.

4.2.2 Groundwater Sampling

CB&I personnel will collect quarterly groundwater samples from the newly installed monitoring wells beginning three months after the initial round of groundwater samples. All groundwater samples will be collected via low-flow techniques until the parameters stabilize and at least one well volume has been removed. Samples will be couriered on ice under the appropriate chain of custody to the laboratory for analysis of TCL VOCs, SVOCs, PCBs, TAL metals and pesticides. However, if the initial groundwater sampling results for any of the above set of analyses (except TCL VOCs) is non-detect and/or below applicable NYSDEC Groundwater Quality Standards (NYSGWQS), the set of analyses will not be analyzed for in future events with NYSDEC and NYSDOH approvals. One set of QA/QC samples will be collected and analyzed via the methods mentioned above. The analysis will be completed under a standard turnaround time (15 business days), and the analytical results will be submitted for data validation after preliminary review by the CB&I's Project Chemist.

4.2.3 Decontamination

All non-dedicated or non-disposable equipment that may come in contact with the samples, interior of a monitoring well will be thoroughly cleaned using an Alconox® solution and potable water rinse prior to reuse. Additional cleaning of the equipment may be necessary under some circumstances. Decontamination fluids will be containerized and staged for proper disposal. All IDW will be handled as described in Section 4.1.10.

5.0 LABORATORY ANALYSIS AND DATA VALIDATION

All soil, groundwater and air samples will be collected and analyzed in accordance with the methodologies described in the FAP (**Appendix C**) and Quality Assurance Plan (QAPP, **Appendix D**).

All soil and groundwater samples will be sent to ALS Environmental (ALS) in Rochester, New York and all air samples will be sent to ALS Environmental in Middletown, Pennsylvania in accordance with NYSDEC's DER-10. ALS is certified by the NYSDOH to perform Contract Laboratory Program (CLP) analysis on all media mentioned in this Work Plan. ALS will perform sample analysis in accordance with the most recent NYSDEC Analytical Services Protocol (ASP). The NYSDEC ASP program requires a full data deliverables package (Category B) to support the performance of SW-846 methods. It ensures that all monitoring and analytical projects be conducted according to approved QAPP, Standard Operating Procedures (SOPs), equipment manufacturers specifications and 40 CFR 136, as appropriate.

ALS will provide a complete ASP Category B deliverable to be used to generate future data validation reports. Additionally, ALS will provide all data in an EQuIS Electronic Data Deliverable (EDD) format to be uploaded to the NYSDEC Environmental Information Management System (EMIS).

All Sample Data Groups (SDGs) (i.e. data packages) will undergo independent data validation. The independent validation deliverable will be a Data Usability Summary Report (DUSR) and will describe compliance with analytical method protocols described in the NYSDEC ASP. The validation will be completed in accordance with NYSDEC DER-10 DUSR guidelines.

The collection and reporting of reliable data is a primary focus of the sampling and analytical activities. Laboratory and field data will be reviewed to ensure that the procedures are effective and that the data generated provides sufficient information to achieve the project objectives. Limitations of the data will also be noted. A qualified independent third party will evaluate the laboratory analytical data according to NYSDEC-DER DUSR guidelines.

6.0 FEASIBILITY STUDY APPROACH

Following the completion of the RI, a Feasibility Study will be conducted as dictated by observed site environmental conditions during the RI. The objectives of the FS are to (a) identify remediation requirements and establish cleanup levels as necessary to eliminate or prevent unacceptable risks to human health and the environment, and (b) identify, screen and evaluate potential remedial alternatives. The FS activities will include the following general steps and considerations.

6.1 Identification of Remediation Requirements and Establishment of Remedial Objectives

Areas and volumes of media will be identified for which remediation is required either (a) to eliminate or control conditions in the Erie Canal posing an unacceptable risk to human health and the environment or (b) to prevent the migration of contaminants from the Site to the Erie Canal that would cause or contribute to an unacceptable risk to human health or the environment. All calculations related to area and volume estimates will be documented in the FS Report. For the areas where a remediation requirement is identified, remedial action objectives (RAOs) and preliminary remedial goals (PRGs) will be developed in consultation with NYSDEC. The PRGs will be developed based on Site-specific risk factors.

The FS activities will include the following general steps and considerations.

- Describing the baseline and/or current situation and summarizing and synthesizing the results of the RI, the human health risk assessment (HHRA) and ecological risk assessment (ERA), the CSM, and related documents.
- Establishing RAOs and preliminary remedial goals that permit a range of remedial alternatives to be developed.
- Developing general response actions that may be taken to meet the RAOs.
- Comparing sediment chemicals of concern results with remedial action levels (RALs) to identify volumes or areas to which general response actions (GRAs) may be applied.
- Identifying and screening GRAs, remedial technology types, and specific process options best suited to Study Area conditions.
- Assembling the technology types and process options into remedial alternatives and then completing the screening and final assembly of remedial alternatives.

- Identifying candidate technologies for a treatability study program, implementing, and evaluating treatability studies and pilot studies, as necessary, through an FS Field Program.
- Completing a detailed evaluation and comparative analysis of retained remedial alternatives using USEPA's seven evaluation criteria.

6.2 Development and Screening of Remedial Alternatives

Remedial alternatives will be developed concurrently with the RI phase, with the results of one influencing the other in an iterative fashion. A focused set of technologies that have the potential to achieve the RAOs will be identified and screened. General response actions, engineering controls, or other actions (singly or in combination) will be developed for each medium of interest (e.g., soil, sediment, groundwater and indoor air) to achieve RAOs. Additionally, technologies applicable to each general response action to eliminate those that cannot be implemented at the Site will be identified and evaluated. Consistent with NYSDEC guidance, the range of remedial options to be considered will include, at a minimum (a) alternatives in which treatment is used to reduce the toxicity, mobility or volume of contaminants, (b) alternatives that involve containment with little or no treatment, and (c) a no-action alternative. Screening of technologies will be based on effectiveness, implementability, and relative cost. Technologies retained after the screening process will be assembled into alternatives for each remediation area.

A representative range of applicable technologies and responses will be assembled into a set of potential remedial alternatives. The following five-step process will be used to develop the remedial alternatives. ARARs/TBCs (including those ARARs and TBCs that may be technically impracticable to achieve and for which waivers may be required) are considered in each step of this process.

1. RAOs will be established, specifying the chemicals of concerns, media of interest, and exposure pathways.
2. GRAs that could be used to meet the RAOs will be identified. GRAs are overall approaches such as natural recovery, removal, containment, or treatment.
3. Media chemicals of concern results will be compared to RALs.
4. Applicable remedial technologies for each medium will be identified and screened. The screening process will eliminate technologies that cannot be implemented for technical reasons and identify the technologies that may be suited to Study Area conditions.
5. A set of appropriate remedial alternatives will be formed by combining selected representative technologies and responses.

6. Remedial alternatives will be screened and analyzed in accordance with Guidance for Conducting Remedial Investigations and Feasibility Studies under Comprehensive Environmental Response, Compensation, and Liability Act ([CERCLA], USEPA, 1988). The remedial alternatives evaluation will include the guidance provided by the Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (USEPA, 2005a), DER-10 and 6 NYCRR Part 375. Specifically the first step of the screening process will be conducted for the purpose of reducing the number of alternatives that are carried into the detailed analysis stage.

In the preliminary screening stage of the FS, remedial alternatives will be evaluated using the three criteria of effectiveness, implementability (technical and administrative), and cost. Effectiveness refers to the ability of a remedial action to protect human health and the environment. The short-term impacts during remedial construction and implementation are considered at this stage, as well as the long-term effectiveness of the remedial action after it is completed. The expected duration of the effectiveness is estimated for each alternative. Implementability refers to the realistic capability to actually implement an alternative. Technical implementability of a remedial alternative involves the ability to construct and operate the alternative, and to rely on the alternative to meet the performance requirements and consistently achieve the RAOs. Administrative implementability refers to the ability to obtain the required permits and stakeholder approvals for the action, regulatory compliance, and the availability and capacity for off-site services such as treatment, storage, and disposal. Cost refers to the relative estimated cost of all aspects (i.e., design, capital costs, and operation and maintenance costs) to implement each alternative. In addition to these three criteria, the preliminary screening stage of the FS will include evaluation of alternatives that include opportunities for reducing the environmental footprint of remedial design and construction activities and include consideration of the sustainability of the alternative.

6.3 Treatability Study Investigations and Pilot Tests

During the performance of the FS, additional data may be necessary to evaluate the extent and effectiveness of potential remedial technologies so that the FS can be used to develop and evaluate alternatives for remediation of the Study Area. Among other information, data needs may include the performance of treatability studies to assess the applicability of specific technologies under conditions present in the Study Area and/or conducting pilot studies to determine the effectiveness of full-scale technologies in the Study Area. If treatability studies and/or pilot tests are required, they will be conducted following the guidance discussed above and the Guidance for Conducting Treatability Studies under CERCLA (USEPA, 1992b). Work plans, including supporting plans, will be prepared for any treatability studies or pilot tests performed. The results of these studies will be incorporated into the FS Report.

6.4 Detailed Analysis of Alternatives

The purpose of the detailed analysis of alternatives is to provide a systematic evaluation of the alternatives considering all of the relevant factors to facilitate sound decision making in the selection of the final Study Area remedy. The following factors will be considered in this analysis:

- Overall protection of public health and the environment;
- Compliance with ARARs/TBCs (including consideration of those ARARs and TBCs that may be technically impracticable to achieve and for which waivers may be required);
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term impacts and effectiveness;
- Implementability;
- Cost-effectiveness.

As part of the analysis, estimates will be made of the short-term and long-term risks to human health and the environment that may be introduced by implementing each of the remedial alternatives.

A comparative analysis of the alternatives will be prepared once the evaluation of each of the individual alternatives is complete. The comparative analysis will discuss the advantages and disadvantages of the alternatives in relation to one another so that the important issues for final remedial action are clearly identified. Upon completion of the individual and comparative evaluations, a proposed remedial action will be described using the best alternative developed. It is anticipated that an adaptive management strategy to implement the recommended remedial action will be required. The proposed plan will consist of a narrative description of the combined alternatives and will be included in the FS Report.

7.0 REPORTING AND SCHEDULES

7.1 Remedial Investigation Report

Following receipt and review of laboratory analytical data, an RI report will be generated. The report will detail all field activities, analytical results, and observations recorded during the soil and groundwater sampling activities. The report will summarize any exceedances of NYSDEC Restricted Commercial Soil Clean-up Objectives (6 NYCRR Part 375-6.8) and NYSDEC's Technical & Operational Guidance Series (TOGS) 1.1.1 groundwater quality standards.

The report will include the following:

- Summary of site history and pertinent historical data collection activities;
- Summary of the data collection activities;
- Summary of soil, groundwater and sediment related data;
- Tabulated summary of all soil and groundwater data compared to applicable New York Guidance Values
- Sample location map for all soil, groundwater and sediment locations;
- Figures presenting soil, groundwater and sediment contaminant concentrations;
- Cross sections maps of Site lithology (as applicable);
- Photo Log of activities;
- Drill logs;
- Groundwater contour maps;
- Copy of all sampling data forms;
- Copy of laboratory analytical data reports; and
- Copy of all Validation Reports.

The results of the investigation will help in the development of the feasibility study, as needed.

7.2 Indoor Air Report

A separate report will be produced for the indoor air sampling. The Indoor Air Report will include a summary of indoor air sampling activities results, sample IDs with corresponding business names and addresses, figures with sample IDs and results as well as building questionnaires/interviews.

The report will include the following:

- Summary of the data collection activities;
- Summary of indoor air related data;
- Tabulated summary of all indoor air and sub-slab soil vapor data;
- Sample location map air sample locations;
- Figures presenting air contaminant concentrations;
- Photo Log of activities;
- Copy of all sampling data forms;
- Copy of laboratory analytical data reports; and
- Copy of all Validation Reports.

7.3 Feasibility Study Report

An FS will be conducted based on the results of the RI. The objectives of the FS are to: (a) identify remediation requirements and establish cleanup levels as necessary to eliminate or prevent unacceptable risks to human health and the environment, and (b) identify, screen and evaluate potential remedial alternatives. The FS activities will include the general steps and considerations presented in Section 6.1.

Upon completion of the detailed evaluation of alternatives, a draft FS Report will be prepared for submittal to NSYDEC. The report will: (a) document the location and extent of media requiring remediation and describe the associated cleanup levels and RAOs, (b) describe the results of the identification and screening of alternatives, and the detailed evaluation of alternatives, and (c) identify a preferred alternative for remedial action.

The following outline of the FS report will be used as a guide:

1. Introduction and Background
2. Identification and Screening of Technologies
3. Development and Screening of Alternatives
4. Detailed Analysis of Alternatives
5. Proposed Remedial Plan for the Study Area

7.4 EQuIS

An EQuIS database will be developed for this project. All data generated during RI/FS activities will be entered and uploaded to the NYSDEC EMIS.

8.0 SCHEDULE

A copy of the proposed scheduled is included as **Appendix E**. It is based on assumptions for durations (in business days) and conditions of key events occurring on critical and non-critical paths. The schedule assumptions are detailed below.

- The schedule for the field activities is dependent upon access to all properties without difficulty.
- The IRM Work plan for Vapor Intrusion Mitigation has been implemented independent of other activities described in this RI/FS Work Plan.
- Field activities will not be significantly delayed by adverse weather or site access issues.
- The schedule for the field activities is dependent on timely review and approval of the work plan and associated documents.
- The schedule for the field investigation is dependent upon all field activities being performed in modified Level D health and safety protection.
- Laboratory EDDs will be received in the proper format and no manipulation of the data will be required to upload the data into the EQuIS database.
- It is assumed that NYSDEC and NYSDOH review and respond to any work plans, fact sheets, memorandums or reports in a timely manner.
- The field effort assumes that multiple field activities will be performed concurrently and that subcontractors will provide multiple sets of equipment such as drill rigs, vessels, and sediment sampling equipment.

9.0 CITIZEN PARTICIPATION ACTIVITIES

Technical support will be provided to the NSYDEC and/or NYSDOH during the course of this project and as outlined in CB&I's Citizen Participation Plan [(CPP), provided under separate cover]. Technical support may include the following:

- Public Meeting Support – Logistical and technical support may be provided for public meetings including selection and reservation of a local meeting space, meeting attendance, providing recording support, preparing meeting summaries, and preparing presentation materials/handouts.
- Fact Sheet Preparation – Fact sheets, letters, and updates may be prepared in accordance with the CPP.
- Public notices – Public notices, to be placed in the most widely read local newspapers, may be prepared to support public meetings or availability sessions.
- Information Repositories – The site information repositories will be updated and maintained.
- Site Mailing List – The site mailing list will be maintained.

10.0 REFERENCES

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Figures

NEW COLEMAN HOLDINGS

FIGURE 1
SITE LOCATION MAP
1000 TURK HILL ROAD
FAIRPORT, NEW YORK

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
LATHAM, NY	04/14/14	HAF	MJS	HAF	HAF	150174-01A1

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
LATHAM, NY	08/06/14	HAF	SJW	HAF	HAF	150174-01B4

NEW COLEMAN HOLDINGS

FIGURE 2
SITE PLAN
FAIRPORT, NEW YORK

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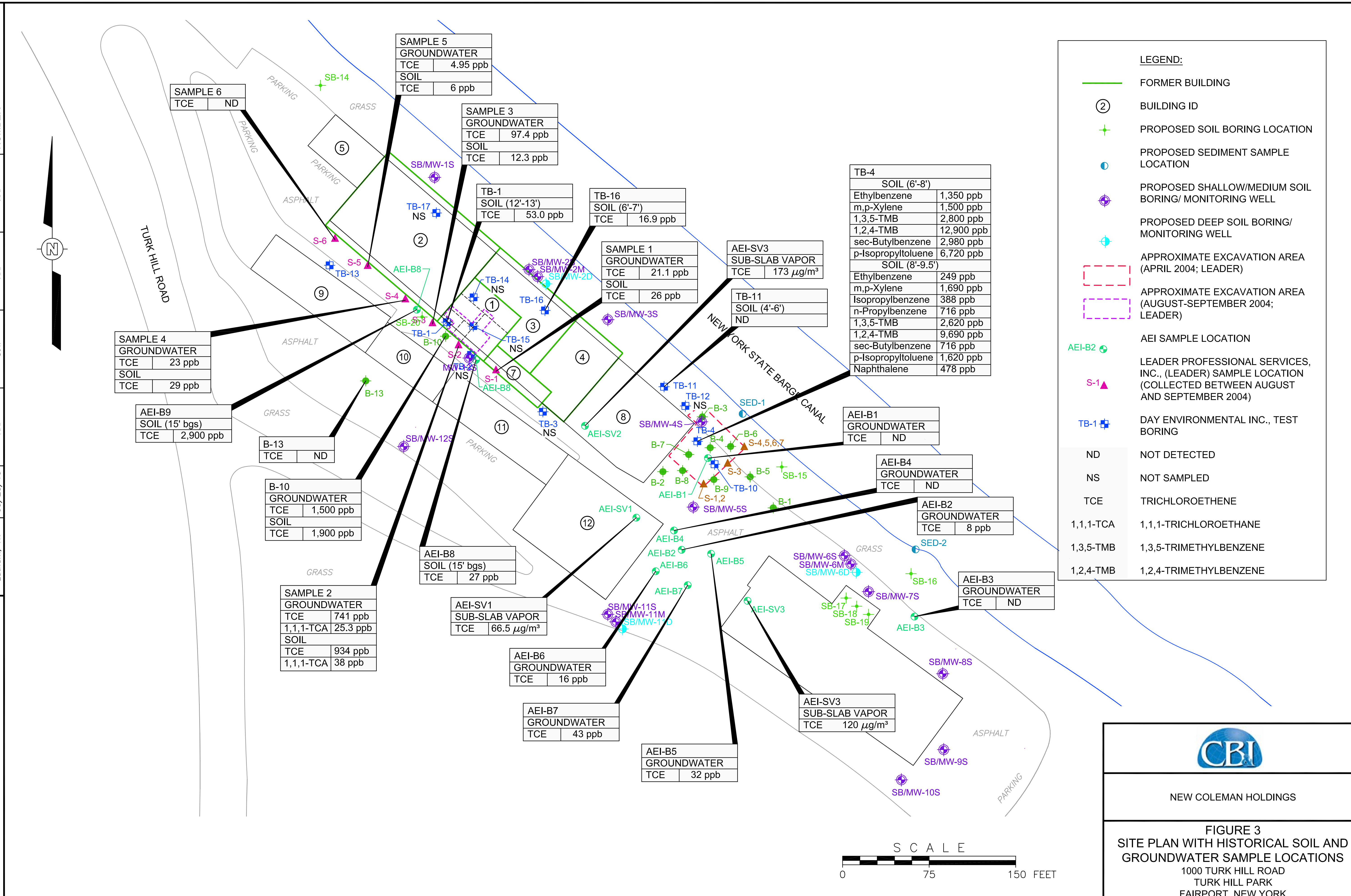

DRAWING NUMBER 150174-B6
APPROVED BY HAF
CHECKED BY HAF
DRAWN BY SJW
DESIGNED BY HAF
DATE 05/28/15
OFFICE Latham, NY

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CBI_Logo-Color-RGB.jpg
FullSizeRender.jpg

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Plot Date/Time: May 28, 2015 - 9:48am
Plotted By: steven.walsh

CB&I

NEW COLEMAN HOLDINGS

FIGURE 3
SITE PLAN WITH HISTORICAL SOIL AND GROUNDWATER SAMPLE LOCATIONS
1000 TURK HILL ROAD
TURK HILL PARK
FAIRPORT, NEW YORK

DRAWING NUMBER	150174-01B3
APPROVED BY	HAF
CHECKED BY	HAF
DRAWN BY	SJW
DESIGNED BY	HAF
DATE	08/06/14
OFFICE	LATHAM, NY

NEW COLEMAN HOLDINGS

FIGURE 4
SITE AREAS OF CONCERN
FAIRPORT, NEW YORK

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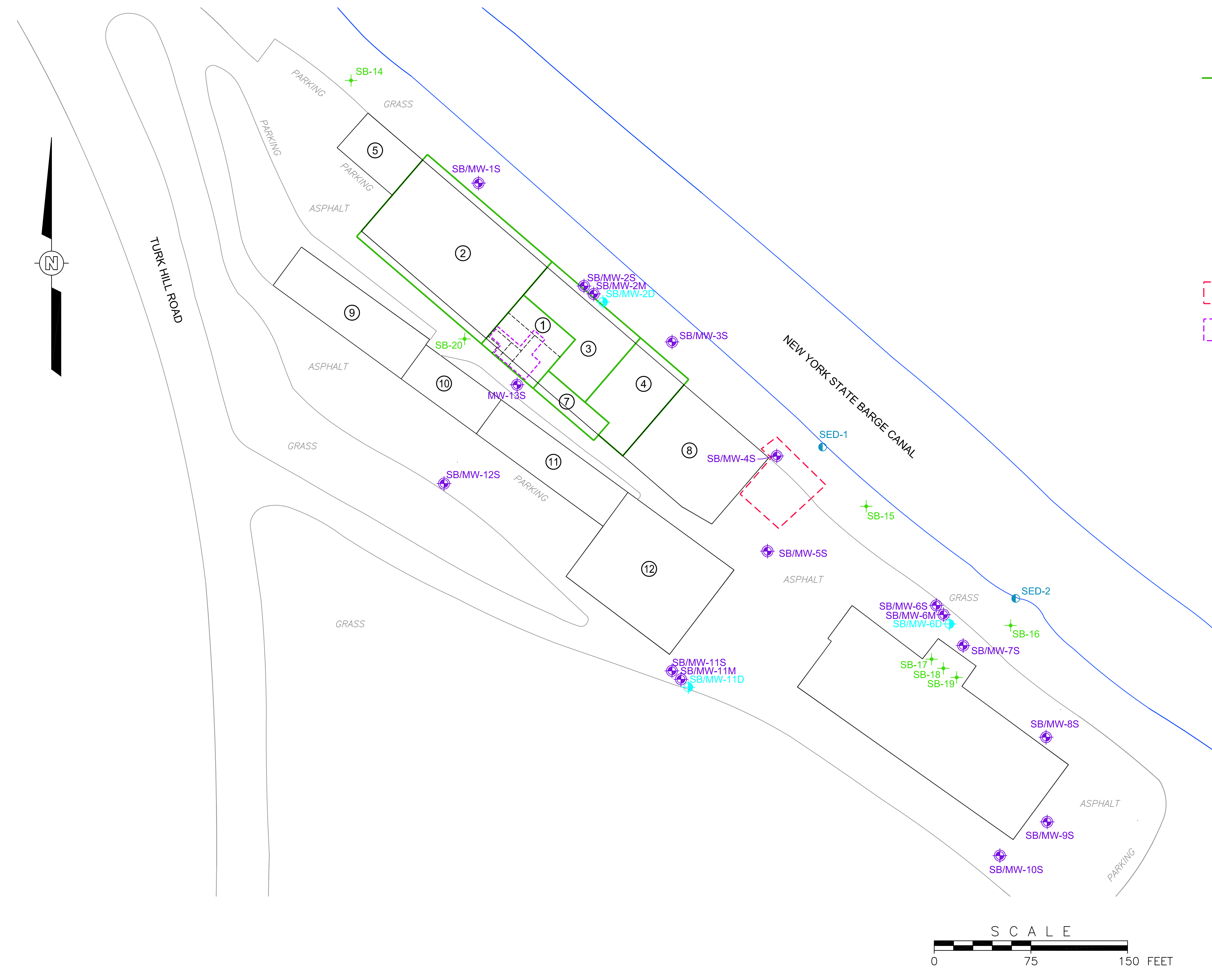

LEGEND:

- FORMER BUILDING
- BUILDING ID
- PROPOSED SOIL BORING LOCATION
- PROPOSED SEDIMENT SAMPLE LOCATION
- PROPOSED SHALLOW/MEDIUM SOIL BORING/ MONITORING WELL
- PROPOSED DEEP SOIL BORING/ MONITORING WELL
- APPROXIMATE EXCAVATION AREA (APRIL 2004; LEADER)
- APPROXIMATE EXCAVATION AREA (AUGUST-SEPTEMBER 2004; LEADER)

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FIGURE 5
PROPOSED SOIL, GROUNDWATER AND SEDIMENT SAMPLE LOCATIONS
1000 TURK HILL ROAD
TURK HILL PARK
FAIRPORT, NEW YORK

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Latham, NY	12/19/14	HAF	ELS	--	--	150174-B3

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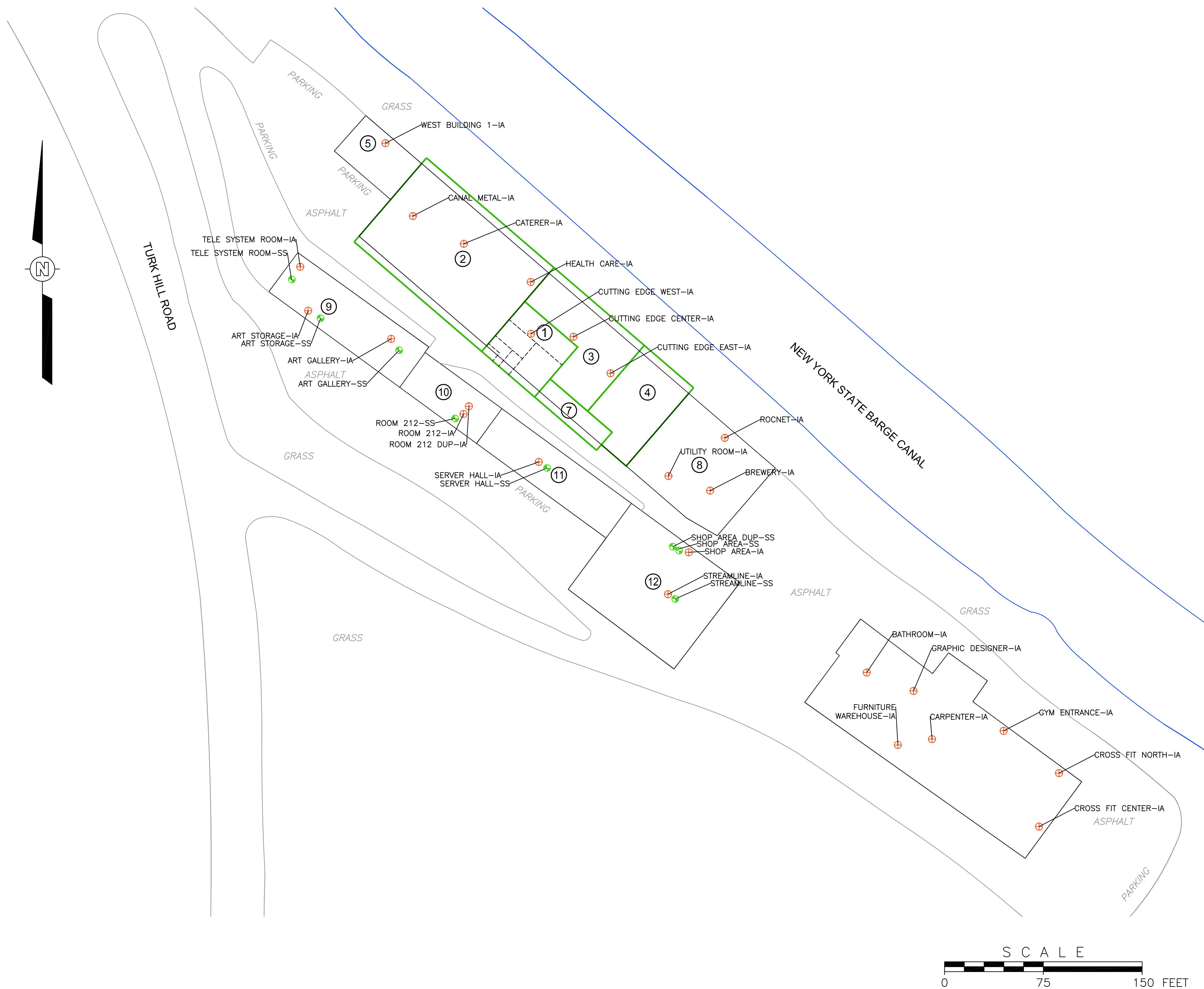

LEGEND:

FORMER BUILDING

BUILDING ID

SLAB SOIL VAPOR SAMPLE LOCATION

INDOOR AIR SAMPLE LOCATION

NOTE:
SAMPLE LOCATION POINTS ARE APPROXIMATE AND HAVE NOT BEEN SURVEYED

CB&I

NEW COLEMAN HOLDINGS

FIGURE 6
INDOOR AIR SAMPLE LOCATION MAP
1000 TURK HILL ROAD
TURK HILL PARK
FAIRPORT, NEW YORK

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Latham, NY	05/26/15	HAF	SJW	HAF	HAF	150174-B5

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Figure 7A: Fire Service

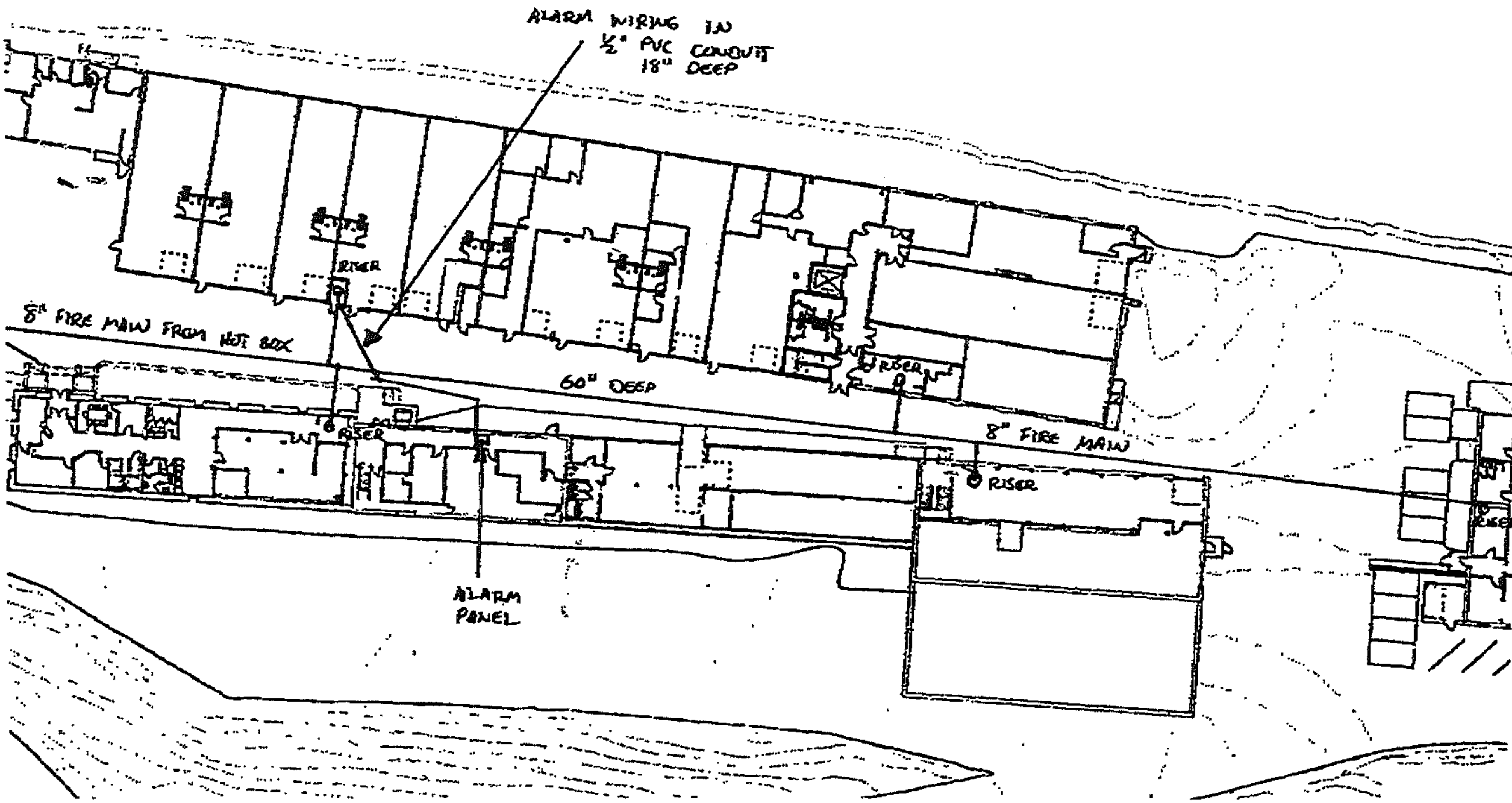


Figure 7B: Domestic Water Lines

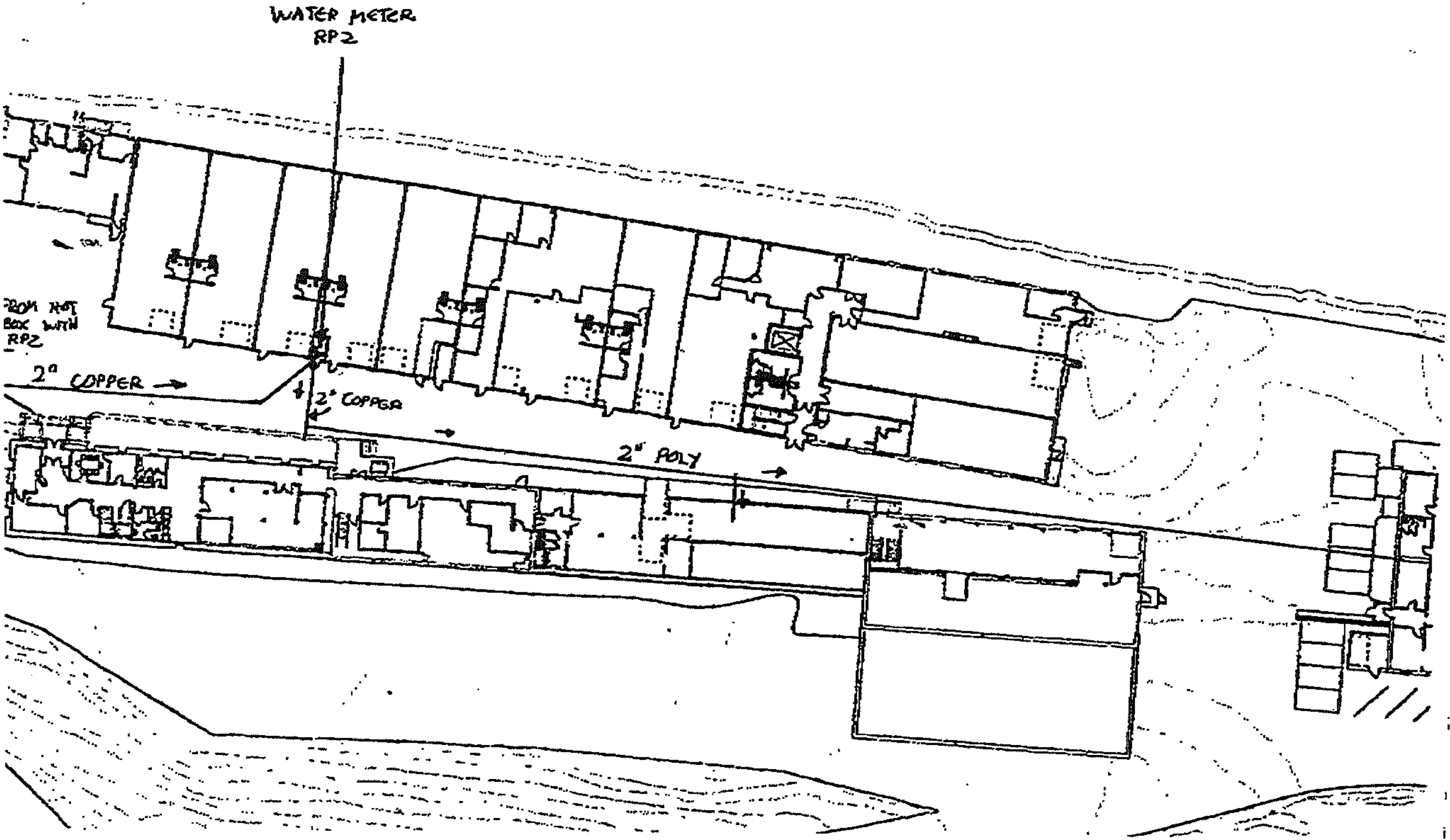


Figure 7C: Sanitary Sewage Plan

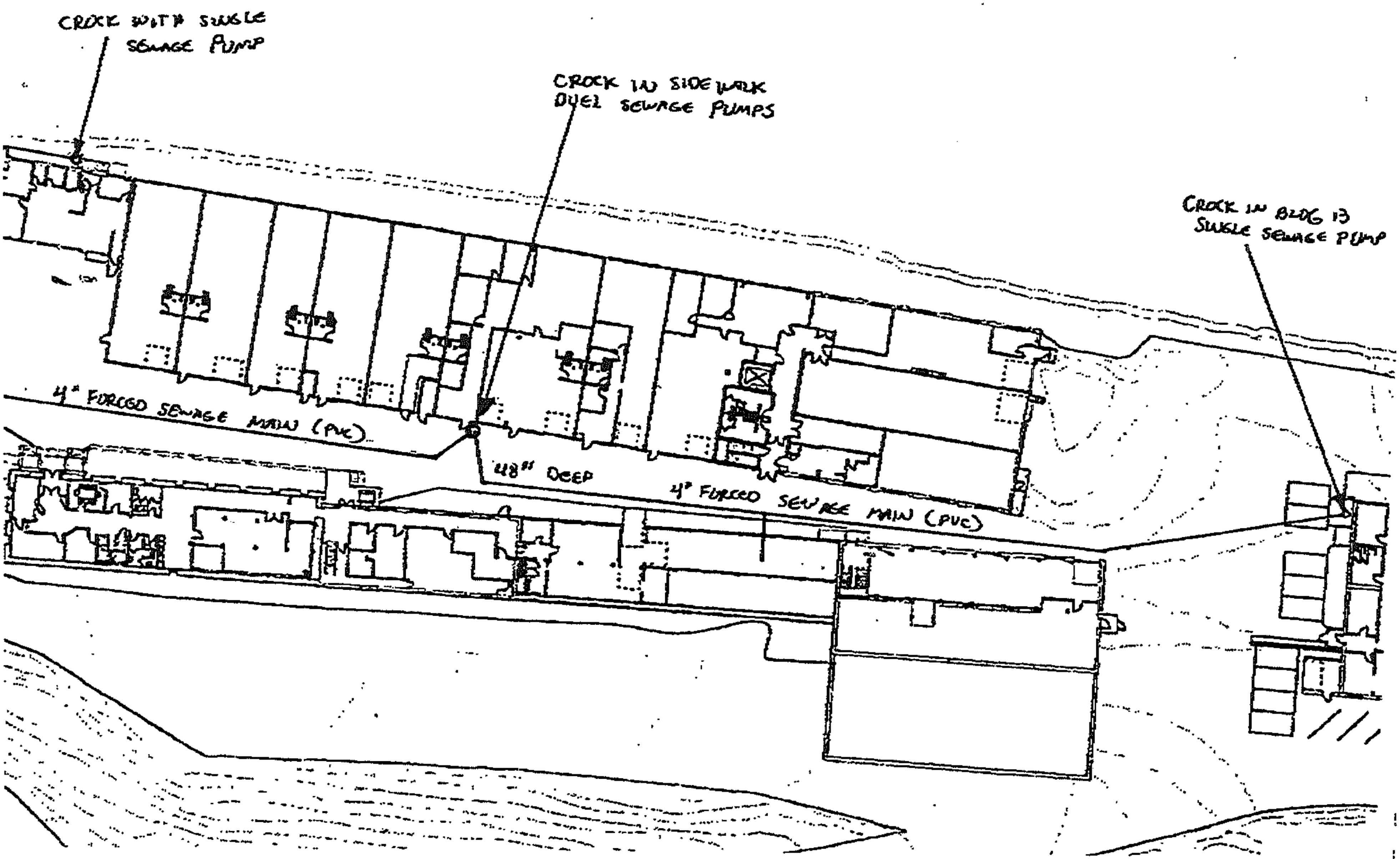
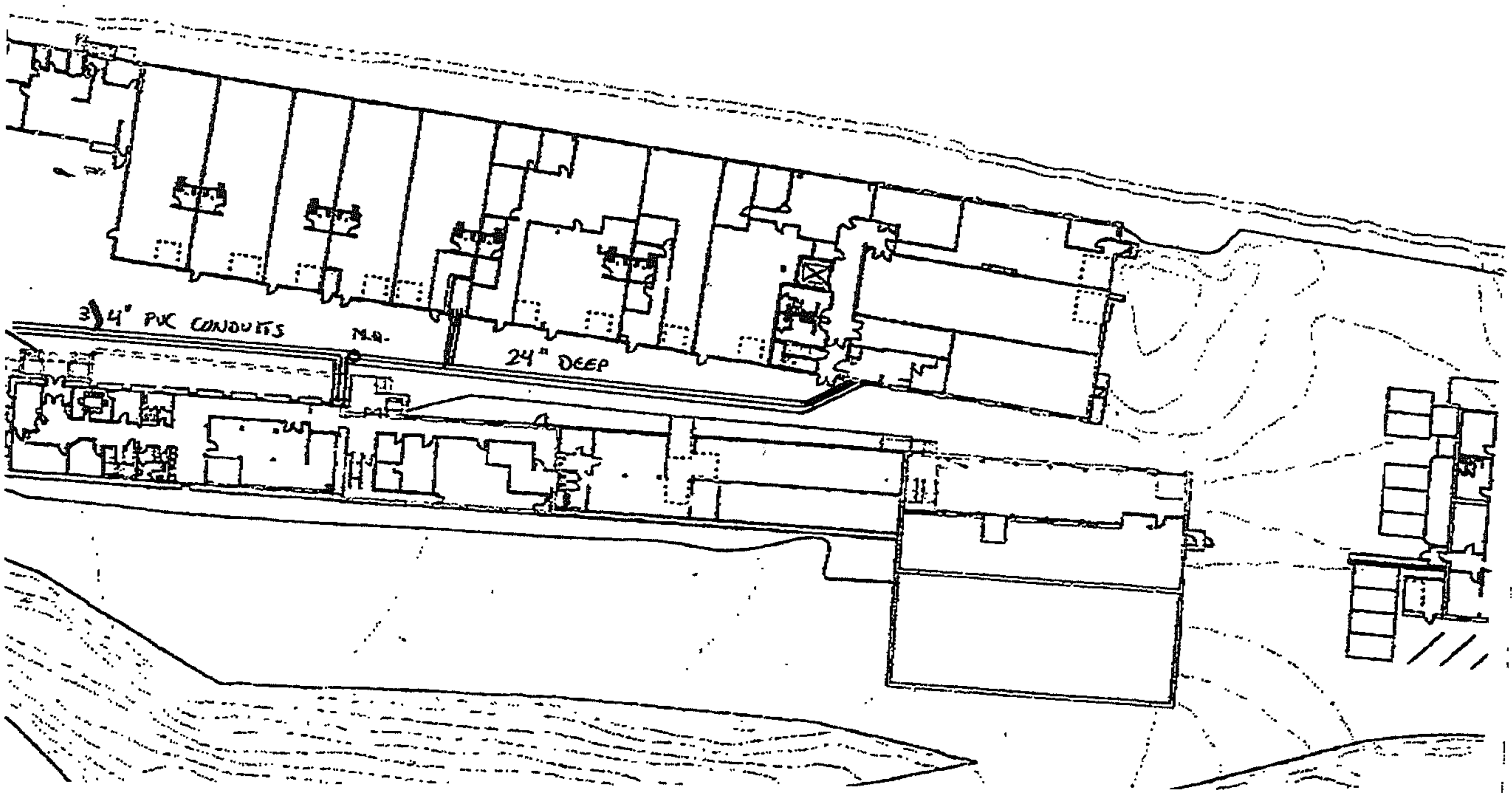


Figure 7D: Electric Service



Appendix A

IRM Vapor Intrusion Work Plan

APPENDIX A
FINAL INTERIM REMEDIAL MEASURE (IRM) VAPOR INTRUSION WORK PLAN

Turk Hill Park Site
1000 Turk Hill Road
Fairport, Monroe County, New York

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414

Prepared by:

CB&I Environmental & Infrastructure, Inc.
13 British American Boulevard
Latham, New York 12110

Project No. 152918
October 2014

Table of Contents

List of Figures

List of Acronyms & Abbreviations

BEACON	BEACON Environmental Services, Inc.
bgs	below ground surface
CB&I	CB&I Environmental & Infrastructure, Inc.
Contractor	NYSDOH-certified radon contractor
GZA	GZA GeoEnvironmental, Inc.
IRM	Interim Remedial Measure
Leader	Leader Professional Services, Inc.
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH VI Guidance	*Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006)
OM&M	operation, maintenance, and monitoring
PES	PES Associates, Inc.
PSG	passive soil gas
Site	Turk Hill Park, 1000 Turk Hill Road, Fairport, Monroe County, New York
sq. ft.	square feet
SSD	sub-slab depressurization
TCE	tricholorethene
UST	underground storage tank
VOC	volatile organic compound

1.0 Introduction

CB&I Environmental & Infrastructure, Inc. (CB&I) is submitting this Interim Remedial Measure (IRM) Work Plan detailing the proposed technical scope of work that will be completed for the Vapor Intrusion Mitigation of Buildings 1 and 3 at 1000 Turk Hill Road, Fairport, Monroe County, New York (the Site) (**Figure 1**). The scope of services discussed herein is based upon the technical requirements detailed in the Order on Consent Index No. B8-0823-14-01 dated March 26, 2014 between the New York State Department of Environmental Conservation (NYSDEC) and New Coleman Holdings, Inc. and issues discussed during the July 29, 2014 meeting among CB&I, NYSDEC, the New York State Department of Health (NYSDOH), and Greenberg Traurig, LLP representatives.

To date, several investigations have been conducted at this site. A summary of these investigations is contained in CB&I's August 2014 Records Search Report (provided under separate cover). The history of the site has been developed based on findings generated as part of various historic environmental investigations that have been completed at the site.

Based on the results of previous investigations, the site has been classified as a Class 2 Inactive Hazardous Waste Site (Order on Consent Index No. B8-0823-14-01). This classification indicates that disposal of hazardous waste has been confirmed and the presence of such hazardous waste or its components or breakdown products represents a significant threat to public health or the environment. Soils, groundwater, and indoor air have been impacted at areas across the site from historic site operations.

CB&I relied upon the methodology and results of a passive soil gas survey and vapor intrusion study investigation included in the December 7, 2011 *Draft Remedial Investigation Work Plan* prepared by PES Associates, Inc. (PES) to craft this IRM Work Plan. One of the investigations summarized in the PES report included a Vapor Intrusion Study. Specifically, in April 2011, PES collected a total 41 vapor samples, 19 sub-slab soil gas and indoor air samples, one ambient outdoor air sample, and two duplicate samples in Buildings 1 through 3 at the site. Samples were collected in SUMMA™ canisters with 24-hour regulators. Tricholorethene (TCE) was detected in samples above the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006) (NYSDOH VI Guidance). Moreover, combinations of sub-slab soil gas and indoor air results in Buildings 1 and 3 were in the Matrix 1 action range that recommended mitigation. The results generated in three out of the four sets of samples collected in Building 2 indicated concentrations that were consistent with monitoring (at one location) and mitigation at another.

As mentioned previously, the focus of this work plan is mitigation and management of indoor air/vapor intrusion at this site. Vapor intrusion occurs when soil vapors enter a building through cracks or perforations in concrete slabs or basement floors and walls, openings around sump pumps, or locations where pipes and electrical wires penetrate the foundation. The difference between interior and exterior pressures generally causes or promotes the intrusion of vapor into improved structures, such as has historically been observed at this site. CB&I's proposed approach to this project is detailed in the remaining portions of this work plan.

2.0 Site Information

2.1 Site Description

The site is located approximately 475 feet above mean sea level and is comprised of Ontario Loam; characteristics include moderate permeability and a medium acidic soil reaction. The site is located within the Lake Erie-Ontario Basin physiographic province of New York which is underlain by sedimentary rocks consisting mostly of shale and limestone (1987 Geologic Map of New York State, published by the State University of New York).

Based on information gathered from previous investigations, fill is located on site near the shoreline of the Erie Canal. Native soils consist of mainly dark brown, fine sandy to silty clays to refusal. Groundwater ranges from approximately 1 to 24 feet below ground surface (bgs).

The Erie Canal is adjacent to the site.

2.2 Site History

As detailed in the August 2014 Records Search Report by CB&I, the Turk Hill Park buildings, located next to the Erie Barge Canal, were constructed in the late 1890s by Cobbs Canary, a food canning and processing company that operated at the property until the 1950s. Crosman Arms used the site as a manufacturing facility from the 1950s into the 1980s. In 1984, the improved structures at the site were divided into the multi-unit complex that is currently operated as Turk Hill Park. Previous report indicated that there were also two 500-gallon underground storage tanks (USTs) located at this site. These USTs reportedly contained cutting oil and lube oil and were removed in 1994.

Based upon the age of the buildings and historic site operations, the following are considered potential contaminants of concern:

- Various metals;
- Asbestos;
- Petroleum hydrocarbons / polycyclic aromatic hydrocarbons compounds; and,
- Volatile organic compounds (including, but not limited to TCE).

Recent investigations completed by BEACON Environmental Services, Inc. (BEACON) and PES indicated the potential for soil vapor issues to exist at the site. On January 25 and 26, 2011, BEACON deployed 97 passive soil gas (PSG) samplers around the site. Ninety-four of the 97 PSG samplers were retrieved on February 12, 2011. According to BEACON, three PSG samplers could not be retrieved due to site conditions. PSG samplers contain hydrophobic adsorbents that allow for a wide range of target analyses. After collection, BEACON thermally desorbed the PSGs and analyzed for VOCs via gas chromatography/mass spectrometry equipment.

In April 2011, PES collected a total 41 vapor samples, 19 sub-slab soil gas and indoor air samples (each), one ambient outdoor air sample, and two duplicate samples in Buildings 1 through 3 at the site. Samples were collected in SUMMA™ canisters with 24-hour regulators. TCE was detected in samples above the NYSDOH VI Guidance. Moreover, combinations of sub-slab soil gas and indoor air results in Buildings 1 and 3 were in the Matrix 1 action range that recommended mitigation. Three out of the four sets of samples collected in Building 2 recommended monitoring and one recommended mitigation. The areas of highest concern were:

- The former paint line near Building 1
- The former location of a degreasing station near Building 3
- The area of the former UST, (which illustrates vinyl chloride impacts) at the southeastern end of the property

This information was provided to previous property owners, but nothing provided to CB&I indicated that further work or mitigation of these observed impacts was ever completed. This was confirmed at the July 29, 2014 meeting among CB&I, NYSDEC, NYSDOH, and the client representative. A summary of the results of these historic vapor assessment studies is detailed below. Additional site history is detailed in the Records Search Report (under separate cover).

2.2.1 Building 1

According to the *Summary of Contaminant Delineation and Removal Activities* prepared by Leader Professional Services, Inc. (Leader) (March 1, 2006), the center portion of the building was demolished in August 2004. In April 2004, Leader oversaw the removal of approximately 70 cubic yards of soil impacted with VOCs, cinders, and ash. The removal was based on results from previous investigations conducted by both Day Environmental, Inc. and Leader which defined the area of impacts within this portion of the building. The extent of contaminated soil extended from the northernmost loading dock and "spread northward following a drainpipe to the canal." During the excavation and investigation activities conducted at this time, approximately 210 cubic yards of soil impacted with VOCs were removed. The source of these VOCs was reported to be from the former paint storage area. Contamination observed in the area did not appear to extend beyond 8 to 10 feet bgs based upon the information provided to CB&I. The excavated area was backfilled with recycled concrete and soil derived from sources on the property. This portion of the building was rebuilt and completed in 2006. The building is approximately 30,000 square feet (sq. ft.) with a partial second story.

The first floor of the building is approximately 20,000 sq. ft. The building is on a slab foundation; the newer part of the building has a full foundation wall. The center of the building is reportedly supported by piers. The elevator pit and sump, are the only portion of the building that extends below the ground surface. No basements or crawl spaces are present. The northern and southern ends of the building are the original construction and built on a slab. The southern end of the building has a complete second story is approximately 5,000 sq. ft. The north portion of the building is approximately 3,000 sq. ft.

2.2.2 Building 3

The main portion of Building 3 was constructed in 1908. The foundation is a combination of concrete and stone. No basements or crawl spaces are present. Three shed additions were added in 1950 with 12-inch solid concrete blocks being employed for the foundation. Most of the partitions between the businesses in this building have one-hour fire walls separating each unit.

3.0 Mitigation

This section presents the anticipated scope of work that will be employed to mitigate vapor intrusion in Buildings 1 and 3 (**Figure 2**). Work will generally be performed in accordance with the processes outlined in the 2006 NYSDOH VI Guidance document. An anticipated scheduled is presented as **Figure 3**.

3.1 General Mitigation Overview

Mitigation systems are considered engineering controls, defined in the NYSDOH VI Guidance document as “any physical barrier or method employed to:

1. Actively or passively contain, stabilize, or monitor hazardous waste or petroleum;
2. Restrict the movement of hazardous waste or petroleum to ensure the long-term effectiveness of remedial actions; or
3. Eliminate potential exposure pathways to hazardous waste or petroleum.”

Mitigation is considered to be an interim measure that is employed to address exposures until contaminated environmental media are remediated or until mitigation is no longer needed to address exposures related to soil vapor intrusion.

The most effective mitigation methods typically involve sealing infiltration points and actively manipulating the pressure differential between the building's interior and exterior (on a continuous basis). Sealing infiltration points limits the flow of subsurface vapors into the building. In conjunction with sealing potential subsurface vapor entry points, an active sub-slab depressurization (SSD) system is the preferred mitigation method for buildings with a basement slab or slab-on-grade foundation when additional mitigation measures beyond sealing of infiltration points are required. An SSD system uses a fan-powered vent and piping to draw vapors from the soil or materials beneath the building's slab (i.e., essentially creating a vacuum beneath the slab) and discharges the recovered vapors to the atmosphere. This results in lower sub-slab air pressure relative to indoor air pressure, which prevents the infiltration of sub-slab vapors into the building.

As described in the NYSDOH VI Guidance document, the most common approach to achieving sub-slab depressurization is to insert the piping through the floor slab into the crushed rock or soil beneath the floor slab when practicable. Other depressurization methods can include:

- Drain tile suction
- Sump hole suction
- Block wall suction

The depressurization approach, or combination of approaches, selected for a building is typically determined on a building-specific basis due to building-specific features that may be conducive to a specific depressurization approach. Within New York State, NYSDOH-certified radon contractors will typically perform this work, as mitigation systems are similar to radon systems in size, design, and operation.

3.2 Design and Installation of Mitigation Systems

Prior to designing the mitigation system, the NYSDOH-certified radon contractor (Contractor) employed by CB&I will perform a qualitative and/or quantitative diagnostic test on each of the buildings to measure the ability of a suction field and air flow to extend through the material beneath the slab. The qualitative test typically includes applying suction on a centrally located hole drilled through the concrete slab and simultaneously observing the movement of smoke downward into small holes drilled in the slab at locations separated from the central suction hole. A digital micro manometer or similar instrument is typically used for a quantitative evaluation. The type and method of the test will be determined by the Contractor and the results of these tests will be used to design the mitigation system(s) for each of the buildings.

It is anticipated that a combination of sealing the building and a depressurization system will be used to mitigate vapor intrusion at the Turk Hill Road buildings. Sealing will improve the effectiveness of depressurization and ventilation systems and limit the flow of subsurface vapors into the buildings.

As mentioned previously, a Contractor retained by CB&I will design and install the SSD systems. The design and installation activities will be documented and reported to the agencies. An information package detailing the installation, operation, and maintenance of the systems will be provided to Turk Hill Canal Works, the site owner. CB&I typically allows for the Contractor to be responsible for any maintenance or repairs associated with the mitigation systems. The Contractor's certifications will be provided under separate cover.

3.3 Design Report

A pre-design letter report detailing the results of the pressure design test and proposed SSDS design layout will be submitted for review/approval prior to installation of the SSDS system. The letter report will include testing specifications and findings as well as figures showing building footer configurations, pressure field test points, proposed suction points, and potential system layouts. Any complicating factors as described above will also be discussed and evaluated as part of the design process.

4.0 Post-Mitigation

4.1 Confirmation Sampling

Once the mitigation system(s) for each building are installed, their effectiveness and proper installation will be confirmed. Post-mitigation testing will be conducted during the heating season (November to March) and no sooner than one month after the SSD system is installed. If a significant decrease in VOC concentrations compared to the 2011 PES vapor intrusion study results is not observed, an evaluation will be conducted to determine why a decrease was not observed. CB&I and their Contractor will re-evaluate the system design and modify it so there is a confirmed decrease in concentrations. All post-mitigation testing activities will be documented and reported NYSDEC and NYSDOH.

As outlined the NYSDOH VI Guidance, the following activities are expected to be performed as part of the confirmation sampling:

- Leak identification. Reasonable and practical actions will be taken to identify and reseal any leaks from cracks, floor joints, and the suction point.
- Backdraft testing (if applicable). The building should be tested for backdrafting (i.e., ventilation competition with other appliances). The competition could result in the accumulation of exhaust gases including, but not limited to, carbon monoxide if it is discovered that any of the businesses in Buildings 1 or 3 have vented appliances.
- Pressure differential measurement. The Contractor will measure the distance that a pressure change is induced in the sub-slab area. An evaluation will be performed if it is determined that adequate depressurization is not occurring. Once the evaluation is complete, corrective actions (if applicable) will be implemented.
- Warning device confirmation. The Contactor will test the operation of the warning device or indicator to ensure it is in proper working order.
- Post-mitigation indoor and outdoor air sampling. Indoor and outdoor air sampling will be conducted in both Buildings 1 and 3 where pre-mitigation samples were collected. Sampling locations, protocols, and analytical methods will generally be consistent with the 2011 indoor air sampling completed by PES.

4.2 Operation, Maintenance and Monitoring of Mitigation Systems

The operation, maintenance, and monitoring (OM&M) protocols for the systems will be included in a site-specific OM&M plan. The plan will include both recommendations for minimum OM&M activities as well as non-routine maintenance. The operation, maintenance, and monitoring (OM&M) plan and certification requirements developed for the VI mitigation systems will be included in a Site Management Plan along with any other engineering and institutional controls and plans developed as part of the overall site remedy. All routine and non-routine OM&M activities will be documented and reported to the NYSDOH, NYSDEC, and current site owner.

4.2.1 SSD Systems

Routine maintenance will likely commence within 18 months after the system becomes operational and should occur every 12 to 18 months thereafter. Based upon a demonstration of the system's reliability, CB&I and their Contractor may recommend an alternative frequency to NYSDEC and NYSDOH. During routine maintenance, the following activities (at a minimum) will be conducted along with any additional activities recommended by the Contractor:

- Visual inspection of the complete system;
- Identification and repair of leaks; and
- Inspection of the exhaust or discharge point to verify no air intakes have been located nearby.

Appropriate preventative maintenance, repairs, and/or adjustments will be made to the system to ensure its continued effectiveness at mitigating exposures related to soil vapor intrusion. The need for preventative maintenance will depend upon the life expectancy and warranty for the specific part, as well as visual observations over time. According to the NYSDOH VI Guidance, air monitoring is not recommended if the system has been installed properly and is maintaining a vacuum beneath the entire slab.

4.2.2 Non-Routine Maintenance

Non-routine maintenance may also be appropriate during the operation of a mitigation system. Examples of such situations include the following:

- The building's owners or occupants report that the warning device or indicator indicates the mitigation system is not operating properly;
- The mitigation system becomes damaged;
- The building has undergone renovations that may reduce the effectiveness of the mitigation system.

Activities conducted during non-routine maintenance visits will vary; repairs or adjustments will be made to the system as appropriate.

5.0 Termination of Mitigation System Operations

Mitigation systems in Buildings 1 and 3 will remain in place and operational until the written concurrence is received from the NYSDEC or NYSDOH that they are no longer necessary to address soil vapor intrusion exposure and may be turned off. Factors that will be taken into consideration when requesting termination of mitigation system operations will include, and may not be limited to, the following factors presented in the NYSDOH VI Guidance document:

- Subsurface sources (e.g., groundwater, soil, etc.) of VOC contamination in subsurface vapors have been remediated based upon an evaluation of appropriate post-remedial sampling results.
- Residual contamination, if any, in subsurface vapors is not expected to affect indoor air quality significantly based upon soil vapor and/or sub-slab vapor sampling results.
- Residual contamination, if any, in subsurface vapors is not affecting indoor air quality when active mitigation systems are turned off based upon indoor air, outdoor air, and sub-slab vapor sampling results.
- There is no "rebound" effect for which additional mitigation efforts would be appropriate observed when the mitigation system is turned off for prolonged periods of time. This determination should be based upon indoor air, outdoor air, and/or sub-slab vapor sampling from the building over a time period determined by site-specific conditions.

6.0 Annual Certification and Notification Recommendations

If required by NYSDEC and/or NYSDOH, a certification will be prepared and submitted by a professional engineer or environmental professional affirming that the engineering controls are in place, are performing properly and remain effective. This requirement of certification will remain in effect until the NYSDEC or NYSDOH provides written notification that the certification is no longer necessary.

7.0 References

GZA GeoEnvironmental, Inc., June 2001. *Phase I Environmental Site Assessment, Turk Hill Office Park.*

Leader Professional Services, Inc. *Summary of Contaminant Delineation and Removal Activities*, March 1, 2006.

New York State Department of Health, 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.*

Figures

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
LATHAM, NY	04/14/14	HAF	MJS	HAF	HAF	150174-01A1

CB&I

NEW COLEMAN HOLDINGS

FIGURE 1
SITE LOCATION MAP
1000 TURK HILL ROAD
FAIRPORT, NEW YORK

CB&I

NEW COLEMAN HOLDINGS

FIGURE 2
SITE PLAN
FAIRPORT, NEW YORK

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
LATHAM, NY	08/06/14	HAF	SJW	HAF	HAF	150174-01B3

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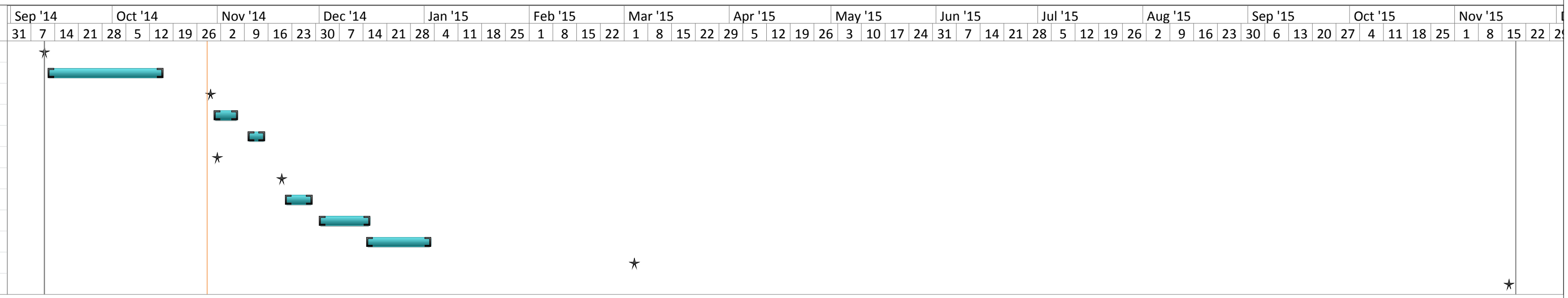
Figure 3
IRM Schedule

ID	Task Name
1	Initial IRM Submittal
2	NYSDEC/NYSDOH Review
3	Revised IRM Submittal
4	NYSDEC/NYSDOH Review and Approval
5	Diagnostic Testing
6	System Design
7	Pre Design Submittal
8	NYSDOH/NYSDEC Review and Comment
9	Building 1 SSDS Install
10	Building 3 SSDS Install
11	Confirmation Sampling
12	Annual Sampling



Project: Figure 3_IRM Schedule_1
Date: Wed 10/29/14

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Deadline
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Progress

Appendix B

Community Air Monitoring Plan (CAMP)

APPENDIX B
COMMUNITY AIR MONITORING PLAN, REV. 1

Turk Hill Park, Site #828161

1000 Turk Hill Road
Fairport, Monroe County, New York

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414

Prepared by:

CB&I Environmental & Infrastructure, Inc.
13 British American Boulevard
Latham, NY 12110

Project No. 152918
May 2015

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List of Appendices

List of Acronyms & Abbreviations

bgs	below ground surface
CAMP	Community Air Monitoring Plan
CB&I	CB&I Environmental & Infrastructure, Inc.
FAP	Field Activities Plan
FS	Feasibility Study
HASP	Health & Safety Plan
HSA	Hollow Stem Auger
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	polychlorinated biphenyl
PID	photoionization detector
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
Site	Turk Hill Park, 1000 Turk Hill Road, Fairport, Monroe County, New York
SVOC	semivolatile organic compound
TCL	Target Compound List
TAL	Target Analyte List
VOC	volatile organic compound

1.0 Introduction

CB&I Environmental & Infrastructure, Inc. (CB&I) has prepared this Community Air Monitoring Plan (CAMP) for the 1000 Turk Hill Road site located in Fairport, New York (Site, **Figure 1**). The Turk Hill Park site is a 7.86-acre property located on the east side of Turk Hill Road and situated in a commercial and residential area in the village of Fairport, New York. The site contains three two-story buildings totaling 90,862 square feet of space with asphalt-paved parking and landscaping. Approximately 64 tenants currently occupy the building for a variety of operations.

This CAMP will be implemented during site activities associated with the approved Remedial Investigation/Feasibility Study Work Plan (RI/FS). As discussed in the New York State Department of Health (NYSDOH) Generic CAMP (**Appendix A**), a CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust), at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection (which is addressed in CB&I's Health & Safety Plan (HASP). Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne particulate releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread VOCs and respirable dust off-site through the air. This CAMP is consistent with the NYSDOH Generic Community Air Monitoring Plan (**Appendix A**).

2.0 Drilling Scope of Work

A larger scope of work, is being completed to delineate site-wide soil and groundwater impacts at the site as well as determine indoor air and soil vapor quality. This plan addresses air monitoring involved with intrusive activities only. Additional detail on the field activities is presented in the RI/FS Work Plan.

2.1 Soil Borings

Upon activation, the following activities will be undertaken:

Twenty soil borings (to be designated SB-1 through SB-20) will be advanced at select locations around the Site (**Figure 2**). Borings will be advanced via split spoon samplers, using a hollow stem auger (HSA) drill rig. Prior to advancement of the boring, each location will be cleared for utilities (e.g. hand auger or air knife) to the required depth of 5-feet below ground surface (bgs) as detailed above.

Each soil boring will be advanced either to refusal or bedrock (presumed to be approximately 25-feet bgs), whichever comes first. All recovered soils will be examined for visible signs of contamination, screened for volatile vapors with a photoionization detector (PID), and logged by a CB&I geologist according to the Unified Soil Classification System.

One soil sample will be collected from each soil boring either at the interval exhibiting the highest PID measurement or immediately above bedrock/ water table interface. Samples will be packed on ice and couriered to for analysis of Target Compound List (TCL) VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and target analyte list (TAL) metals.

Upon completion of the boring, all soil cuttings will be placed in 55-gallon drums for characterization and appropriate disposal.

2.2 Monitoring Well Installation

Thirteen of the 20 soil boring locations will be converted to monitoring wells using HSA during techniques. Three of these locations will have nested monitoring wells (i.e. two overburden monitoring wells and one shallow bedrock well). Sixteen overburden monitoring wells will be installed via a 4-1/4 inch (inner diameter) hollow-stem auger will typically be employed to install 2-inch diameter wells. Thirteen boreholes will extend to top of bedrock (assumed to be approximately 25 feet bgs) and be constructed with a 10-foot section of 10 slot well screen and the appropriate length of schedule 40 PVC flush-joint casing to ground surface. The remaining three monitoring wells will be constructed with a 5-foot section of 10 slot well screen set to straddle the water table interface and the appropriate length of schedule 40 PVC flush-joint casing to ground surface.

Three bedrock monitoring wells will be installed via a 4-1/4 inch (inner diameter) hollow-stem auger. The augers will be advanced to the top of competent bedrock. Bentonite chips will be installed around a 4-inch steel temporary casing set up to a wash tee at the ground surface. Drilling will continue using an H-size core bit 10-feet into bedrock. This will create a 3 7/8-inch rock core hope. The bedrock wells will be constructed with a 2-inch 10-foot section of 10 slot well screen and the appropriate length of schedule 40 PVC flush-joint casing to ground surface.

The annular space between the boring wall and the screen will be backfilled with Morie Sand to at least 2 feet above the screened interval; at least two feet of bentonite chips will be placed above the sand pack and hydrated. The remaining annular space will be backfilled with a cement/bentonite grout mixture.

All monitoring wells will be completed at the ground surface with flush mounted protective roadboxes. Each well will have a cap and a locking cover and be completed with a concrete pad.

2.3 Test Pits

The purpose of advancing the test pits is to evaluate/identify the contents of the "mounds" that are located in the wooded area east of Building 3. The Canal Corp. may own a portion of the area where the proposed test pits are located. CB&I personnel will determine the property boundary and obtain permission to excavate on the Canal Corp. property if necessary. A maximum of ten test pits will be advanced to groundwater or a maximum depth of 8-ft bgs, whichever is encountered first, in and around identified anomalies (based on results from the GPR survey) to allow for visual characterization of site conditions. Soil removed for the excavation of the test pits will remain on-site, placed on plastic sheeting and utilized as backfill once visual characterization is complete. Materials will be stored at appropriate distances from the excavation to maintain compliance with slope stability and the CB&I HASP. At no time will any personnel enter any test pit unless all requirements of the HASP have been followed and it has been determined that the activity is necessary. The test pits will be backfilled prior to leaving the site each day.

Vapor readings will be collected on each sample using a PID and placed in the void space of a sample jar or "zip-lock" bag. One surface sample and one soil sample will be collected from each excavated test pit. Samples will be collected in accordance with the site-specific QAPP and sent for the analysis of VOCs via USEPA Method 5035A, SVOCs via USEPA method 8270, PCBs (USEPA method 8082), TAL metals analysis (USEPA Method 6010) and pesticides (USEPA method 8081).

Any drums (intact or carcasses) identified during excavation will be removed and stockpiled for further characterization and disposal.

The test pit will be backfilled in lifts with the excavated soils after the soils in each test pit have been characterized and sampled. The test pits will be compacted using the excavator bucket or "tracked in" by the excavator.

3.0 Air Monitoring Procedures for Intrusive Activities

It is anticipated that very little dust will be generated and/or observed during these site activities. Dust may be generated from the disturbance of dry soil. The following sections describe the specific CAMP monitoring procedures for VOCs and respirable dust levels.

Fence line and/or property line air monitoring locations will be selected based on the work zone location, wind direction, and proximity of potential receptors. The frequency and locations to provide representative air monitoring will be evaluated on a day-to-day basis and adjusted for the weather conditions and the locations of remedial work.

Community air monitoring will be conducted in accordance with the following:

i. VOCs will be monitored continuously at the downwind perimeter of the excavation area. Readings will be recorded at 15-minute intervals or sooner if an action level has been exceeded. If total VOC levels exceed 5 ppm above background, work activities will be halted and monitoring continued under the provisions of the Vapor Emission Response Plan (see Section 3.3). All monitoring readings will be recorded and available for review; and

ii. A fugitive dust suppression and particulate monitoring program will be conducted in accordance with the procedures presented in Section 3.4.

3.1 Step 1 Vapor Emission Monitoring

If the ambient air concentrations of VOCs exceeds 5 ppm above background at the downwind perimeter of the excavation area, then a check of the downwind site perimeter will be made to verify that the level is less than 5 ppm. Activities will be halted and monitoring at the downwind perimeter of the site will be continued if levels at the downwind perimeter are greater than 5 ppm. If the VOC level decreases below 5 ppm above background at the downwind perimeter of the site, work activities can resume.

If the VOC level is above 25 ppm at the downwind perimeter of the excavation area, air monitoring at 200 feet downwind of the site perimeter or half the distance to the nearest residential or commercial structure, whichever is less, will be performed to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Step 2 Vapor Emission Monitoring section (Section 3.3).

3.2 Step 2 Vapor Emission Monitoring

If any VOC levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone). If efforts to abate the emission source are unsuccessful, and if any of the VOC levels persist at 5 ppm above background or greater for more than 30 minutes in the 20 Foot Zone, then the Vapor Emission Response Plan (see Section 3.3) will automatically be placed into effect. Additionally, the Vapor Emission Response Plan will be immediately placed into effect if VOC levels are greater than 10 ppm above background at the 20 Foot Zone for any one time.

3.3 Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

i. All New York State Department of Environmental Conservation (NYSDEC) contacts, Client contacts and CB&I contacts will be notified so that evacuation procedures may begin.

ii. Frequent air monitoring will be conducted at 30 minute intervals within the 20-Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the project manager.

3.4 Fugitive Dust Suppression And Particulate Monitoring Program

The following fugitive dust suppression and particulate monitoring program will be employed at the site during ground invasive activities or during other activities which may potentially create an airborne hazard:

i. Reasonable fugitive dust suppression techniques will be employed during all site activities that may generate fugitive dust.

ii. Particulate monitoring will be employed during ground invasive activities or activities which may generate fugitive dust.

iii. Particulate monitoring will be performed using a real-time particulate monitor that is capable of monitoring particulate matter less than 10 microns in size. Particulate levels will be monitored at the downwind side of the excavation area. Readings will be based on the 15-minute average concentrations.

iv. Particulate monitoring will be performed by a trained technician who fully understands the operation of the monitoring equipment and the necessary calibration procedures. The technician will be responsible for keeping the air monitoring log book which will contain records of equipment calibration and all air monitoring readings.

v. The action level will be set at 150 micrograms per cubic meter ($\mu g/m^3$) based on a 15 minute average. If particulate levels are detected in excess of 150 $\mu g/m^3$, the upwind background level will be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 $\mu g/m^3$ above the background level, additional dust suppression techniques will be implemented to reduce the generation of fugitive dust and corrective actions will be taken to protect project personnel and reduce the potential for chemical migration. Corrective measures may include increasing the level of personal protection and implementing additional dust suppression techniques. These may include:

   a. Wetting equipment and work areas

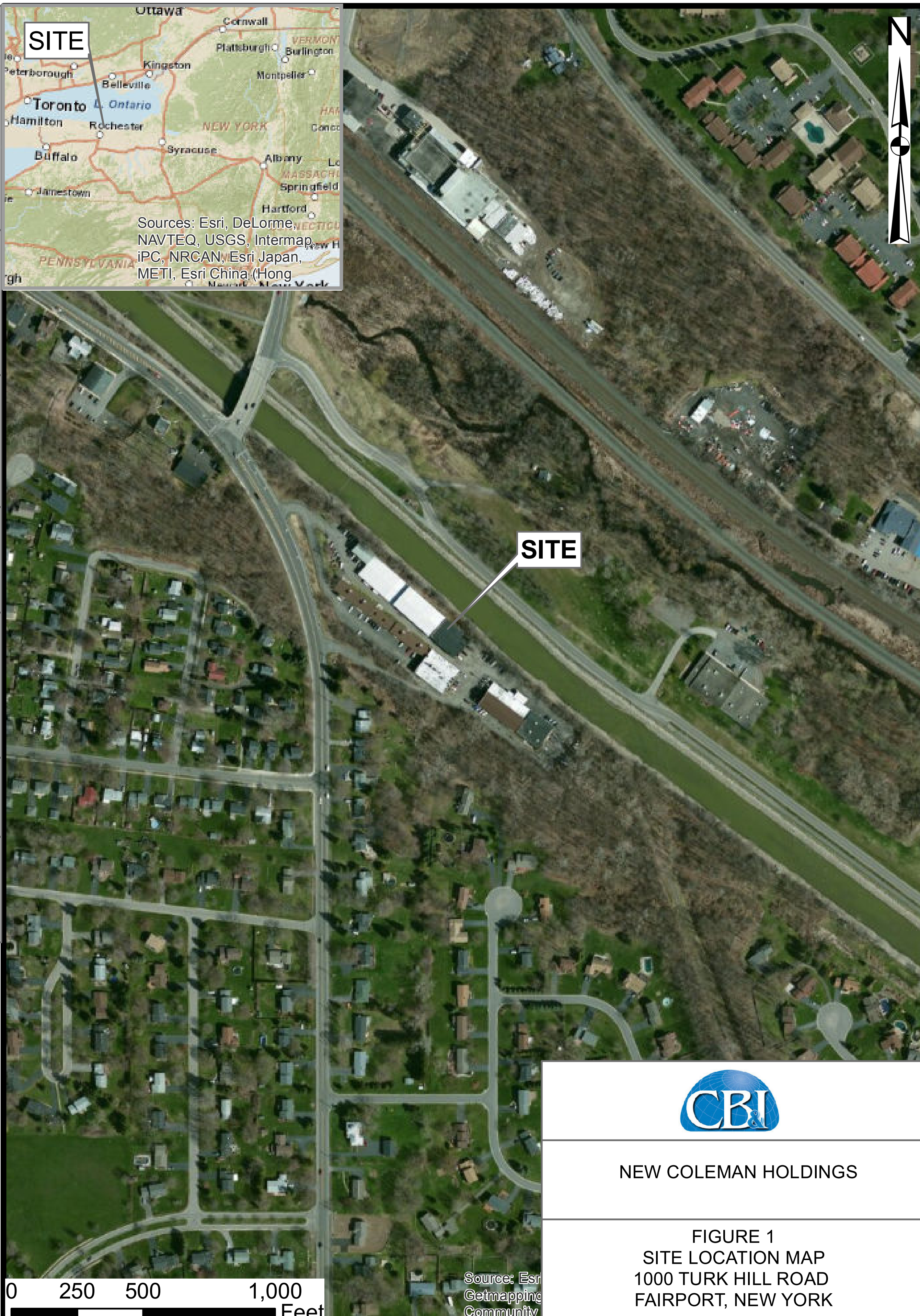
   b. Immediately covering work areas or materials upon completion

vi. If dust is observed leaving the working site, additional dust suppression techniques will be employed.

vii. If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (below 150 $\mu g/m^3$) work will be suspended until appropriate corrective measures are approved to remedy the situation.

While project activities are ongoing, other work may impact dust levels. If dust levels at the fence line exceed 150 $\mu g/m^3$ while work other than remedial construction is underway, then dust readings will be obtained at the downwind boundary of the remedial work area to determine if the remedial work is contributing to the fence line measured dust levels. If it is apparent that the source of dust that exceeds 150 $\mu g/m^3$ is due to work other than the excavation activities, then the NYSDEC will be notified of this occurrence and project activities will continue without implementing dust control measures.

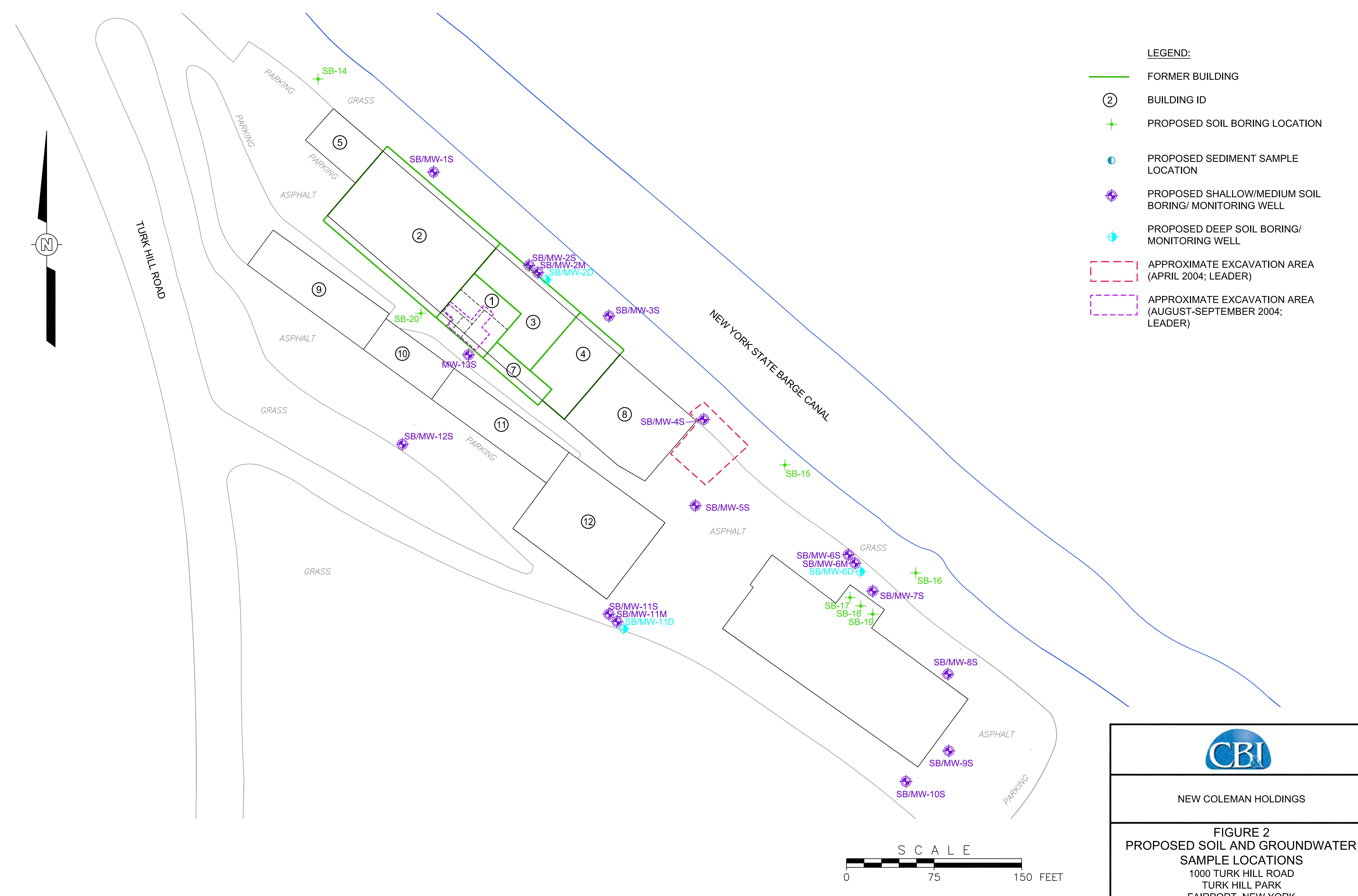
Figures



NEW COLEMAN HOLDINGS

FIGURE 1
SITE LOCATION MAP
1000 TURK HILL ROAD
FAIRPORT, NEW YORK

DRAWING NUMBER	150174-01A1
APPROVED BY	HAF
CHECKED BY	HAF
DRAWN BY	MJS
DESIGNED BY	HAF
DATE	04/14/14
OFFICE	LATHAM, NY



OFFICE Latham, NY | DATE 12/19/14 | DESIGNED BY HAF | DRAWN BY ELS | CHECKED BY -- | APPROVED BY -- | DRAWING NUMBER 150174-B3

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Plotted By: steven.walsh

CB&I

NEW COLEMAN HOLDINGS

FIGURE 2
PROPOSED SOIL AND GROUNDWATER SAMPLE LOCATIONS
1000 TURK HILL ROAD
TURK HILL PARK
FAIRPORT, NEW YORK

Appendix A

NYSDOH Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50° C (14 to 122° F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

Appendix C

Field Activities Plan (FAP)

APPENDIX C
FIELD ACTIVITIES PLAN, REV. 1

Turk Hill Park, Site #828161
1000 Turk Hill Road
Fairport, Monroe County, New York

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414

Prepared by:

CB&I Environmental & Infrastructure, Inc.
13 British American Boulevard
Latham, NY 12110

Project No. 152918
May 2015

Table of Contents

List of Appendices

List of Acronyms & Abbreviations

ASP	Analytical Services Protocol
CB&I	CB&I Environmental & Infrastructure, Inc.
DER	Department of Environmental Remediation
DER-10	Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010)
DO	Dissolved Oxygen
ELAP	Environmental Laboratory Accreditation Program
FAP	Field Activities Plan
FS	Feasibility Study
HASP	Health and Safety Plan
HAS	Hollow Stem Auger
ID	Inner Diameter
IDW	Investigation Derived Waste
IP	Interface Probe
L	Liter
L/min	Liters per minute
NTU	Nephelometric Turbidity Units
NAPL	Non-aqueous Phase Liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH	NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006)
PID	Photoionization Detector
O&M	Operations and Maintenance
ORP	Oxidation-Reduction Potential
PPE	Personal protective equipment
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
SITE	Turk Hill Park, 1000 Turk Hill Road, Fairport, Monroe County, New York
SOP	Standard Operating Procedures
SSDS	Sub-slab Depressurization System
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

1.0 Introduction

CB&I Environmental and Infrastructure, Inc. (CB&I) has prepared this Field Activities Plan (FAP) to outline the typical field activities that CB&I personnel anticipated to be completed as part of the Remedial Investigation(RI)/Feasibility Study (FS) for Turk Hill Park, Site # 828161, 1000 Turk Hill Road, Fairport, New York (Site). All work at the site is being conducted under Order on Consent #B8-0823-14-01.

The elements of this FAP have been prepared in accordance with the most recent and applicable guidelines and requirements of the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) as specified in Section 2.15 as well as CB&I's Standard Operating Procedures (SOP).

2.0 Anticipated Field Activities

The primary field work assignments anticipated to be completed under this term contract include the assessment and evaluation of surface and subsurface soil, groundwater, surface water, sediment, soil vapor, and indoor air quality conditions to evaluate the potential impact to human health and the environment and determine whether remedial activities are required at each site. CB&I anticipates that the following field tasks may be completed during the RI/FS at the Site.

2.1 Direct-Push Soil Borings

Direct-push is a method by which soil cores are continuously collected from the sub-surface within a single point referred to as a soil boring. Soil borings are commonly used to classify shallow overburden soils and collect soil samples in order to quickly and cost effectively delineate potential impacts and facilitate the installation of temporary or permanent monitoring wells, piezometers and/or soil vapor points.

In order to advance the soil borings, a Geoprobe ® or similar direct-push machinery is used to continuously drive steel sampling probes lined with acetate sleeves into the ground to the desired depth. Subsurface soil cores are extracted at intervals ranging from 4 to 5 feet in length, and visually assessed and screened using a photoionization detector (PID) to identify potential impacts and collect representative soil samples from selected depth intervals. The selection of subsurface soils for laboratory analysis will be made in the field in consultation with a NYSDEC project manager.

Typically, samples are secured for laboratory analysis based upon the following characteristics:

1. Intervals that exhibit visual signs of contamination;
2. Soil intervals that exhibit the highest response on the field screening device (i.e. PID);
3. The interval above the water table interface (assuming none of the above conditions trigger the need for sample collection);
4. A combination of all of the above as directed by the NYSDEC project or field manager.

All soil borings will be classified and logged according to the Unified Soil Classification System. Additionally, soil borings will be abbreviated as "SB" in all documentation and numbered sequentially in the order of their completion (i.e. SB-1, SB-2, SB-3, etc.). Information including the field description of soil quality conditions, classification, sampling interval, PID reading, and other field observations will be recorded on a soil boring log form or field notebook. An example of the typical soil boring log is provided in **Appendix A**.

Soil samples secured for laboratory analysis will be sent to an approved NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified laboratory for analytical analysis using the U.S. Environmental Protection Agency (USEPA) methods specified by the approved work assignment. Samples will be managed in accordance with CB&I's Quality Assurance Project Plan (QAPP) included as Appendix D to the RI/FS Work Plan.

Soil cores extracted from the subsurface will be handled in a manner that will avoid direct contact with nearby ground surfaces or any other source of potential cross contamination. This may require the use of polyethylene sheeting laid upon the ground as a temporary staging area for soil cores. Soil obtained from the subsurface that will not be submitted to the laboratory for analysis will be containerized and properly disposed of in accordance with the Waste Storage practices proposed in Section 2.13 of this document.

2.2 Monitoring Well Installation and Construction

Monitoring wells will be installed and constructed to define geologic and hydrogeologic characteristics the Site. The ultimate goal in the installation of these wells is to accurately characterize groundwater quality conditions, delineate any contaminant plume(s) that may exist at the site and determine the potential for offsite migration of any groundwater contaminants. Monitoring wells will be installed at locations determined in consultation with the NYSDEC project manager. These locations will be based upon experience, anticipated regional or site specific groundwater conditions, existing information gathered during previous site investigative activities, knowledge of the existing contaminate distribution or impacts, historical data and other information provided by the NYSDEC or Site Manager.

2.2.1 Types of Monitoring Wells

Permanent or temporary monitoring wells will be installed depending upon site-specific conditions and in discussion with the NYSDEC project manager. Permanent wells would be proposed at locations requiring long term monitoring; temporary wells would be installed at locations requiring cursory or short term monitoring. Completed well depth will be dependent upon groundwater monitoring objectives, anticipated site specific conditions, and contaminant behavior and site geology.

All monitoring wells will be designated as "MW-#" unless otherwise directed. Shallow, intermediate, or deep depth wells will be identified with an "S", "I", or "D" that is immediately preceded by the well number (e.g., "MW-#I") unless otherwise directed.

Shallow monitoring wells will be installed to assess the uppermost water bearing zone and or "perched aquifers" that are of concern to the NYSDEC. Intermediate and deep monitoring wells will be installed in consultation with the NYSDEC; these wells will typically be used to evaluate vertical hydraulic gradient and contaminant distribution within complex geologic formations or to assess regional water bearing zones of particular concern or interest. The monitoring wells will be installed by a licensed and qualified well drilling contractor and supervised and documented by a field geologist according to the procedures described in Sections 2.2.2 and 2.2.3.

2.2.2 Temporary Monitoring Well Construction

Temporary monitoring wells will be installed using direct-push techniques to the appropriate depth, assuming that the site conditions are amenable to direct-push methodology. The applicability of this technique to site conditions will be discussed with the NYSDEC project manager prior to implementation.

The temporary wells will be completed using 1-inch diameter Schedule 40 polyvinyl chloride (PVC) 0.010-slot screen and an appropriate length of Schedule 40 PVC riser to the ground surface. The slot screen size may be changed based upon site specific geologic conditions. The screened interval will be installed at depths to capture groundwater from the predetermined zone. The riser will extend above ground surface unless directed otherwise by the project manager. The annular space will be backfilled with sand to a minimum of 2-feet above the screen interval and a bentonite seal will be placed from the top of the sand to the ground surface to complete the temporary monitoring well. No casing or similar steel protective device will be installed around the temporary points unless directed by the NYSDEC Project Manager.

When it has been determined that it is necessary to “close” a temporary monitoring well, the PVC casing will be removed from the ground and the boring may be backfilled with drill cuttings or bentonite and marked with a stake/flag or similar device as directed by the NYSDEC. The location will be labeled and identified on the site map so that it can be located at a later date. Borings installed in paved or concrete areas will be backfilled and refinished at the ground surface with concrete or asphalt cold patch.

2.3 Permanent Monitoring Well Construction

Permanent monitoring wells will likely be installed in two types of geologic materials: overburden or bedrock. The following sections detail the installation procedures for each type of monitoring well.

2.3.1 Overburden Wells

Overburden monitoring wells will typically be installed using hollow-stem augering techniques. A 4-1/4 inch inner diameter (ID) hollow-stem auger (HSA) will typically be employed to install 2-inch diameter wells while a 6-1/4 inch ID HSA will be used to install 4-inch diameter wells. Split spoon samplers will be used to secure samples for classification and laboratory analysis at intervals determined by field screening or other means. Boreholes will typically extend at least 5 feet into the groundwater table or to a depth directed by the NYSDEC. Monitoring wells will be constructed with a ten foot section of proper slot sized well screen (as determined by site conditions) and the appropriate length of schedule 40 PVC flush-joint casing to ground surface. Alternative well materials (i.e. stainless steel or similar) may be employed in discussion by the NYSDEC. The annular space between the boring wall and the PVC riser will be backfilled with appropriately sized sand. The sand pack will be extended to a minimum of 2 feet above the screened interval and at least two feet of bentonite chips will be placed above the sand pack and hydrated. The remaining annular space will be backfilled with drill cuttings and/or a cement/bentonite grout mixture as directed by the NYSDEC project manager.

Monitoring wells will be completed at the ground surface (as "flush-mounts") or will extend approximately 3 feet above the ground surface. If the wells are extended above ground surface a steel protective casing (and possibly bollards) will be used to adequately protect the well depending upon well location and/or direction from the NYSDEC representative. Each well will have a cap and a locking cover. A concrete pad will be installed around each well casing and a weep hole will be drilled in the protective casing to allow any water between the inner and outer casing to drain.

Alternative drilling methods will be discussed and addressed, as needed, in site specific work plans.

2.3.2 Bedrock Monitoring Wells

Bedrock monitoring wells will be installed using a combination of hollow-stem augering and rock coring/air rotary drilling. Borings will be advanced through the overburden material using 6-1/4-inch ID HSA or similar equipment dictated by site conditions. Split spoon samplers will be used to collect soil samples from the overburden material if warranted.

Once bedrock is encountered, a 6-inch "rock socket" will be installed into the competent rock, assuming that rock cores are not to be collected. If rock cores are to be collected, the bedrock will be NX or HQ cored to a site-specific depth below ground surface.

Monitoring wells will be constructed with at least a ten foot section of appropriate slot size well screen and schedule 40 PVC flush-joint casing to ground surface. The length and slot size of the well screen will be determined by site specific geologic conditions and the zones from which samples will be taken.

The annular space between the boring wall and the PVC riser pipe will be backfilled with the appropriately sized sand to at least 2 feet above the top of the screened interval. A two foot layer of bentonite chips will be placed on top of the sandpack and hydrated. The remaining annular space will be backfilled with a cement/bentonite grout mixture and/or drill cuttings to the ground surface.

Monitoring wells will be completed at the ground surface (as flushmounts) or will extend approximately 3 feet above the ground surface. If the wells are extended above ground surface a steel protective casing and possibly bollards will be used to adequately protect the well depending upon well location and/or direction from the NYSDEC representative. Each well will have a cap and a locking cover. A concrete pad will be installed around each well casing and a weep hole will be drilled in the protective casing to allow any water between the inner and outer casing to drain.

2.4 Monitoring Well Development

All monitoring wells will be developed by the drilling subcontractor and/or CB&I personnel. The wells will be developed to remove any drilling fluids or sediment that may have entered the well during installation and to "settle" the filter pack. Monitoring wells will be developed no sooner than 48-hours following installation, assuming that schedule and budget allows.

Monitoring wells will be developed using surging and/or pumping techniques. Well development will be considered complete when either 10 well volumes have been removed, the well has been purged "dry", or field readings of temperature, conductivity, and pH have stabilized (see Section 2.6.2) and a turbidity of less than 50 nephelometric turbidity units (NTU) has been achieved (whichever occurs first).

Development water will be containerized; containerized water will be handled and disposed of in accordance with Section 2.13.

The wells will be allowed to stabilize for a period of no less than two weeks following the date of development prior to collecting samples for analysis as dictated by groundwater recharge, project schedule or NYSDEC requests.

2.5 Groundwater Monitoring and Sampling

2.5.1 Groundwater Monitoring and Sampling Procedures

Prior to sampling, groundwater monitoring wells will be purged unless insufficient well volume exists or directed otherwise by the NYSDEC project manager. The wells will be purged as discussed in Section 2.5.3.

Field sampling procedures will include the collection of water level measurements, purging of static water within the wells, collection of field groundwater chemistry measurements, and sample collection at each monitoring well location. A copy of the field purging and sampling log form used to record water level measurements, well volumes, field water quality measurements, and sampling flow rates is included in **Appendix A**.

Water levels will be measured in all site monitoring wells prior to purging or sampling. All water level measurements will be collected using an oil/water interface probe to allow for the measurement of product thickness (if any) in the groundwater monitoring wells. This information will eventually be used to prepare a groundwater contour map and evaluate groundwater flow patterns at the site.

Groundwater samples will be analyzed by USEPA methods in accordance with the NYSDEC Analytical Services Protocol (ASP) during sampling events. Samples will be handled, managed and labeled as detailed in CB&I's QAPP for this Site (please refer to Appendix D of the RI/FS Work Plan).

2.5.2 Groundwater Sampling-Temporary Monitoring Wells

Temporary monitoring wells may or may not be purged prior to sampling as directed by the NYSDEC. If the wells will be purged, the purging will be completed in accordance with Section 2.5.3 below. Groundwater samples will be collected from temporary monitoring wells using a disposable bailer, bladder pump or a peristaltic pump with clean, dedicated polyethylene tubing. The groundwater sample will be collected using the procedures outlined Section 2.5.3.3.

2.5.3 Groundwater Purging and Sampling – Permanent Monitoring Wells

2.5.3.1 Field Analytical, Purging and Sampling Equipment

Field equipment that will typically be used at the site will include submersible pumps, peristaltic pumps, and /or disposable polyethylene bailers; electronic oil/water interface probe (IP) with an accuracy of +/-0.01 feet, and a multi-parameter water quality meter (which includes probes for measurement of pH, turbidity, oxidation-reduction potential (ORP), dissolved oxygen (DO), temperature, and conductivity). Additionally, a PID instrument (mini RAE or similar) will be used to measure the potential for volatile organic compounds (VOCs) within the well head as required by the site-specific Health and Safety Plan ([HASP], under separate cover). Each piece of equipment will be checked and calibrated as outlined in the QAPP. Prior to each use, field analytical equipment probe(s) will be decontaminated.

2.5.3.2 Purging and Sampling Procedures

Groundwater samples will be collected from each well a minimum of 2 weeks following monitoring well installation and development. Although low-flow (discussed in section 2.6) will be the preferred method of monitoring well sampling, there may be instances where a more traditional approach may be implemented due to various site conditions. Any deviations from the preferred method will likely be made in the field in consultation with the NYSDEC project manager or detailed in the site-specific work plan prior the commencement of field activities. In this case, the follow procedure will be used:

- Wear appropriate personal protective equipment as specified in the site-specific HASP.
- Unlock and remove the well cap.
- Obtain PID readings at the well head and record them in the field logbook.
- Measure the static water level and total well depth with an IP. The IP must be washed with Alconox detergent and water, then triple rinsed with deionized water between individual wells to prevent cross- contamination.
- Calculate the volume of water in the well using the formula provided on field forms (**Appendix A**). Well volume must be documented on the same forms.
- Place polyethylene sheeting near the well casing (but out of walk ways to avoid slip, trip and fall hazards) to prevent contact of sampling equipment with the ground in the event sampling equipment is dropped.
- Purge the well using one of the methods described below. Purged water must be managed separately from decontamination fluids unless otherwise directed by the NYSDEC.
    - Purge 3-5 well volumes with a dedicated, disposable polyethylene bailer and dedicated twine.
    - Purge 3-5 well volumes with a peristaltic or a submersible pump using new dedicated polyethylene tubing in each well. Submersible pumps must be decontaminated between uses following the procedures in section 2.9.
    - If the well goes “dry” before the required volumes are removed, the well may be sampled when it recovers 80% of the initial static volume.
- Obtain a sample from the well with a bailer while being careful not to agitate the groundwater. If using a pump, be sure to lessen the flow rate prior to sample collected to avoid agitation.
- Collect VOC samples first followed by semi-volatile organic sample and then any remaining samples for additional analyses as required. Carefully pour directly into the appropriate sample bottles. Sample bottles must be obtained from the laboratory.
- Place analytical samples in cooler and chill to at least 4°C. Samples must be shipped or delivered to the analytical laboratories within 24-hours of collection.
- Properly discard any twine or sample tubing if necessary. If dedicating sample tubing, be sure it is cut to a length greater than the total depth of the well.
- Close the well cap and lock it. Complete field logbook, sample sheet, custody seals, and pertinent chain of custody forms.

Groundwater samples will be placed in appropriate sample containers, sealed, and submitted to the laboratory for analysis. The samples will be labeled, handled, and packaged following the procedures described in the approved QAPP. Quality assurance/quality control (QA/QC) samples will be collected at the frequency detailed in the site-specific QAPP and work plans.

Groundwater samples will be analyzed by an approved ELAP-certified laboratory in accordance with NYSDEC ASP.

Purge water will be discharged to the ground surface away from the well unless otherwise directed by the NYSDEC. If non-aqueous phase liquid (NAPL) or an odor is observed, or if directed by NYSDEC, the purge water must be containerized, handled, and disposed of as detailed in Section 2.13.

2.6 Groundwater Sampling Using Low Flow Sampling Technique

Low flow purging/sampling is a method of collecting groundwater samples from a monitoring well that does not require the removal of large volumes of water and therefore does not overly agitate the water column and suspended solids or potentially volatize VOCs present in the water during evacuation. This method removes water directly from the monitoring well's screen interval without disturbing any stagnant water above the screen by pumping the groundwater at a low enough flow rate to maintain minimal drawdown of the water column. Typically flow rates for this method range from 0.1-liters/minute (L/min) to 0.5-L/min depending on site hydrogeologic conditions. Water drawn down will not exceed 0.3-feet during sampling. Low-flow methods utilized at each site will follow all applicable NYSDEC and USEPA guidance.

2.6.1 Low Flow Purging/Sampling Equipment

Monitoring wells will be purged and sampled using the following equipment:

- A peristaltic or submersible bladder pump with dedicated polyethylene tubing for each individual monitoring well. If using submersible pump, a control box and source for compressed air will be necessary;
- Electronic oil/water interface probe with an accuracy of +/-0.01 ft;
- PID instrument (MiniRAE or similar) to monitor vapor concentrations within the well prior to and during purging and sampling as required by the site-specific HASP;
- A graduated cylinder (unit of measure = Liters) or similar measuring device;
- Buckets to capture purge water;
- A multi-parameter meter to measure pH, turbidity, DO, temperature, ORP, and specific conductivity of the purged groundwater; and,
- Associated field forms (**Appendix A**).

Field equipment to be used at the site will be checked and calibrated as outlined in the QAPP prior to each use. In addition, all down-hole, non-dedicated sampling equipment will be decontaminated using an Alconox/deionized rinse between each monitoring well location.

2.6.2 Low Flow Purging Procedures

Groundwater samples will be collected from each well a minimum of 2 weeks following monitoring well installation and development. The following procedures will be used for low-flow monitoring well groundwater purging:

- Wear appropriate personal protective equipment as specified in the site-specific HASP and the HASP Addendum issued for each work assignment.
- Unlock and remove the well cap.
- Obtain PID readings at the well head and record them in the field logbook or field sampling form.
- Measure both the static water level and the total well depth with an IP and record them in the field logbook or field form. The IP must be washed with Alconox detergent and water and rinsed with deionized water between individual wells to prevent cross-contamination. If sample tubing is already present in the well, be sure to measure static water level while tubing is in place to ensure an accurate measurement.
- Place polyethylene sheeting near the well casing (but out of walk ways to avoid slip, trip and fall hazards) to prevent contamination of sampling equipment in the event sampling equipment is dropped.
- Slowly lower the dedicated polyethylene tubing (an attached bladder pump if applicable), down the monitoring well into the screen interval.
- Begin purging the well using the lowest flow rate/frequency on the pump control. This may involve adjusting the speed setting on the peristaltic pump motor or the pump cycle and compressed air setting on the bladder pump controller. Adjust the flow rate to ensure a rate of between 0.1 to 0.5 L/min. Do not let drawdown exceed 0.3 feet during purging. Purge water must be managed separately from decontamination fluids unless otherwise directed by the NYSDEC.
- Direct the purge water thru the multi-parameter meter and allow field parameters (i.e. pH, DO specific conductivity, and temperature) to stabilize before collecting groundwater samples. The frequency of time at which parameters will be collected should be equal to the amount of time required to replace a single volume of the cell being used with the multi parameter meter. For example, if the cell holds 1 L of water and the well is being purged at a rate of 0.25 L/min, then the frequency of parameter collection should be once every 4 minutes. Purging will continue for a minimum of thirty minutes. Purging will be considered "complete" once three consecutive readings meet the following criteria:
    - pH readings are ±0.1 pH units of each other
    - Temperatures are 3% of each other
    - Specific conductance is 3% of each other
    - ORP are ±10 millivolts of each other
    - Turbidity readings are 10% for values greater than 5 NTU; if three turbidity values are less than 5 NTU, consider the values as stabilized

- DO readings are 10% for values greater than 0.5 mg/L; if three DO values are less than 0.5 mg/L, consider the values as stabilized

If these parameters are not met the CB&I Project Manager will be contacted to determine the appropriate action(s).

Purge water will be containerized, handled, and disposed of as detailed in Section 2.13.

2.6.3 Low Flow Sampling Procedures

Once the groundwater parameters have stabilized, the following procedures should be completed for sample collection:

- Retrieve the sample bottles required for sample analysis.
- Don a pair of clean nitrile gloves.
- Remove the pump effluent tubing from the multi-parameter meter and prepare for sample collection directly from the well.
- Collect VOC sample first followed by semi-VOC sample and then samples for remaining constituents. Carefully pour directly into the appropriate sample bottles. Sample bottles must be obtained from the laboratory.
- Place analytical samples in cooler and chill to at least 4°C. Unpreserved samples must be shipped or delivered to the analytical laboratories within 24 hours of collection. Be mindful of sample holding times and ensure sample delivery takes places prior to the shortest holding time required for the analyses.
- Any sample pumps must be decontaminated between each well following the procedure in Section 2.9; the polyethylene tubing and twine must be properly discarded. If tubing is to be dedicated, be sure the tubing is cut to a length that is longer than the total well depth prior to leaving it inside the well.
- Re-lock well cap.
- Complete field logbook, sample sheet, custody seals, and pertinent chain-of-custody forms.

Groundwater samples will be placed in appropriate sample containers, sealed, and submitted to the laboratory for analysis. The samples will be labeled, handled, and packaged following the procedures described in the approved QAPP. Quality assurance/quality control samples will be collected at the frequency detailed in the site-specific QAPP and work plans. Groundwater samples will be analyzed by an approved ELAP-certified laboratory in accordance with NYSDEC ASP.

2.7 Exploratory Test Pits and Excavations

Test pits and excavations will be performed as detailed in the RI/FS work plan. Test pits will allow for visual characterization of site conditions that may not otherwise be possible using alternative methods. Locations will be determined based upon site conditions and historic site usage. At no time will CB&I, NYSDEC or site personnel enter any test pit or excavation unless all requirements of the HASP have been followed and it has been determined that this activity is necessary and safe.

Test pits and excavations will be performed using a backhoe or similar heavy machinery. All excavated soil generated from the advancement of test pits will remain on site, placed on plastic sheeting (as appropriate) and utilized as backfill. Soils must be stored at appropriate distances from the excavation to maintain compliance with slope stability and HASP. Soil generated from excavations for permanent disposal will be handled as described in the RI/FS work plan.

If necessary, grab samples may be collected along sidewalls or directly from the bottom in both test pits and excavations. Prior to sampling, soil from the area of interest will be collected and placed into a jar or zip-lock bag in order to obtain head space reading using a PID. These head space results will provide a preliminary characterization of soil quality in order to determine if laboratory analyses of the soils are warranted. Test pits will be abbreviated as "TP" in all documentation and numbered sequentially in the order of their completion (i.e. TP-1, TP-2, TP-3, etc.). Information including the field description of soil quality conditions, classification, sampling interval, PID reading, and other field observations will be recorded on a soil boring log form or field notebook.

All samples collected from test pits and excavations will be submitted to an ELAP-certified laboratory in accordance with NYSDEC ASP. All samples will be labeled, handled, and packaged following the procedures described in the RI/FS. QA/QC samples will be collected at the frequency detailed in the RI/FS work plan.

After the soils in each test pit have been characterized and sampled, the test pit will be backfilled with the excavated soils. Test pits will be backfilled in lifts and compacted with the bucket of the excavator/backhoe.

2.8 Surface Water Sampling

The approximate location of the sample will be photographed, as appropriate, and noted in the field logbook. Field measurement of pH, dissolved oxygen, temperature, and specific conductivity will be obtained and recorded in the field logbook. The field sampling crew will record visual observations (sample color, any unusual characteristics [odor, staining, etc.]) in the field notebook and/or the field sampling form and will collect the sample using a sample container, clean dipper, beaker, or pond sampler. The number of samples and method by which they will be collected will be specified in the work plan. All equipment used in sample collection will be decontaminated between locations to prevent cross-contamination.

Surface water samples will be placed in appropriate containers, sealed, and submitted to an approved ELAP-certified laboratory in accordance with NYSDEC ASP. The samples will be labeled, handled, and packaged following the procedures described in the RI/FS work plan. QA/QC samples will be collected at the frequency detailed in the RI/FS Work Plan. Surface water sample locations and ID's will be abbreviated "SW" followed by a number that will either be assigned sequentially in the field or predetermined in the site-specific work plan.

2.9 Sediment and Surface Soil Sampling

The approximate location of the sample points will be photographed, as appropriate, noted in the field logbook, and if possible, flagged to facilitate its location at a later date. The field sampling crew will record both visual observations (sample color, any unusual characteristics [odor, staining, etc.]) and PID measurements in the field notebook and/or the field sampling form, and will collect the sample using the method and device specified in the work plan. All equipment used in sample collection will be decontaminated between locations to prevent cross-contamination.

Surficial (0-6 inches) soil and sediment samples will generally be collected using a clean, stainless steel coring device, a stainless steel hand auger, or a stainless steel scoop as appropriate for the soil or sediment conditions. Dedicated sampling equipment will be used (when possible) to prevent cross-contamination and to minimize decontamination requirements. Samples will be placed into a clean stainless steel bowl or directly into the sampling jar as directed by the NYSDEC. The VOC samples will be collected and preserved in accordance with USEPA SW-846 Method 5035. All non-dedicated sampling equipment will be decontaminated between uses as detailed in the QAPP. Benthic sediments from pond or lake bottoms may also be collected. The methods and devices used to collect these samples will be included in site-specific work plans.

Surface soil and sediment samples will be analyzed by an approved ELAP-certified laboratory in accordance with NYSDEC ASP. All samples collected will be labeled, handled, and packaged following the procedures described in the QAPP. Quality assurance/quality control samples will be collected at the frequency detailed in the QAPP and the site-specific project Work Plan. Sediment sample locations and ID's will be abbreviated "SED" while surface soil samples will be abbreviated "SS" followed by a number that will either be assigned sequentially in the field or predetermined in the site-specific work plan.

2.10 Soil Vapor Point Installation and Sampling

Soil vapor points may be required to assess soil vapor impacts with the vadose zone. This sampling will be completed pursuant to the *NYSDOH Guidance Document for Evaluating Soil Vapor Intrusion in the State of New York*, October 2006 (NYSDOH VI Guidance).

2.10.1 Soil Vapor Point Installation

All soil vapor points will be designated with an "SVP" prefix and numbered sequentially in all subsequent documentation. The soil vapor points will be flagged in the field and labeled with the assigned sample location ID. Sample locations will also be photographed and marked on a site map.

Soil vapor points will be installed using a direct-push device to install stainless steel drive points to a specified depth. Once the sampling depth is reached, the drive point rods will be retracted, leaving the drive point at the base of the interval. The 6-inch stainless steel sampling screen will be fitted with a dedicated section of 0.25-inch diameter Teflon or Teflon-lined tubing (laboratory or food grade) to collect the soil vapor samples.

The borehole will then be backfilled with sand/glass beads to a minimum of 6 inch above the screened interval. Granular bentonite pellets will be placed from approximately 6 inches above the screened interval to the ground surface hydrating concurrently with placement. Sufficient time (at least 24 hours) will then be provided to allow the bentonite to "cure". Soil cuttings will be used to backfill the points unless a visible sheen or odor is evident, in which case the cuttings will be drummed and disposed of in accordance with Section 2.16.

2.10.2 Soil Vapor Point Sampling

The field sampling team will maintain a sample log sheet (**Appendix A**) summarizing the following:

- Sample identification
- Date and time of sample collection
- Sampling depth
- Identity of samplers
- Sampling methods and devices
- Purge volumes
- Volume of soil vapor extracted
- Canister and associated regulator identification
- Helium leak test results
- Vacuum before and after samples collected
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
- Chain-of-custody protocols and records used to track samples.

Soil vapor samples will be collected as detailed below:

- Remove 2-3 implant volumes (i.e., the volume of the sample probe and tube) at a rate note exceeding 0.2 L/min prior to collecting the samples to ensure that representative samples are collected.
- Screen the vapor within the implant using a PID and record the measurement on the field sheets (**Appendix A**)
- Perform a tracer gas (e.g., helium, butane, or sulfur hexafluoride) test at the location to test for infiltrating atmosphere immediately following installation and verify that the point was properly installed. An enclosure will be placed over top of the sample point with the sample tubing protruding through the lid. Modeling clay containing no VOCs or beeswax will be used to provide a seal between the tubing and the hole through which it was placed. The tracer gas will then be introduced through another hole in the lid. The multi-gas detector will then be placed into the sample tubing in an attempt to detect any of the tracer gas previously introduced into the enclosure. Any detections of helium in the detector will indicate that the sample point is not adequately sealed and must be repaired.
- Collect samples by attaching the vapor point tubing to an assembled Summa® canister that has been certified clean by the laboratory using an appropriate USEPA method. The sample duration for these samples will be specified by the work plan and could range from 2 hours to 24 hours. Record starting and ending times and vacuums on the field sheets. Starting pressures must be between -30 and -15 in. Hg, and sampling will be considered completed when the vacuum gauge reads a measurement of between -5 and -1 inches of mercury (in. Hg); do not let the vacuum reach 0 in. Hg.

The following issues (that may influence interpretation of the results) will be noted to document site conditions during sampling:

- Sample location including the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor ambient air sample locations (if applicable), and compass orientation (north).
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed, and direction) for the past 24-48 hours.
- Any pertinent observations such as odors and readings from field instrumentation.

After the sample collection period, the Summa® Canisters will be sent for laboratory analysis by an approved ELAP-certified laboratory in accordance with NYSDEC ASP. A minimum reporting limit of 1 microgram per cubic meter (μg/m3) will be achieved for all analytes unless otherwise directed by the NYSDEC or NYSDOH.

Upon completion of the sampling, the sample tubing will be removed and the temporary soil vapor point location will be backfilled with soil cuttings and /or bentonite and marked with a stake/flag that will be labeled with the proper sample identification and illustrated on the site map such that it can be located by the site surveyor. Borings installed in paved or concrete areas will be backfilled and finished at the ground surface with concrete or cold patch. If the soil vapor point is permanent, the tubing and implant will not be removed and the point will be completed at grade with a road box and concrete anchor pad.

2.11 Indoor Air Monitoring

Indoor air sampling programs will be completed in accordance with the NYSDOH VI Guidance. The protocol for any indoor air monitoring program will follow NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006.

Indoor air sampling and analysis will be performed at locations approved by the NYSDEC and NYSDOH.

2.11.1 Indoor Air Sample Collection

An inspection of general site conditions will be performed at each property location as part of the air sampling. The inspection will include the following activities:

- Completion of the NYSDOH Indoor Air Quality Questionnaire and Building Inventory included in Indoor Air Sampling and Analysis Guidance. A sample of the questionnaire will be provided in the site-specific Work Plan and is include in Appendix A.
- Documentation of exterior weather conditions and inside temperature.
- Ambient air (indoor and outdoor) screening using field equipment (i.e., parts per billion photoionization detector or similar).
- Selection of air sampling locations in consultation with NYSDEC and NYSDOH personnel.

Air samples will be collected from a minimum of two locations per structure: basement and the sub-slab environment unless otherwise directed by the NYSDEC PM. A section of Teflon or Teflon-lined tubing that is identified as laboratory or food grade will be extended from the Summa® canister to collect the ambient air sample from the breathing zone at approximately 3 to 5 feet above ground surface. Laboratory certified Summa® canisters, regulated for a 24-hour sample collection, will be used to evaluate the indoor air and sub-slab soil vapor conditions unless otherwise directed by the NYSDEC/NYSDOH. Procedures for handling, starting, and ending the ambient air samples will be identical to that of the canisters used for sub-slab sample collection. Starting vacuum pressures must be between -30 and -25 in. Hg and the gauge must measure between -5 and -1 in. Hg before it can be stopped.

2.11.1.1 Sub-Slab Sample Procedures

The following procedures will be used for all sub-slab sampling:

- Visually assess the condition of the floor. Select an area for sampling that is out of the line of traffic and away from major cracks and other floor penetrations (sumps, pipes, floor drains, etc.) and confirm sampling location with NYSDEC/NYSDOH personnel.
- Drill a hole through the concrete floor slab at the selected location using an electric hammer drill.
- Sweep concrete dust away from the drill hole and wipe the floor with a dampened towel.
- Insert the Teflon-lined polyethylene tubing into the hole drilled in the floor, extending no further than 2 inch below the bottom of the floor slab and backfill with sand or glass beads to the bottom of the concrete slab.
- Pour melted beeswax and/or non-toxic modeling clay that does not contain VOCs around the tubing at the floor penetration, packing it in tightly around the tubing.
- Conduct helium leak detection test to insure that seal is "tight" as described in section 2.10.2
- Purge the sample point of 2-3 volumes and measure the volatile content using a PID capable of measuring in the parts per billion range.
- Place an assembled Summa® canister (provided by an independent laboratory) with a vacuum gauge and flow controller on the floor and connect it to the sample tubing. The canister must be "certified clean" in accordance with USEPA Method TO-15 and under a vacuum pressure between -25 and -30 in. of mercury in Hg. Flow controllers must be set for a 24-hour collection period unless requested otherwise.
- Record the serial number of the canister and associated regulator on the chain-of-custody (COC) form and field notebook/sample form. Assign sample identification on the canister identification tag and record this on COC and field notebook/sample form. For the property owner's privacy, do not use a sample identifier containing the name of the property owner or the address of the property.
- Record the sample start time on the air sampling form (Appendix A) and take a digital photograph of canister setup and surrounding area.

2.11.1.2 Termination of Sub Slab Samples

The following procedures will be used for terminating sample collection:

- Sampling will be considered complete when the vacuum gauge on the canister measures between -5 and -1 in. Hg; do not let the canister vacuum read 0 in. Hg. Once complete, close the canister valve; record the stop time on the sample form.
- Record the final gauge pressure and disconnect the sample tubing and the pressure gauge/flow controller from the canister, if applicable.
- Install the plug on the canister inlet fitting and place the sample container in the original box.
- Complete the sample collection log with the appropriate information, and log each sample on the COC form.
- Remove the temporary subsurface probe and properly seal the hole in the slab with hydraulic cement or similar material. Photograph the repair if possible and retain in project file.

Field quality control samples will include duplicates and trip blanks. Field duplicates will be collected at the rate of 1 duplicate per 20 original samples (20 percent). Field duplicates will be collected by installing an in-line "tee," which will split the flow to 2 canisters set up adjacent to each other and each collecting vapors at identical flow rates.

2.11.2 Outdoor Air Sample Collection

Outdoor ambient air samples will be collected in addition to the indoor air samples. Ambient air samples will be collected during the same 24-hour period as the indoor air samples; these samples will presume to be representative of outdoor air conditions for the entire sampling area. The ambient air samples will be collected in a laboratory certified Summa® canister, regulated for a 24-hour sample collection or a duration specified by the NYSDEC/NYSDOH. A section of Teflon or Teflon-lined tubing (laboratory or food grade) will be extended from the Summa® canister to the breathing zone at approximately 3 to 5 feet above ground surface. The influent rate of the outdoor air sample must be less than 0.2 L per minute. Outdoor ambient air samples will be collected at a minimum of one (1) per day during the indoor air monitoring program or as directed by the NYSDEC project manager. Starting vacuum pressures must be between -30 and -25 in. Hg and the gauge must measure between -5 and -1 in. Hg before it can be stopped.

2.11.3 Laboratory Analysis of Air Samples

Air samples will be analyzed by an ELAP-certified laboratory. Detection limits for the analyzed compound list will be defined by the NYSDEC and NYSDOH prior to sample submittal and outlined in the site-specific work plan. For specific parameters identified by NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), the higher detection limits will be designated by NYSDOH.

2.12 Operation and Maintenance

CB&I anticipates conducting operation and maintenance (O&M) checks on sub-slab depressurization systems (SSDS) in order to monitor their operational efficiency and effectiveness. O&M will consist of an assessment of the overall condition and security of the system. CB&I will follow the equipment manufacturer's recommendation for O&M. The period and frequency of O&M activities will be discussed and approved by the NYSDEC project manager prior to implementation.

2.13 Storage and Disposal of Waste

CB&I is responsible for the proper storage, handling, and disposal of investigative-derived waste (IDW) including personal protective equipment (PPE) and solids and liquids generated during the well drilling, well development and sampling activities. All drummed materials will be clearly labeled as to their contents and origin. All investigative derived waste will be managed in accordance with NYSDEC Department of Environmental Remediation (DER)-10/Technical guidance for Site Investigation and Remediation and other applicable regulations.

Accordingly, handling and disposal will be as follows:

- Liquids generated from contaminated equipment decontamination that exhibit visual staining, sheen, or discernible odors will be collected in drums or other containers at the point of generation. They will be stored in a designated staging area as directed by the NYSDEC. A waste subcontractor will then remove the drums and dispose at an offsite location.
- Liquids generated during well purging or a decontamination activity that does not exhibit visible staining, sheen, or discernible odors will be discharged to an unpaved area on the site where it can percolate into the ground as approved by the NYSDEC.
- Concrete dust will be collected in shop vacuums and disposed of as non-regulated solid waste, unless photoionization detector readings or visual indications of contamination are noted during field operations.
- Soil and rock cuttings from drilling operations that do not exhibit visible staining, sheen, or discernible odors will be disposed of onsite or used to backfill temporary borings, wells or test pits.
- Soil and rock cuttings from drilling operations that exhibit visible staining, sheen or discernible odors will be staged onsite until an appropriate treatment/disposal procedure has been approved by the NYSDEC.
- Excavated soils from test pits will be used to backfill the excavation.
- Used protective clothing and equipment that is suspected to be contaminated with hazardous waste will be placed in plastic bags, packed in 55-gal ring-top drums and transported to the drum staging area for proper disposal.
- Non-contaminated trash and debris and protective equipment will be placed in a trash dumpster and disposed of by a local garbage hauler as appropriate or warranted at each site. Alternative disposal arrangements will be discussed with the NYSDEC.

2.14 Site Survey and Base Map Preparation

A detailed topographic base map of the site and immediate vicinity will be developed by a New York State licensed professional land surveyor. All relevant features of the site and adjacent areas will be plotted. A site survey will incorporate all soil boring locations, monitoring well locations, test pit locations, soil vapor point locations, and surface water/sediment sampling locations, performing a topographic survey, and preparation of a site map (typically based upon a previous base map or site control markers).

The site map will also include site-specific features associated with the assessment activities and potential areas of concern to the NYSDEC. Contours will be plotted at 1-ft intervals. The elevations of all monitoring well casings will be established to within +/-0.01 ft based on the National Geodetic Vertical Datum.

The site tax map number will also be identified. The tax maps will be reviewed and the property lines of the parcels will be plotted on the base map.

3.0 References

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006

NYSDEC. 2010. *DER-10 / Technical guidance for Site Investigation and Remediation*. DEC Program Policy. May 3, 2010.

NYSDOH. 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.* New York State Department of Health, Division of Environmental Health Assessment, Center for Environmental Health. October, 2006.

USEPA. 2010. *Low Stress (low flow) Purging and Sampling Procedure for the Collection Groundwater Samples from Monitoring Wells*, Revision 3. January 19, 2010

Appendix A

Field Forms

CB&I Environmental & Infrastructure, Inc.

Groundwater Sample Event Field Data Sheet

Project Name:______________________________________ Project No.:____________________

Water Level Data

Date:_______________ Start Time:________________ Well ID:_______________________

*Volume Factors:

Initial Total Casing Length:___________________________ (feet)

1-inch well = 0.041 gal / ft

1.5-inch well = 0.092 gal / ft

Depth to Water (from top of casing):____________________ (feet)

2-inch well = 0.163 gal / ft

3-inch well = 0.367 gal / ft

a) Height of Water Column:___________________________ (feet)

4-inch well = 0.653 gal / ft

6-inch well = 1.468 gal / ft

Well Volume ([a] x volume factor *) = _________ (feet) x _________ gallons / foot = _________ gallons

Purge Data

Date:__________ Time:__________ (start) __________(finish)

Method (Waterra, bailer, submersible pump, etc.):____

Purge Volume (if applicable):____

Time							
Volume							
Specific Conductivity							
pH							
Turbidity							
Temperature							
ORP							
DO							

Did well dry out? (If yes, how many times?) __________________ Actual Volume Removed:_________ (gal.)

Sampling Data

Sample Date:_________________ Sample Time:_______________

Appearance (visual):______________________ Color:_______________ Odor:_________________

Sampling Method:____

Constituents Sampled	*Container Description*	*Preservative*

Personnel:____

Comments:

CB&I Environmental & Infrastructure, Inc.
Monitoring Well Development Field Sheet

Project Name:______________________________________ Project No.:_____________________

Water Level Data

Date:_______________ Start Time:________________ Well ID:_______________________

Initial Total Casing Length:___________________________ (feet)

Depth to Water (from top of casing):____________________ (feet)

a) Height of Water Column:___________________________ (feet)

*Volume Factors:
2-inch well = 0.163 gal / ft
4-inch well = 0.653 gal / ft
6-inch well = 1.468 gal / ft

Well Volume ([a] x volume factor *) = _________ (feet) x _________ gallons / foot = _________ gallons

Development Data

Date:___________ Time:___________ (start) ___________(finish)

Method (Waterra, bailer, submersible pump, etc.):____

Time							
Specific Conductivity							
pH							
Turbidity							
Temperature							
ORP							
DO							

Time							
Specific Conductivity							
pH							
Turbidity							
Temperature							
ORP							
DO							

Time							
Specific Conductivity							
pH							
Turbidity							
Temperature							
ORP							
DO							

Did well dry out? (If yes, how many times?) __________________ Actual Volume Removed:_________ (gal.)

Personnel:____

Comments:

BORING NUMBER Field Copy

CLIENT ____	PROJECT NAME ____
PROJECT NUMBER ____	PROJECT LOCATION ____
DATE STARTED ____ COMPLETED ____	GROUND ELEVATION ____ HOLE SIZE inches
DRILLING CONTRACTOR ____	GROUND WATER LEVELS:
DRILLING METHOD ____	AT TIME OF DRILLING ---
LOGGED BY ____ CHECKED BY ____	AT END OF DRILLING ---
NOTES ____	AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0						
5						
10						
15						
20						
25						

(Continued Next Page)

CLIENT ____________________ PROJECT NAME ____________________

PROJECT NUMBER ____________________ PROJECT LOCATION ____________________

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
25						
30						
35						
40						
45						
50						

ENVIRONMENTAL BH - GINT STD US LAB.GDT - 4/21/14 14:30 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\EXAMPLE.GPJ

(Continued Next Page)

Drilling Log

Soil Boring -

Project		Owner			
Location		Proj. No.			
Surface Elev.	*NA*	Total Hole Depth	*0.0 ft.*	North	East
Top of Casing	*NA*	Water Level Initial	*NA*	Static *NA*	Diameter
Screen: Dia	*NA*	Length	*NA*	Type/Size	*NA*
Casing: Dia	*NA*	Length	*NA*	Type	*NA*
Fill Material		Rig/Core			
Drill Co.		Method			
Driller		Log By		Date	Permit # *NA*
Checked By		License No.			

COMMENTS

Depth (ft.)	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.
0						
2						
4						
6						
8						
10						
12						
14						
16						
18						
20						
22						
24						

CB&I	Project Name and No: Date: Sampler(s):
Sample ID:	Address / Location
Weather Conditions:	

PID Meter Used:	He LD Meter Used:	Purge Pump Used:

	Soil Gas	**Ambient**	**Comments**
SUMMA CANISTER RECORD			
Canister Serial No.:			
Flow Controller No.:			
Start Date / Time			
Stop Date / Time			
Start / Stop Pressure (in. Hg)			
DUPLICATE SAMPLE ID			
Approximate GW Depth:			
Air Temp (°C or °F):			
Direction / Distance fom Bldg. or Structure:			
Distance to roadway:			
Intake Height / Depth (feet)			
Noticeable Odor?			
PID Reading (ppb):			
He Dector Reading (% or ppm He): Leak Test result: Pass/Fail			
Sample Analysis:			
Container Description:			
Photo Taken: Yes / No			

Indoor / Sub-Slab Air Sampling Field Sheet

	Project Name and No:
	Date:
	Sampler(s):

Owner / Landlord / Occupant

Name:	Address:	
Home Phone:	Office Phone:	
PID Meter Used:	He LD Meter Used:	Purge Pump Used:

	INDOOR AIR	SUB-SLAB /SUB-STRUCTURE	OUTDOOR AMBIENT AIR
SUMMA CANISTER RECORD			
Canister Serial No.:			
Flow Controller No.:			
Start Date / Time			
Stop Date / Time			
Start / Stop Pressure (in. Hg)			
SAMPLE ID			
DUPLICATE SAMPLE ID			
BUILDING CONSTRUCTION / OTHER CHARACTERISTICS			
Story / Level / Room:			
Air Temp (°C or °F):			
Floor Slab Thickness (in"):			
Potential Vapor Entry Points?			
Direction / Distance fom Bldg. or Structure:			
Distance to roadway:			
Intake Height / Depth (feet)			
Noticeable Odor?			
PID Reading (ppb):			
He Dector Reading (% or ppm He): Leak Test result: Pass/Fail			
Sample Analysis:			
Container Description:			
Photo Taken: Yes / No			
Comments:			

	Project Name:
	Date:
	Sampler(s):
Occupant Information	Tax Map ID:
Name:	Address:
Home Phone:	Office Phone:
Owner or Landlord (If different than occupant)	
Name:	Address:
Home Phone:	Office Phone:

PID Meter Used:	FID Meter Used:	Infrared Gas Analyzer Used:

	INDOOR AIR	**SUBSTRUCTURE SOIL GAS**	**AMBIENT AIR**
SUMMA CANISTER RECORD			
Canister Serial No:			
Flow Controller No.:			
Start Date/Time:			
Stop Date/Time:			
Stop Pressure (in. Hg):			
Sample ID:			
Duplicate Sample ID:			
Sample ID Category:			
BUILDING CONSTRUCTION / OTHER CHARACTERISTICS			
Story / Level			
Room			
Indoor Air Temp (^{o}C)			
Gas Sampling Point (in. of H_2O) Deploy			
Gas Sampling Point (in. of H_2O) Pickup			
Basement / Crawl Space			
Crawl Space Condition			
Floor Slab Thickness (in.)			
Percent O_2/CO_2/CH4			
Potential Vapor Entry Points Observed			
direction/Distance from Bldg.			
Distance to Roadway			
Intake Height/Depth (feet)			
Noticable Odor?			
PID Reading (ppmv)			
FID Reading (ppmv)			

Comments:

	Project Name:
	Date:
	Sampler(s):

Sample Location Information

Sample ID:		Address/Location:
PID Meter Used:	He Detector Used:	Weather Conditions:

	SOIL GAS	AMBIENT AIR	COMMENTS
SUMMA CANISTER RECORD			
Canister Serial No:			
Flow Controller No.:			
Start Date/Time:			
Stop Date/Time:			
Duplicate Sample ID:			
Sample ID Category:			
Sample Depth			
Approximate GW Depth:			
Air Temperature			
Direction/Distance from any Structure:			
Distance to Roadway:			
Any Noticable Odor?			
PID Reading (ppb):			
He Detector Reading (% He):			
Constituents Sampled:			
Container Description:			

Checked Seals:	☐ Yes	☐ No		
Took GPS Coordinates at Position:	☐ Yes	☐ No		
Tracer Gas Test:	☐ Successful	☐ Unsuccessful		
Sample:	☐ Duplicate	☐ Matrix Spike Duplicate	☐ Matrix Spike	☐ Analysis
Photo Taken:	☐ Yes	☐ No		

INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

This form must be completed for each residence involved in indoor air testing.

Preparer's Name ______________________ Date/Time Prepared ____________

Preparer's Affiliation ______________________ Phone No. ____________

1. OCCUPANT

Name: ______________________

Address: ______________________

____

County: ______________________

Home Phone No. ____________ Office Phone No ____________

Number of Occupants/persons at this location ____________

Number of years at this location ____________

2. OWNER OR LANDLORD:
(If different than occupant)

Name: ______________________

Address: ______________________

____

Phone No. ______________________

Number of years owned this location ____________

3. OTHER CONTACTS:
(If different than occupant/landlord)

Name: ______________________

Address: ______________________

____

Phone No. ______________________

TAX MAP ID# ______________________
(Tax Map # - Tax Sheet # - Lot #)

Use Code ______________________
(ref: NY Property Class / Use Codes)

Use Code Description: ______________________
(ref: NY Property Class / Use Code Descriptions)

PART I

Type (circle appropriate responses): Residential School Commercial/Multi-Use

Industrial Church Other

Nominal Building Use ____

---

6. **If the property is residential, type?**

Ranch	2-Family
Cape	3-Family
Raised Ranch	Duplex
Split Level	Apartment House ________ Units
Colonial	Number of floors ________
Mobile Home	Condominium ________ Units
	Other specify ________________

Residence Age ________ General Description of Building Construction Materials ________________

____

Is the building insulated? Yes / No How air tight is the building ________________________

---

7. **If the property is commercial, type?**

7a. Does it include residences (i.e. multi-use?) (Y / N) If yes, how many? ________

7b. Business Type ________________________________

8. **Above Grade Building Construction**
(Circle appropriate response)

Wood Frame Concrete Block Stone Poured Concrete

Brick Other________________________________

9. **Foundation Construction**
(Circle all that apply)

Concrete Slab Concrete Block Fieldstone

Other________________________________

10. **Maximum Number of Stories:** ____________

Level	Description / General Use
Basement	____________
1st Floor	____________
2nd Floor	____________
3rd Floor	____________
4th Floor	____________

Basement construction characteristics (circle all that apply):

1. Full basement, crawlspace, slab on grade, other ____________
2. Basement floor: concrete, dirt, other ____________
3. Concrete floor: unsealed, painted, covered; with ________
4. The basement is: wet, damp, dry _______Sump present? y / n _____Water in sump? y / n ____
5. The basement is: finished, unfinished ____________
6. Identify potential soil vapor entry points (e.g., cracks, utility ports etc.) ____________
7. Describe how air tight the basement is ____________

11. **Weatherized**
Has the building been weatherized with any of the following?

Insulation Storm Windows Energy-Efficient Windows Others ____________

12. **Elevators**
Does the building have elevators? (Y / N) If yes, description/location?

____

13. **Remodeling**
Has there been remodeling / painting within the last 6 months in the home/structure? If yes, please specify what, where and when it was done?

____

____

14. **<u>Has new carpeting, upholstery, drapes or other textiles been installed in the home/structure within the last year?</u>** (Y / N)
If yes, please specify what, where and when it was done?

____

15. **<u>Utilities</u>**
(Circle appropriate response)

Electrical: Fuses Circuit Breaker

Describe Free Circuits, if any: ______________________________

Water: Public Private Spring Well (Driven / Drilled / Dug)

Sewer: Public Septic Leach field Other____________________

Water Well Specifications:

Well Diameter ______________________ Grouted or Ungrouted ___________

Well Depth ________________________ Type of Storage Tank ___________

Depth to Bedrock ___________________ Size of Storage Tank ____________

Feet of Casing _____________________ Describe type(s) of Treatment ______

____

Water Quality:

Taste and/or odor problems? y / n If so, describe _________________________________

How long have the taste and/or odor been present? ______________________________

Sewage Disposal:
Distance from well to septic system _________ Type of septic tank additive _______________

HVAC System(s) present (circle all that apply):

Fuel Type	**Heat Conveyance System**	
Natural Gas	Forced Hot Air	Fireplace
Fuel Oil	Forced Hot Water	Electrical Baseboard
Electric	Steam	Unvented Kerosene Heater
Wood	Radiation floor heat	Other:_____________________
Coal	Wood Stove	
Solar	Coal Furnace	

Other ____

16. **What type of mechanical ventilation systems are present and/or currently operating in the building?**

Central Air Conditioning	Kitchen Range Hood
Individual Air Conditioning Units	Bathroom Ventilation Fan
Open Windows	Air-to-Air Heat Exchanger
Mechanical Fans	Other:_____________________

Miscellaneous Questions

Is the heating system's power plant located in the basement or another area: ________________.

If there are individual air-conditioning units specify the location ____________________________

Are there air distribution ducts present? Yes / No

Describe the supply and cold air return duct work in the basement including whether there is a cold air return, the tightness of duct joints

____

____

17. **Do any of the building occupants regularly use or work at a dry cleaning service?** (Circle all that apply)

Yes, use dry-cleaning regularly (weekly)

Yes, use dry cleaning infrequently (monthly or less)

Yes, work at a dry cleaning service

No

Unknown

18. Do any of the building occupants use solvents at work? (Y / N / Unknown)

If yes, how many persons / type ________________________________

Are the clothes washed at work? (Y / N)

19. Where is the washer/dryer located? (Circle all that apply)

Basement/Lowest level   Kitchen   Use a Laundromat   Upstairs utility room

Garage   Other ________________________________

20. If there is a dryer, is it vented to the outdoors? (Y / N)

21. Does the building have an attached garage? (Y / N)

22. If yes to #21, is a car usually pared in the garage? (Y / N)

23. Potential Indoor Sources of Pollution?

Has the house ever had a fire? Yes / No

Is there a kerosene heater present? Yes / No

Is there a workshop, hobby or craft area in the residence? Yes / No

An inventory of all products used or stored in the home should be performed. Any products that contain volatile organic compounds or chemicals similar to the target compounds should be listed. The attached product inventory form should be used for this purpose.

Is there a kitchen exhaust fan? Yes / No   Where is it vented? ____________________

Has the house ever been fumigated? If yes describe date, type and location of treatment.

____

____

24. Ease of Mitigation
(circle one)

Easy (Open)   Difficult (Walls / Clutter)

Plan View

Draw a plan view sketch for each floor of the residence and if applicable, indicate air sampling locations, possible indoor air pollution sources and PID meter readings.

25. Potential Outdoor Sources of Pollution
Draw a sketch of the area surrounding the residence being sampled. If applicable, provide information on the spill location (if known), potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system if applicable, and a qualifying statement to help locate the site on a topographical map.

26. **Household Products Inventory**

Occupant / residence ____

Investigator: ____________________________ Date: ________________

Product description (dispenser, size, manufacturer ...)	VOC Ingredients	PID Reading

27. Weather conditions During Sampling

Initial "Deployment Visit:

Outside Temperature (°F):

Prevailing Wind Direction:

Describe the general weather conditions (e.g., sunny, cloudy, rain, etc.)

Was there any significant precipitation (0.1 inches) within 12 hours preceding sampling event?

Type of ground condition (e.g., wet, dry snow, frost) outside building?

Second "Retrieval" Visit:

Outside Temperature (°F):

Prevailing Wind Direction:

Describe the general weather conditions (e.g., sunny, cloudy, rain, etc.)

Was there any significant precipitation (0.1 inches) within 12 hours preceding sampling event?

Type of ground condition (e.g., wet, dry snow, frost) outside building?

28. General comments – Part 1

Is there any other information about the structural features of this building, the habits of its occupants or potential sources for chemical contaminants to the indoor air that may be of importance in facilitating the evaluation of the indoor air quality of the building? (indicate any question numbers to which comments apply.)

____

____

____

____

____

____

____

____

____

____

PART II – Characteristics of Sampling Locations (Basement or Lowest Level)

TAX MAP ID# ______________________
(From Survey Part I)

Indoor Air Sample Name	Indoor Air Location Description	Duplicate Name

Or

Substructure Sample Name	Substructure Location Description	Duplicate Name

Or

Ambient Air Sample Name	Ambient Air Location Description	Duplicate Name

29. **What type of basement / lowest level does the building have?** (Circle all that apply)

Full Basement (Y / N) Crawlspace (Y / N) Slab-on-Grade (Y / N)

Other (Y / N) ____

(Circle all that apply)

Full Basement	Crawlspace	Slab-on-Grade
Heated	Heated	Heated
Vented	Vented	Vented
Door to exterior	Connection to basement	Door to exterior
Door to upper level	Fully open	Door to upper level
Open stair to upper level	Access Opening	Open stair to upper level
	Access Door	
	Isolated or no basement	

30. **What are the characteristic of the basement / lowest level?** (Circle all that apply)

Finished How many rooms are in the basement/lowest level? ____________

Unfinished

31. **What is the use of the basement / lowest level?** (Circle all that apply)

Family playroom/den Bedroom Laundry Workshop Storage Office

Retail Other____________________________________

32. **Basement / lowest level occupancy?** (Circle all that apply)

Full time Occasionally Seldom Almost Never

33. **Basement / lowest level depth below grade?**

Front __________ Side 1 ____________

Rear __________ Side 2 ____________

34. **Basement / lowest level walls/wall finish?** (Circle all that apply)

Walls	**Wall Finish**	
Block	None	Other ____________
Poured Concrete	Plaster	
Layed Up Stone	Sheetrock	
Wood Frame	Paneling	
Brick	Particle Board/Fiber Board	
Other __________	Plywood	

35. **Basement / lowest level floor/floor finish?** (Circle all that apply)

Floor	**Floor Finish**
Concrete Slab	None
Earth	Tile
Poly	Carpet
Other __________	Other __________

36. <u>Other basement/lowest level characteristics?</u> (Circle all that apply)

Air Ducts (Y / N)	Drainage (Y / N)	
Supply	Sump hole	Int. Footer Drain
Insulated?	Sealed	Ext. Footer Drain
Return	Int. Pipe	French Drain
Insulated	Ext. Pipe	Water Damage?
Supply under slab	Water present	
Return under slab	Drain to Daylight	

37. <u>Potential entry points basement/lowest level?</u>
S,M,L (size of entry point crack, annulus around pipe penetration
S – ¼" or less M – 1/4" to 1" L – 1" or greater

Water Entry ________
Sewer Exit ________
Gas Entry ________
Electric ________
Floor Cracks ________
Wall Cracks ________
Floor-Wall Cracks ________
Pipes through Wall ________
Pipes through Floor ________
Main house trap ________
Beam pocket ________
Stairway framing ________
Equipment supports ________
Ash cleanout ________

(Y / N)
Open Block Tops ________
Solid Block Tops ________
Bathtub ________
Shower ________
Toilet ________
Interior Block Walls ________
Floor Drains ________
Other ____

38. <u>Does the basement/lowest level have a moisture problem?</u> (Circle one only)
Yes, Frequently (3 or more times per year)
Yes, Occasionally (1-2 times per year)
Yes, Rarely (less than 1 time per year)
No

39. **Does the basement/lowest level ever flood?** (Circle one only)
Yes, Frequently (3 or more times per year)
Yes, Occasionally (1-2 times per year)
Yes, Rarely (less than 1 time per year)
No

40. **Has the basement/lowest level ever been tested for radon?** (Y / N)
If yes,

Location	Test Date	Method	Agency	Result (pCi/l)

41. **Is there a radon mitigation system for the building/structure?** (Y / N)

If yes, date of installation ________________ **Installed by** ____________________
Brief description of components parts ______________________________________

____

42. **Are any of the following used or stored in the basement/lowest level?** (Check all that apply)

Item	Check	Removed 48 hours prior to sampling (Yes / No / NA)	Removed During Pre-sampling survey (Yes / No / NA)
Paints or paint thinners			
Gas-powered equipment – Diesel Generator			
Gasoline storage cans			
Cleaning solvents			
Air fresheners			
Oven Cleaners			
Carpet/upholstery cleaners			
Hairspray			
Nail Polish Remover			
Bathroom cleaner			
Appliance cleaner			
Furniture/floor polish			
Moth Balls			
Fuel Tank			
Wood Stove			
Fireplace			
Perfume/colognes			
Solvent-based household adhesives			
Hobby Supplies			
Shoe Polish			
Scented trees, wreaths, potpourri, etc.			
Other – Asphalt patch			
Other – see comments			

43. Sub slab Material? (Circle)
Gravel (stone)
Sand
Sand & Gravel
Silt/Clay
Poly Sheet
Bedrock
Can't Tell

44. General comments – Part II
Is there any other information about the structural features of this building, the habits of its occupants or potential sources for chemical contaminants to the indoor air that may be of importance in facilitating the evaluation of the indoor air quality of the building? (indicate any question numbers to which comments apply.)

____

____

____

____

____

____

____

____

____

____

Plan View

Draw a plan view sketch of sampling locations

Appendix D

Quality Assurance Project Plan (QAPP)

APPENDIX D
QUALITY ASSURANCE PROJECT PLAN, REV. 1

Turk Hill Park, Site #828161
1000 Turk Hill Road
Fairport, Monroe County, New York

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414

Prepared by:

CB&I Environmental & Infrastructure, Inc.
13 British American Boulevard
Latham, NY 12110

Project No. 150174
May 2015

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1.0 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared by CB&I Environmental & Infrastructure, Inc. (CB&I) to detail the quality assurance/quality control (QA/QC) procedures that will be followed during the collection, analysis and evaluation of analytical samples and data generated during the Remedial Investigation (RI) / Feasibility Study (FS) under Order on Consent #B8-0823-14-01.

This document provides general information and references CB&I's Standard Operating Procedures (SOPs) related to analytical sampling, field equipment operation, calibration and management, data collection, field sampling and management and data quality requirements as detailed herein and in the approved contract.

2.0 QUALITY ASSURANCE PROJECT PLAN

This QAPP establishes function-specific responsibilities and authorities for data quality and defines procedures that will be followed to ensure that field sampling activities will result in the generation of reliable data. Inherent in the Quality Assurance (QA) program is the implementation of Quality Control (QC) measures. These measures provide assurance that the monitoring of quality-related events has occurred and that the data gathered in support of the project are complete, accurate, and precise. Implementation of this QAPP will help ensure the validity of the data collected and establish a firm foundation for decisions regarding the assessment. QA goals for the development and execution of the collection of data for this scope of work will be achieved through proper planning, organization, review, communication of objectives, auditing, reporting and corrective action. Personnel knowledgeable in QA theory and practice will carry out the QA program. Implementation of this QAPP requires that the program and project staff maintain an awareness of project procedures and goals. It is the policy of CB&I to provide a QA program that ensures information produced by its employees and subcontractors is valid and of known quality. These requirements include statements of completeness, comparability, representativeness, precision, and accuracy, where applicable.

2.1 Project Organization and Responsibilities

A general description of project positions and their responsibilities is provided below.

Project Manager (Heather Fariello): is responsible for ensuring that all activities are conducted in accordance with the approved work plans. The Project Manager will also provide technical coordination. The Project Manager is responsible for management of all operations conducted for the project. She will ensure that all personnel assigned to the project, including subcontractors, review the technical plans before any task associated with the project is initiated. The Project Manager will monitor the project budget and schedule and ensure availability of necessary personnel, equipment, subcontractors, and services.

M.s Fariello will participate in the development of the field program, evaluation of data, development of conclusions and recommendations, and associated project reporting.

Field Operations Leader (Kevin Cronin): provides management of the field activities. This person is responsible for ensuring that technical matters pertaining to the field program are addressed. They will participate in data interpretation, report writing and preparation of deliverables, and ensure that work is being conducted as specified in the technical plans. Before field activities are initiated, the Field Operations Leader will conduct a field staff orientation and briefing to acquaint project personnel with the Site and assign field responsibilities. The Field Operations Lead reports directly to the Project Manager.

Project QC Manager/Project Chemist (Heather Fariello): responsible for ensuring that the QC procedures and objectives in the RI/FS work plan is met.   This individual reviews field and analytical data to ensure adherence to Quality Assurance/Quality Control (QA/QC) procedures, and approves the quality of data before they are included in any client deliverables. The Project QC Manager is also responsible for day-to-day compliance monitoring of the approved QC plans including records filing, archiving and reporting project activities.

The Project Chemist will ensure that the work performed is in accordance with the QAPP, Standard Operating Procedures (SOPs), and other pertinent analytical procedures. They will also be responsible for sample tracking, data management, laboratory coordination, data interpretation, and report writing. The Project Chemist will be responsible for the review, evaluation, and validation of all analytical data for the project and will participate in interpreting and presenting the analytical data. This includes reviewing selected field and analytical data to ensure adherence to QA/QC procedures and approving the quality of data before they are included in the investigation reports. The Project Chemist/Data Validation Manager will also oversee and incorporate the completion of Data Usability Summary Reports (DUSR) prepared by a third party data validation subcontractor.

Site Safety and Health Officer (SSHO) (Kevin Cronin): The SSHO is responsible for day-to-day compliance with the approved HASP. This plan specifies site-specific personnel training; maintenance of the medical monitoring program; management of personal protective equipment (PPE), decontamination operations, and operations support to the on-site field staff. The SSHO will ensure that all field staff maintain Occupational Safety and Health Administration (OSHA), Hazardous Waste Operations and Response (HAZWOPER) certifications and are current under medical monitoring programs meeting 29 Code of Federal Regulations (CFR) 1910.120. For the project, the SSHO reports to the Project manager. Under the CB&I's corporate umbrella, the SSHO reports to CB&I's Regional Health and Safety Director.

Project Engineer (Matthew Sausville): The Project Engineer is responsible for project planning, documentation, and technical support. This position will also coordinate Work Plan development and assist in site evaluation and support operations. The Project Engineer will report directly to the Project Manager.

CB&I Project Team: implements field activities, field QA/QC, and health and safety operations as required in the Work Plan and Site Health and Safety Plan. The project team will be provided with additional specific guidance for field modifications from the field operations leader and the SSHO. The CB&I Project Team reports directly to the CB&I Field Operations Leader.

Subcontractors: Subcontractors will be selected based upon demonstrated experience, technical approach, staff experience, cost and schedule commitments, and business classification. CB&I will utilize several subcontractors for major work elements during this field effort including drillers, sub-slab depressurization system installers, etc. Professional service subcontractors anticipated for this contract include licensed land/civil surveying, drilling, analytical laboratory services, data validation and asbestos and lead paint sampling and abatement.

As part of the subcontracting process, the laboratory will supply CB&I with a copy of their analytical QAPP upon request and perform the chemical analysis of environmental samples collected for each work assignment. The subcontracted laboratory will certify that they can complete the analytical services requested by the term contract. The laboratories will maintain their certification with the New York State Department of Health Environmental Laboratory Approval Program (ELAP). All subcontractors report to the Project Manager.

2.2 Sample Management

Sample collection, preservation, handling, storage, packaging, and shipping will be performed in a manner that minimizes damage, loss, deterioration, and artifacts. Procedures described are designed to eliminate external contamination and to ensure data quality through the use of approved standardized sampling procedures.

2.2.1 Sample Number and Type

All samples will be assigned a unique identification code consisting of three or four unique parts. These parts generally consist of the project, sample type, boring number or location, and additional identification codes (as needed). Sample IDs will contain an acronym prefix, as shown below, as well as an assigned number that will allow for a unique sample code. For samples that may have been collected at multiple depths from a single point, the ID will also contain a suffix denoting the sample depth interval. Sample and location IDs will be assigned in the field and marked on field sheets/maps or they may be predetermined in the RI/FS work plan. Note that geographical, residential or an additional designator may be added to each sample to assist in data management and presentation given the size of the area being assessed.

2.2.1.1 Field Sample Acronym Codes

Soil Vapor Samples = SV - #

Sub Slab Vapor = SSV - #

Indoor Ambient Air = IAA - #

Outdoor Ambient Air = OAA - #

Surface Soil Samples = SS - #

Sediment Samples = Sed - #

Surface Water Samples = SW - #

Soil Boring Samples = SB - # (#ft - #ft)

Groundwater Monitoring Well Samples = MW - # Date Code (MMDDYY)

Groundwater "Grab" Samples = GW - #

Note: This designation will be used for groundwater samples collected from soil borings or geoprobe/direct push locations.

2.2.1.2 Quality Assurance/Quality Control Samples

Matrix Spike/Matrix Spike Duplicate Samples: *QA/QC* samples will include matrix spike (MS) and matrix spike duplicate (MSD) samples at a frequency of not less than 5% (one MS/MSD pair per every 20 samples collected) for each matrix (aqueous and soil). Nomenclature used in these samples will follow the same naming conventions used for normal environmental samples but will be followed by an "MS" or "MSD" as shown in the example below.

Example: SB-6 (4-6') MS and SB-6 (4-6') MSD

Blind Field Duplicate Samples: Field duplicate samples are sent "blind" to the laboratory. They will receive the following naming convention:

Examples: Duplicate 1 - 'Matrix' or Dup 1 – 'Matrix'
Duplicate 2 - 'Matrix' or Dup 2 – 'Matrix'

The sample location where a blind field duplicate is collected will be marked both in the field notebook and on the copy of the chain-of-custody record retained by CB&I and will not be shared with the laboratory. A blind field duplicate sample will be collected at a frequency of one per every 20 samples for each matrix (aqueous, soil, and sediment).

Equipment Blanks: Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used in the soil sampling program, equipment blanks will be analyzed at a frequency of not less than 5% (one equipment blank per every 20 samples collected). They receive the following name code:

Example: Equipment Blank 1 - Matrix or EQ 1 – Matrix

Trip Blanks: Trip blanks are used to monitor potential aqueous sample volatile organic contamination during shipment to and from the laboratory. It also provides information on laboratory water quality since the laboratory provides the trip blank water. One trip blank will be submitted for analysis for each day that aqueous matrix volatile organic samples are collected. A trip blank will be included in each cooler that contains aqueous matrix volatile organic samples, therefore all volatile organic samples and containers will be shipped to and from the laboratory in the smallest number of coolers possible in order to minimize the number of trip blanks required.

Example: Trip Blank 1 or TB 1

2.2.2 Sample Containers

All sample containers used will be of traceable quality purchased and supplied by the laboratory and certified as clean. The selection of sample containers used to collect the samples is based on the following consideration:

- Sample matrix;
- Analytical methods;
- Potential contaminants of concern;
- Reactivity of container material with sample; and
- QA/QC requirements.

The anticipated project compound list is included as **Table 1**. The required containers, preservatives and holding times will conform to the NYSDEC Analytical Services Protocol

(ASP) (10/95) and are tabulated in **Table 2**. No chemical preservative is required for soil samples, although the samples will be kept on ice in a cooler at a temperature of 4 °C (±2°C). All sample containers will be labeled prior to sample collection. A non-removable label on which the following information is recorded with a permanent waterproof marker (pen for volatile samples) will be affixed to each sample container for shipment to the laboratory:

- Project name/location;
- Sample identification code;
- Date and time the sample was collected (except for blind field duplicates, where the time will be omitted);
- Sample type (soil or aqueous); and
- Analysis requested.

2.2.3 Sample Preservatives

Preservatives will be used, as applicable, to retard hydrolysis of chemical compounds and complexes, to reduce volatility of constituents, and to retard biological action during transit and storage prior to laboratory analysis. Preservation acids and bases will be added to the sample containers at the laboratory, prior to shipment, when practical.

In cases where the sample needs to be filtered, CB&I personnel will filter the sample in the field prior to adding the sample to the preserved container. Samples will not be filtered at the laboratory unless approved by the NYSDEC Project Manager.

2.2.4 Holding Times

Sample holding time is defined as the interval between sample collection to sample extraction and analysis such that a sample may be considered valid and representative of the sample matrix. The laboratory QA program will be responsible for ensuring the adequacy of the sample tracking system in precluding holding time deficiencies. It will also be the responsibility of CB&I personnel to ensure that samples are delivered to the laboratory prior to the expiration of holding times.

2.2.5 Packaging and COC Requirements

Sample coolers will be shipped to the laboratory via overnight courier as soon as possible after sampling. The laboratory will be notified of the sample shipment and the estimated date of arrival of the samples being delivered.

2.2.5.1 Sample Packaging and Shipment

Samples will be transferred to the contract laboratory for analysis via insulated plastic coolers. Before samples can be put in the cooler, any drains will be sealed with tape to prevent leaking. Each cooler will be packed in the following manner:

1. Ensure sample lids are tight.
2. Wrap environmental samples and associated QC samples in bubble wrap or similar foam packing material as supplied by the laboratory and place in a watertight plastic bag.
3. Fill cooler with enough packing material to prevent breakage of glass bottles.
4. Place sufficient ice in cooler to maintain the internal temperature at 4 ± 2°C during transport. The ice will be double-bagged to prevent contact of the melt water with the samples.
5. Place associated COCs in a water proof plastic bag, and tape it with masking tape to the inside lid of the cooler.
6. Seal coolers at a minimum of two locations with signed custody seals or evidence tape before being transferred offsite. Attach completed shipping label to top of the cooler. Cover seals with wide, clear tape, and continue around the cooler.

2.2.5.2 Chain-of-Custody

Sampling will be evidenced through the completion of a COC form, which accompanies the sample containers in the field, during transit to the laboratory, and upon receipt by the laboratory. The COC will be annotated to indicate time and date that samples are relinquished.

The COC will be filled out using indelible ink and will include the following information:

- Project name and number;
- The signatures of the sampling personnel;
- The site code and sample number;
- Sampling dates, locations, and times (military format);
- List of the chemical analysis, volume, and preservatives used;
- Type of sample, whether "grab" or "composite";
- The total number of containers per location;
- The custody seal number;
- Sample relinquisher, date and time; and,
- Courier, or carrier airbill number, and analytical laboratory.

Sample designations must be consistent with those used on sample labels. Additionally, each sample cooler will contain one or more COCs that list only the samples contained within that particular cooler. Furthermore, if multiple coolers are shipped as part of a single sampling event, each cooler must contain its own set of COCs.

2.3 Sampling Equipment Field Decontamination

All non-dedicated manual equipment used to collect samples for chemical analyses (including trowels, spatulas, spoons, scoops, hand augers, and split spoons) will be decontaminated using the following procedures:

- Non-phosphate detergent wash;
- Water rinse (either tap water or bottled water);
- Nitric Acid wash (if sampling for metals only)
- Water rinse (either tap water or bottled water);
- Laboratory-grade methanol or isopropanol rinse (only when non-aqueous phase liquids are encountered); and
- Distilled/de-ionized water rinse.

If equipment is to be stored for future use, it will be allowed to air dry, then wrapped in aluminum foil (shiny-side out) or sealed in plastic bags. Decontamination fluid will be discharged directly to the ground, away from any surface water. This equipment will be decontaminated again prior to its next use.

Pumps and Pumping Equipment: In general, all suction-lift pumps and pumping equipment that have come in contact with the water column during well development and/or purging will use dedicated and pre-cleaned tubing. If submersible pumps are used, the following cleaning procedure will be employed:

- Wash the exteriors of the pump, wiring, and cables with non-phosphate detergent;
- Pump a minimum of 5 gallons of non-phosphate detergent through the pump housing and through the pump tubing if a dedicated pre-cleaned discharge hose is not used for each well;
- Rinse with potable water;
- Pump a minimum of 25 gallons of potable water through the pump housing and through the pump tubing if a dedicated pre-cleaned discharge hose is not used for each well;
- Perform a final rinse by pumping 5 gallons of distilled/de-ionized water through the pump and pump tubing.

2.4 Analytical Methods

All samples will be analyzed using following standard USEPA SW-846 methods. They include Methods 8260 and 5035A for Volatile Organic Compounds (VOCs), 8270 for Semi-volatile Organic Compounds (SVOCs), 8081/8082 Pesticides/Herbicides/PCB Aroclors, and 6000/7000 series or other appropriate methods for Inorganics, as necessary. Soil sampling for VOCs will be conducted in accordance with EPA Method 5035A to minimize volatilization and negative bias. Air samples will be analyzed via USEPA Method TO-15 plus selective ion monitoring for site-specific compounds. The analytical methods, sample containers, preservatives and holding times are presented in **Table 2**. The QA/QC sampling frequency is presented in **Table 3**.

Air, soil vapor, and sub-slab vapor samples will be analyzed using USEPA Method TO-15 for the compounds listed in **Table 4**. The indoor air, sub-slab vapor, and soil vapor sample analyses will achieve minimum reporting limits of less than 1 microgram per cubic meter ($\mu g/m^3$) for each compound except for TCE and carbon tetrachloride, which will have a minimum reporting limit of 0.25 $\mu g/m^3$, and 1,2,4-Trichlorobenzene, 2,2,4-Trimethylpentane, Hexachloro-1,3-butadiene, and t-Butyl Alcohol (TBA), which will have a minimum reporting limit of slightly greater than 1 $\mu g/m^3$.

2.5 Data Quality Requirements

Data quality objectives (DQO) for data measurement are generally defined in terms of six parameters: precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCC+S). The following DQO have been established to ensure that the data collected as part of this program are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPP are used to assess the uncertainty associated with decisions related to the Site. The QAPP and the SOPs for each laboratory outlines the acceptable Surrogate Recovery, Laboratory Control Samples (LCS), Matrix Spike and Matrix Spike duplicates limits needed to calculate precision and accuracy (**Tables 5 – 9**). Method detection limits and reporting limits for each parameter are also located in the QAPP (**Table 9**) and SOPs. Data Reporting Conventions are included as **Table 10**.

2.5.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. To maximize precision, established sampling and analytical procedures are consistently followed. Analytical precision is monitored through analysis of matrix spike or laboratory duplicates and field duplicates. Matrix spike duplicates for organic compounds are analyzed at a frequency of once for every 20 samples as specified by the ASP. Precision is expressed as the relative percent difference (RPD):

$$RPD = 100 \times 2[(X1 - X2)/(X1 + X2)]$$

where X1 and X2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values. The equation is taken from "Data Quality Objectives for Remedial Response Activities" (EPAl540lG-871003, March 1987).

2.5.2 Accuracy

Accuracy refers to the bias in a measurement system. Laboratory accuracy is assessed through use of laboratory internal QC samples, matrix spikes, and surrogate recovery. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on similar samples. A matrix spike and matrix spike blank are analyzed once for every twenty samples, as specified in the ASP.

Accuracy values can be presented in a variety of ways. Average error is one way of presenting this information; however, more commonly, accuracy is presented as percent bias or percent recovery. Percent bias is a standardized average error (the average error divided by the actual or spiked concentration and converted to a percentage). Percent bias is unit-less and allows accuracy of analytical procedures to be compared easily. Percent recovery provides the same information as percent bias. Routine organic analytical protocols require a surrogate spike in each sample, and percent recovery is defined as:

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

Where:

S = spike surrogate concentration

R = reported surrogate concentration

and % Bias = % Recovery – 100

This equation is taken from "Data Quality Objectives for Remedial Response Activities" (EPA/540/G-87/003, March 1987). Percent recovery criteria published by the NYSDEC as part of the NYSDEC ASP (10/95) and those determined from laboratory performance data are used to evaluate accuracy in matrix spike and blank spike quality control samples.

2.5.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent actual conditions. In the field, the representativeness of the data depends on selection of appropriate sampling locations, collection of an adequate number of samples, and use of consistent sampling procedures. The sampling procedures, as described in the sampling and analysis plan, are designed with the goal of obtaining representative samples for each of the different matrices.

In the analytical laboratory, the representativeness of the analytical data is a function of the procedures used in processing the samples. The objective for representativeness is to provide data of the same high quality as other analyses of similar samples using the same methods during the same time period within the laboratory. Representativeness is determined by comparing the quality control data for these samples against other data for similar samples analyzed at the same time.

2.5.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Analytical results are comparable to results of other laboratories with the use of the following procedures/programs: Instrument standards traceable to National Institute of Standards and Testing (NIST), Environmental Protection Agency (EPA) or NYSDEC sources; the use of standard methodology; reporting results from 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 laboratories operating similarly. The QA program documents internal performance and the inter-laboratory studies document performance compared to other laboratories. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

2.5.5 Completeness

Completeness is the percentage of measurements made that are judged to be valid measurements. The completeness goal is to generate the maximum amount possible of useable data (i.e., 100% usable data). Data is considered usable unless qualified during validation as "R," rejected. In accordance with USEPA data validation criteria, estimated values are considered valid and usable.

2.5.6 Sensitivity (Reporting Limits)

The estimated reporting limits or practical quantification limits that are desired for each analysis are the Contract Required Quantitation Limits (CRQLs, for organics) and the Contract Required Detection Limits (CRDLs) specified in the NYSDEC ASP (10/95). All such limits are dependent upon matrix interferences and reporting limits may vary as a result of dilution.

Sensitivity is achieved in the laboratory using instrument detection limits (IDLs), method detection limits (MDLs), and practical quantitation limits (PQLs). These limits are published with NYSDEC methods and are based on a reagent water matrix; therefore they do not account for specific sample matrices. The IDL samples estimate the instrument's detection limit under ideal conditions, and are introduced at a later stage of the analytical process where instrument sensitivity can be directly measured. MDLs estimate the detection limits by introducing a known concentration matrix to the total method process and thereby estimates the detection limits under more practical conditions. PQLs are the lowest concentrations a method can reliably achieve within limits of precision and accuracy. Laboratory control samples (LCS, method blanks, etc.) should be able to achieve the majority of these published limits whereas environmental samples may not. Compliance for sensitivity will be verified during the data review and validation process.

2.6 Field Quality Assurance/Quality Control Samples

The following QA/QC samples will be taken in the field to help confirm that the Data Quality Objectives are attained. **Table 3** outlines the frequency that the QC samples will be taken. Samples will be labeled as noted in **Section 2.2.1.**

2.6.1 Blind 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. Field duplicate samples are defined as a second sample collected from the same location, at the same time, in the exact same manner as the first and placed into a separate container with no prior mixing. Field duplicate samples are collected at a frequency of one per every 20 samples per matrix. Each duplicate sample is analyzed for the same parameters as the samples collected that day. Thus, both field and laboratory variability are evaluated. Acceptance and control limits for the laboratory follow NYSDEC ASP guidelines for organic and inorganic analyses, and any deviations in the data with respect to the limits will be discussed in the report. Although there are no established QC limits for field duplicate RPD data, CB&I considers RPD values of 50% or less for aqueous samples and 100% or less for soil samples to be an indication of acceptable sampling and analytical precision.

2.6.2 Equipment Decontamination Blanks

Equipment decontamination blanks (equipment blanks) are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used for the sampling program, then equipment blanks will be analyzed at a frequency of not less than 5% (i.e., one equipment blank per every 20 samples collected). Equipment blanks will be collected by passing clean deionized water over the sampling device and capturing the drainage in applicable laboratory containers.

2.6.3 Trip Blanks

Trip blanks are used to monitor potential sample volatile organic contamination during shipment to and from the laboratory. It also provides information on laboratory water quality since the laboratory provides the trip blank water. One trip blank will be submitted for analysis for each day that aqueous volatile organic samples are collected. A trip blank will be included in each cooler that contains aqueous volatile organic samples, therefore all aqueous volatile organic samples and containers will be shipped to and from the laboratory in the smallest possible number of coolers in order to minimize the number of trip blanks required.

2.7 Laboratory Quality Assurance Samples

In accordance with each laboratory's QAPP, the following samples will be taken, in the laboratory, to help confirm that the Data Quality Objectives are attained.

2.7.1 Method Blanks

Method blanks are used to assess the background variability of the analytical method and assess the introduction of contamination to the samples by the method, technique, or instrument as the sample is prepared and analyzed in the laboratory. A method blank is defined as an aliquot of laboratory de-ionized water on which every step of the analytical method is performed and analyzed along with the samples. Method blanks are analyzed at a frequency of one for every 20 samples analyzed, or every analytical batch, whichever is more frequent.

2.7.2 Spiked Samples

Two types of spiked samples are analyzed as part of the analytical *QA/QC* program, and include matrix spikes (MS) and matrix spike duplicates (MSD). Matrix spike samples are analyzed to evaluate instrument and method performance on samples of similar matrix. Matrix spike duplicates are analyzed to determine the precision of the analytical method and instrument. These samples are analyzed and the percent recovery is determined to assess matrix interferences/affects on the methods. One MS/MSD sample pair will be analyzed for every 20 samples.

2.8 Equipment Operation and Calibration Procedures

The following sections describe the operation and calibration procedures for the field and laboratory analytical instruments that are anticipated to be used during this program. Any equipment not listed herein should be maintained and calibrated pursuant to the manufacturer's requirements and instructions. These could potentially include items such as multi-parameter water quality meters, dust and particulate monitoring devices, multi-gas detectors, and other field screening devices.

2.8.1 Field Equipment Calibration

Calibration and maintenance of the field equipment will be conducted in accordance with manufacturer's recommendations to assure that accurate field data is collected. The calibrations will be documented for each measuring instrument and include the following information, where applicable.

- Name of instrument calibrated;
- Instrument serial and/or identification number;
- Frequency of calibration;
- Results of calibration;
- Name of person performing the calibration;
- Identification of the calibration gas (if applicable); and
- Buffer solutions (if applicable).

Equipment calibrations done in the field will be recorded in the field notebook. The calibration procedures and frequency for the field equipment is presented in the following sections. In general, field calibrations will be conducted at the start of each day prior to use following the instructions and other materials provided by the manufacturer or supplier of the equipment being used.

2.8.1.1 pH Meters

Because of the great variety of pH meters available, operators should refer to the manufacturer's instruction manual for specific calibration, operation, and troubleshooting procedures for their instrument. The following general procedure is used for measuring pH in the field with a pH meter:

- The pH meter will be calibrated at the start of each day of activities with a minimum of 2 different buffer solutions bracketing the expected pH range of the samples;
- The instrument will be checked and calibrated prior to the initiation of the field effort. The pH electrodes will be kept moist at all times;

- Buffer solutions used for calibration should be checked. Buffer solutions will degrade upon exposure to the atmosphere;
- Select 4.0, 7.0 and 10.0 buffers for calibration;
- Make sure electrolyte solutions within the electrode(s) are at their proper levels and that no air bubbles are present within the electrode(s);
- Immerse the electrode(s) in a pH-7.0 buffer solution;
- Adjust the temperature compensator to the proper temperature (on models with automatic temperature adjustments, immerse the temperature probe into the buffer solution). It is best to maintain buffer solution at or near expected sample temperature before calibration;
- Adjust the pH meter to read 7.0;
- Remove the electrode(s) from the buffer and rinse well with distilled water. Immerse the electrode(s) in pH 4.0 or 10.0 buffer solution and adjust the slope control to read the appropriate pH. At least three successive readings during calibration, one minute apart, should be within $\pm$0.1 pH unit; and
- Rinse the electrode(s) with distilled water.

pH meters will be calibrated at the commencement of each sampling day (minimum)

2.8.1.2 Specific Conductance Meters

Because many conductivity meters are available, operators should refer to the manufacturer's instruction manual for specific calibration, operation, and troubleshooting procedures. The following general procedure is used for obtaining specific conductance measurements:

- The conductivity meter will be calibrated at the start of each sampling day or more frequently if deemed necessary;
- Check batteries before going into the field;
- Check the µmhos/cm value of the potassium chloride standard solution normalized to 25^{o}C; and
- Calibrate the instrument using a potassium chloride standard solution.

2.8.1.3 Photoionization Detector (PID)

For ambient air monitoring for health and safety considerations during work activities and field screening of soil samples, a PID with a lamp energy of at least 10.2 electron volts will be used. The PID will be used to measure the total concentration of volatile compounds with ionization potentials less than the PID lamp energy. Because many PIDs are available, operators should refer to the manufacturer's instruction manual for specific calibration, operation, and troubleshooting procedures. The general operating and calibration procedure for the miniRAE

PID is provided below. If a different brand of PID is utilized, the unit will be calibrated in accordance with the manufacturer's guidelines. Operation of PIDs under wet conditions can cause erratic and potentially unreliable readings making the use of PIDs under wet conditions not practical.

A PID can be used to detect a variety of trace gases, particularly VOCs. The PID uses the principle of photoionization to detect and measure the VOC concentrations in the atmosphere or from a sample.

The following procedure is used for operating and calibrating the miniRAE PID.

Start Up

- Attach probe tip and hydrophobic filter by screwing it to the unit.
- Press the MODE button to turn the unit on and let it warm up for 10 - 15 minutes in clean ambient air.
- The unit will display its settings during the warm up sequence.
- When the unit has finished its warm up it will display a ppm reading.

Zeroing/Calibration

- To enter the calibration mode, simultaneously press the MODE and N/- buttons until the screen displays "Calibrate/select Gas?" Then press Y/+
- Ensure that the unit is drawing clean ambient air or from a zero air source.
- "Fresh Air Cal?" is first displayed. Select Y/+ to being fresh air calibration sequence, or N/+ to view the next option.
- When conducting a fresh air calibration, the unit will display "zero in progress" followed by "wait" and a 15 second countdown.
- When the unit is finished zeroing, it will display "zeroed! reading 0.0 ppm"
- Press mode once to return to calibration options.
- The unit will typically come set for 100 ppm Isobutylene calibration reference. Consult the manufacturer's instructions if using alternative calibration reference gas.
- In calibration options, select "Span Cal?" using the Y/+ button.
- The screen will read "Cal gas = Isobutylene, Span value - 0100.0, Apply gas now!"
- Open and connect a full tedlar bag full of isobutylene to the probe tip. If the pump sounds like it is restricted, the bad is not open enough. The unit will recognize the gas and start to span. The screen will then read "wait" while it counts down from 30 seconds.

- When the countdown is finished, the screen will read “cal’ed reading = 100 ppm” It should read within a few parts per million of the span gas concentration value.
- Press MODE once. The screen will read “cal done, turn off gas” Remove and close the tedlar bag.
- Press MODE again twice to return to the run mode. The unit should read 0.0 ppm without gas and 100 ppm with gas.

2.8.1.4 Turbidity Meters

Because many turbidity meters are available, operators should calibrate the meter in accordance with the manufacturer’s instruction manual. The turbidity meter will be calibrated prior to its use each day and more frequently, if necessary. The following is a general procedure for calibrating and operating the turbidity meter.

- Place a mark on the reference standards and sample cuvettes and the top of the optical well to ensure that any incidental marks on the cuvettes are consistently positioned in the optical well;
- Place the supplied reference standard in the optical well of the turbidimeter. Be careful to ensure the glass vial is clean and dry;
- Adjust the reference until the turbidimeter reads the reference standard value; and
- To measure a sample, fill a clean, dry cuvette. Dry the cuvette and place in the optical well. Select the appropriate range until reading has stabilized. Be consistent with the methodology for each sample analyzed.

2.8.2 Laboratory Equipment

All laboratory equipment is calibrated according to the requirements of the respective NYSDEC ASP (10195) method for each analysis and/or in accordance with the manufacturer's specifications. In general, preventative maintenance of laboratory equipment follows the guidelines recommended by the manufacturer. Generally speaking, a malfunctioning instrument which cannot be repaired directly by laboratory personnel is repaired following a service call to the manufacturer. The laboratory specific QAPP will contain information on each specific laboratory’s analytical equipment.

2.9 Field Documentation

A field notebook will be initiated at the start of on-site work and will include the following daily information, where applicable:

- Day and Date;

- Meteorological conditions;
- Crew members;
- Brief description of proposed field activities for that day;
- Locations where work is performed;
- Problems and corrective actions taken;
- Records of all field measurements;
- A description of all modifications to the work plan;
- A record of all field data sampling point locations;
- Pertinent sample collection information;
- Chain-of-custody information; and
- Documentation of the calibration of field instrumentation used.

The CB&I employee will sign the first line and sign and date the last line of each day's entry to maintain proper custody. Any changes made in the field notebook will be initialed and dated by the CB&I employee. Additionally, each entry in the field notebook will have a corresponding time (military) associated with it.

Once the CB&I field employee returns to the office, a copy will be made and retained in the project files of the field notes. This ensures proper documentation in case something happens to the original field notebook (e.g. it gets lost).

All original forms and notebooks used during field activities become part of the permanent project file. Additionally, project-specific questionnaires or data sheets will also be completely and accurately completed by CB&I personnel as required. These data sheets are provided in Appendix A of CB&I's Field Activities Plan (FAP) included as Appendix C to the RI/FS Work Plan.

2.10 Corrective Actions

Corrective actions are required when a problem arises that impedes the progress of the investigation as detailed in the project plans, or when field or analytical data are not within the objectives specified in the Work Plan or QAPP. Corrective actions include those actions implemented to promptly identify, document, and evaluate the problem and its source, as well as those actions taken to correct the problem. These corrective actions are documented in the project file. Prior to implementing any deviations from the approved procedures contained in the QAPP, the Project Manager must be notified.

2.10.1 Field Procedures

Project personnel continuously monitor ongoing work performance as part of their daily responsibilities. If a condition is noted that would have an adverse impact on data quality, corrective actions are taken. Situations that require corrective action include the following:

- Standard operating procedures and or protocols identified in the RI/FS Work Plan or QAPP have not been followed;
- Equipment is not calibrated properly or in proper working order;
- QC requirements have not been met; and,
- Performance or system audits identify issues of concern.

The problem, its cause, and the corrective action implemented are documented. The Project Manager is responsible for initiating and approving corrective actions.

2.10.2 Laboratory Procedures

During all investigations/studies, instrument and method performance and data validity are monitored by the analytical laboratory performing the analyses. The laboratory calibrates its instruments and documents the calibration data. Laboratory personnel continuously monitor the performance of its instruments to ensure that performance data fall within acceptable limits. If instrument performance or data fall outside acceptable limits, or when any condition is noted that has an adverse effect on data quality, then the laboratory implements appropriate corrective actions. Situations that require corrective action include the following:

- Protocols defined by the project-specific QAPP have not been followed;
- Identified data acceptance standards are not obtained;
- Equipment is not calibrated properly or in proper working order;
- Sample and test results are not completely traceable;
- QC requirements have not been met; and
- Performance or system audits identify issues of concern.

The laboratory QA Officer is responsible for initiating and approving corrective actions. The corrective actions may include one or more of the following:

- Re-calibration or standardization of instruments;
- Acquiring new standards;
- Repairing equipment; and

- Reanalyzing samples or repeating portions of work.

System audits and reviews of calibration procedures and corresponding data are conducted by the laboratory at a sufficient frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work. CB&I provides independent data validation and/or data review and summary, and the laboratory is notified as soon as possible of any situation which requires corrective action so that the corrective action may be implemented in a timely manner.

2.11 Data Reduction, Review and Reporting

The laboratory is required to meet all applicable documentation, data reduction, and reporting protocols as specified in the NYSDEC ASP (10195) CLP deliverable format.

2.11.1 Data Reduction

The laboratory conducts its own internal review of the analytical data generated for the project prior to sending the data to CB&I. Deficiencies discovered during the laboratory internal data validation, as well as the corrective actions used to correct the deficiency, are documented in the laboratory Case Narrative submitted with each data package.

2.11.2 Data Review

In addition to the laboratory's in house review of the data, CB&I chemists or a qualified data validation subcontractor will review the laboratory standard quality control summary forms prior to its incorporation into a final report and complete a Data Usability Summary Report (DUSR) if required by the NYSDEC.

This data review will follow the NYSDEC Guidance for Development of Data Usability Reports (portions of which are included as **Appendix A**); complete validation of the data in accordance with the National Functional Guidelines will not be performed. Upon receipt of the laboratory data analytical package, the data reviewer:

1. Reviews the data package to determine completeness. It must contain all sample chain of custody forms, case narratives including sample analysis summary forms, QAQC summaries with supporting documentation, relevant calibration data, instrument and method performance data, documentation of the laboratory ability to attain the method detection limits for target analytes in required matrices, data report forms with examples of calculations, and raw data. The laboratory is promptly notified of any deficiencies,

and must produce the documentation necessary to correct the deficiencies within 10 calendar days.

2. Reviews the data package to determine compliance with the applicable portions of the work plan. The data reviewer confirms that the data is produced and reported consistent with the QAPP and laboratory quality control program, protocol required QA/QC criteria are met, instrument performance and calibration requirements were met, protocol required calibration data are present and documented, data reporting forms are complete, and problems encountered during the analytical process and actions taken to correct the problems are reported. Field duplicate data are evaluated to determine field variability.
3. Prepares a tabular summary of the reported data. The data reviewer summarizes the data in a tabular format to provide the data in more accessible format.

Third part validation of samples will be performed as directed by the NYSDEC. The third party validation will issue the DUSR.

2.11.3 Data Reporting

The laboratory reports the data in tabular form by method and sample. The laboratory is required to submit analytical results that are supported by a complete NYSDEC ASP Category B CLP data package to enable the quality of the data to be determined. This standard backup data includes supporting documentation (chromatograms, raw data, etc.), sample preparation information, and sample handling information (i.e., chain-of-custody documentation).

2.12 Quality Assurance Controls

The Project QC Manager is responsible for ensuring that quality QA/QC records such as chain-of- custody forms, field notebooks, and data summaries are being properly prepared. The Project Manager is responsible for ensuring that all records are properly filed. Information received from outside sources, such as laboratory analytical reports, is retained by CB&I. Access to working project files is restricted to project personnel.

2.12.1 Field Audits

The Project Manager is responsible for ensuring that all field investigations are performed in accordance with the requirements and specifications outlined in this QAPP. As part of CB&I's field QAQC program, a field audit may be performed by CB&I's Program Manager or a designated representative on projects where sampling activities extend for more than two weeks. The primary purpose of the field audit is to monitor project sampling practices. The QA/QC field audit is performed during sampling to evaluate the performance of work during the collection of samples for laboratory analysis. The QC manager will monitor field performance and document all work performed in field notes, a narrative, and/or a checklist of tasks, as appropriate. The Project Manager will review this documentation to ensure the necessary information has been recorded and conduct discussions with field team members to verify that field activities were performed according to the RI/FS Work Plan, QAPP and HASP. The QC Manager will communicate any concerns to the field team as appropriate.

2.12.2 Meetings

Periodic meetings between the Project Manager and QC Manager will be held to review quality assurance procedures, field work, laboratory performance and data documentation and review. Any potential problems identified during the review are documented and addressed. If necessary, they are reported to management for review and appropriate corrective action.

Tables

Table 1
Turk Hill Park Site
Project Compound List

Compounds	Soil	Water	Air
Polychlorinated Biphenyls (PCBs)	X	X	X
Pesticides/Herbicides	X	X	
Semi-volatile Organic Compounds (SVOCs)	X	X	
Volatile Organic Compounds (VOCs)	X	X	X
Total Phenols			
Particle Size			
Total Organic Carbon (TOC)			
Oil and Grease			
NYSDEC STARS compounds			
Total Petroleum Hydrocarbons (TPH)			
EPA Method 3035			
Diesel Range Organics/Gasoline Range Organics (DRO/GRO)			
Bulk Density			
Moisture Content	X		
pH			
Total Suspended Solids (TSS)			
Metals	X	X	
Mercury	X	X	
Hexavalent Chromium			
Total Cyanide			
Biological Oxygen Demand (BOD)			
Chemical Oxygen Demand (COD)			
Fixed Suspended Solids			
MNA Parameters	X	X	
Volatile Suspended Solids			

Table 2
Turk Hill Park Site
Sampling Containers, Preservation and Holding Times

PARAMETER	MATRIX	CONTAINER	PRESERVATION	HOLDING TIME
VOCs TCL/EPA 8260/5035	Aqueous	40 ml. VOA Vial w/ TFE lined septum cap (3)	4^oC / HCl	14 days
	Soils	Encore Samplers (3-4) and 2-4 oz jar (1-2)	Ice	48 hours
EPA TO-15	Gas	Summa Canister	N/A	7 days
SVOCs EPA 8270	Aqueous	1 L Amber (2)	4°C	7 days
	Soils	8 oz. (wide mouth) of 250 mL (narrow mouth)	4°C	14 days
Metals EPA 6010, Mecury 7470A, 7171B, 7474	Aqueous	Plastic 500 mL	HNO3, pH<2, 4^oC	180 days / 28 days Hg
	Soil	Amber glass 4 oz Container	4^oC	180 days
Pesticdes EPA 8081	Aqueous	1 L Amber (2)	4°C	7 days
	Soil	8 oz. (wide mouth) of 250 mL (narrow mouth)	4^oC	14 days
PCBs EPA 8082	Aqueous	1 L Amber (2)	4°C	7 days
	Soil	8 oz. (wide mouth) of 250 mL (narrow mouth)	4^oC	14 days
Moisture Content	Soil	Glass wide-mouth w/TFE lined septum cap/4 oz.	4^oC	14 days

Notes:

TCL: Full Superfund Target Compound List

TPH: Total Petroleum Hydrocarbons

Table 3
Turk Hill Park Site
Number of Samples to be Collected for Each Sampling Media and Analyses to be Performed

QA/QC SAMPLES									
TYPE	**SOURCE**	**No. of Matrix Samples (Minimum)**	**MATRIX**	**(BLIND) FIELD DUPLICATE[1] REP.**	**FIELD BLANK[2]** (minimum)	**RINSE BLANK[3]** (minimum)	**TRIP BLANK[4]** (minimum)	**MS/MSD[5]**	**ANALYSIS**
Groundwater	MW-1 through MW-17	68*	Aqueous	4	4	4	4	4	VOCs, SVOCs, PCBs, TAL metals and pesticides**
Sub-Slab Vapor/ Indoor Air/ Ambient Air	Predetermined Locations	17***	Air	2	N/A	N/A	N/A	N/A	EPA TO-15
Soil	SB-1 through SB-20	20	Soil	1	1	1	1	1	VOCs, SVOCs, PCBs, TAL metals and pesticides
	TP-1SS through TP-10SS	10	Soil	1	1	1	1	1	
	TP-1 through TP-10	10	Soil	1	1	1	1	1	
Sediment	SED-1 and SED-2	2	Soil	1	1	1	1	1	

Notes:

1: 1 per 20 samples/matrix
2: 1 per day
3: 1 per week/sampling equipment used
4: 1 per 20 samples/day
5: 1 per 20 samples/matrix
N/A: Not Applicable
*: Quarterly sampling for one year including the intial sampling round
**: If SVOCs, pesticides, PCBs or TAL metal results during initial sampling round are non-detect, the analyses will be dropped for future sampling events
***: Does not include confirmation sampling as part of IRM

Table 4
Turk Hill Park Site
TO-15 Compound List

Standard TO-15 Compound List	
74-87-3	Chloromethane
75-01-4	Vinyl Chloride
74-83-9	Bromomethane
75-00-3	Chloroethane
67-64-1	Acetone
75-69-4	Trichlorofluoromethane (CFC 11)
75-35-4	1,1-Dichloroethene
75-09-2	Methylene Chloride
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane
75-15-0	Carbon Disulfide
156-60-5	trans-1,2-Dichloroethene
75-34-3	1,1-Dichloroethane (1,1-DCA)
1634-04-4	Methyl tert-Butyl Ether
108-05-4	Vinylcetate
78-93-3 2	2-Butanone (MEK)
156-59-2	cis-1,2-Dichloroethene
67-66-3	Chloroform
107-06-2	1,2-Dichloroethane
71-55-6	1,1,1-Trichloroethane (TCA)
71-43-2	Benzene
56-23-5	Carbon Tetrachloride
78-87-5	1,2-Dichloropropane
75-27-4	Bromodichloromethane
79-01-6	Trichloroethene (TCE)
10061-01-5	cis-1,3-Dichloropropene
108-10-1 4	4-Methyl-2-pentanone
10061-02-6	trans-1,3-Dichloropropene
79-00-5	1,1,2-Trichloroethane
108-88-3	Toluene
591-78-6	2-Hexanone
124-48-1	Dibromochloromethane
106-93-4	1,2-Dibromoethane
127-18-4	Tetrachloroethene (PCE)
108-90-7	Chlorobenzene
100-41-4	Ethylbenzene
179601-23-1	m,p-Xylenes
75-25-2	Bromoform
100-42-5	Styrene
95-47-6	o-Xylene
79-34-5	1,1,2,2-Tetrachloroethane
541-73-1	1,3-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
95-50-1	1,2-Dichlorobenzene

Table 5
Turk Hill Park Site
Field Accuracy and Precision

PARAMETER	SPIKING COMPOUND	WATER ACCURACY % RECOVERY	WATER PRECISION % RPD (1)	SOIL ACCURACY % RECOVERY	SOIL PRECISION % RPD (1)	AIR	AIR
VOA (3)	1,1 Dichloroethene	5	+/- 14% RPD	5	+/- 22% RPD	1	
VOA (3)	Trichloroethene	5	+/- 14% RPD	5	+/- 24% RPD	1	
VOA (3)	Benzene	5	+/- 11% RPD	5	+/- 21% RPD	1	
VOA (3)	Toluene	5	+/- 13% RPD	5	+/- 21% RPD	1	
VOA (3)	Chlorobenzene	5	+/- 13% RPD	5	+/- 21% RPD	1	
BNA (3)	Phenol	5	+/- 42% RPD	5	+/- 35% RPD	1	
BNA (3)	2-Chlorophenol	5	+/- 40% RPD	5	+/- 50% RPD	1	
BNA (3)	1,4-Dichlorobenzene	5	+/- 28% RPD	5	+/- 27% RPD	1	
BNA (3)	N-Nitrosos-di-n-propylamine	5	+/- 38% RPD	5	+/- 38% RPD	1	
BNA (3)	1,2,4-Trichlorobenzene	5	+/- 28% RPD	5	+/- 23% RPD	1	
BNA (3)	4-chloro-3-methylphenol	5	+/- 42% RPD	5	+/- 33% RPD	1	
BNA (3)	Acenapthene	5	+/- 31% RPD	5	+/- 19% RPD	1	
BNA (3)	4-Nitrophenol	5	+/- 50% RPD	5	+/- 50% RPD	1	
BNA (3)	2,4-Dinitrotoluene	5	+/- 38% RPD	5	+/- 47% RPD	1	
BNA (3)	Pentachlorophenol	5	+/- 50% RPD	5	+/- 47% RPD	1	
BNA (3)	Pyrene	5	+/- 31% RPD	5	+/- 36% RPD	1	
Pest (3)	Lindane	5	+/- 15% RPD	5	+/- 50% RPD	1	
Pest (3)	Heptachlor	5	+/- 20% RPD	5	+/- 31% RPD	1	
Pest (3)	Aldrin	5	+/- 22% RPD	5	+/- 43% RPD	1	
Pest (3)	Dieldrin	5	+/- 18% RPD	5	+/- 38% RPD	1	
Pest (3)	Endrin	5	+/- 21% RPD	5	+/- 45% RPD	1	
Pest (3)	4,4-DDT	5	+/- 27% RPD	5	+/- 50% RPD	1	
Metals (2) (4)	*	5	+/-20% RPD	5	+/-20% RPD	1	

Notes:

1: % RPD is applicable above five times the contract required detection limit (CRDL). Below five times the CRDL use control limit of +/- the CRDL;

2: Laboratory Accuracy and Precision control limits obtained from USEPA Statement of Work (SOW 3/90) For Inorganics Analysis, Document No. ILM01.0, Section E-14 through and including E-16 and Section E-18 through and including Section E-19;

3: Laboratory Accuracy and Precision Control Limits obtained from USEPA Statement of Work (3/90) for Organics Analysis, Document Number OLM01.0, Section D-55, Table 7, Section D-59, Table 7 and Section D-60, Subsection 16.4;

4: Pre-digestion spikes for metals, if matrix spikes are required by the method, the percent recovery range will be adjusted to 85-115%;

5: For organic parameters control limits for individual matrix spike compounds are to be found in tables 11.1 and 11.2;

VOA - Volatile Organic Compounds;

BNA - Semi-volatile Organic Compounds;

Pest - Pesticides;

* - Spiking compound contains all metals being analyzed for.

Table 6
Turk Hill Park Site
Laboratory Accuracy and Precision

PARAMETER	SPIKING COMPOUND	WATER ACCURACY % RECOVERY	WATER PRECISION % RPD (1)	SOIL ACCURACY % RECOVERY	SOIL PRECISION % RPD (1)	AIR	AIR
VOA (3)	1,1 Dichloroethene	5	+/- 14% RPD	5	+/- 22% RPD	1	
VOA (3)	Trichloroethene	5	+/- 14% RPD	5	+/- 24% RPD	1	
VOA (3)	Benzene	5	+/- 11% RPD	5	+/- 21% RPD	1	
VOA (3)	Toluene	5	+/- 13% RPD	5	+/- 21% RPD	1	
VOA (3)	Chlorobenzene	5	+/- 13% RPD	5	+/- 21% RPD	1	
BNA (3)	Phenol	5	+/- 42% RPD	5	+/- 35% RPD	1	
BNA (3)	2-Chlorophenol	5	+/- 40% RPD	5	+/- 50% RPD	1	
BNA (3)	1,4-Dichlorobenzene	5	+/- 28% RPD	5	+/- 27% RPD	1	
BNA (3)	N-Nitrosos-di-n-propylamine	5	+/- 38% RPD	5	+/- 38% RPD	1	
BNA (3)	1,2,4-Trichlorobenzene	5	+/- 28% RPD	5	+/- 23% RPD	1	
BNA (3)	4-chloro-3-methylphenol	5	+/- 42% RPD	5	+/- 33% RPD	1	
BNA (3)	Acenapthene	5	+/- 31% RPD	5	+/- 19% RPD	1	
BNA (3)	4-Nitrophenol	5	+/- 50% RPD	5	+/- 50% RPD	1	
BNA (3)	2,4-Dinitrotoluene	5	+/- 38% RPD	5	+/- 47% RPD	1	
BNA (3)	Pentachlorophenol	5	+/- 50% RPD	5	+/- 47% RPD	1	
BNA (3)	Pyrene	5	+/- 31% RPD	5	+/- 36% RPD	1	
Pest (3)	Lindane	5	+/- 15% RPD	5	+/- 50% RPD	1	
Pest (3)	Heptachlor	5	+/- 20% RPD	5	+/- 31% RPD	1	
Pest (3)	Aldrin	5	+/- 22% RPD	5	+/- 43% RPD	1	
Pest (3)	Dieldrin	5	+/- 18% RPD	5	+/- 38% RPD	1	
Pest (3)	Endrin	5	+/- 21% RPD	5	+/- 45% RPD	1	
Pest (3)	4,4-DDT	5	+/- 27% RPD	5	+/- 50% RPD	1	
METALS(2) (4)	*	5	+/-20% RPD	5	+/-20% RPD	1	

Notes:

1: %RPD is applicable above five times the contract required detection limit (CRDL). Below five times the CRDL use control limit of +/- the CRDL;

2: Laboratory Accuracy and Precision control limits obtained from USEPA Statement of Work (SOW 3/90) For Inorganics Analysis, Document No. ILM01.0, Section E-14 through and including E-16 and Section E-18 through and including Section E-19;

3: Laboratory Accuracy and Precision Control Limits obtained from USEPA Statement of Work (3/90) for Organics Analysis, Document Number OLM01.0, Section D-55, Table 7, Section D-59, Table 7 and Section D-60, Subsection 16.4.;

4: Pre-digestion spikes for metals, if matrix spikes are required by the method, the percent recovery range will be adjusted to 85-115%;

5: For organic parameters control limits for individual matrix spike compounds are to be found in tables 11.1 and 11.2;

VOA - Volatile Organic Compounds;

BNA - Semi-volatile Organic Compounds;

Pest - Pesticides;

* - Spiking compound contains all metals being analyzed for.

Table 7
Turk Hill Park Site
Percent Spike Recoveries

FRACTION	MATRIX SPIKE COMPOUND	WATER	RPD WATER	LOW/MEDIUM SOIL	RPD SOIL
VOA	1,1 Dichloroethene	61-145	0-14	59-172	0-22
VOA	Trichloroethene	71-120	0-14	62-137	0-24
VOA	Chlorobenzene	75-130	0-13	60-133	0-21
VOA	Toluene	76-125	0-13	59-139	0-21
VOA	Benzene	76-127	0-11	66-142	0-21
BN	1,2,4-Trichlorobenzene	39-98	0-31	38-107	0-21
BN	Acenapthene	46-118	0-31	31-137	0-19
BN	2,4-Dinitrotoluene	24-96	0-38	28-89	0-47
BN	Pyrene	26-127	0-31	35-142	0-36
BN	N-Nitrosos-di-n-propylamine	41-116	0-38	41-126	0-38
BN	1,4-Dichlorobenzene	36-97	0-31	28-104	0-21
Acid	Pentachlorophenol	9-103	0-50	17-109	0-47
Acid	Phenol	12-110	0-42	26-90	0-35
Acid	2-Chlorophenol	27-123	0-40	25-102	0-50
Acid	4-chloro-3-methylphenol	23-97	0-42	26-103	0-33
Acid	4-Nitrophenol	10-80	0-50	11-114	0-50
Pesticide	Lindane	56-123	0-15	46-127	0-50
Pesticide	Heptachlor	40-131	0-20	35-130	0-31
Pesticide	Aldrin	40-120	0-22	34-132	0-43
Pesticide	Dieldrin	52-126	0-18	31-134	0-38
Pesticide	Endrin	56-121	0-21	42-139	0-45
Pesticide	4,4'-DDT	38-127	0-27	23-134	0-50
Arocolors	Aroclor 1016	29-135	0-15	29-135	0-15
Arocolors	Aroclor 1260	29-135	0-20	29-135	0-20
Metals	ALL PRE-DIGEST SPIKES	75-125		75-125	
Metals	MATRIX SPIKES	85-115		85-115	

Notes:

VOA - Volatile Organic Analysis;

BN - Base-Neutral.

Table 8
Turk Hill Park Site
Percent Spike Recovery Limits

FRACTION	SURROGATE COMPOUND	WATER	LOW/MEDIUM SOIL	INDOOR AIR
VOA	Toluene-d8	77-121	84-138	---
VOA	4-Bromofluorobenzene	86-115	59-113	70-130
VOA	1,2-Dichloroethane-d4	76-114	70-121	---
VOA	Dibromofluoromethane	76-114	70-121	---
BN	Nitrobenzene-d5	35-114	23-120	---
BN	2-Fluorobiphenyl	43-116	30-115	---
BN	Terphenyl-d5	33-141	18-137	---
BN	1,2-Dichlorobenzene-d4	80-131	70-131	---
Acid	Phenol-d5	39-106	17-103	---
Acid	2-Fluorophenol	21-110	25-121	---
Acid	2,4,6-Tribromophenol	10-123	19-122	---
Acid	2-Cholorophenol-d4	41-106	13-101	---
Pesticide	Decachlorobiphenyl	60-150[2]	60-150[2]	---
Pesticide	Tetra-Chloro-m-Xylene	60-150[2]	60-150[2]	---

Notes:

1: Once 20 samples of a given matrix are evaluated, statistical control should be developed as described in section 14. The surrogate limits for other parameters should also be updated when 50 samples of a given matrix have been evaluated, or sooner as needed;

2: These limits are advisory purposes only. They are not used to determine if a sample should be reanalyzed. When sufficient data becomes available, the NYSDEC ASP may set performance based contract required windows;

VOA - Volatile Organic Analysis

BN - Base-Neutral

Table 9A
Turk Hill Park Site
Target Compound List and Contract Required Limits for Volatile Organic Compounds

Volatile Compounds	CAS No.	Water (µg/L)	Low Soil/Sediment[3] (mg/kg)	Air (ug/m^3)
1,1,1,2-Tetrachloroethane	630-20-6	5	0.53	1
1,1,1-Trichloroethane	71-55-6	5	0.68	1
1,1,2,2-Tetrachloroethane	79-34-5	5	0.6	1
1,1,2-Trichloroethane	79-00-5	1	0.68	1
1,1,2-Trichlorotrifluoroethane	76-13-1	5	---	1
1,1-Dichloroethane	75-34-3	5	0.27	1
1,1-Dichloroethene	75-35-4	5	0.33	1
1,1-Dichloropropene	563-58-6	5	0.57	1
1,2,3-Trichlorobenzene	87-61-6	---	---	1
1,2,3-Trichloropropane	96-18-4	0.04	0.4	1
1,2,4-Trichlorobenzene	120-82-1	5	---	1
1,2,4-Trimethylbenzene	95-63-6	5	3.6	1
1,2-Dibromo-3-chloropropane	96-12-8	0.04	1.7	1
1,2-Dibromoethane	106-93-4	0.0006	0.42	1
1,2-Dichlorobenzene	95-50-1	3	1.1	1
1,2-Dichloroethane	107-06-2	0.6	0.02	1
1,2-Dichloropropane	78-87-5	1	0.6	1
1,2-Dichloropropene	563-54-2	5	---	1
1,3,5-Trimethylbenzene	108-67-8	5	8.4	1
1,3-Butadine	106-99-0	5	---	1
1,3-Dichlorobenzene	541-73-1	3	2.4	1
1,3-Dichloropropane	142-28-9	5	0.3	1
1,4-Dichlorobenzene	106-46-7	3	1.8	1
1,4-Dioxane	123-91-1	1	0.1	1
2,2,4-Trimethylpentane	540-84-1	5	---	1
2,2-Dichloropropane	594-20-7	5	0.52	1
2-Butanone (MER)	78-93-3	50	0.12	1
2-Chlorotoluene	95-49-8	5	0.66	1
2-Hexanone	591-78-6	50	0.51	1
2-Propanol	67-63-0	5	---	1
4-Chlorotoulene	106-43-4	5	0.47	1
4-Ethyl toluene	622-96-8	5	---	1
4-Methyl-2-pentanone	108-10-1	1	1.0	1
Acetone	67-64-1	50	0.05	1
Benzene	71-43-2	0.7	0.06	1
Benzyl chloride	100-44-7	5	---	1
Bromobenzene	108-86-1	5	0.66	1
Bromochloromethane	83847-49-8	5	1.1	1
Bromodichloromethane	75-27-4	50	0.67	1
Bromoform	75-25-2	50	2.4	1
Bromomethane	74-83-9	5	1.3	1
Carbon Disulfide	75-15-0	60	2.7	1
Carbon Tetrachloride	56-23-5	5	0.8	0.25
Chlorobenzene	108-90-7	5	1.1	1
Chloroethane	75-00-3	5	1.9	1
Chloroform	67-66-3	7	0.37	1
Chloromethane	74-87-3	5	0.77	1
cis-1,2-Dichloroethene	156-59-2	5	0.25	1
cis-1,3-Dichloropropene	10061-02-5	0.4	0.39	1

Table 9A
Turk Hill Park Site
Target Compound List and Contract Required Limits for Volatile Organic Compounds

Volatile Compounds	CAS No.	Water (µg/L)	Low Soil/Sediment[3] (mg/kg)	Air (ug/m^3)
Cyclohexane	100-82-7	5	---	1
Dibromochloromethane	124-48-1	50	0.64	1
Dibromomethane	74-95-3	5	0.52	1
Dichlorodifluoromethane	75-71-8	5	1.6	1
Dichlorotetrafluoroethane	76-14-2	5	5	1
Ethyl acetate	141-78-6	5	MDL	1
Ethylbenzene	100-41-4	5	1	1
Freon 113	76-13-1	5	5	1
Heptane	142-82.5	5	MDL	1
hexachloro-1,3-butadine	97-68-3	0.5	MDL	1
hexachlorobenzene	118-74-1	0.33	---	1
Hexane	110-54-3	5	MDL	1
Isopropylbenzene	98-82-8	5	0.3	1
methyl acetate	72-90-9	---	---	1
Methyl tert-butyl ether	1634-04-4	10	0.93	1
methylchclohexane	108-87-2	---	---	1
Methylene Chloride	75-09-2	5	0.05	1
m-Xylenes	108-38-3	5	0.26	1
n-butylbenzene	104-51-8	---	12	1
n-propylbenzene	74296-31-4	5	3.9	1
o-Xylene	95-57-6	5	0.26	1
Propylene	115-07-1	5	MDL	1
p-Xylenes	106-42-3	5	0.26	1
sec-butylbenzene	135-98-8	---	11	1
Styrene	100-42-5	5	0.5	1
tert-butylbenzene	98-06-6	---	59	1
Tetrachloroethene	127-18-4	5	1.3	1
Tetrahydrofuran	109-99-9	50	MDL	1
Toluene	108-88-3	5	0.7	1
trans-1,2-Dichloroethene	56-60-5	5	0.19	1
Trans-1,3-Dichloropropene	10061-02-6	0.4	0.28	1
Trichloroethene	79-01-6	5	0.47	0.25
Trichloroflouromethane	75-69-4	5	5	1
Vinyl acetate	108-05-4	5	MDL	1
Vinyl bromide	593-60-2	5	MDL	1
Vinyl chloride	75-01-4	2	0.02	1

Notes:

Specific quantification limits are highly matrix dependent. The limits listed herein are provided for guidance and may not always be achievable;

1: Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher;

2: Medium Soil/Sediment contract Required Quantification Limits for Volatile TCL Compounds are 125 times the individual Low/Soil Sediment CRQL;

3: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semi-Volatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL;

4: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Pesticide PCB/TCL Compounds are 15 times the individual Low Soil/Sediment CRQL;

5: Not analyzed;

--- - No given value;

MDL - Method Detection Limit.

Table 9B
Turk Hill Park Site
Target Compound List and Contract Required Limits for SemiVolatile Organic Compounds

Semi-Volatile Compounds	CAS No.	Water (µg/L)	Low Soil/Sediment[3] (mg/kg)
1,1-Biphenyl	92-52-4	---	---
1,2,4-5 tetrachlorobenzene	95-94-3	---	---
1,2,4-Trichlorobenzene	120-82-1	5	0.33
1,2-Dichlorobenzene	95-50-1	3	7.9
1,3-Dichlorobenzene	541-73-1	3	1.6
1,4-Dichlorobenzene	106-46-7	3	8.5
1-Methylnaphthalene	90-12-0	5	MDL
2,2'-Oxy(bis-1-chloropropane)	108-60-1	5	0.33
2,3,4,6-tetrachloraphenol	58-90-2	---	---
2,4,5-Trichlorophenol	95-95-4	1	0.1
2,4,6-Trichlorophenol	87-86-2	1	0.33
2,4-Dichlorophenol	120-83-2	5	0.4
2,4-Dimethylphenol	105-67-9	50	0.33
2,4-Dinitrophenol	51-28-5	10	0.2
2,4-Dinitrotoluene	121-14-2	5	0.33
2,6-Dinitrotoluene	606-20-2	5	1
2-Chloronaphthalene	91-58-7	10	0.33
2-Chlorophenol	95-57-8	1	0.8
2-Methylnaphthalene	91-57-6	5	36.4
2-Methylphenol	95-48-7	5	0.1
2-Nitroaniline	88-74-4	5	0.43
2-Nitrophenol	88-75-5	1	0.33
3,3'-Dichlorobenzidine	91-94-1	0.30	0.33
3-Nitroaniline	98-95-3	5	0.5
4,6-Dinitro-2-methylphenol	534-52-1	1	0.8
4-Bromophenyl-phenylether	101-55-3	5	0.33
4-Chloro-3-methylphenol	59-50-7	1	0.24
4-Chloroaniline	106-47-8	5	0.22
4-Chlorophenyl phenyl ether	7005-72-3	5	0.33
4-Methylphenol	106-44-5	1	0.9
4-Nitroaniline	100-01-6	5	0.8
4-Nitrophenol	100-02-7	1	0.1
Acenaphthene	83-32-9	20	20
Acenaphthylene	208-96-8	5	100
Acetophenone	98-86-2	---	---
Anthracene	120-12-7	50	100
Atrazine	1912-24-9	---	---
Benzaldehyde	100-52-7	---	---

Table 9B
Turk Hill Park Site
Target Compound List and Contract Required Limits for SemiVolatile Organic Compounds

Benzo(a) anthracene	56-55-3	0.002	1
Benzo(a) pyrene	50-32-8	0.2	0.061
Benzo(b) fluoranthene	205-99-2	0.002	1
Benzo(g,h,i)perylene	191-24-2	5	100
Benzo(k) fluoranthene	207-08-9	0.002	0.8
Bis-(2-Chloroethoxy) methane	111-91-1	5	0.33
Bis(2-Chloroethyl) ether	108-60-1	1	0.33
Bis(2-Ethylhexyl) phthalate	117-81-7	5	50
Butylbenzylphthalate	85-68-1	50	50
Caprolactum	105-60-2	---	
Carbazole	86-74-8	5	0.33
Chrysene	218-01-9	0.002	1
Dibenz(a,h) anthracene	53-70-3	5	0.33
Dibenzofuran	132-64-9	5	6.2
Diethylphthalate	84-66-2	50	7.1
Dimethylphthalate	131-11-3	50	2
Di-n-butylphthalate	84-74-2	50	8.1
Di-n-octylphthalate	117-84-0	50	50
Fluoranthene	206-44-0	50	100
Fluorene	86-73-7	50	30
Hexachlorobenzene	118-74-1	0.04	0.41
Hexachlorobutadiene	87-68-3	0.5	0.33
Hexachlorocyclopentadiene	77-47-4	5	0.33
Hexachloroethane	67-72-1	5	0.33
Indeno(1,2,3-cd) pyrene	193-39-5	0.002	0.5
Isophorone	78-59-1	50	4.4
M-Cresol	108-39-4	---	0.33
Naphthalene	91-20-3	10	12
Nitrobenzene	98-95-3	0.4	0.2
N-Nitroso-di-n-dipropylamine	621-64-7	5	0.33
N-nitrosodiphenylamine	86-30-6	50	0.33
O-Cresol	95-48-7	---	0.33
P-Cresol	106-44-5	---	0.33
Pentachlorophenol	87-86-5	1	0.8
Phenanthrene	85-01-8	50	100
Phenol	108-95-2	1	0.03
Pyrene	129-00-0	50	100

Notes:

Specific quantification limits are highly matrix dependent. The limits listed herein are provided for guidance and may not always be achievable;

1: Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher;

2: Medium Soil/Sediment contract Required Quantification Limits for Volatile TCL Compounds are 125 times the individual Low/Soil Sediment CRQL;

3: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semi-Volatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL;

4: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Pesticide PCB/TCL Compounds are 15 times the individual Low Soil/Sediment CRQL;

MDL - Method Detection Limit.

Table 9C
Turk Hill Park Site
Target Compound List and Contract Required Limits for PCBs/Pesticides

PCBs/Pesticides	CAS No.	Water (µg/L)	Low Soil/Sediment[3] (mg/kg)
4,4'-DDD	72-54-8	0.3	0.0033
4,4'-DDE	72-55-9	0.2	0.0033
4,4'-DDT	50-29-3	0.2	0.0033
Aldrin	309-00-2	1	0.0005
alpha-BHC	319-84-6	0.05	0.02
alpha-Chlordane	5103-71-9	0.5	0.094
Aroclor-1016/1242	12674-11-2	0.09	0.1
Aroclor-1221	11104-28-2	0.09	0.1
Aroclor-1232	11141-16-5	0.09	0.1
Aroclor-1242/1016	53469-21-9	0.09	0.1
Aroclor-1248	12672-29-6	0.09	0.1
Aroclor-1254	11097-69-1	0.09	0.1
Aroclor-1260	11096-82-5	0.09	0.1
Aroclor-1262	37324-23-5	---	---
Aroclor-1268	11100-14-4	---	---
beta-BHC	319-85-7	0.05	0.036
Decachlorobiphenyl	2051-24-3	---	---
delta-BHC	319-86-8	0.05	0.04
Dieldrin	60-57-1	0.004	0.005
Endosulfan I	959-98-8	0.05	2.4
Endosulfan II	33213-65-9	0.1	2.4
Endosulfan Sulfate	1031-07-8	0.1	2.4
Endrin	72-20-8	0.1	0.014
Endrin Aldehyde	7421-36-3	5	0.0033
Endrin ketone	53494-70-5	5	0.0033
gamma-BHC (Lindane)	58-89-9	0.05	0.1
gamma-Chlordane	5103-74-2	0.05	0.54
Heptachlor	76-44-8	0.04	0.042
Heptachlor epoxide	1024-57-3	0.03	0.02
Methoxychlor	72-43-5	35	10
Tetrachloro-m-xylene	877-09-8	---	---
Toxaphene	8001-35-2	0.06	0.17

Notes:

1: Specific quantification limits are highly matrix dependent. The limits listed herein are provided for guidance and may not always be achievable;

2: Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher;

3: Medium Soil/Sediment contract Required Quantification Limits for Volatile TCL Compounds are 125 times the individual Low/Soil Sediment CRQL;

4: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semi-Volatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL;

5: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Pesticide PCB/TCL Compounds are 15 times the individual Low Soil/Sediment CRQL;

--- - Not analyze;

MDL - Method Detection Limit.

Table 9D
Turk Hill Park Site
Target Compound List and Contract Required Limits for Inorganic Compounds

Metals	CAS No.	Water (µg/L)	Low Soil/Sediment[3] (mg/kg)
Aluminum	7429-90-5	100	MDL
2,4,5-TP (Silver)	93-72-1	---	3.8
Antimony	7440-36-0	3	MDL
Arsenic	7440-38-2	25	13
Barium	7440-39-3	1000	350
Beryllium	7440-41-7	3	7.2
Cadmium	7440-43-9	5	2.5
Calcium	7440-70-2	5	MDL
Chromium (hexavalent)	18540-29-91	50	1
Chromium (trivalent)	16065-83-1	50	30
Cobalt	7440-48-4	5	MDL
Copper	7440-50-8	200	50
Cyanide	N/A	200	MDL
Dibenzofuran	132-64-9	---	7
Iron	7439-89-6	300	2000
Lead	7439-92-1	25	63
Magnesium	7439-95-4	35000	MDL
Manganese	7439-96-5	300	1600
Mercury	7439-97-6	0.7	0.18
Nickel	7440-02-0	100	30
Potassium	7440-09-7	5	MDL
Selenium	7782-49-2	10	3.9
Silver	7440-22-4	50	2
Sodium	7440-23-5	20000	MDL
Thallium	7440-28-0	0.5	MDL
Vanadium	7440-62-2	14	MDL
Zinc	7440-66-6	2000	109

Notes:

1: Specific quantification limits are highly matrix dependent. The limits listed herein are provided for guidance and may not always be achievable;

2: Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher;

3: Medium Soil/Sediment contract Required Quantification Limits for Volatile TCL Compounds are 125 times the individual Low/Soil Sediment CRQL;

4: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semi-Volatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL;

5: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Pesticide PCB/TCL Compounds are 15 times the individual Low Soil/Sediment CRQL;

--- - Not analyzed;

MDL - Method Detection Limit.

Table 9E
Turk Hill Park
Target Compound List and Contract Required Limits for Other Compounds

Other Compounds	CAS No.	Water (µg/L)	Low Soil/Sediment[3] (mg/kg)
TOC	N/A	---	---
Alkalinity	N/A	---	---
BOD	N/A	---	---
Bulk Density	N/A	---	---
Carbon Dioxide	N/A	---	---
Chloride	N/A	---	---
COD	N/A	---	---
Ethene/Ethane	N/A	---	---
Fixed Suspened Solids	N/A	---	---
Hydrogen	N/A	---	---
Iron II	N/A	---	---
Methane	N/A	---	---
Moisture Content	N/A	---	---
Nitrate	N/A	---	---
Oil and Grease	N/A	---	---
(ORP)	N/A	---	---
Oxygen	N/A	---	---
Particle Size	N/A	---	---
Percent Solids	N/A	---	---
pH	N/A	---	---
Sulfate	N/A	---	---
Sulfide	N/A	---	---
Temperature	N/A	---	---
Total Phenols	N/A	---	---
TPH	N/A	---	---
TSS	N/A	---	---
Volatile fatty acids	N/A	---	---
Volatile Suspened Solids	N/A	---	---

Notes:

1: Specific quantification limits are highly matrix dependent. The limits listed herein are provided for guidance and may not always be achievable;

2: Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher;

3: Medium Soil/Sediment contract Required Quantification Limits for Volatile TCL Compounds are 125 times the individual Low/Soil Sediment CRQL;

4: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semi-Volatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL;

5: Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Pesticide PCB/TCL Compounds are 15 times the individual Low Soil/Sediment CRQL;

--- - Not analyzed;
MDL - Method Detection Limit.

Table 10
Turk Hill Park Site
Data Reporting Conventions

Name Analysis	Units	Decimal Accuracy
VOLATILES BY GC/MS		
Soil	mg/kg	0.1
SEMI-VOLATILES BY GC/MS		
Soil	mg/kg	0.1
Water	µg/l	0.1
VOLATILES BY GC		
Soil	mg/kg	0.1
Water	µg/l	0.1
PESTICIDES/PCBs BY GC/ECD		
Soil	mg/kg	0.1
Water	µg/l	0.1
Wipe	µg/surface area	0.1
METALS BY ICP		
Soil	mg/kg	0.1
Water	µg/l	0.01
METALS BY FURNACE		
Soil	mg/kg	0.01
Water	µg/l	0.01
TEMPERATURE	^{o}C	0.1
pH	pH UNITS	0.1
SPECIFIC CONDUCTANCE	µmhos/cm	0.1
TURBIDITY	NTU	0.1

Appendix A

Guidance for Data Deliverables and the Development of Data Usability Summary Reports (DUSR)

Appendix 2B
Guidance for Data Deliverables and the Development of
Data Usability Summary Reports

1.0 Data Deliverables

(a) DEC Analytical Services Protocol Category A Data Deliverables:

1. A Category A Data Deliverable as described in the most current DEC Analytical Services Protocol (ASP) includes:

i. a Sample Delivery Group Narrative;

ii. contract Lab Sample Information sheets;

iii. DEC Data Package Summary Forms;

iv. chain-of-custody forms; and,

v. test analyses results (including tentatively identified compounds for analysis of volatile and semi-volatile organic compounds)

2. For a DEC Category A Data Deliverable, a data applicability report may be requested, in which case it will be prepared, to the extent possible, in accordance with the DUSR guidance detailed below.

(b) DEC Analytical Services Protocol Category B Data Deliverables

1. A Category B Data Deliverable is includes the information provided for the Category A Data Deliverable, identified in subdivision (a) above, plus related QA/QC information and documentation consisting of:

i. calibration standards;

ii. surrogate recoveries;

iii. blank results;

iv. spike recoveries;

v. duplicate results;

vi. confirmation (lab check/QC) samples;

vii. internal standard area and retention time summary;

viii. chromatograms;

ix. raw data files; and

x. other specific information as described in the most current DEC ASP.

2. A DEC Category B Data Deliverable is required for the development of a Data Usability Summary Report (DUSR).

2.0 Data Usability Summary Reports (DUSRs)

(a) Background. The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data with the primary objective to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

1. The development of the DUSR must be carried out by an experienced environmental scientist, such as the project Quality Assurance Officer, who is fully capable of conducting a full data validation. The DUSR is developed from:

i. a DEC ASP Category B Data Deliverable; or

ii. the *USEPA Contract Laboratory Program National Functional Data Validation Standard Operating Procedures for Data Evaluation and Validation*.

2. The DUSR and the data deliverables package will be reviewed by DER staff. If full third party data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

(b) Personnel Requirements. The person preparing the DUSR must be pre-approved by DER. The person must submit their qualifications to DER documenting experience in analysis and data validation. Data validator qualifications are available on DEC's website identified in the table of contents.

(c) Preparation of a DUSR. The DUSR is developed by reviewing and evaluating the analytical data package. In order for the DUSR to be acceptable, during the course of this review the following questions applicable to the analysis being reviewed must be answered in the affirmative.

1. Is the data package complete as defined under the requirements for the most current DEC ASP Category B or USEPA CLP data deliverables?

2. Have all holding times been met?

3. Do all the QC data; blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?

4. Have all of the data been generated using established and agreed upon analytical protocols?

5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?

6. Have the correct data qualifiers been used and are they consistent with the most current DEC ASP?

7. Have any quality control (QC) exceedances been specifically noted in the DUSR and have the corresponding QC summary sheets from the data package been attached to the DUSR?

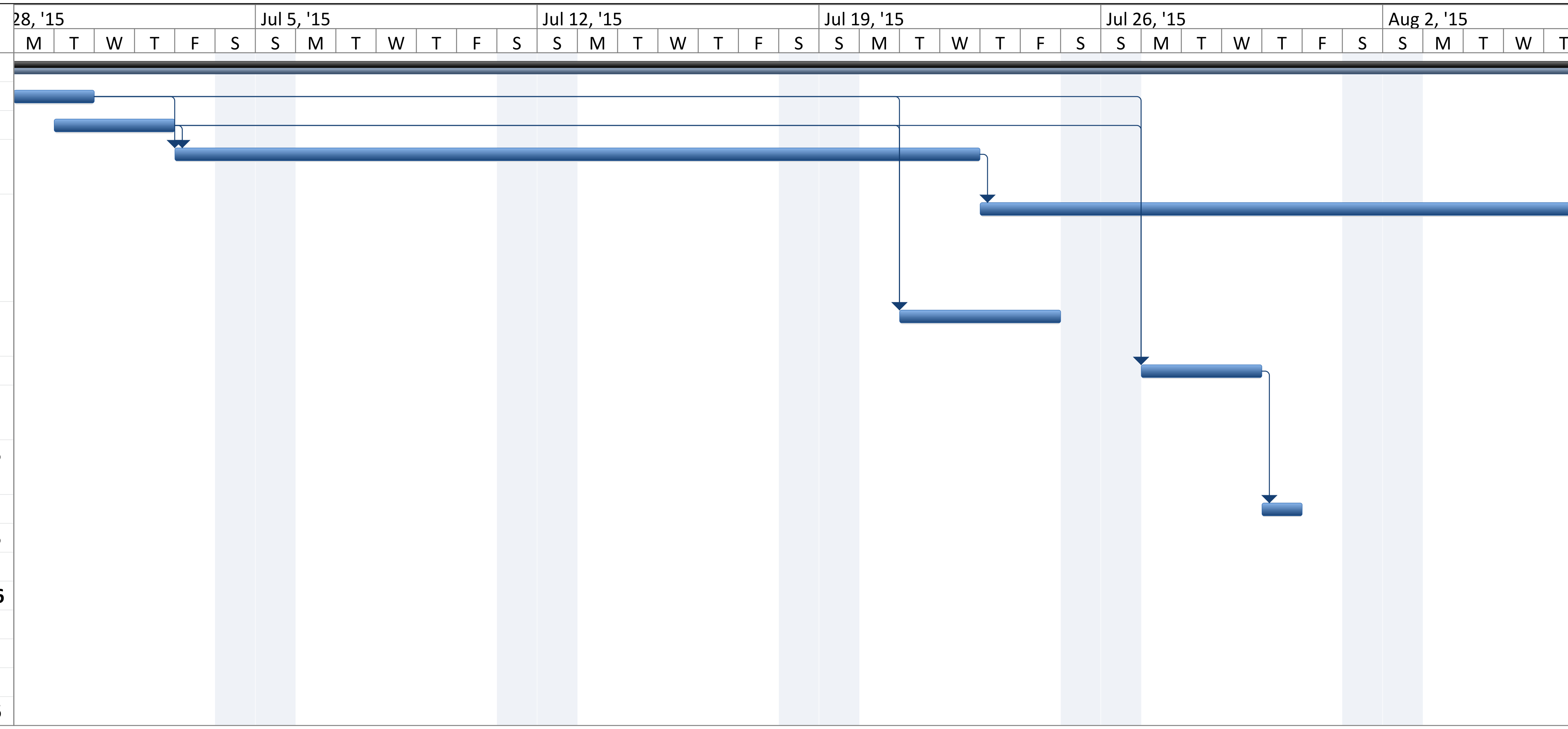
(d) Documenting the validation process in the DUSR. Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters, including data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed.

Appendix E

Project Schedule

Appendix E: Proposed Field Activities for Remedial Investigation Schedule
Turk Hill Park Site
1000 Turk Hill Road, Fairport, New York

ID	Task Name	Duration	Start	Finish
1	**Phase 1**	**191 days**	**Tue 3/3/15**	**Tue 11/24/15**
2	Site Survey - Initial	2 days	Mon 6/29/15	Tue 6/30/15
3	Geophysical Survey	3 days	Tue 6/30/15	Thu 7/2/15
4	Pre-Clearing Locations	14 days	Fri 7/3/15	Wed 7/22/15
5	Advance Soil Borings and Install Overburden Monitoring Wells	21 days	Thu 7/23/15	Thu 8/20/15
6	Advance Bedrock Monitoring Wells	4 days	Tue 7/21/15	Fri 7/24/15
7	Test Pit Excavation	3 days	Mon 7/27/15	Wed 7/29/15
8	Monitoring Well Development	14 days	Fri 8/21/15	Wed 9/9/15
9	Monitoring Well Sampling - Initial	14 days	Wed 9/30/15	Mon 10/19/15
10	Site Survey - Phase 1	1 day	Thu 7/30/15	Thu 7/30/15
11	Sediment Sampling	1 day	Mon 11/23/15	Mon 11/23/15
12	Indoor Air Sampling	3 days	Tue 3/3/15	Thu 3/5/15
13	**Phase 2**	**194 days**	**Wed 2/3/16**	**Mon 10/31/16**
14	MW sampling Q2	14 days	Wed 2/3/16	Mon 2/22/16
15	MW sampling Q3	14 days	Wed 6/8/16	Mon 6/27/16
16	Ecological Survey	2 days	Mon 4/18/16	Tue 4/19/16
17	MW sampling Q4	14 days	Wed 10/12/16	Mon 10/31/16



Project: RIFS WP Schedule
Date: Thu 5/28/15

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			

Appendix E: Proposed Field Activities for Remedial Investigation Schedule
Turk Hill Park Site
1000 Turk Hill Road, Fairport, New York

ID	Task Name	Duration	Start	Finish
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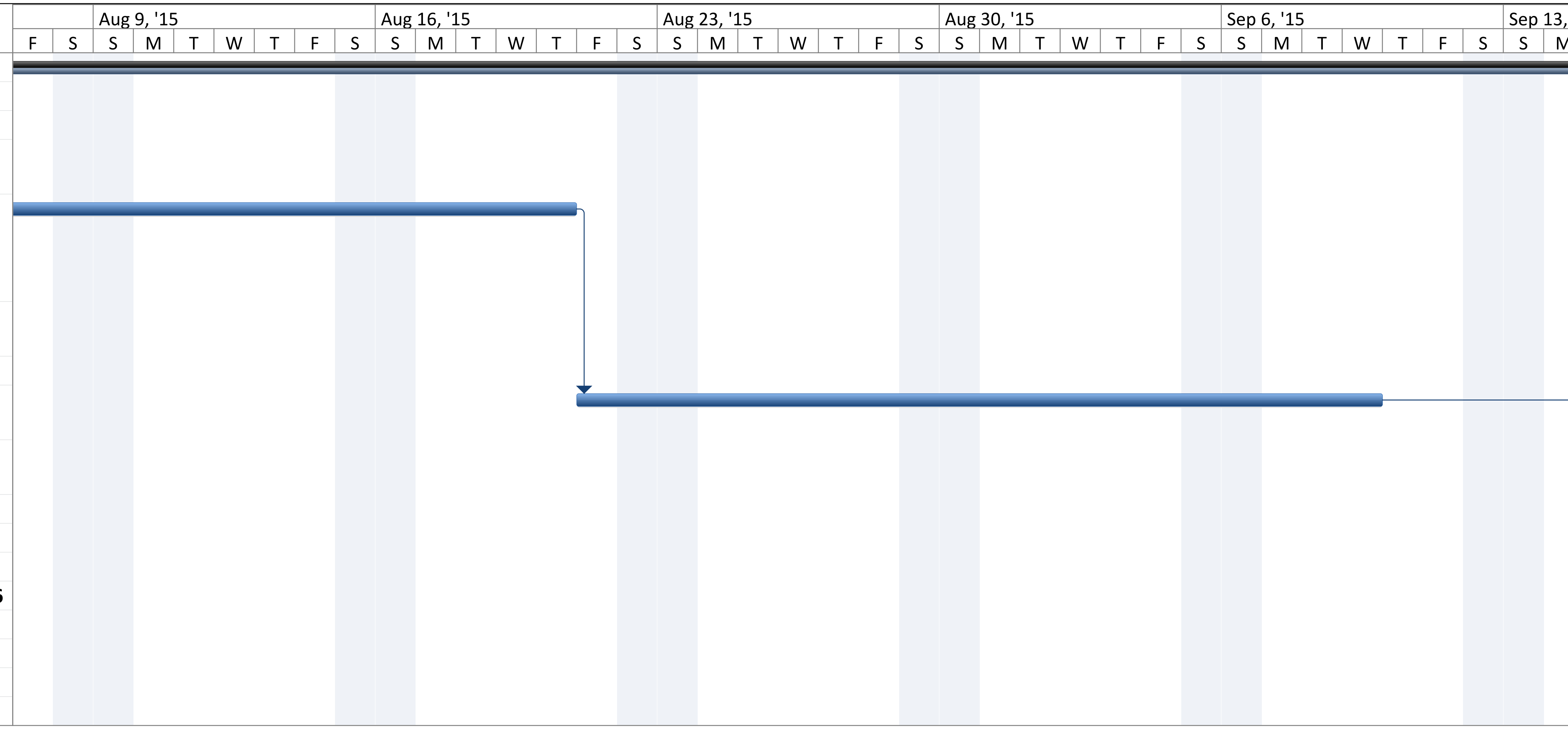

Project: RIFS WP Schedule
Date: Thu 5/28/15

Task | Project Summary | Inactive Milestone | Manual Summary Rollup | Deadline
Split | External Tasks | Inactive Summary | Manual Summary | Progress
Milestone | External Milestone | Manual Task | Start-only
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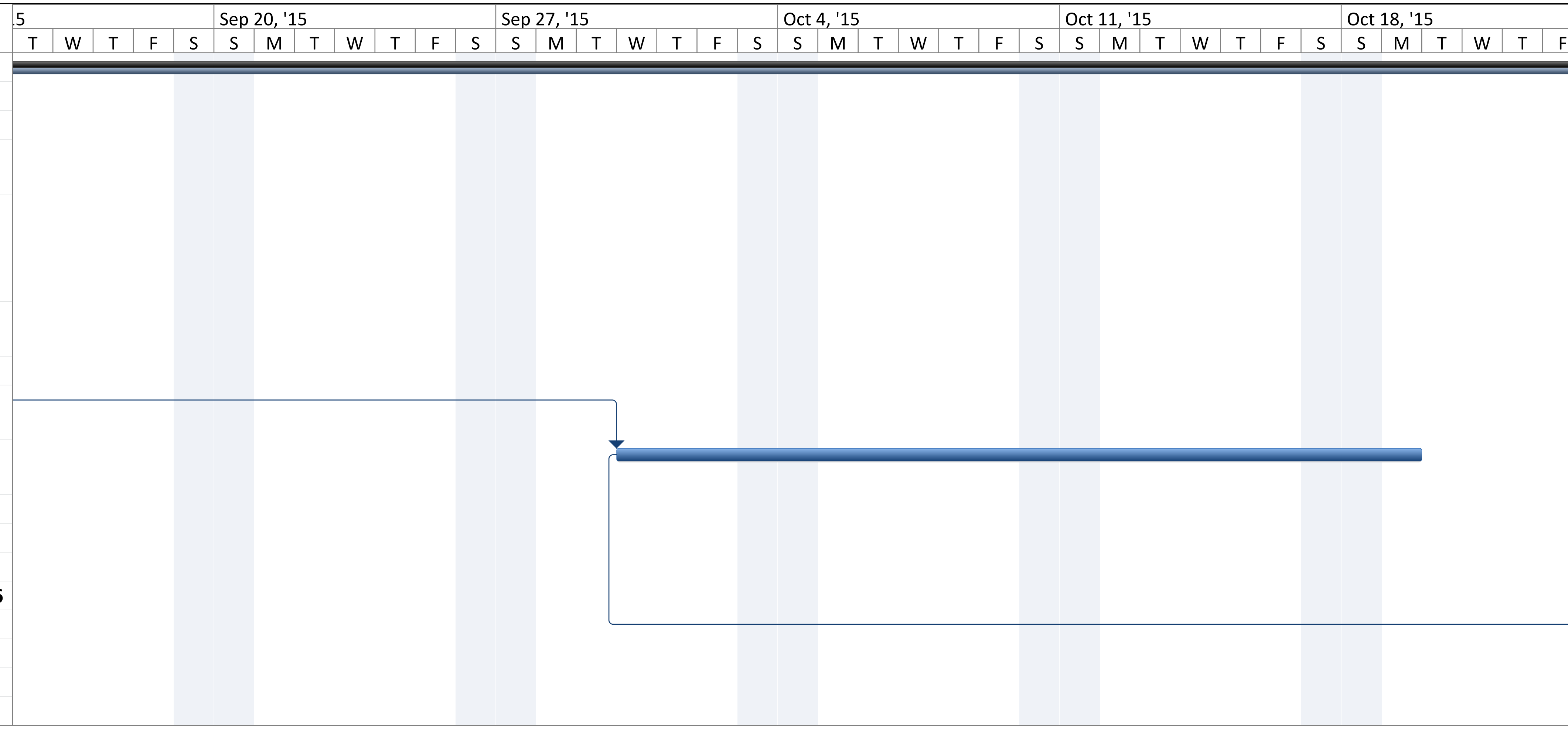

Project: RIFS WP Schedule
Date: Thu 5/28/15

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

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1000 Turk Hill Road, Fairport, New York

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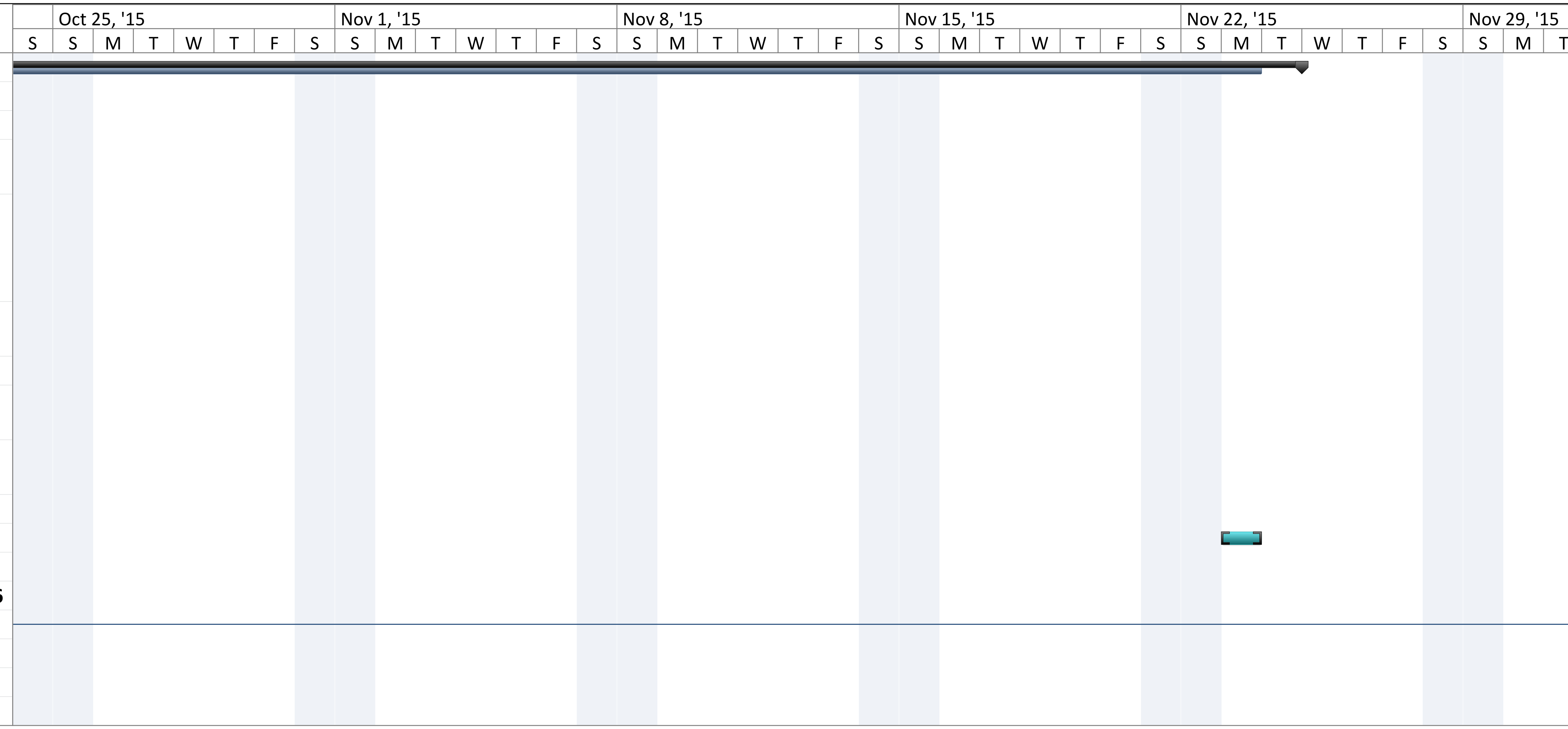

Project: RIFS WP Schedule
Date: Thu 5/28/15

- Task
- Split
- Milestone
- Summary
- Project Summary
- External Tasks
- External Milestone
- Inactive Task
- Inactive Milestone
- Inactive Summary
- Manual Task
- Duration-only
- Manual Summary Rollup
- Manual Summary
- Start-only
- Finish-only
- Deadline
- Progress