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Groundwater Pre-Design Investigation Work Plan

Former Ithaca Gun Factory
121 – 125 Lake Street
City of Ithaca, Tompkins County, New York
Site No. C755019

February 27, 2024
Revised: May 10, 2024
C & S Project X55.001.002

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for

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121 – 125 Lake Street
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Site No. C755019

Prepared by:

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CERTIFICATION

I, H. Nevin Bradford, III, certify that I am currently a NYS Registered Professional Engineer and that this Pre-Design Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with *DER-10 - Technical Guidance for Site Investigation and Remediation* (DER-10, dated May 3, 2010, as amended) and *DER-31 – Green Remediation* (DER-31, dated August 11, 2010, as amended).

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State of New York Professional Engineer No. 086008

May 10, 2024

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ACRONYM LIST

AAR	Alternatives Analysis Report
AMSL	Above Mean Sea Level
ASP	Analytical Services Protocol
BGS	Below Ground Surface
CAMP	Community Air Monitoring Plan
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Approval Program
HASP	Health and Safety Plan
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PART 375	6 NYCRR Part 375
PDI	Pre-Design Investigation
PID	Photo-ionization Detector
PPM	Parts-per-million
RI	Remedial Investigation
RD	Remedial Design
RWP	Remedial Work Plan
SCO	Soil Cleanup Objectives
TAL	Target Analyte List
TCL	Target Compound List
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound(s)

Executive Summary

This document presents the Pre-Design Investigation (PDI) Work Plan for the Former Ithaca Gun Factory Site Brownfield Cleanup Program Site located at 121 – 125 Lake Street in the City of Ithaca, New York (the "Site"). The PDI Work Plan includes procedures that will be implemented at the site to collect additional data that will support the remedial design process for contaminated groundwater at the site. The project details are summarized below:

Contaminant Source and Constituents

A remedial investigation was conducted at the site by O'Brien & Gere, Inc. (OBG) between September 2016 and March 2018, to evaluate the nature and extent of contamination resulting from historic site operations. The findings of the remedial investigation were documented by OBG in a Remedial Investigation Report that was issued in November 2018. This report indicated the following groundwater contaminants:

- Volatile Organic Compounds (VOCs), specifically chlorinated VOCs (CVOCs), that are commonly related to historical industrial operations and chlorinated solvents usage.
- No detectable concentrations of semi volatile organic compounds (SVOCs), heavy metals, polychlorinated biphenyls (PCBs), or pesticides were identified in the site's groundwater during the previous investigations.

Extent of Known Groundwater Contamination

The investigation of the site's groundwater revealed that several CVOCs were detected above their corresponding groundwater standards. The CVOCs of concern are trichloroethylene (TCE), tetrachloroethene (PCE), vinyl chloride, 1,1-dichloroethene (DCE), cis-1,2-dichloroethene (cDCE), and trans-1,2-Dichloroethene (tDCE). Trichloroethane (TCA) and 1,1-dichloroethane (DCA) are also present in lower concentrations near the source area.

The highest CVOC concentrations were observed in the area of MW-08 and MW-09 on the northern portion of the eastern parcel (the source area) and in nearby well MW-05, located just outside the east boundary of the eastern parcel. The groundwater in this area had exceedances of TCE and PCE, believed to be attributed to the storage and use of these solvents in the past, and exceedances of vinyl chloride, DCE, cDCE, and tDCE, typical daughter / breakdown products of TCE and PCE. Elevated CVOC concentrations were also observed in the near downgradient wells located on and near the western parcel (wells MW-03, MW-04R, and MW-10), but at approximately 1 to 2 orders of magnitude lower than concentrations in the source area. These wells are located approximately 50 to 150 feet downgradient of the source area). Downgradient wells (MW-06 and MW-07) located approximately 350 feet west-northwest of wells MW-08

and MW-09 have historically contained only trace concentrations of these compounds, below currently recognized groundwater standards.

Concentrations of CVOCs in the upgradient well (approximately 150 feet upgradient of the source area), cross-gradient well (approximately 250 feet cross-gradient of the source area), and distant downgradient wells (approximately 400 feet downgradient of the source area) were either below applicable standards or below laboratory detections levels.

Proposed Site Redevelopment

The current property owner, 121-125 Lake Street, LLC, plans to remediate and redevelop the property. The eastern property will be redeveloped to include an apartment building with an underground car garage, outdoor parking, and common areas. The western parcel will be redeveloped to support the use as a public area for the Ithaca Gorge Overlook.

Groundwater Pre-Design Investigation

This PDI is based on information previously gathered regarding historical operations conducted at the site, the results of the previous subsurface investigations, and the project objectives. The PDI was developed to further evaluate the site's current groundwater condition, identify hydrogeologic, microbial, and geochemical factors that may affect the efficacy of in-situ remedial approaches, and identify current concentrations and distribution of the contaminants of concern (COCs). The results will be used to develop a groundwater remedial design for a groundwater injection program. The PDI includes:

- **Existing Well Inspection:** Prior to installation of the injection wells, an inspection of the conditions of the existing groundwater monitoring wells will be completed. The existing groundwater monitoring wells will be located and inspected for signs of damage or vandalism.

- **Baseline Groundwater Assessment:** Prior to installation of the injection wells an assessment of the existing groundwater monitoring wells will be completed. The existing groundwater monitoring wells will be developed and sampled prior to beginning the injection program.

- **Injection Well Installation:** Injection wells will be installed to aid in the delivery of injection fluid to directly impact the chlorinated solvent groundwater plume within the eastern parcel. Five injection wells will be advanced to intersect the impacted groundwater plume at a depth of 42.5 to 57 bgs. Packer testing will be completed to confirm the groundwater bearing zone was met.

- **Injection Treatability Study:** Following the installation of the injection wells, a treatability study will be conducted to aid in the development of the in-situ

enhanced biodegradation groundwater remedial program and to determine if any additional amendments or additives may be necessary for the in-situ degradation. Samples will be collected and analyzed from the injection wells to develop a baseline. Hydraulic conductivity testing will be conducted at all five of the injection well locations.

Cleanup Track

121-125 Lake Street, LLC proposes to remediate the site by pursuing a Track 1 cleanup to Unrestricted Use for the eastern parcel and Track 4 cleanup to Restricted-Residential Use for the western parcel. This includes remediating the site's groundwater in accordance with the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Standards and Guidance Values.

1. Introduction

The Former Ithaca Gun Factory Site (the site) is located at 121 – 125 Lake Street in the City of Ithaca, Tompkins County, New York. The site consists of 1.63 acres of vacant land that was acquired by 121-125 Lake Street, LLC. The site was previously utilized as a gun and munition manufacturing facility by Ithaca Gun Company. This use dates to the late 1800s and continued until the company filed for bankruptcy in 1979.

The original Ithaca Gun Company property consisted of approximately 2.6 acres, but approximately one acre of the original property was transferred to the City of Ithaca and was subsequently remediated under New York State's Environmental Restoration Program (ERP) by the City between 2008 and 2018. This remediation site was identified as the Ithaca Falls Overlook Site and was further identified by Site No. E755018.

The numerous buildings that occupied the site were later demolished in 2009, except for a small one-story building and the stack of the former boiler house that remain in the northwestern portion of the site.

The site was entered into New York State's Brownfield Cleanup Program (BCP) by the previous property owner, IFR Development, LLC, in 2013. The site is identified by Site No. C755019. As a Volunteer under the BCP, IFR Development, LLC conducted a site-wide remedial investigation, performed a remedial alternatives analysis to compare various approaches to site remediation, and prepared a Remedial Action Work Plan describing the remedial approach that was selected as a result of the alternatives analysis. The Decision Document was later issued by NYSDEC in February 2021.

The site was purchased from IFR Development, LLC by the current owner, 121-125 Lake Street, LLC, in December 2021. In March 2022, the BCP Agreement was amended to add 121-125 Lake Street, LLC as an applicant and to reflect the change in site ownership. 121-125 Lake Street, LLC plans to complete the remediation and redevelop the property. The eastern property will be redeveloped to include an apartment building with an underground car garage, outdoor parking, and common areas. The western parcel may be redeveloped to support the use as a public area for the Ithaca Gorge Overlook.

The remedial investigation characterized the lateral and vertical extent of contamination across both portions of the site with sufficient detail to allow scoping of the soil remediation, with limited exceptions. These exceptions were addressed by C&S and are presented under separate covers in the *Pre-Design Investigation Work Plan (Soil)*, dated August 9, 2022, and *Pre-Design Investigation Report (Soil)*, dated January 2024. The soil remedial design was prepared in August 2022 and the soil remedial work on the eastern parcel was completed in 2023. The soil remedial work on the western parcel is anticipated to occur in late Spring and Summer 2024.

The investigation identified elevated concentrations of CVOCs in groundwater. These contaminants are present in the fractured bedrock formation beneath the site, with the highest concentrations present beneath the northern portion of the eastern parcel.

This Pre-Design Investigation (PDI) Work Plan provides a description of the procedures that will be implemented at the site to collect additional data that will support the remedial design process for contaminated groundwater at the site. The nature and extent of site contamination was previously characterized in the remedial investigation conducted by IFR Development, LLC. This PDI work plan has been prepared consistent with Division of Environmental Remediation "*Technical Guidance for Site Investigation and Remediation*" (DER-10). To effectively characterize the environmental conditions throughout the site's groundwater, this PDI work plan discusses the following:

- Current and historic site conditions
- Contaminants of concern and the extent of the contamination
- Objectives and Scope for Pre-Design Investigation (PDI) activities
- Pre-Injection Groundwater Sampling and Investigation
- Injection Well Construction Design and Installation
- Pre-Injection Groundwater Sampling
- Quality assurance and control protocols for analytical and sampling methods
- Health and safety procedures and work practices to protect site workers and the local community
- Reporting

The PDI will be implemented to further evaluate the current extent of the contamination associated with site's groundwater and to aid in the final development of the groundwater remedial design. The scope of the investigation is described in **Section 4, Pre-Design Investigation**.

1.1 Existing Site Conditions

The 1.6-acre site is divided into two separate parcels. For purposes of discussion, the two separate parcels are referred to herein as the eastern parcel and the western parcel. The eastern parcel is located on the northern side of Lake Street and to the south of Fall Creek. The western parcel is located northwest of the eastern parcel and is accessed at the back of a parking lot located off of Lake Street. The two-parcel site is located in the northeastern portion of the City of Ithaca and west of Cornell University.

The eastern parcel was formerly occupied by the main manufacturing operations of the Ithaca Gun Company and the smaller western parcel was occupied by the former boiler house and a turbine house.

The soil remediation was completed in summer of 2023 for the eastern parcel. The eastern parcel is currently an open vacant parcel with exposed bedrock terraces. The western parcel soil remediation has yet to be completed. The western parcel is currently overgrown with vegetation covering remnants of the former retaining walls, the former turbine house, boiler stack, and remnants of the former boiler house foundations. The former manufacturing buildings were associated with the operations of the Ithaca Gun Company. The main manufacturing building encompassed majority of the eastern parcel and extended to the City of Ithaca Island and Raceway property, while the western parcel housed the former boiler house, boiler stack, and turbine house.

The site is bordered to the north by Fall Creek and the City of Ithaca Natural Area, to the south and east by multi-family residential properties, and to the west by parking areas. Properties surrounding the site are predominately residential with some commercial and multi-family properties.

The area immediately north of the eastern parcel, commonly referred to as the "Island and Raceway", and a narrow strip of land between the two parcels had historically been part of the Ithaca Gun Company property; however, this area was granted to the City of Ithaca Urban Renewal Agency to be developed into a walkway and public park and overlook area for the adjacent Ithaca Falls. The Urban Renewal Agency was approved to receive grant funding to conduct an investigation of potential contamination through the New York State Environmental Restoration Program (ERP; Ithaca Falls Overlook Site, NYSDEC Site Number E755018) and investigation and remedial activities were conducted under this program from approximately 2012 through 2018. Various institutional and engineering controls (cover system) were implemented and this site remains subject to ongoing site management and periodic review requirements.

Figure 1 shows the location of the site and **Figure 2** shows the brownfield limits and parcel boundaries.

1.2 Site Geography, Geology, and Hydrogeology

The site is located on the eastern side of a broad glacial valley. The site is bounded to the north by a deep gorge. Fall Creek is located at the base of this gorge, approximately 200 to 250 feet north of the two parcels. Ithaca Falls is located to the east along the gorge. Fall Creek flows in a general western direction and discharges into the southern basin of Cayuga Lake at a point approximately 1.05 miles northwest of the site, as shown on **Figure 1**.

The topography of the site and surrounding area is characterized by steep grades and intermittent terraces. Since the completion of the soil remediation, the current surface elevation on the eastern parcel ranges from 550 feet amsl at the southeastern portion of the parcel to 511 amsl at the northwestern portion of the Site. The western parcel sits at a lower elevation than the eastern parcel, at approximately 494 amsl at its highest elevation at its southern boundary. The western parcel slopes gently to the north then abruptly descends towards Fall Creek dropping to an approximate elevation of 491 amsl. **Figure 3** shows the general topography to the site and the adjacent parcels.

According to the Surficial Geology Map of New York, Finger Lakes Sheet (Ernest H. Muller and Donald H. Cadwell, 1986), the overburden materials at and in the vicinity of the site is classified as bedrock. This material is described as "exposed or within 1 meter of surface, the following types of rock may be exposed: Paleozoic limestone, sandstone, shale". The Geologic Map of New York, Finger Lakes Sheet (Lawrence V. Rickard and Donald W. Fisher, 1970) identifies the local bedrock beneath and in the immediate vicinity of the site as West River shale of the Ithaca Formation.

Previous site investigations and soil remedial activities revealed that the site's overburden soil is comprised of a mix of silt, sand and gravel. The overburden is believed to be native soil mixed with imported gravel fill material used for leveling surfaces during construction of the previous Ithaca Gun Company facilities. Since the completion of the soil remediation for the eastern parcel, there is no soil remaining on the parcel. The eastern parcel consists of exposed bedrock cliffs with a deep crevasse in the northwestern corner of the parcel. The depths of the overburden soil range from 0.5 feet to 15.5 feet for the western parcel and the typical depth to bedrock is believed to be 10 feet bgs.

Groundwater was previously observed within the bedrock formation at depths ranging from 34 to 57 feet below grade within monitoring wells installed at the site in 2018. No significant groundwater was encountered in the site's overburden. Groundwater flow direction was found to be in a northwesterly direction, toward Cayuga Lake. Hydrogeologic evaluations conducted during the previous investigations suggest that the hydraulic conductivity of the fractured bedrock ranges from 3.48×10^{-6} cm/sec (0.01 ft/day) to 8.25×10^{-5} cm/sec (0.23 ft/day). Vertical migration in the bedrock seems to be limited by less fracturing of the bedrock with increasing depth.

The City of Ithaca receives its municipal water supply from the Six Mile Creek reservoir and Cornell University receives their municipal water supply from Falls Creek at a point approximately 1.5 miles upstream from the site. There are currently no groundwater drinking wells on or in the surrounding area of the site.

1.3 Nature and Extent of Groundwater Contamination

A remedial investigation was conducted at the site by O'Brien & Gere, Inc. (OBG) between September 2016 and March 2018, to evaluate the nature and extent of

contamination resulting from historic site operations. The findings of the remedial investigation were documented by OBG in a Remedial Investigation Report that was issued in November 2018. This report indicates the following regarding groundwater conditions:

- The existing groundwater monitoring well network consisted of ten wells. These wells include:

Well I.D.	Location
MW-1R	Upgradient of Source Area
MW-8, MW-9	Source Area
MW-3, MW-04R, MW-5, MW-10	Near Downgradient of Source Area
MW-6, MW-7	Distant Downgradient of Site
MW-11	Cross-Gradient of Source Area

The monitoring well locations are presented on **Figure 4** and **Figure 5.**

- Several CVOCs are present in groundwater beneath the northern portion of the site at concentrations that exceed their corresponding groundwater standards. The CVOCs of concern are trichloroethylene (TCE), tetrachloroethene (PCE), trichloroethane (TCA), vinyl chloride, 1,1-dichloroethane (DCA), 1,1-dichloroethene (DCE), cis-1,2-dichloroethene (cDCE), and trans-1,2-dichloroethene (tDCE).
- The presence of TCE and PCE are believed to be attributed to the storage and use of these solvents during past operations at the site. The remaining compounds (vinyl chloride, TCA, DCA, DCE, cDCE, and tDCE) are typical daughter / breakdown products of TCE and PCE and are likely present as a result of past degradation in the subsurface environment.
- Concentrations of the various CVOCs in the source area, upgradient of the source area, cross-gradient of the source area, near-downgradient area of the source area, and distant downgradient area of the source area are as follows (as of 2017 / 2018):

CVOC Compound	CVOC Concentration (µg/l or ppb)				
	Source Area	Upgradient	Cross-gradient	Near Downgradient	Distant Downgradient
TCE	910 – 9520	ND	1.6	90 – 1100	ND – 4.1
PCE	28.7 – 50	ND	ND	ND – 37	ND
TCA	8.6 – 8.9	ND	ND	ND	ND
Vinyl Chloride	11.9 – 241	ND	ND	ND	ND
DCA	11.6 – 131	ND	ND	ND – 13	ND
DCE	12.7 – 54.1	ND	ND	ND – 11	ND
cDCE	3260 – 11600	ND	1.3	40 – 1500	ND – 0.95
tDCE	21 – 64.9	ND	ND	ND	ND

- No detectable concentrations of SVOCs, heavy metals, PCBs, or pesticides were identified in groundwater during the remedial investigation.

The area in which the site is located is served by municipal water service, and local groundwater is not used as a source of potable water. As such, ingestion of or direct contact with contaminated groundwater is not likely a significant concern. Potential for volatile organic compounds to migrate off-site through groundwater flow or through soil vapor present potential concerns to on-site buildings and nearby properties.

1.4 Selected Groundwater Remedial Action

A Remedial Alternatives Analysis (RAA) was completed for the site by OBG (a Ramboll Company) in January 2020. Based on the findings of the Remedial Investigation and the RAA, the Decision Document for the site was issued by the New York State Department of Environmental Conservation (NYSDEC) in February 2021. The Decision Document presented the selected groundwater remedy for the site, to include:

- **Remedial Design:** *A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:*
  - *Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;*
  - *Reducing direct and indirect greenhouse gases and other emissions;*
  - *Increasing energy efficiency and minimizing use of non-renewable energy;*
  - *Conserving and efficiently managing resources and materials;*

- *Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;*
- *Maximizing habitat value and creating habitat when possible;*
- *Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;*
- *Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and*
- *Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.*

- **Enhanced Bioremediation:** *In-situ enhanced biodegradation will be employed on the eastern parcel to treat contaminants in groundwater directly in the source area. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by injecting emulsified vegetable oil (EVO) or a similar material into the subsurface to promote microbe growth. The treatment amendment will be placed in direct contact with contaminated groundwater via five injection wells screened at a depth interval of 42.5 to 57 feet below grade. Other amendments or additives may be necessary to achieve conditions for contaminant degradation and will be determined in remedial design and, if necessary, a pilot scale study. For example, if appropriate aquifer pH (6-8) and total organic carbon (TOC) concentration (greater than 50 mg/l) cannot be simultaneously maintained, the injection solution will be buffered with sodium bicarbonate to counteract the organic acids generated from biological activity. Monitoring will be required up-gradient, down-gradient, and within the treatment zone. Monitoring will be conducted for contaminants of concern and other groundwater parameters that are used as measures of effectiveness for the in-situ treatment method determined during remedial design.*

The purpose of this PDI work plan is to develop the objectives and scope of the PDI. The PDI will be implemented to support and inform the development of a detailed remedial design to facilitate the in-situ enhanced bioremediation of the target CVOCs in groundwater, consistent with the intent of the Decision Document.

1.5 Planned Future Use

The current property owner, 121-125 Lake Street, LLC, plans to remediate and redevelop the property. The eastern property will be redeveloped with an apartment building with an underground car garage, outdoor parking, and common areas. The

western parcel will be redeveloped to support the use as a public area for the Ithaca Gorge Overlook.

2. Objectives and Scope

The following sections outlines the objectives and scope of the PDI for the site's groundwater.

2.1 Objectives

The objectives of the PDI work plan are as follows:

- Evaluate the condition of the existing groundwater monitoring well network and identify any required repairs or well replacements that may be necessary;
- Assess the current groundwater conditions at and downgradient of the site, including CVOC concentrations, groundwater geochemistry, and microbial populations that may facilitate contaminant degradation through anaerobic reductive dechlorination and / or aerobic degradation processes;
- Verify site hydrogeologic conditions (water bearing zone(s), hydraulic conductivity) and their potential impacts to contaminant distribution and migration patterns and introduction and distribution of amendments that may enhance in-situ biodegradation of the contaminants of concern;
- Determine amendment (microbes, nutrients, buffers, electron donors) requirements, design volumes, and injection methods to be used in a full-scale bio-stimulation or bio-augmentation program;
- Develop quality assurance and control protocols for analytical and sampling methods during remediation and post-remediation monitoring; and
- Develop and implement health and safety procedures and work practices to protect site workers and the local community during remediation activities.

2.2 Scope

The development of this PDI is based on information previously gathered regarding historical operations conducted at the site, the results of the previous subsurface investigations, and the project objectives. The PDI will include the following activities:

- **Existing Well Inspection:** Prior to installation of the injection wells, an inspection of the conditions of the existing groundwater monitoring wells will be completed. The existing groundwater monitoring wells will be located and inspected for signs of damage or vandalism. The depth to water table and total well depth will be recorded and compared to well construction logs / details. This will determine whether significant sediment buildup has occurred since the last evacuation and sampling event. An inventory of required well repairs or

replacements will be developed and planned to occur at the time of the injection well installations.

- **Baseline Groundwater Assessment:** Prior to installation of the injection wells the existing groundwater monitoring wells will be evacuated and sampled to establish current target contaminant and geochemical analyte concentrations and microbial populations.

- **Injection Well Installation:** Injection wells will be installed to aid in the delivery of injection fluid to directly impact the chlorinated solvent groundwater plume within the eastern parcel. Five injection wells will be advanced to intersect the impacted groundwater plume at a depth of 42.5 to 57 bgs. Packer testing will be completed to confirm the groundwater bearing zone was met.

- **Injection Treatability Study:** Following the installation of the injection wells, a treatability study will be conducted to aid in the development of the full-scale in-situ enhanced biodegradation groundwater remedial program and to determine if any additional amendments or additives may be necessary for the in-situ degradation. Samples will be collected and analyzed to develop a baseline. Hydraulic conductivity testing will be conducted at all five of the injection well locations.

The following scope will be refined and completed under the groundwater Remedial Design, which will be developed at a later time.

- **Injection Program:** An in-situ enhanced biodegradation groundwater remedial program will be developed to promote the degradation of the chlorinated solvent groundwater plume within the eastern parcel. The program will treat the contaminant groundwater plume directly, through biological anaerobic degradation. This will include:

    - Emulsified vegetable oil (EVO) will be injected into the subsurface through five injection wells to promote growth of Dehalococcoides and increase the degradation of the impacted groundwater plume.

    - The EVO treatment amendment will be injected directly into the impacted groundwater plume.

- **Post-Injection Monitoring:** Groundwater monitoring will be completed for the site's up-gradient wells, down-gradient wells, and wells within the chlorinated solvent groundwater plume.

    - Groundwater samples will be collected and analyzed for the site's groundwater contaminants of concern (COCs).

- Groundwater samples will be analyzed for geochemistry and microbial parameters that can measure the effectiveness of the in-situ treatment.

The groundwater monitoring wells and injection well locations are depicted on **Figure 4** and **Figure 5**. The PDI activities will be completed in a manner consistent with NYSDEC Part 375-6 and the NYSDEC Division of Environmental Remediation's *Technical Guidance for Site Investigation and Remediation, dated May 2010 (DER-10).*

3. Methodologies

This section describes the investigative work methodologies that will be implemented to collect sufficient data to develop an injection program to meet the groundwater remedial goals established in the Decision Document.

The scope of the PDI is described in the following sections. The various sampling locations are intended to provide representative data for the groundwater throughout the site. During the development of the site and construction of the site structures, there is the potential that certain groundwater monitoring wells will have to be reinstalled. In such event, the NYSDEC will be consulted to approve the relocation of groundwater monitoring well locations. Based on the current site design, it is not anticipated that any of the injection well locations will need to be relocated.

All investigation findings will be recorded on sampling field sheets. Examples of the sampling field sheets are provided as **Appendix C**. All work will be performed in conformance with this Plan and within guidance of any pertinent regulatory guidance documents cited herein.

3.1 Existing Well Conditions and Baseline Groundwater Assessment

The groundwater monitoring wells installed during previous investigations have not been developed or sampled since the last sampling event in 2018. As such, prior to the installation of injection wells, the integrity and overall condition of the ten groundwater monitoring wells will be inspected. The groundwater monitoring well locations are depicted in **Figure 4** and **Figure 5**.

3.1.1 Monitoring Well Inspection

The inspection methods are outlined below:

- The overall condition of the well surface protection (curb box/casing) will be inspected;
- Prior to removing the well cap, the cap will be inspected to ensure integrity of the gasket / seal;
- A photoionization detector (PID) will be used to monitor for detectable VOCs within the wellhead airspace;
- The depth to the top of the groundwater level will be measured; and
- The depth to the bottom of the well will be measured.

The total well depth will be compared to original well installation logs to determine if significant silt / sediment buildup has occurred.

Based on the condition assessment, appropriate repairs (or well replacements) will be identified and planned to occur to during the injection well installations described in **Section 3.2** below.

3.1.2 Monitoring Well Development

Following the inspection of the monitoring wells, the existing wells will be developed using a peristaltic or submersible pump. An in-line water quality measurement device (flow through cell) will be used during well development to monitor temperature, dissolved oxygen (DO), conductivity, oxidation / reduction potential (ORP), and turbidity. Water levels will be measured periodically throughout well development to establish stabilization criteria for drawdown. Data on pumping rate, drawdown, and water volume required to meet parameter stability will be used during well purging and sampling activities. The well development will continue until:

- Field turbidity readings are below 50 nephelometric turbidity units (NTU), or until further improvement (decrease) in turbidity is not observed and a maximum of three well volumes have been removed; and
- All other field parameters have stabilized. Conditions will be considered to be stabilized when water quality measurements recorded from three consecutive readings are within the below variance tolerances:

Field Parameter	Unit of Measurement	Variance
pH	Standard units (su)	+/- 0.1
Conductivity	mS/cm	3%
Turbidity	(NTU)	10%
Dissolved Oxygen (D.O.)	mg/L	10%
Temperature	Degrees f	3%
Oxidation / reduction potential (ORP)	mV	+/- 10

Groundwater samples will not be collected within seven days of well development. Calibration times, purging volumes, water levels and field measurements will be recorded in the groundwater development field log as provided in **Appendix C.**

3.1.3 Monitoring Well Purging and Sampling

After a minimum of seven days following development, the wells will be evacuated until stabilized conditions are observed, and subsequently sampled. The evacuation and sampling will be performed as follows:

- Immediately upon well opening, the well headspace will be monitored with a PID. Wellhead PID measurements will be recorded on well sampling logs.
- Static water levels will be measured using an electronic water level indicator capable of measuring to 0.01-foot accuracy. The water levels will be measured relative to an established, repeatable point at the top of the PVC riser. The

reference elevation for each well will be surveyed relative to NAVD 88, and the reference point will be marked so that all future water level measurements are recorded to the same point.

- Prior to sampling, the monitoring wells will be evacuated using low-flow (typically < 0.5 L/min) purging techniques. The goal of low flow sampling is to not exceed a drawdown of more than 0.1 meters or a rate that does not cause excessive pressure changes, temperature changes, or physical impact on water quality. An electronic water level indicator will be used periodically during purging to monitor drawdown and determine an appropriate evacuation rate. Peristaltic or bladder pumps using manufacturer-specified tubing will be used for purging and sampling groundwater. Dedicated tubing will be used for each well to prevent cross-contamination.
- Groundwater will be evacuated until stabilization of water quality is achieved. Using a flow through cell, the evacuated water will be monitored for the following parameters and their tolerances:

Field Parameter	Unit of Measurement	Variance
pH	Standard units (su)	+/- 0.1
Conductivity	mS/cm	3%
Turbidity	(NTU)	10% or <5 NTU
Dissolved Oxygen (D.O.)	mg/L	10% or <0.5
Temperature	Degrees f	3%
Oxidation-reduction potential (ORP)	mV	+/- 10

- Water quality data will be recorded every three to five minutes or after one flow-through cell has been purged, whichever is greater. Conditions will be considered to be stabilized when water quality measurements recorded from three consecutive readings are within the above variance tolerances. These stabilized parameters will also inform the treatability study and aid in the final design of the injection program.

Groundwater sampling will follow well evacuation and will be conducted using low-flow sampling techniques as described above. The flow through cell will be removed and samples will be collected directly from the tubing. Unfiltered and field-filtered groundwater samples will be collected for total and dissolved metals, respectively. Each field-filtered sample will be filtered through a single-use/disposal 10-micron filter at the time of collection. Calibration times, purging volumes, water levels, and field measurements will be recorded in a field log as provided in **Appendix C** and will be provided in the Groundwater PDI Report.

The groundwater samples will be analyzed for the following list of target analytes:

- TCL VOCs
- Total Organic Carbon (TOC)

- Total and Dissolved Metals (Ferrous and Ferric Iron, Calcium, Magnesium, Potassium, and Sodium)
- Dissolved Hydrocarbon Gases (methane, ethane, and ethene)
- Alkalinity (including bicarbonate and carbonate)
- Sulfide
- Sulfate
- Nitrite
- Nitrate
- Chloride

Wells MW-5, MW-8, MW-9, and MW-10 will also be sampled for the following:

- Quantitative polymerase chain reaction (qPCR) analysis to identify and quantify existing colonies of key microorganisms (Dehalococcoides) and functional genes to assess the potential for existing conditions to support reductive dichlorination and aerobic co-metabolism of chlorinated compounds in groundwater.
- Compound Specific Isotope Analysis to establish baseline ratios of carbon and chloride isotopes for comparison with trends in carbon and chloride isotope ratios following amendment injection as a gauge of reductive dechlorination success.

3.2 Injection Well Installation

As detailed in the approved Remedial Work Plan prepared by Ramboll, five injection wells will be installed approximately 30 to 40 feet upgradient of the existing chlorinated solvent groundwater plume identified on the eastern parcel (upgradient of monitoring wells MW-08 and MW-09). The five injection well locations are depicted on the attached **Figure 4** and **Figure 5**.

3.2.1 Injection Well Construction

Based on the data gathered during the remedial investigation, the water bearing zone was identified as 46 to 57 feet bgs within monitoring wells MW-08 and MW-09. The following methods will be employed for the construction of the injection wells:

- Injection boreholes will be advanced using wet-rotary coring methods. Continuous cores will be extracted using NQ-size core barrels (will create a 96 mm or 3-3/8-inch diameter borehole).
- Bedrock cores will be visually examined to identify prominent fractures zones and to determine Rock Quality Designation (RQD) values for each cored interval.

- Each injection well will be equally spaced (approximately 30 to 40 feet apart).
- The injection wells will be advanced to a terminal elevation of approximately 450 to 455 feet amsl, or a depth of approximately 70 feet below the top of the exposed bedrock formation. It is intended that this depth will position the bottom of the injection wells approximately 5 feet above the bottom of the target water bearing zone.
- Packer testing will be performed in each borehole to confirm that the water bearing zone was met, as described in **Section 3.2.2** below.
- The integrity of the borehole will be inspected and characterized. If collapse of the bedrock is not likely to occur, the borehole will remain open to allow for flexibility in the depths of injections.
- If collapse of the bedrock is a concern, the borehole will be finished as follows:
    - Each borehole will be sleeved with two-inch Schedule 40 PVC well screen with 0.030-inch slots.
    - An appropriate length of flush-thread, Schedule 40 PVC well riser will be connected.

Each injection well will be finished at the surface with a flush mounted curb box, which will be later set in the final concrete foundation of the new apartment building or to match finished grades at the site following construction. The injection well construction will be recorded on well construction field logs and bedrock core characterization will be summarized on a bedrock core field log. Blank copies of these logs are provided in **Appendix C**.

3.2.2 Packer Testing

Once the borings have been advanced to the target terminal depth, packer testing will be performed to confirm the water bearing zone. The packer testing will be completed as follows:

- The packer system will utilize slotted PVC drop pipe with an affixed upper inflatable packer (or equivalent).
- The packer test will be installed approximately 15 to 20 feet above the bottom of the borehole.
- One to three well volumes of groundwater will be evacuated (using a submersible pump or bailer).
- Confirmation of the water bearing zone will be deemed successful if groundwater returns to the well.
- Additional intervals will be evaluated if water does not return to the well (until the water bearing zone is confirmed).

3.3 Injection Treatability Study

The selected remedy for the site included the development of a bio-treatment to aid in the decomposition of the chlorinated solvent groundwater plume in the eastern parcel.

3.3.1 Injection Well Development

Following the installation of the injection wells, they will be allowed to equilibrate for at least 7 days before development. The injection wells will be developed using a peristaltic or submersible pump. An in-line water quality measurement device (flow through cell) will be used during well development to monitor temperature, DO, conductivity, ORP, and turbidity. Water levels will be measured periodically throughout well development to establish stabilization criteria for drawdown. Data on pumping rate, drawdown, and water volume required to meet parameter stability will be used during well purging and sampling activities. The well development will continue until:

- Field turbidity readings are below 50 nephelometric turbidity units (NTU), or until further improvement (decrease) in turbidity is not observed and a maximum of three well volumes have been removed; and
- All other field parameters have stabilized. Conditions will be considered to be stabilized when water quality readings measurements from three consecutive readings are within the above variance tolerances:

Field Parameter	Unit of Measurement	Variance
pH	Standard units (su)	+/- 0.1
Conductivity	mS/cm	3%
Turbidity	(NTU)	10%
Dissolved Oxygen (D.O.)	mg/L	10%
Temperature	Degrees f	3%
Oxidation-reduction potential (ORP)	mV	+/- 10

Baseline groundwater samples will not be collected within seven days of well development.

3.3.2 Baseline Injection Well Sampling

After a minimum of seven days following development, the injection wells will be evacuated until stabilized conditions are observed, and subsequently sampled. The evacuation and sampling will be performed as follows:

- Immediately upon well opening, the well headspace will be monitored with a PID. Wellhead PID measurements will be recorded on well sampling logs.
- Static water levels will be measured using an electronic water level indicator capable of measuring to 0.01-foot accuracy. The water levels will be measured relative to an established, repeatable point at the top of the PVC riser. The

reference elevation for each well will be surveyed relative to NAVD 88, and the reference point will be marked so that all future water level measurements are recorded to the same point.

- Prior to sampling, the monitoring wells will be evacuated using low-flow (typically < 0.5 L/min) purging techniques. The goal of low flow sampling technique is to not exceed a drawdown of more than 0.1 meters or a rate that does not cause excessive pressure changes, temperature changes, or physical impact on water quality. An electronic water level indicator will be used periodically during purging to monitor drawdown and determine an appropriate evacuation rate. Peristaltic or bladder pumps using manufacturer-specified tubing will be used for purging and sampling groundwater.
- Groundwater will be evacuated until stabilization of water quality is achieved. Using a flow through cell, the evacuated water will be monitored for the following parameters and their tolerances:

Field Parameter	Unit of Measurement	Variance
pH	Standard units (su)	+/- 0.1
Conductivity	mS/cm	3%
Turbidity	(NTU)	10% or <5 NTU
Dissolved Oxygen (D.O.)	mg/L	10% or <0.5
Temperature	Degrees f	3%
Oxidation-reduction potential (ORP)	mV	+/- 10

- Water quality data will be recorded every three to five minutes or after one flow-through cell has been purged, whichever is greater. Conditions will be considered to be stabilized when water quality measurements recorded from three consecutive readings are within the above variance tolerances. These parameters will be used in the treatability study and aid in the final design of the injection material.

Groundwater sampling will follow well evacuation and be conducted using low-flow sampling techniques as described above. The flow through cell will be removed and samples will be collected directly from the tubing. A 10-micron filter will be used for the collection of field filtered samples for dissolved metals. Decontamination will be conducted after each well is sampled to reduce the likelihood of cross contamination. Calibration times, purging volumes, water levels, and field measurements will be recorded in a field log and will be provided in the Remedial Investigation Report.

The groundwater samples will be analyzed for the following list of target analytes:

- TCL VOCs
- Total Organic Carbon (TOC)
- Total and Dissolved Metals (Ferrous and Ferric Iron, Calcium, Magnesium, Potassium, and Sodium)

- Dissolved Hydrocarbon Gases (methane, ethane, and ethene)
- Alkalinity (including bicarbonate and carbonate)
- Sulfide
- Sulfate
- Nitrite
- Nitrate
- Chloride

Two of the injection wells will also be sampled for the following:

- Quantitative polymerase chain reaction (qPCR) analysis to identify and quantify existing colonies of key microorganisms (Dehalococcoides,) and functional genes to assess the potential for existing conditions to support reductive dichlorination and aerobic co-metabolism of chlorinated compounds in groundwater.
- Compound Specific Isotope Analysis to establish baseline ratios of carbon and chloride isotopes for comparison with trends in carbon and chloride isotope ratios following amendment injection as a gauge of reductive dichlorination success.

3.3.3 Hydraulic Conductivity Testing

Hydraulic conductivity testing will be performed at each of the five injection wells using conventional "slug" testing methods. The data collected will be used in conjunction with the data collected during the remedial investigation hydraulic conductivity testing, to define the amendment volume and injection rates. The chosen hydraulic conductivity testing methods will be based on the injection wells characteristics and static water level. The test methods will be conducted in similar manner to the remedial investigation, to ensure similar results. The testing will be performed as follows:

- Immediately upon well opening, the well headspace will be monitored with a PID. Wellhead PID measurements will be recorded on well sampling logs.
- Static water levels will be measured using an electronic water level indicator capable of measuring to 0.01-foot accuracy. The water levels will be measured relative to an established, repeatable point at the top of the PVC riser.
- The type of test will be selected based on the observed water level.
    - If the groundwater level is within the screened interval of the well, then a rising head test will be conducted.
    - If the groundwater level is above the screened interval of the well, then a rising and falling head test will be conducted.

- A water level data logger will be submerged into the groundwater well to a depth sufficient to ensure the well slug will not encounter the data logger. The data logger will be capable of recording temperature, pressure, and conductivity.
- A second water level data logger will be submerged into an adjacent injection well to evaluate the hydraulic connections between wells.
- The selected well slug will be submerged based on the selected testing method. The test slug length, diameter, and volume will be recorded on the field log.

An examples of a hydraulic conductivity test field log is provided as **Appendix C**.

3.4 Sampling Plan and Laboratory Analysis

Table 1 summarizes the sampling program described in the sections above. Additionally, Quality Assurance / Quality Control (QA / QC) samples will be collected, as follows:

- Matrix Spike / Matrix Spike Duplicate (MS / MSD) – 5% (2 total for two separate events)
- Blind Field Duplicate (DUP) – 5% (2 total for two separate events)

All samples will be analyzed by a laboratory maintaining current accreditation for the targeted analyses under the NYSDOH Environmental Laboratory Approval Program (ELAP). All data will be reported as Analytical Services Protocol (ASP) Category B deliverables in Electronic Data Deliverable (EDD) format compatible with EQuIS.

A third-party validator will review all laboratory data packages and prepare a Data Usability Summary Report (DUSR). The validator will evaluate the analytical results for the field samples and quality assurance / quality control samples and compare the findings to United States Environmental Protection Agency (USEPA) guidance to verify the accuracy and validity of the results. The EDD for all media will be uploaded to NYSDEC's EQuIS database.

3.5 Management of Investigation-Derived Wastes

Investigation derived waste (IDW) that is anticipated to be generated during the completion of the PDI includes:

- Drill cuttings / spoils (bedrock cores)
- Equipment decontamination fluids
- Monitoring well development and evacuation water
- Injection well development and evacuation water

- Personnel Protective Equipment (PPE)
- Disposable materials and supplies

All IDW will be collected and managed in accordance with the Section 3.3(e) of DER-10.

3.6 Green Remediation Implementation

This Groundwater PDI work plan is being prepared within guidance of the NYSDEC *DER-31, Green Remediation Issued August 11, 2010*. The PDI is being implemented to further evaluate the current extent of the contamination and to develop an injection treatability study, to aid in the final development of the groundwater remedial design. The PDI describes the steps taken to develop an injection treatability study which will collect the necessary data to develop the appropriate flow rates, loading rates, and the type of treatment material to ensure the remedy will influence the site's groundwater contamination and promote the degradation of the COCs.

The implementation of the PDI reinforces the groundwater remedial design to produce a remedy that will be best suited to treat groundwater contamination and reduce the need for additional mobilizations and treatment activities. The reduction in mobilizations and the number of groundwater treatment activities is less disruptive to the environment, generates less waste, and emits fewer pollutants / emissions (such as greenhouse gasses).

3.6.1 Best Management Practices

The section describes the Best Management Practices (BMPs) which will be implemented throughout the PDI to best achieve the green remediation concepts described within the NYSDEC DER-31. The following BMPs were identified for the implementation of this PDI:

- Minimize Mobilizations – C&S will schedule work to ensure injection well installation activities can be completed within one mobilization. C&S will coordinate site activities in conjunction with the well inspection and development and the baseline sampling and treatability study to minimize the number of trips to site for the field staff.
- No Idling of Equipment – Equipment will be shut down if left idling longer than 15 minutes.
- Sampling Equipment:
    - Rechargeable Battery-Powered Sampling Equipment – CAMP equipment (PIDs, DusTraks, Tharmis Antenna), GeoPump Peristaltic Pump, Horiba water quality meter, data loggers, and any other battery-operated equipment will be charged at the C&S facility. C&S estimated in 2022 that 26% of the electricity used at their facility is generated on-

site through use of solar panels. This practice will reduce the load on the electrical grid and allow for the use of renewable sources of energy.

- Sampling tubing or bailers – C&S will leave either the HDPE sampling tubing or bailers in each of the wells once sampling is completed. This practice will reduce sampling waste.

- Waste Storage Containers – C&S uses cleaned reclaimed 55-gallon drums for the storage of IDW. C&S reuses plastic 5-gallon buckets for the purpose of the collection of groundwater or waste soil generated during sampling activities prior to being containerized for storage and disposal. The use of these containers decreases the generation of waste and provides opportunities for recycling of IDW.

- Storm and Excavation Water Reuse – C&S will coordinate with the site's general contractor to containerize wastewater generated during the excavation dewatering activities for the building foundation installation work. Stormwater entering the site typically pools in a bedrock trench along the northwestern edge of the site in the planned location of the building's footers. C&S will implement a plan to reuse the water during the injection treatment.

To comply with DER-31, the anticipated IDW generated during the completion of the PDI will be handled as follows:

- Drill cuttings / spoils (bedrock cores) will be sampled in accordance with Section 3.3(e) of DER-10 for Re-Use on the site as backfill.
- Equipment decontamination fluids will be drummed and disposed of at an off-site facility. This material cannot not be recycled during the remediation phase of the project; however, phosphate-free detergents will be used to reduce the use of harmful cleaning chemicals.
- Monitoring well development and evacuation water will be sampled and characterized to ensure it can be recycled during the injection process.

Personnel protective equipment (PPE) and disposable materials and supplies will need to be disposed of and cannot be recycled. Care will be taken to ensure cleanable sampling equipment and materials will be used, when possible.

All site activities related to the BMPs described above will be recorded and tracked on a C&S Green Remediation BMP Tracker, which is equivalent to the NYSDEC Form A, Summary of Green Remediation Metrics. The total quantities will be recorded daily and summarized in the NYSDEC Form A, upon the completion of Groundwater PDI and in the Final Engineering Report (FER). A copy of the BMP Tracking Form and the NYSDEC Form A is provided in **Appendix C**.

4. Quality Assurance and Quality Control Protocols

To ensure that suitable and verifiable data results are obtained from the information collected at the site, quality assurance procedures will be implemented as detailed in this section. During the PDI, the NYSDEC may split any groundwater samples.

4.1 Sampling Methods

Sampling procedures will be conducted consistent with the NYSDEC *Sampling Guidelines and Protocols Manual*. The following procedures will be used to ensure the collection of representative samples:

- Ensure that the samples taken are representative of the material being sampled;
- Use proper sampling, handling and preservation techniques;
- Properly identify the collected samples and document their collection in field records;
- Maintain a chain-of-custody; and
- Properly preserve samples after collection.

4.1.1 Groundwater Sampling

Groundwater sampling will be conducted consistent with NYSDEC and USEPA guidance for low flow purging and sampling, as described in **Section 3**.

Water samples will be collected by pouring directly into pre-cleaned bottles provided by the laboratory and immediately placing the bottles on ice. The bottles and associated preservatives used, if any, will be based on the requirements of the analytical methods.

4.1.2 Quality Assurance / Quality Control Samples

MS / MSD and duplicate samples will be collected for groundwater samples, from a minimum of 5% of the locations. The locations of these QA/QC samples will be selected randomly. Attached Table 1 provides a summary of the analyses to correspond to each well and injection well, as well as the overall estimated sampling quantities for the PDI.

4.1.3 Sample Custody

As outlined in NYSDEC *Sampling Guidelines and Protocols,* a sample is in custody under the following conditions:

- It is in your actual possession;
- It is in your view after being in your physical possession;

- It was in your possession and then you locked or sealed it up to prevent tampering; or
- It is in a secure area.

The environmental professional will maintain all chain-of-custody documents for all samples leaving the site to be tested in the laboratory.

4.2 Analytical Procedures and Documentation

All samples will be analyzed by a third-party laboratory that is accredited under the NYSDOH ELAP. Laboratory analytical methods will include the most current NYSDEC ASP.

Groundwater samples will be analyzed for a combination of the following contaminants and parameters will be analyzed:

- TCL VOCs – USEPA Method 8260
- TOC – USEPA Method 9060
- Total and Dissolved Metals (Iron, Magnesium, Potassium, Sodium, and Calcium) – USEPA Method 6010 and 200.7
- Dissolved Hydrocarbon Gases (methane, ethane, and ethene) – Method RSKSOP-175
- Alkalinity (including bicarbonate and carbonate) – USEPA Method 2320
- Sulfide – USEPA Method 9030
- Nitrate – USEPA Method 300.0
- Chloride – USEPA Method 300.0
- Sulfate – USEPA Method 300.0
- Quantitative Polymerase Chain Reaction (qPCR) – Gene-Trac
- Compound Specific Isotope Analysis for Carbon, Chloride

Category B deliverables will be requested to be used in a third-party data validation.

4.2.1 Data Usability

A data usability review will be completed for all analytical data generated as part of the investigation and a DUSR will be prepared for all data sets, consistent with NYSDEC-DUSR Guidance contained in Appendix 2B of NYSDEC DER-10. The data review and DUSR preparation will be performed by an independent, third-party, qualified, and experienced individual that has been approved by DER. The data review and DUSR preparation will serve to confirm and document that:

- The data packages are complete as defined under the requirements set forth in the most current DEC ASP Category B;
- All sample holding times have been met;
- All 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;
- All data has been generated using established and agreed upon analytical protocols;
- An evaluation of the raw data confirms the results provided in the data summary sheets and quality control verification forms;
- The correct data qualifiers have been used and are consistent with the most current NYSDEC ASP; and
- Any QC exceedances are specifically noted in the DUSR and corresponding QC summary sheets from the data package have been attached to the DUSR.

5. Community Air Monitoring (CAMP)

Continuous air monitoring will be required during all active ground-intrusive activities, such as bedrock coring advancement, well installations, loading of any contaminated soil and media, and other activities that disturb existing in-situ soil at the site.

The monitoring will include real-time sampling for respirable dust / particulates and airborne VOCs. The specifics of the air monitoring procedures and criteria are detailed in the Community Air Monitoring Plan (CAMP) in **Appendix A.**

The intent of the CAMP 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. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air. The action levels specified within the Plan require increased monitoring, corrective actions to abate emissions, and / or work shutdown.

CAMP reports summarizing the daily tasks / activities and data tables will be provided to the NYSDEC and NYSDOH on a daily basis (at a minimum), and any exceedances of CAMP action levels and corrective measure taken will be reported to the Departments immediately (i.e., as early as possible).

6. Health and Safety

To verify the safety of the workers and the local community during the performance of the work, monitoring practices of the work environment will be in place during all phases of Groundwater PDI activities. A Health and Safety Plan (HASP) was prepared which details procedures for maintaining safe working conditions and minimizing the potential for exposure to hazardous material. The HASP is provided in **Appendix B**.

7. Reporting

Based on the results of the work described above, a report will be prepared to describe the methodologies and results of the PDI. The PDI Report will:

- Be prepared in conformance with DER – 10;
- Be certified as required by DER – 10, section 1.5;
- Include pertinent tables and figures;
- Include all field sampling forms/logs, including coring logs, monitoring well construction logs, groundwater sampling logs, and questionnaire, etc.;
- Include all laboratory data reports (category B deliverables);
- Include data usability summary reports; and
- Include documentation regarding IDW management.

The PDI Report will describe:

- Investigative methods;
- Observations and findings;
- Comparison of groundwater results to Class GA Standards and Guideline Values;
- Development of the full-scale bio-stimulation or bio-augmentation remediation approach based on the results of the treatability study;
- Results of the community air monitoring program;
- Summary of the BMPs in the NYSDEC Form A (to be provided in the FER); and
- Analytical results

The document will be submitted to the NYSDEC for review and approval.

8. Schedule

Below is an anticipated schedule for the completion of groundwater PDI activities, the preparation of the groundwater remediation design documents, and full-scale implementation of the groundwater program.

Estimated Project Schedule:

Approval of PDI Work Plan (Groundwater)..... May 2024

Well Condition and Baseline Groundwater Quality Assessment..... Spring/Summer 2024

Injection Well Installation and Hydraulic Testing ..... Spring/Summer 2024

Injection Treatability Study ..... Summer 2024

Submit PDI Report (Groundwater)..... Summer 2024

Groundwater Remedial Design ..... Summer 2024

Approval of Groundwater Remedial Design ..... Summer / Fall 2024

Full-Scale Groundwater Implementation..... Fall 2024

9. References

Aztech, 2015. ***Annual Groundwater Monitoring Report, Former Ithaca Gun Factory - Offsite, 121 – 125 Lake Street, Ithaca, Tompkins County, New York, NYSDEC Site No. C755019A,*** Aztech Environmental Technologies, January 25, 2016.

Aztech, 2016. ***Annual Groundwater Monitoring Report, Former Ithaca Gun Factory - Offsite, 121 – 125 Lake Street, Ithaca, Tompkins County, New York, NYSDEC Site No. C755019A,*** Aztech Environmental Technologies, January 25, 2016.

Aztech, 2018. ***Periodic Groundwater Monitoring Report, Former Ithaca Gun Factory - Offsite, 121 – 125 Lake Street, Ithaca, Tompkins County, New York, NYSDEC Site No. C755019A,*** Aztech Environmental Technologies, November 30, 2018.

NYSDEC, 2010. ***DEC Program Policy DER-10 – Technical Guidance for Site Investigation and Remediation***, New York State Department of Environmental Conservation, May 3, 2010.

NYSDEC, 2010. ***DEC Program Policy DER-31 – Green Remediation****, New York State Department of Environmental Conservation, August 11, 2010.*

NYSDEC, 2021. ***Decision Document – Former Ithaca Gun Factory Brownfield Cleanup Program, Ithaca, Tompkins County, Site No. C755015***, New York State Department of Environmental Conservation, February 2021.

OBG, 2018. ***Remedial Investigation, Former Ithaca Gun Factory Site – Site No. C755019, Ithaca, New York,*** O'Brien & Gere Engineers, Inc., November 2018.

Ramboll, 2020. ***Remedial Alternatives Analysis Report, Former Ithaca Gun Factory Site,*** Ramboll, January 24, 2020.

Ramboll, 2021. ***Remedial Work Plan, Former Ithaca Gun Factory Site – Site No. C755019***, Ramboll, April 2021

Figures

A1 **SITE LOCATION**
SCALE: 1" = 500'-0"

C&S COMPANIES
C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

Pre-Design Investigation Work Plan
(Groundwater)
Former Ithaca Gun Factory BCP Site
121-125 Lake Street, City of Ithaca
Tompkins County, New York

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	X55.002.001
DATE:	January 2024
DRAWN BY:	N. COULOMBE
DESIGNED BY:	N. BRADFORD P.E.
CHECKED BY:	N. BRADFORD P.E.

SITE LOCATION

FIGURE 1

Apr 29, 2024 - 9:05am
P:\Project\X55 - Vicum Development\X55.002.001 - Former Ithaca Gun Factory BCP Site\Design\CADD\Sheet Files\CAD PDI Groundwater Drawings\C-100 Existing Conditions.dwg

A1 BCP / PARCEL LIMITS
SCALE: 1" = 30'-0"

0 30' 60'

C&S COMPANIES
C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
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Pre-Design Investigation Work Plan (Groundwater)
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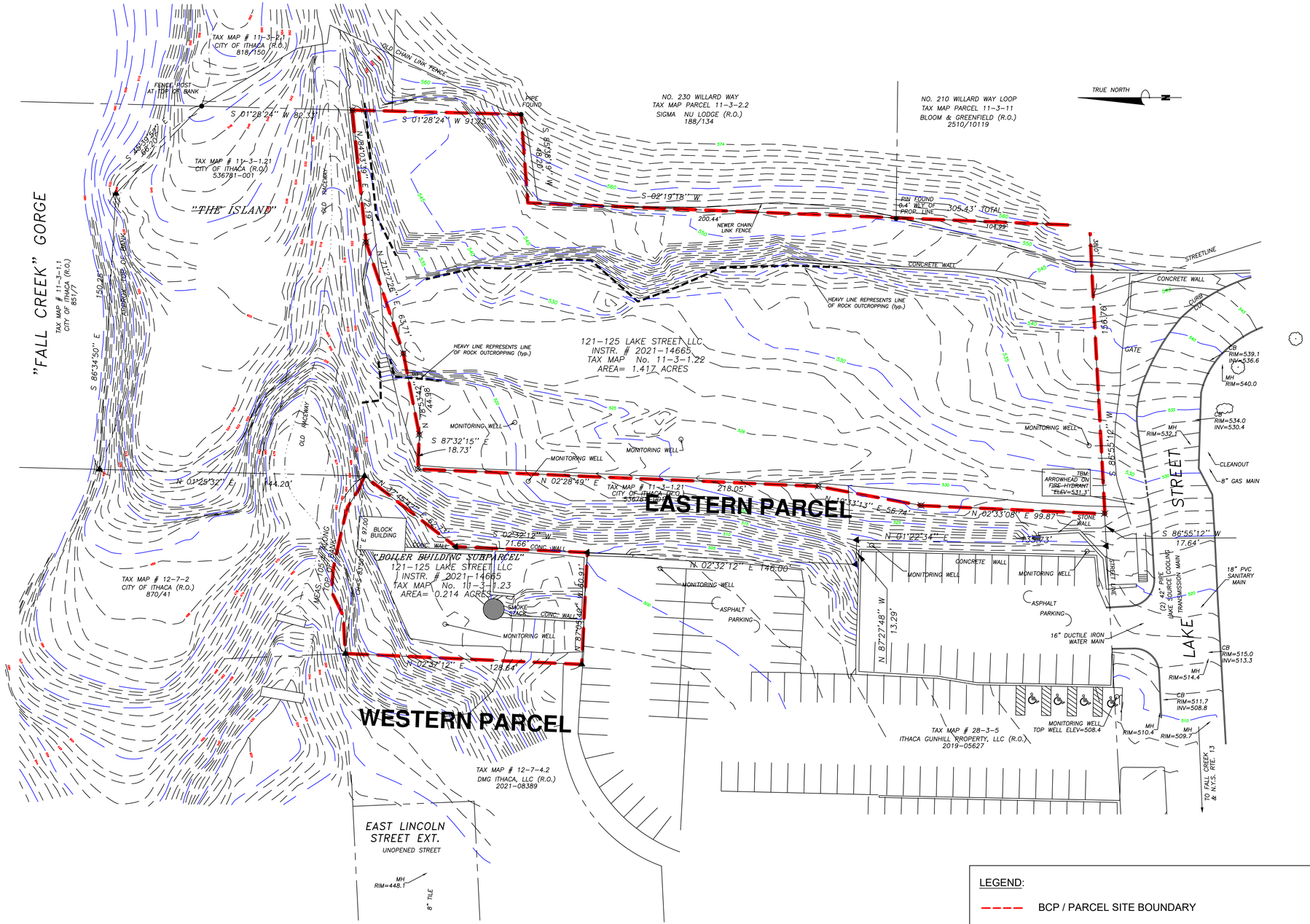
DESIGNED BY:	N. BRADFORD P.E.
CHECKED BY:	N. BRADFORD P.E.

BCP / PARCEL LIMITS

FIGURE 2

Apr 29, 2024 - 9:06am
F:\Project\X55 - Vigium Development\X55.002.001 - Former Ithaca Gun Factory BCP Site\Design\CADD\Sheet Files\CAD PDI Groundwater Drawings\C-100 Existing Conditions.dwg



LEGEND:

- BCP / PARCEL SITE BOUNDARY
- CONTOUR LINE TYPE - MINOR INTERVAL 1' TO 2'
- CONTOUR LINE TYPE - MAJOR INTERVAL 5' TO 10'

DRAWING NOTE:

CONTOUR INFORMATION SHOWN OUTSIDE TAX PARCEL NO.11-3-1.22 IS SHOWN FOR INFORMATIONAL PURPOSES ONLY AND ARE APPROXIMATE.

A1 EXISTING CONDITIONS PLAN
SCALE: 1" = 30'-0"

Apr 29, 2024 - 9:06am
F:\Project\X55 - Vicum Development\X55.002.001 - Former Ithaca Gun Factory BCP Site\Design\CADD\Sheet Files\CAD PDI Groundwater Drawings\C-100 Existing Conditions.dwg

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Pre-Design Investigation Work Plan (Groundwater)
Former Ithaca Gun Factory BCP Site
121-125 Lake Street, City of Ithaca
Tompkins County, New York

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO: X55.002.001
DATE: January 2024
DRAWN BY: N. COULOMBE
DESIGNED BY: N. BRADFORD P.E.
CHECKED BY: N. BRADFORD P.E.

PRE-SOIL REMEDIATION CONDITIONS PLAN

FIGURE 3

A1 **GROUNDWATER INJECTION MONITORING WELL LOCATIONS PLAN**
SCALE: 1" = 30'-0"

C&S COMPANIES
C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
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Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

Pre-Design Investigation Work Plan
(Groundwater)
Former Ithaca Gun Factory BCP Site
121-125 Lake Street, City of Ithaca
Tompkins County, New York

MARK	DATE	DESCRIPTION

REVISIONS

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DESIGNED BY:	N. BRADFORD P.E.
CHECKED BY:	N. BRADFORD P.E.

GROUNDWATER INJECTION/MONITORING WELL LOCATIONS MAP

FIGURE 4

Apr 29, 2024 - 9:06am
F:\Project\X55 - Vision Development\X55.002.001 - Former Ithaca Gun Factory BCP Site\Design\CADD\Sheet Files\CAD PDI Groundwater Drawings\Ithaca Gun Injection Well Map.dwg

S 01°28'24" W 82.33'

ROCK=532.5

ROCK=532.0

ROCK=531.0

TOP WALL=530.4

TOP WALL=528.9

EX. GRADE=530.4

EX. GRADE=528.6

INJECTION WELL

INJECTION WELL

INJECTION WELL

INJECTION WELL

INJECTION WELL

MW-01R

TW=551.2

TW=551.0

MW-09

MW-08

MW-05

MW-011

N 01°25'32" E 144.20'

CH=S 83°50'12" E 97.00'

MW-03

N 02°32'12" E 146.00'

N 01°22'34" E 135.73'

S 86°55' 17.64

MW-04R

MW-10

MONITORING WELL

MONITORING WELL

N 87°27'48" W 13.29'

MONITORING WELL
TOP WELL ELEV=508.4

LEGEND:

BCP / PARCEL SITE BOUNDARY

CONTOUR LINE TYPE - MINOR INTERVAL 1'

CONTOUR LINE TYPE - MAJOR INTERVAL 5'

Apr 29, 2024 - 9:06am
F:\Project\X55 - Vicum Development\X55.002.001 - Former Ithaca Gun Factory BCP Site\Design\CADD\Sheet Files\CAD PDI Groundwater Drawings\WELL MAP.dwg

C&S COMPANIES
C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
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Pre-Design Investigation Work Plan (Groundwater)
Former Ithaca Gun Factory BCP Site
121-125 Lake Street, City of Ithaca
Tompkins County, New York

MARK	DATE	DESCRIPTION
		REVISIONS

PROJECT NO:	X55.002.001
DATE:	January 2024
DRAWN BY:	N. COULOMBE
DESIGNED BY:	N. BRADFORD P.E.
CHECKED BY:	N. BRADFORD P.E.

PLANNED GROUNDWATER INJECTION WELL LOCATION MAP

FIGURE 5

Location ID:		MW-08	MW-08	MW-08	MW-08	MW-08	MW-08
Start Depth (ft bgs):		46	46	46	46	46	46
End Depth (ft bgs):		56.5	56	56	56	56	56
Sample ID:		MW-8-46-56.5-082916	MW-8-120816	FD-1-120816	MW-8-022117	MW-08-011118	FD-01-011118
Sample Type Code:		N	N	FD	N	N	FD
Sample Date:		9/30/2016	12/8/2016	12/8/2016	2/21/2017	1/11/2018	1/11/2018
Parameter	Action Level[1]						
CVOCs							
Tetrachloroethene	5	100 U	200 U	400 U	81 J	47.3	50
Trichloroethene	5	1100	4600	4700	9100	9520	9090
Cis-1,2-Dichloroethene	5	4100	14000	14000	7000	11600	11200
1,1-Dichloroethene	5	100 U	200 U	400 U	200 U	54.1	53.1
Vinyl Chloride	2	100 U	530	400 U	200 U	241	237
1,1-Dichloroethane	5	100 U	200 U	400 U	200 U	131	128
Chloroform	7	100 U	200 U	400 U	200 U	1 U	1 U
1,1,1-Trichloroethane	5	100 U	200 U	400 U	200 U	8.6	8.9
Trans-1,2-Dichloroethene	5	100 U	200 U	400 U	200 U	64.9	61.3
Other VOCs							
Benzene	1	100 U	200 U	400 U	200 U	1 U	1 U
Toluene	5	100 U	200 U	400 U	200 U	1 U	1 U

Location ID:		MW-09	MW-09	MW-09	MW-09
Start Depth (ft bgs):		46.2	46	46	46
End Depth (ft bgs):		56.7	56	56	56
Sample ID:		MW-9-46.2-56.7-100516	MW-9-120816	MW-9-022217	MW-09-011118
Sample Type Code:		N	N	N	N
Sample Date:		10/5/2016	12/8/2016	2/22/2017	1/11/2018
Parameter	Action Level[1]				
CVOCs					
Tetrachloroethene	5	200	330	380	28.7
Trichloroethene	5	3800	2400	3400	910
cis-1,2-Dichloroethene	5	3000	3300	2700	3260
1,1-Dichloroethene	5	100 U	100 U	100 U	12.7
Vinyl Chloride	2	100 U	100 U	100 U	11.9
1,1-Dichloroethane	5	100 U	100 U	100 U	11.6
Chloroform	7	100 U	100 U	100 U	1 U
1,1,1-Trichloroethane	5	100 U	100 U	100 U	1 U
Trans-1,2-Dichloroethene	5	100 U	100 U	100 U	21
Other VOCs					
Benzene	1	100 U	100 U	100 U	1.1
Toluene	5	100 U	100 U	100 U	1 U

Location ID:		MW-04R	MW-04R	MW-04R
Start Depth (ft bgs):		45	45	45
End Depth (ft bgs):		55	55	55
Sample ID:		MW-4-120916	MW-4-022217	FD-1-022217
Sample Type Code:		N	N	FD
Sample Date:		12/9/2016	2/22/2017	2/22/2017
Parameter	Action Level[1]			
CVOCs				
Tetrachloroethene	5	1.7	3.4	3.1
Trichloroethene	5	61	92	98
Cis-1,2-Dichloroethene	5	65	67	65
1,1-Dichloroethene	5	1 U	1 U	2 U
Vinyl Chloride	2	2.2	1 U	2 U
1,1-Dichloroethane	5	1 U	1 U	2 U
Chloroform	7	1 U	1 U	2 U
1,1,1-Trichloroethane	5	1 U	1 U	2 U
Trans-1,2-Dichloroethene	5	1.1	1 U	2 U
Other VOCs				
Benzene	1	1 U	1 U	2 U
Toluene	5	1 U	1 U	2 U

Location ID:		MW-10	MW-10	MW-10
Start Depth (ft bgs):		34	32.5	32.5
End Depth (ft bgs):		44.5	42.5	42.5
Sample ID:		MW-10-34-44.5-10716	MW-10-120916	MW-10-022217
Sample Type Code:		N	N	N
Sample Date:		10/7/2016	12/9/2016	2/22/2017
Parameter	Action Level[1]			
CVOCs				
Tetrachloroethene	5	1.8	3.3	3.3
Trichloroethene	5	71	80	90
cis-1,2-Dichloroethene	5	98	66	75 J
1,1-Dichloroethene	5	0.34 J	1 U	0.29 J
Vinyl Chloride	2	1 U	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U	1 U
Chloroform	7	12	1 U	1 U
1,1,1-Trichloroethane	5	1 U	1 U	1 U
Trans-1,2-Dichloroethene	5	1.2	1 U	1 U
Other VOCs				
Benzene	1	2.1	1 U	1 U
Toluene	5	12	1 U	1 U

Location ID:		MW-06	MW-06
Start Depth (ft bgs):		31.5	31.5
End Depth (ft bgs):		41.5	41.5
Sample ID:		MW-6-120916	MW-6-022217
Sample Type Code:		N	N
Sample Date:		12/9/2016	2/22/2017
Parameter	Action Level[1]		
CVOCs			
Tetrachloroethene	5	1 U	1 U
Trichloroethene	5	1 U	1 U
Cis-1,2-Dichloroethene	5	1 U	1 U
1,1-Dichloroethene	5	1 U	1 U
Vinyl Chloride	2	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U
Chloroform	7	1 U	1 U
1,1,1-Trichloroethane	5	1 U	1 U
Trans-1,2-Dichloroethene	5	1 U	1 U
Other VOCs			
Benzene	1	1 U	1 U
Toluene	5	1 U	1 U

Location ID:		MW-01R	MW-01R
Start Depth (ft bgs):		16.5	16.5
End Depth (ft bgs):		65	65
Sample ID:		MW-1R-120816	MW-1R-022117
Sample Type Code:		N	N
Sample Date:		12/8/2016	2/21/2017
Parameter	Action Level[1]		
CVOCs			
Tetrachloroethene	5	1 U	1 U
Trichloroethene	5	1 U	1 U
Cis-1,2-Dichloroethene	5	1 U	1 U
1,1-Dichloroethene	5	1 U	1 U
Vinyl Chloride	2	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U
Chloroform	7	1 U	1 U
1,1,1-Trichloroethane	5	1 U	1 U
Trans-1,2-Dichloroethene	5	1 U	1 U
Other VOCs			
Benzene	1	1 U	1 U
Toluene	5	1 U	1 U

Location ID:		MW-03	MW-03
Start Depth (ft bgs):		0	0
End Depth (ft bgs):		0	0
Sample ID:		MW-3-120916	MW-3-022117
Sample Type Code:		N	N
Sample Date:		12/9/2016	2/21/2017
Parameter	Action Level[1]		
CVOCs			
Tetrachloroethene	5	5 U	5 U
Trichloroethene	5	130	150
Cis-1,2-Dichloroethene	5	44	40
1,1-Dichloroethene	5	5 U	5 U
Vinyl Chloride	2	5 U	5 U
1,1-Dichloroethane	5	5 U	5 U
Chloroform	7	5 U	5 U
1,1,1-Trichloroethane	5	5 U	5 U
Trans-1,2-Dichloroethene	5	5 U	5 U
Other VOCs			
Benzene	1	5 U	5 U
Toluene	5	5 U	5 U

Location ID:		MW-11
Start Depth (ft bgs):		42.5
End Depth (ft bgs):		52.5
Sample ID:		MW-11-011118
Sample Type Code:		N
Sample Date:		1/11/2018
Parameter	Action Level[1]	
CVOCs		
Tetrachloroethene	5	1 U
Trichloroethene	5	1.6
cis-1,2-Dichloroethene	5	1.3
1,1-Dichloroethene	5	1 U
Vinyl Chloride	2	1 U
1,1-Dichloroethane	5	1 U
Chloroform	7	1 U
1,1,1-Trichloroethane	5	1 U
Trans-1,2-Dichloroethene	5	1 U
Other VOCs		
Benzene	1	1 U
Toluene	5	1 U

Location ID:		MW-05	MW-05
Start Depth (ft bgs):		40.5	40.5
End Depth (ft bgs):		50.5	50.5
Sample ID:		MW-5-120816	MW-5-022117
Sample Type Code:		N	N
Sample Date:		12/8/2016	2/21/2017
Parameter	Action Level[1]		
CVOCs			
Tetrachloroethene	5	200 U	37
Trichloroethene	5	910	1100 J
Cis-1,2-Dichloroethene	5	5700	1500 J
1,1-Dichloroethene	5	200 U	11 J
Vinyl Chloride	2	200 U	20 U
1,1-Dichloroethane	5	200 U	13 J
Chloroform	7	200 U	20 U
1,1,1-Trichloroethane	5	200 U	20 U
Trans-1,2-Dichloroethene	5	200 U	20 U
Other VOCs			
Benzene	1	200 U	20 U
Toluene	5	200 U	20 U

Location ID:		MW-07	MW-07
Start Depth (ft bgs):		40	40
End Depth (ft bgs):		50	50
Sample ID:		MW-7-120916	MW-7-022117
Sample Type Code:		N	N
Sample Date:		12/9/2016	2/21/2017
Parameter	Action Level[1]		
CVOCs			
Tetrachloroethene	5	1 U	1 U
Trichloroethene	5	1.5 J	4.1
Cis-1,2-Dichloroethene	5	1 U	0.95 J
1,1-Dichloroethene	5	1 U	1 U
Vinyl Chloride	2	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U
Chloroform	7	0.44 J	1.3
1,1,1-Trichloroethane	5	1 U	1 U
Trans-1,2-Dichloroethene	5	1 U	1 U
Other VOCs			
Benzene	1	1 U	1 U
Toluene	5	1 U	1 U

Tables

Table 1: Sample and Analysis Summary

Sample Location	Media/ Type of Sample	Analyses										
		TCL VOCs	TOC	Total Metals [1]	Dissolved Metals [1]	Dissolved Hydrocarbon Gas [2]	Alkalinity [3]	Sulfide / Sulfate	Chloride	Nitrate / Nitrite	qPCl [4]	CSIA [5]
MW-01R Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●		
MW-03 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●		
MW-04R Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●		
MW-05 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-06 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●		
MW-07 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●		
MW-08 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-09 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-10 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-11 Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●		
MW-__-MS Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-__-MSD Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-__-DUP Pre-Sampling	Groundwater	●	●	●	●	●	●	●	●	●	●	●
IJW-01 Baseline	Groundwater	●	●	●	●	●	●	●	●	●		
IJW-02 Baseline	Groundwater	●	●	●	●	●	●	●	●	●	●	●
IJW-03 Baseline	Groundwater	●	●	●	●	●	●	●	●	●		
IJW-04 Baseline	Groundwater	●	●	●	●	●	●	●	●	●	●	●
IJW-05 Baseline	Groundwater	●	●	●	●	●	●	●	●	●		

Sample Location	Media/ Type of Sample	Analyses										
		TCL VOCs	TOC	Total Metals [1]	Dissolved Metals [1]	Dissolved Hydrocarbon Gas [2]	Alkalinity [3]	Sulfide / Sulfate	Chloride	Nitrate / Nitrite	qPCl [4]	CSIA [5]
MW-__-MS Baseline	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-__-MSD Baseline	Groundwater	●	●	●	●	●	●	●	●	●	●	●
MW-__-DUP Baseline	Groundwater	●	●	●	●	●	●	●	●	●	●	●
Subtotals:	**Groundwater**	15	15	15	15	15	15	15	15	15	6	6
	MS, MSD, Dup	6	6	6	6	6	6	6	6	6	6	6
	Trip Blank	1										
TOTAL:		**22**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**12**	**12**

The above quantities include QA/QC (MS, MSD, Duplicate) samples. A blind duplicate (DUP), matrix spike (MS), and matrix spike duplicate (MSD) will be submitted for groundwater samples at a rate of 1 for every 20 samples collected, per sampling event.

1 – Metals Analysis will include: Iron, Magnesium, Potassium, Sodium, and Calcium

2 – Dissolved Hydrocarbon Gas analysis will include: Methane, Ethane, Ethene

3 - Alkalinity (including bicarbonate and carbonate)

4 – Quantitative polymerase chain reaction (qPCR) analysis will: identify and quantify existing colonies of key microorganisms (Dehalococcoides,) and functional genes

5 – Compound Specific Isotope Analysis (CSIA) analysis will include: carbon and chloride isotopes

Appendix A

Community Air Monitoring Plan

Community Air Monitoring Plan

for

The Former Ithaca Gun Factory BCP Site
121-125 Lake Street
City of Ithaca, Tompkins County, New York

Site No. C755019

Prepared by:

C&S Engineers, Inc.
499 Col Eileen Collins Blvd.
Syracuse, New York 13212

April 2022
Revised October 2022

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Appendices:

1.0 Overview

A Community Air Monitoring Plan (CAMP) establishes procedures and practices for 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.

Planned sampling and remediation activities to be conducted at the Former Ithaca Gun BCP site will require real-time air monitoring for VOCs and airborne particulate levels at the perimeter of all work areas during all site activities. The nature of such monitoring and the number of monitoring points will be dependent upon and determined by the nature and extent of activities being conducted at any given time. It is the intent of this CAMP to ensure that real-time monitoring is representative of site conditions and risks, and is extensive enough to ensure that the surrounding community is sufficiently protected from potential airborne contaminants.

The air monitoring to be conducted at the former Ithaca Gun Factory BCP site will employ the following provisions:

- **Weather Monitoring Station**: A dedicated weather station will be established at the site to monitor weather conditions throughout the duration of the work. The weather station will continuously monitor the following ambient conditions:
  - Wind speed and direction
  - Atmospheric Pressure
  - Humidity
  - Precipitation
- **Fixed Air Monitoring Station**: A fixed monitoring station will be established near the southeast side of the site, to provide continuous monitoring of VOC and particulates at two elevations. The intent of this station will be to provide air monitoring between the site activities and the nearest residential structures, regardless of wind direction. This location also represents the general downwind area of the site, based on prevailing wind conditions in the area. This station will monitor and log airborne VOC and particulate concentrations at two separate elevations. The first monitoring point will be elevated approximately 4 to 5 feet

above grade, corresponding to a typical human breathing zone. The second will monitor conditions at a height of 10 to 12 feet above grade, to account for VOC and particulates that may become elevated as a result of lofting winds associated with nearby topography.

- **Mobile Air Monitoring Stations**: The following monitoring stations will be established each day, based on current wind direction and the location and nature of site activities. The station locations will be adjusted throughout the day, as needed, to account for changes in wind direction.
    - *Upwind Monitoring Station*: One monitoring station equipped to monitor and log VOC and particulate concentrations near the upwind side of the site. This upwind monitoring location will provide data on local ambient (i.e., background) conditions and serve as a comparison for VOC and particulate concentrations recorded at the downwind monitoring locations.
    - *Downwind Monitoring Stations*: Three monitoring stations will be placed downwind of intrusive site work activities (i.e., excavation, soil handling, loading, soil mixing) and routes of truck and equipment traffic across the site. Concentrations of VOC and particulates will be continuously monitored at these locations, and compared to upwind (background) concentrations, to determine if site activities are resulting in higher downwind concentrations.
- **Dust Suppression Measures**: Dust suppression techniques will be employed by the Contractor as necessary to limit fugitive dust generated in disturbed areas during remediation activities. Such techniques may be employed, as appropriate, even if the community air monitoring results indicate that particulate levels are below action levels. Techniques may include but are not limited to:
    - Applying water on haul roads
    - Wetting equipment and excavation surfaces
    - Wetting soil during on-site handling, stabilization, and loading activities
    - Pre-wetting the surface of soil in trucks prior to transportation from the site
    - Hauling materials in properly tarped or watertight containers
    - Limiting vehicle speed on the site
    - Limiting the size of excavations
    - Covering excavated areas and materials following excavation
    - Applying alternate dust suppression agents if use of water does not adequately mitigate dust generation

- **Telemetry**: All monitoring stations will be equipped with visible alarms (lights) that will alert field crews of an exceedance of an established action level. In addition, all stations will be equipped with telemetry to provide real-time communication of VOC or particulate detections above action levels to C & S' on-site representative via cellular phone message. The telemetry will also provide for continuous recording of

Continuous monitoring will be required for all ground intrusive activities and during the handling, mixing, loading of soil. 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.

2.0 VOC Monitoring, Action Levels, and Responses

Monitoring of real-time VOC concentrations will be performed at each monitoring station (upwind, downwind, and fixed) using portable photo-ionization detectors (PIDs) equipped with 10.6 eV lamps. These instruments are capable of detecting the VOC that are present in groundwater beneath the site.

Monitoring Equipment

The instrument specifications are as follows:

Instrument Manufacturer	RAE Systems, Inc.
Model Number	MiniRAE 3000
Type of Sensor	Photoionization with 10.6 eV lamp
Compounds Measured	Volatile organic compounds with ionization potentials at or below 10.6 eV
Measurement Range	0.0 to 15,000 ppm by volume
Resolution	0.1 ppm at concentration range 0.0 to 999.9 ppm and 1.0 ppm at concentration range 1000 to 15,000 ppm
Calibration	100 ppm Isobutylene
Sampling Pump	Internal, integral flow rate at 500 cc/min
Datalogging	6 months at 1 minute increments
Direct Readout	Instantaneous reading of VOCs as ppm by volume; high values; STEL and TWA; battery and shutdown voltage; date, time, and temperature

Alarms	95 dB at 12" (30 cm) buzzer and flashing red LED to indicate exceeded preset high, low, STEL, and TWA limits; additional diagnostic alarm and display message for low battery and pump stall
Operating Time	16 hours
Operating Temperature	-20 to 50 °C (-4 to 122 °F)

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis while ground-intrusive or dust generating (i.e., truck and equipment traffic; soil handling, mixing, and loading) activities are being performed. Upwind concentrations will be also measured at the upwind perimeter of the site during such activities, to monitoring ambient / background levels that are present in the area. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate, such as isobutylene. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

Upwind and downwind monitoring locations must be adjusted throughout the course of each workday in the event of changes in wind direction, as indicated by the on-site weather station.

VOC Action Levels and Responses

The following action levels will be observed during the duration of work at the site:

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background (i.e., upwind) 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 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 will be data logged (recorded) and be available for New York State Department of Environmental Conservation (NYSDEC) and New York State

Department of Health (NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

3.0 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the site while ground-intrusive or dust generating (i.e., truck and equipment traffic; soil handling, mixing, and loading) activities are being performed. Upwind concentrations should be also measured at the upwind perimeter of the site during such activities, to monitoring ambient / background levels that are present in the area. The particulate monitoring will 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 levels. The equipment will be equipped with an alarm and telemetry to alert site personnel of an exceedance of the action level.

In addition to the particulate monitoring, fugitive dust migration will be visually assessed during all work activities.

Monitoring Equipment

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

Instrument Manufacturer	TSI Incorporated
Model Number	DustTrak II Model 8530
Compounds Measured	Dust, mists or aerosols
Flow Rate	3.0 L/min (pre-set), 1.4 to 3.0 L/Min user adjustable
Measurement Range	0.001 to 400 mg/m^3 (1 to 400,000 ug/m^3)
Accuracy	+/- 5% of reading +/- precision (referenced to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 m, g= 2.5, as aerosolized)
Resolution	0.1% of reading or 1 g/m^3, whichever is larger
Particle Size Range of Maximum Response	0.1-10 µm
Memory	5 MB (>60,000 Data Points), 45 Days at 1 minute interval
Operating Temperatures	0 to 50 °C (32 to 120 °F)
Log Interval	1 second to 1 hour
Logged Data	Each data point with average concentration, time/date and data point number
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
Alarm Averaging Time (user selectable)	Real-time (1-60 seconds) or STEL (15 minutes), alarms required
Operating Time	48 hours (fully charged NiCd battery); continuously with charger

Particulate Action Levels and Responses

The following action levels will be observed during the duration of work at the site:

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) 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/m3 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/m3 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/m3 of the upwind level and in preventing visible dust migration.

3. All 15-minute readings will be data logged (recorded) and be available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

4.0 Reporting

Community air monitoring data will be compiled, summarized, and provided to NYSDEC and NYSDOH on a weekly basis during site remediation activities.

Appendix A

Fixed Monitoring Station Location

Sep 21, 2022 – 2:44pm
F:\Project\X55 – Visum Development\X55.002.001 – Former Ithaca Gun Factory BCP Site\Design\CADD\Sheet Files\CAD CAMP Drawing\CAMP Drawing.dwg

C&S COMPANIES

C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

PROJECT NO:	X55.002.001
DATE:	SEPTEMBER 2022
DRAWN BY:	N. COULOMBE
DESIGNED BY:	N. BRADFORD
CHECKED BY:	N. BRADFORD

COMMUNITY AIR MONITORING PLAN
FORMER ITHACA GUN FACTORY
BROWNFIELD CLEANUP PROJECT
121-125 LAKE STREET
ITHACA, NEW YORK 14850

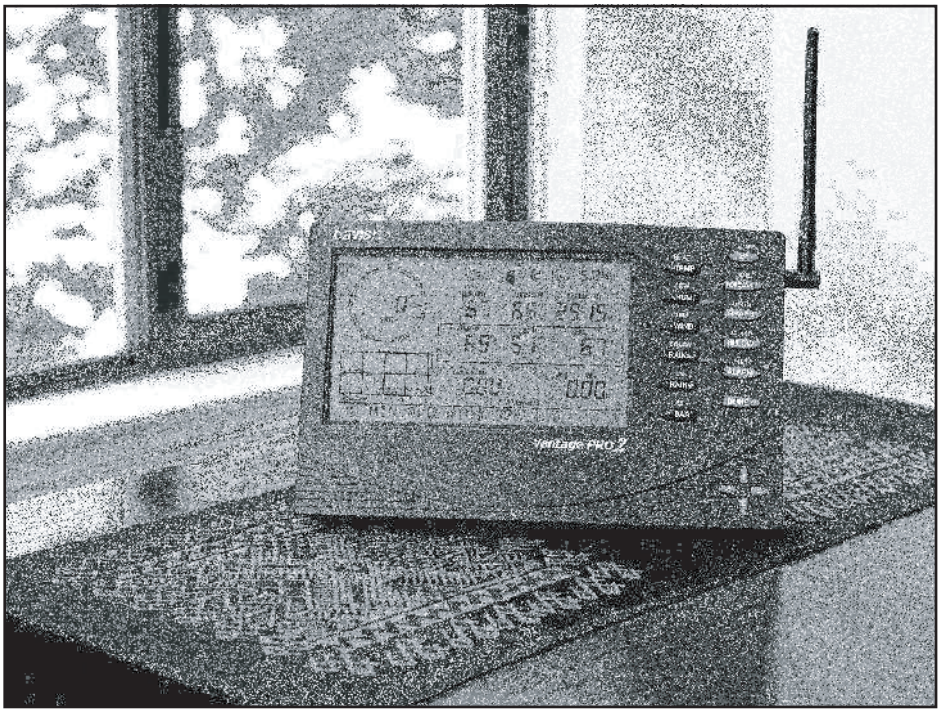
FIXED AIR MONITORING STATION PLAN

AERIAL VIEW

FIGURE 1

Appendix B

Weather Station Specifications

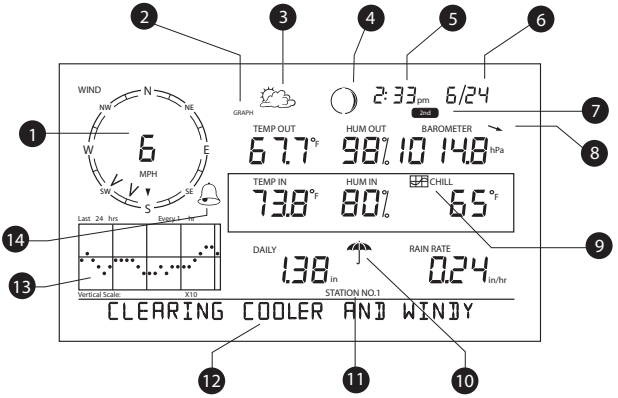


Vantage Pro2™ Console Manual

For Vantage Pro2™ & Vantage Pro2 Plus™ Weather Stations

Davis Instruments, 3465 Diablo Avenue, Hayward, CA 94545-2778 U.S.A. • 510-732-9229 • www.davisnet.com

Vantage Pro2 Console Display Features



Display Features

1. Compass Rose
2. Graph & Hi/Low Mode Settings
3. Forecast Icons
4. Moon Phase Indicator
5. Time/Sunrise Time
6. Date/Sunset Date
7. 2ND Button Indicator
8. Barometric Trend Arrow
9. Graph Icon
10. Current Rain Icon
11. Station Number Indicator
12. Weather Ticker
13. Graph Field
14. Alarm Icon

FCC Part 15 Class B Registration Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modification not expressly approved in writing by Davis Instruments may void the warranty and void the user's authority to operate this equipment.
FCC ID: IR2DWW6312
IC: 378810-6312

EC EMC Compliance

This product complies with the essential protection requirements of the EC EMC Directive 2004/108/EC; Low Voltage Directive 2006/95/EC; and Eco-Design Directive 2005/32EC > .05 watt no-load adaptor.

Vantage Pro2 Console Manual

Document Part Number: 07395.234 Rev. K, 1/12/12
For Vantage Pro2 Consoles # 6312 & 6312C
And Vantage Pro2 Weather Stations # 6152, 6152C, 6153, 6162, 6162C, 6163

Table of Contents

Chapter 1
Welcome to Vantage Pro2™

Welcome to your Vantage Pro2 Weather Station console. The console displays and records your station's weather data, provides graph and alarm functions, and interfaces to a computer using our optional WeatherLink® software.
Vantage Pro2 stations are available in two basic versions: cabled and wireless. A cabled Vantage Pro2 station transmits outside sensor data from the Integrated Sensor Suite (ISS) to the console using a straight-through four-conductor cable. A wireless Vantage Pro2 station transmits outside sensor data from the ISS to the console via a low-power radio.

Note: Wireless consoles can also collect data from optional Vantage Pro2 sensors or a Davis Vantage Vue ISS, and can also retransmit data to other Vantage Pro2 or Vantage Vue consoles or a Davis Weather Envoy. You can have an unlimited number of consoles - one in each room!

The *Vantage Pro2 Quick Reference Guide* included with your station provides an easy to use reference for most console functions.

Console Features

Keyboard & Display

The keyboard lets you view current and historical data, set and clear alarms, change station models, enter calibration numbers, set up and view graphs, select sensors, and read the forecast. The keyboard consists of 12 command keys located next to the screen display and four navigation keys located below the command keys.
A weather variable or console command is printed on each command key. Just press a key to select the variable or function printed on that key.

Each command key also has a secondary function which is printed above the key on the console case. To select the secondary function, press and release 2ND (on the front of the console, upper right corner) and then immediately press the key for that function.

After pressing 2ND, the 2ND icon displays above the barometer reading on the screen for three seconds. All secondary key functions are enabled during this time. Keys resume normal operation after the icon disappears.
The+ and - navigation keys, along with < and > navigation keys are used to select command options, adjust values, and to provide additional functions when used in combination with a command key.

Console Modes

The console operates in five basic modes: Setup, Current Weather, Highs and Lows, Alarm, and Graph. Each mode lets you access a different set of console functions or display a different aspect of your weather data.

Vantage Pro2 Options

Optional Sensors & Transmitting Stations

Vantage Pro2 stations are extremely flexible. Use the following optional sensors and wireless stations to enhance the weather monitoring capabilities of your Vantage Pro2. See our web site for complete details: www.davisnet.com.

Optional Sensor and Stations	Description
Anemometer/Sensor Transmitter Kit (#6332)	Provides more flexible anemometer placement for wireless stations. With Envoy8X, allows additional solar radiation, UV, temperature, rain or 3rd party (reporting 0-3 volt) sensors.
Vantage Connect (#6620)	Transmits data from remote ISS to WeatherLink.com via cellular connection.
Wireless Leaf & Soil Moisture/ Temperature Station (#6345)	Measures and transmits leaf wetness, soil moisture and temperature data. Also for use with GLOBE.
Wireless Temperature Station (#6372)	Measures and transmits temperature data.
Wireless Temperature/Humidity Station (#6382)	Measures and transmits air temperature and humidity data.
Solar Radiation Sensor (#6450)	Measures solar radiation. Required for calculating evapotranspiration (ET). Available for cabled and wireless stations. Requires Sensor Mounting Shelf (#6673).
Ultraviolet (UV) Radiation Sensor (#6490)	Measures UV radiation. Required for calculating the UV dose. Available for Cabled and Wireless stations. Requires Sensor Mounting Shelf (#6673).

Note: Optional wireless stations can only be used with Wireless Vantage Pro2 Stations.

Optional WeatherLink® Software

The WeatherLink software and data logger connect your Vantage Pro2 station directly to a computer, providing enhanced weather monitoring capabilities, a continuous preserved data record, and powerful Internet features. The WeatherLink data logger fits neatly on the console and stores weather data even when the computer is turned off.

WeatherLink Option	Description
WeatherLink for Windows, USB connection (#6510USB)	Includes WeatherLink software and USB data logger. Allows you to save and view your weather data on your PC.
WeatherLink for Windows, serial connection (#6510SER)	Includes WeatherLink software and serial data logger. Allows you to save and view your weather data on your PC.
WeatherLink for Macintosh OS X, USB connection (#6520)	Includes WeatherLink software and USB data logger. Allows you to save and view your weather data on your Mac.

WeatherLink Option	Description
WeatherLinkIP for Windows XP/ Vista/7 (#6555)	Requires a broadband router with available Ethernet port. Allows you to post your weather data directly to your personal web page on WeatherLink.com without a PC. Among other features, allows you to receive e-mail alerts of current weather conditions or simple alarm conditions.
WeatherLink for APRS, Windows version, with streaming data logger, serial connection (#6540)	Includes WeatherLink software and streaming serial data logger. Allows real-time display of current weather conditions for use with APRS (Automatic Position Reporting System), for HAM radio users.
WeatherLink for Alarm Output, for Windows, with streaming data logger, serial connection (#6544)	Includes WeatherLink software and streaming serial data logger. Gives you the ability to control external devices based on various combinations of weather trends and events.
WeatherLink for Emergency Response teams, Windows version, with streaming data logger, serial connection (#6550)	Includes WeatherLink software and streaming serial data logger. Allows real-time display of current weather conditions for use by emergency response teams.
WeatherLink for Irrigation Control, Windows version, with streaming data logger, serial connection (#6560)	Includes WeatherLink software and streaming serial data logger. Allows intelligent and efficient control of popular automated irrigation systems using weather data.

Optional Accessories

Accessories are available from your dealer or may be ordered directly from Davis Instruments.

Envoys: Wireless Weather Envoy (#6316,) Envoy8X (#6318)

Performs many of the same functions as a Vantage Pro2 console, but without a display. Use an Envoy to interface your wireless station to a computer, freeing the display for use elsewhere. Weather Envoy can receive the same number and combinations of stations as a Vantage Pro2 console; Envoy8X can receive up to 8 stations in any combination and create a large database.

Sensor Mounting Shelf (#6673)

Required for mounting the optional Solar Radiation and/or UV sensors. The mounting shelf attaches to the base of the rain collector on the ISS.

Additional Vantage Pro2 (#6312) or Vantage Vue Console (#6351)

Enjoy weather information in several rooms.

USB-to-Serial (DB-9) Cable (#8434)

Allows the Serial version of WeatherLink (#6510SER, 6540, 6544, 6550, 6560) to connect to a USB port on your computer.

Telephone Modem Adapter (#6533)

Required when connecting station to an external phone modem.

Extension Cables (#7876)

Allows you to place the Cabled Vantage Pro2 ISS further away from the console using the extension cable provided by Davis Instruments. Maximum cable length is 1000’ feet (300 m).

- #7876-040 Cable, 40’ (12 m)
- #7876-100 Cable, 100’ (30 m)
- #7876-200 Cable, 200’ (61 m)

Chapter 2
Installing the Console

The Vantage Pro2 console is designed to give extremely accurate readings. As with any precision instrument, use care in its assembly and handling. Although installing the console is relatively simple, following the steps outlined in this chapter and assembling the Vantage Pro2 correctly from the start will help ensure that you enjoy all of its features with a minimum of time and effort.

Powering the Console

Cabled Vantage Pro2 Stations

Cabled Vantage Pro2 consoles supply power to the Integrated Sensor Suite (ISS) through the console cable. Because of the added power consumption of the ISS, the cabled console requires an AC power adapter used as the main power supply. The console batteries provide backup power for up to four to six weeks.

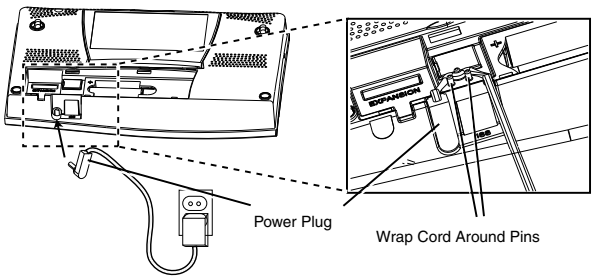
Wireless Vantage Pro2 Stations

Wireless Vantage Pro2 consoles do not require the use of an AC adapter. You may use the included adapter if you wish, but the three C-cell batteries should power a wireless console for up to nine months.

Note: When using an AC Power adapter, be sure to use the power adapter supplied with your Vantage Pro2 Console. Your console may be damaged by connecting the wrong power adapter. The console does not recharge the batteries. Because of this, and because NiCad batteries do not power the console as long as alkaline batteries, use alkaline batteries in the console.

Installing the AC Power Adapter

1. Remove the battery cover located on the back of the console by pressing down on the two latches at the top of the cover.
2. Find the power jack located on the bottom of the console case.



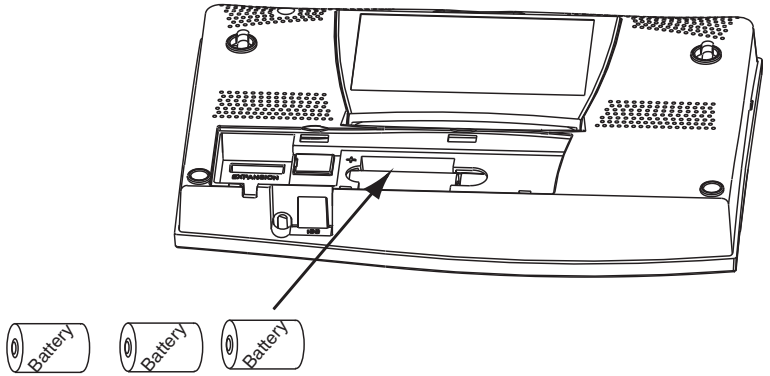
3. Insert the power adapter plug into the console power jack, then plug the other end of the adapter into an appropriate power outlet.

4. Check to make sure the console runs through a brief self-test procedure successfully. On power up, the console displays all the LCD segments and beeps twice. A message displays in the ticker banner at the bottom of the console, followed by the first screen that displays during Setup Mode. Press and hold DONE to skip the message and enter into Setup Mode.

   Setup Mode guides you through steps required to configure the station. See "Setup Mode" on page 9 for more information.

Installing Batteries

1. Remove the battery cover located on the back of the console by pressing down on the two latches at the top of the cover.

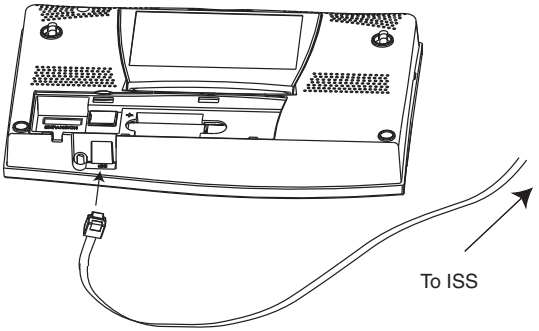


2. Insert three C batteries into the battery channel, negative (or flat) terminal first.
3. Replace the battery cover.

Connecting Cabled Stations

Cabled Vantage Pro2 stations come with 100 feet (30m) of cable. This cable is used for connecting the console to the ISS. Maximum cable length from ISS to the console using Davis Instruments cables is 1000 feet. To connect the console to the ISS:

1. Firmly insert the console end of the straight-through four-conductor wire into the console receptacle marked "ISS" until it clicks into place. Do not force the connector into the receptacle.



2. Ensure that the ISS cable is not twisted through the access port.

Note: The ISS must be assembled and connected to the console so that it is receiving power before the console connection can be tested.

Once the console and ISS are both powered up, cable connection should be tested and established.

Once the console is powered, it automatically enters Setup Mode. You can step through the Setup Mode options, or exit the Setup Mode to test the connection and sensor readings in Current Weather Mode. See “Setup Mode” on page 9 for Setup Mode options. See “Current Weather Mode” on page 18 for viewing and verifying current weather data coming from the cabled console.

To verify that the console is receiving data from the ISS through the console connection, see “Cabled ISS Assembly” in the *Integrated Sensor Suite Installation Manual*.

Console Location

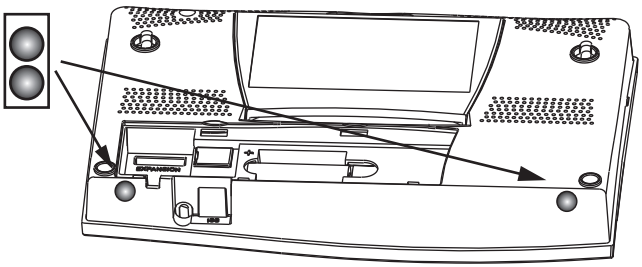
Place the console in a location where the keyboard is easily accessible and the display is easy to read. For more accurate readings:

- Avoid placing the console in direct sunlight. This may cause erroneous inside temperature and humidity readings and may damage the unit.
- Avoid placing the console near radiators or heating/air conditioning ducts.
- If you are mounting the console on a wall, choose an interior wall. Avoid exterior walls that tend to heat up or cool down depending on the weather.
- If you have a wireless console, be aware of possible interference from cordless phones or other devices. To prevent interference, maintain a distance of 10 feet between the Vantage Pro2 console and a cordless phone (handset and base).
- Avoid positioning a wireless console near large metallic appliances such as refrigerators, televisions, heaters, or air conditioners.
- The console antenna does not rotate in a complete circle. Avoid forcing the console antenna when rotating it.

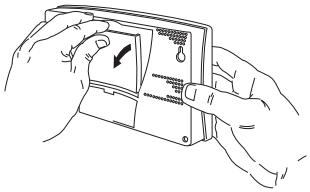
Table & Shelf Placement

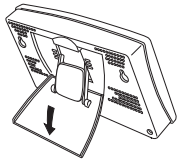
The console kickstand can be set to three different angles allowing five different display angles.

1. Install the two round rubber feet on the bottom of the console. The rubber feet help prevent damage to furniture and surfaces.

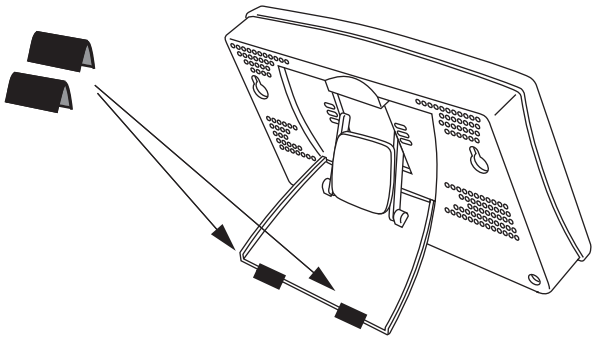


2. Lean the kickstand out by pulling on its top edge.
   You'll see the indentation for your finger at the top edge of the console.
3. Slide the catch to rest the kickstand in the appropriate angle.
   Choose low angles for display on a coffee table or other low area. Choose higher angles for display on a desk or shelf.





4. Install the two rubber channel feet on the kickstand.



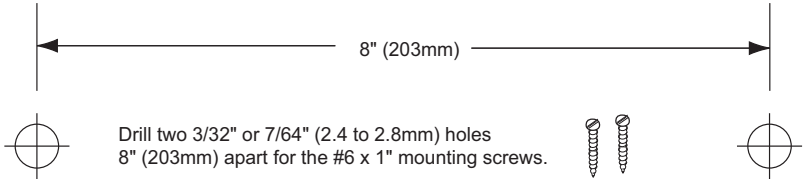
If necessary, pull up on the stand to close it. It will be a little tight, so it's okay to push hard enough to get it to slide.

Wall Mounting

The console mounts to the wall using two keyholes located on the back of the case.

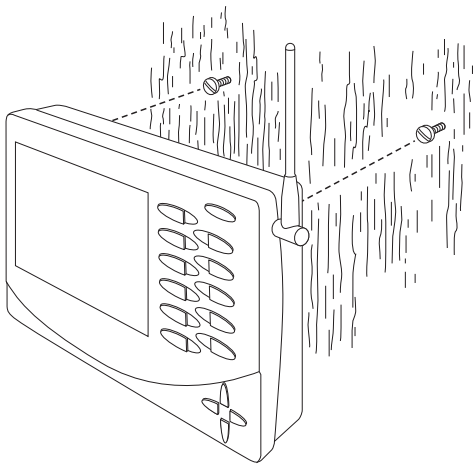
To mount the console on a wall:

1. Use a ruler to mark two mounting hole positions on the wall 8 inches (203 mm) apart.



This is a representation for the mounting hole positions. This template is not true to size.

   If installing a cabled Vantage Pro2 console with sensor cable running inside the wall, mount the console over an empty switch box.
2. Use a drill and a 3/32 or 7/64"(2.5 mm) drill bit to drill two pilot holes for the screws.
3. Using a screwdriver, drive the two #6 x 1" pan head self-threading screws into the wall. Leave at least 1/8" (3 mm) between the wall and the heads of the screws.
4. If the kickstand has been pulled out from the case, push it back into its upright and locked position.
5. Guide the two keyholes on the back of the console over the two screws.



Chapter 3
Using Your Weather Station

The console LCD screen and keyboard provide easy access to your weather information. The large LCD display shows current and past environmental conditions as well as a forecast of future conditions. The keyboard controls console functions for viewing current and historical weather information, setting and clearing alarms, changing stations types, viewing and/or changing station settings, setting up and viewing graphs, selecting sensors, getting the forecast, and so on.

Console Modes

The Vantage Pro2 console operates in five different modes:

Mode	Description
Setup	Use Setup Mode to enter the time, date, and other information required to calculate and display weather data.
Current Weather	Use Current Weather Mode to read the current weather information, change measurement units, and to set, clear or calibrate weather readings.
High/Low	High/Low Mode displays the daily, monthly or yearly high and low readings.
Alarm	Alarm Mode allows you to set, clear, and review alarm settings.
Graph	Graph Mode displays your weather data using over 100 different graphs.

Setup Mode

Setup Mode provides access to the station configuration settings that control how the station operates. Setup Mode consists of a series of screens for selecting console and weather station options. The screens that display in Setup Mode vary depending on the weather station type (cabled or wireless), or if the console has a WeatherLink connection already established. (See the *WeatherLink Getting Started Guide* for more information on connecting your console to your computer.)

Setup Mode Commands

Setup Mode displays when the console is first powered. This mode can be displayed at any time to change any of the console/weather station options. Use the following commands to enter, exit and navigate Setup Mode:

- Enter Setup Mode by pressing DONE and the - key at the same time.

Note: The console automatically enters Setup Mode when first powered.

- Press DONE to move to the next screen in the Setup Mode.
- Press BAR to display the previous screen in the Setup Mode.
- Exit Setup Mode by pressing and holding DONE until the Current Weather screen displays.

Screen 1: Active Transmitters

Screen 1 displays the message “Receiving from...” and shows the transmitters being received by the console. In addition, an “X” blinks in the lower right-hand corner of the screen every time the console receives a data packet from a station. The rest of the LCD screen is blank.

If you have a cabled station, or if your wireless ISS uses the factory settings and you are receiving the signal, the screen displays “Receiving from station No. 1.” Any optional stations that have been installed should also display.

Screen 1: Active Transmitters

Note: An ISS or optional station must be powered for the console to recognize it. Refer to the *Integrated Sensor Suite Installation Manual* or optional station installation instructions for more information. It make take several minutes for the console to acquire and display a Transmitter ID.

1. Make a note of the station number(s) listed on the screen.

Note: If a Vantage Pro2 or Vantage Vue ISS has been installed in your area, its ID number may also be displayed.

2. Press DONE to move to the next screen.

The console can receive signals from up to eight transmitters total, but there is a limit on the number of certain types of transmitters. The table below lists the maximum number of stations allowable for a receiver:

Station Type	Maximum Number
Integrated Sensor Suite (ISS)	1
Anemometer Transmitter Kit *(replaces ISS anemometer)*	1
Leaf & Soil Moisture/Temperature Station	2*
Temperature Station	8
Temperature/Humidity Station	8

Maximum Number of Transmitters in a Network with One Receiver

**Two are allowable only if both stations are only partially populated. For example, A network can either have both a Leaf Wetness/Temperature station and a Soil Moisture/Temperature station, or it can have one combined Leaf Wetness and Soil Moisture/Temperature station.*

Note: Listening to more than one transmitter may reduce battery life significantly.

Screen 2: Configuring Transmitter IDs — Wireless Only

(If you have a cabled station, press DONE and continue on to “Screen 4: Time & Date” on page 12.)

Setup screen 2 allows you to change the ISS transmitter ID and to add or remove optional transmitter stations. The default transmitter ID setting is “1” (ISS), which works fine for most installations.

Screen 2: Transmitter ID configuration

If you have a cabled station, or if you have a wireless station and are using the default transmitter ID setting, press DONE to move to the next screen.

Note: Typically, you can use the default transmitter ID setting of 1 unless you are installing one of the optional transmitter stations. However, if you are having trouble receiving your station, there may be another ISS with ID 1 operating nearby. Try changing the ID of both the console and ISS to another ID number.

3. Press the < and > keys to select the transmitter ID.

   When you select a transmitter ID, the ID number is displayed on the screen as well as the current configuration.
4. Press the + and - keys to toggle console reception of signals from transmitters using that ID on and off.
5. Press GRAPH to change the type of station assigned to each transmitter. Scroll through the station types - ISS, TEMP, HUM, TEMP HUM, WIND, RAIN, LEAF, SOIL, and LEAF/SOIL - until the correct type appears.
6. Press DONE to move to the next screen.

Note: This screen contains functionality for enabling repeaters. If the word “Repeater” displays in the right corner of the screen and you are not using repeaters as part of your network, see “Clearing Repeater ID” on page 52. If you are using repeaters as part of your network see “Wireless Repeater Configuration” (Appendix C) on page 51 for configuring repeaters on the console.

Screen 3: Retransmit — Wireless Only

If you have a cabled station, press DONE and go to “Screen 4: Time & Date” on page 12.

The console can retransmit the data it receives from the ISS to other Vantage Pro2 or Vantage Vue consoles using the retransmit feature. By toggling the feature on, the console becomes another transmitter that requires its own unique ID to transmit the data received from the ISS.

Screen 3: Retransmit

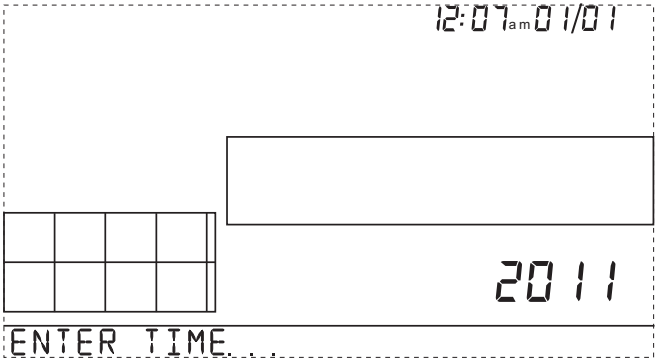
1. Press the + or - keys to turn the retransmit function on and off. The first available transmitter ID not used by the ISS or any optional sensor is automatically assigned. Data from the ISS is the only data that can be retransmitted by the console.

   When retransmit has already been enabled, pressing the < and > keys changes the Transmitter ID used for retransmit.
2. Use the > key to scroll through the list of available transmitter IDs and select the ID for your console.
3. Press DONE to move to the next screen.

Note: Make a note of the ID selected for retransmit. The console that receives the data from the console you have selected to retransmit should be configured to receive the transmitter ID you selected. See “Screen 2: Configuring Transmitter IDs — Wireless Only” on page 10 for more information.

Screen 4: Time & Date

The first time you power-up the console, enter the correct date and local time.



Screen 4: Time & Date

To change the time and date:

1. Press the < and > keys to select the hour, minute, month, day or year. The selected time or date setting blinks on and off.
2. To change a setting, press the + and - keys to adjust the value up or down.

   To choose a 12-hour (default in US models) or 24-hour clock (default in EU and UK models), first select either the hour or minute setting, then press 2ND and immediately press UNITS**.** This toggles the clock setting between the two clock types.

   To choose between a MM/DD (default in US models) or DD.MM (default in EU and UK models) display for the date, first select either the day or month setting, then press 2ND and immediately press UNITS**.** This switches the console from one date display to the other.
3. Press DONE to move to the next screen.

Screen 5 and Screen 6: Latitude and Longitude

The console uses latitude and longitude to determine your location, allowing it to adjust the forecast and calculate the times for sunset and sunrise.

- Latitude measures distance north or south of the equator.
- Longitude measures distance east or west of the Prime Meridian, an imaginary line running north and south through Greenwich, England.

Note: You can find your latitude and longitude by searching the internet (for example: googlemaps.com, earth.google.com or earthtools.org). Many atlases and maps include latitude and longitude lines. You can also talk to the reference department of your local library, call your local airport, or search on the Internet.

The more accurate you are, the better; however, a reasonable estimate will work, too.

Screen 5: Latitude

1. Press the < and > keys to move between fields.
2. Press the + and - keys to change the settings up or down.
3. To select between SOUTH or NORTH, press 2ND and then UNITS.
4. Press DONE to move to the Longitude screen.

Screen 6: Longitude

1. Press the < and > keys to move between fields.
2. Press the + and - keys to change the settings up or down.
3. To select the East or West Hemisphere, press 2ND, then UNITS.
4. Press DONE to move to the next screen.

Screen 7: Time Zone

The console is pre-programmed with a combination of US time zones and the names of major cities representing time zones around the world. You can also configure your time zone using the Universal Time Coordinate (UTC) offset.

Screen 7: Time Zone

Note: UTC offset measures the difference between the time in any time zone and a standard time, set by convention as the time at the Royal Observatory in Greenwich, England. Hayward, California, the home of Davis Instruments, observes Pacific Standard Time. The UTC offset for Pacific Standard Time is -8:00, or eight hours behind Universal Time (UTC). When it's 7:00 pm (1900 hours) UTC, it's 19 - 8 = 1100 hours, or 11:00 am in Hayward in winter. When daylight saving time is observed, an hour is added to the offset time automatically. Use this function in correlation with Screen 8, Daylight Saving Settings.

1. Press the + and - keys to cycle through time zones.
2. If your time zone is not shown, press 2ND then press the + and - keys to set your UTC offset.
3. Press DONE to select the time zone or UTC offset shown on the screen and move to the next screen.

Screen 8: Daylight Saving Settings

In most of North America (except Saskatchewan, Arizona, Hawaii, and the Mexican State of Sonora); and Europe use the AUTO daylight saving setting. The console is pre-programmed to use the correct starting and stopping dates for daylight saving time in these areas, based on the time zone setting in screen 7.

Stations located outside North America and Europe, or in areas that do not observe daylight saving time should use the MANUAL setting.

Screen 8: Daylight Saving Settings

1. Press the + and - keys to choose Auto or Manual.
2. Press DONE to move to the next screen.

Screen 9: Daylight Saving Status

Use this screen to either verify the correct automatic daylight saving status or to set daylight saving manually.

Screen 9: Daylight Saving Status

1. If Daylight Saving setting is MANUAL, you will have to set the time correctly when it changes. However, to maintain accurate calculations, you also need to use the + and - keys to turn daylight saving time on or off on the appropriate days of the year. If you have an AUTO daylight saving setting, the console displays the appropriate setting based on the current time and date.
2. Press DONE to move to the next screen.

Screen 10: Elevation

Meteorologists standardize barometric pressure data to sea level so that surface readings are comparable, whether they're taken on a mountainside or by the ocean. To make this same standardization and ensure consistent readings, enter your elevation in this screen.

Screen 10: Elevation

Note: If you do not know your elevation, there are several ways to find out. Many atlases and almanacs include elevation for cities and towns. You can also check with the reference department of your local library, or refer to internet resources. (See "Screen 5 and Screen 6: Latitude and Longitude" for a list of web sites.) The more accurate you are, the better; but a reasonable estimate works too.

1. Press the < and > keys to move from one numeral to another.
2. Press the + and - keys to adjust a numeral up or down.
3. To switch between feet and meters, press 2ND then press UNITS.
4. If you are below sea level, like in Death Valley or the Salton Sea, first enter the elevation as a positive number. Then, select the "0" immediately to the left of the left-most non-zero digit (the second zero from the left in 0026, for example, or the first zero from the left in 0207) and press the + and - keys to switch from a positive to negative elevation.

Note: You can only set the elevation to negative after you have entered a non-zero digit and when the zero in the position immediately to the left of the left-most non-zero digit has been selected.

5. Press DONE to move to the next screen.

Screen 11: Wind Cup Size

Vantage Pro2 stations come standard with large wind cups. Switch this setting to SMALL CUP if you have separately purchased and installed small wind cups. Switch to OTHER if you are receiving from a Vantage Vue ISS or are using a third-party anemometer.

Note: Large wind cups are more sensitive to low wind speeds and are the best choice for most users.

Screen 11: Wind Cup Size

1. Press the + and - keys to switch between the LARGE CUP, SMALL CUP, and OTHER wind cup settings.
2. Press DONE to move to the next screen.

Screen 12: Rain Collector

The tipping bucket in the Vantage Pro2 rain collector has been calibrated at the factory to measure 0.01"of rain with each tip for US models, or 0.2 mm of rain with each tip for UK and EU models. The typical user will not need to change this screen. However, some US users may want to install a metric adapter on their ISS so that it takes 0.2 mm readings for every tip of the bucket. If a metric adapter has been installed on your ISS, you should also calibrate your console for metric measurements using this screen.

Screen 12: Rain Collector Settings

Note: See the *Integrated Sensor Suite Installation Manual* for instructions on installing the metric rain adapter. The 0.1mm setting does not provide correct rain measurements with either the standard measurement or the metric adapter installed in the rain bucket and should not be used.

To calibrate your console for 0.2 mm measurements:

1. Press the + and - keys to display the 0.2 mm setting.
2. Press DONE to use the selected setting and move to the next screen.

If you calibrate your console for metric rain data in screen 12 of the Setup Mode, you will also need to set up your Current Weather Mode to display the metric readings. To display metric rain readings in the Current Weather Mode, once you have completed or exited the Setup Mode:

To Display Rain in Metric Units on the Console

1. Press RAINYR to display the current rain rate. 

   Selecting Metric units for one rain variable also sets all the other rain variables to Metric units.
2. Press and release 2ND and press UNITS once. 

   The units used to display rain data toggle between inches and millimeters each time you repeat this key sequence.

To Display Rain in Metric Units in WeatherLink

Refer to the *WeatherLink Online Help* for instructions to set the rain collector to 0.2 mm and to select millimeters as the unit for rain.

Screen 13: Rain Season

Because rainy seasons begin and end at different times in different parts of the world, you must specify the month you wish your yearly rain data to begin. January 1st is the default. The date the rain season begins affects yearly rain rate highs and lows.

Screen 13: Rain Season

1. Press the + and - keys to select the month for the start of the rainy season.
2. Press DONE to move to the next screen.

Note: This setting determines when the yearly rain total is reset to zero. Davis Instruments recommends a January rain season setting (the default), unless you reside in the west coast of the United States, the Mediterranean coast, experience dry winters in the Southern Hemisphere. If so, change the rain season setting to July 1st. If you are performing hydrology studies in any of these climates in the Northern Hemisphere, change the rain season setting to October 1st.

Screen 14: Serial Baud Rate

The Baud Rate screen displays only if the console detects that a WeatherLink data logger installed on the console.

The console uses a serial or USB port to communicate with a computer. If you are connecting the console directly to your computer via USB or Ethernet, leave the setting at 19200, the highest rate for the port. If you're using a modem, use the highest setting your modem can handle. The console must be equipped with a WeatherLink data logger to communicate with a computer or modem.

Screen 14: Baud Rate

Note: The baud rate setting on your console must match the baud rate of the software you are using. If you are using WeatherLink for Vantage Pro2, refer to WeatherLink help for instructions on setting the serial port baud rate on your computer.

1. Press the + and - keys to select the baud rate.

   Your Vantage Pro2 console supports baud rates of 1200, 2400, 4800, 9600, 14400, and 19200.
2. You have completed the console setup. To exit Setup Mode, press and hold DONE until the current weather screen appears.

Clear All Command

After you have completed the above setup procedures and have exited the Setup Mode, please use the Clear All command before putting your weather station into service.

The Clear All command clears all stored high and low weather data including monthly and yearly highs and lows and clears the alarm settings. The command is recommended to properly clear the console of any erroneous data before first putting the station into use.

1. Make sure wind speed is showing in the wind compass. If wind direction is showing, press WIND on the console until wind speed appears.
2. Press 2ND, then press and hold CLEAR for at least six seconds.
3. Release CLEAR when you see "CLEARING NOW" displayed at the bottom of the console's screen.

Current Weather Mode

In the Current Weather Mode you can display the current data readings from your station, select units of measure, and calibrate, set, or clear weather variables. You can see up to ten weather variables on the screen at the same time, as well as the time and date, the moon and forecast icons, a forecast or special message from your station, and a graph of the currently selected variable. A few variables are always visible on the console screen while most variables share their location with one or more variables. You can select any variable not currently on the screen to display it.

Selecting Weather Variables

Select a weather variable to display its data on the screen if it isn't already visible or to graph the data available for that variable.

Weather variables are selected via the console command keys:

- If the variable is printed on a key, just press the key to select the variable.
- If the variable is printed on the console housing, first press and release 2ND, then quickly press the key below the variable to select it.

Note: After pressing 2ND, the 2ND icon displays on the screen for three seconds. Command key secondary functions are enabled during this time. The keys return to normal operation after the icon disappears.

- Select a variable and press GRAPH to graph the variable in the Current Weather Mode screen. The console places a graph icon on the screen next to the selected variable or value you want to view to indicate the currently selected variable.

- You can also select any variable currently displayed on the LCD screen using the navigation keys. Push up (+) to move up the screen. Press down **(-)** to move down the screen. Push left (**<**) to move left and push right (**>**) to move right.

Selecting Units of Measure

Most weather variables may be displayed in at least two different measurement units, including imperial (US) and metric systems, although some variables feature more possibilities. Barometric pressure, for example, may be displayed in millibars, millimeters, inches, or hectoPascals. Note that you can set each variable's units independently, and at any time, as you like.

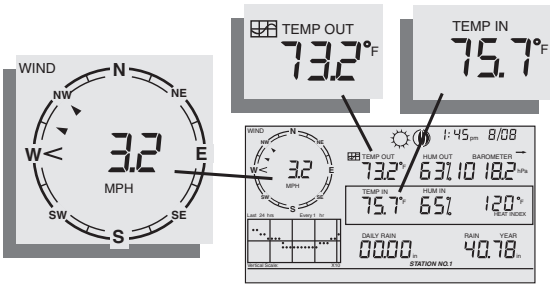
To change units:

1. Select the weather variable. See "Selecting Weather Variables" on page 18.
2. Press and release 2ND then press UNITS. The selected variable's units change. Repeat steps 1 and 2 until the desired units appear.

For example, to change the barometric pressure units, first select barometric pressure by pressing BAR. Next, press and release 2ND, then press UNITS. Repeating

these steps cycles through the units available for barometric pressure: millibars, millimeters, inches, and hectoPascals.

Displaying Units: Barometric Pressure Units: millibars (mb), millimeters (mm) and



Wind Direction, Outside and Inside Temperature

Wind Speed and Direction

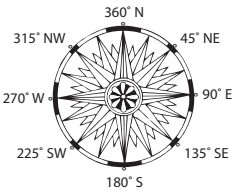
Press WIND to select wind speed.

3. Wind speed may be displayed in miles per hour (m.p.h.), kilometers per hour (km/h), meters per second (m/s), and knots (knots). The 10 minute average wind speed will be displayed in the ticker.

   A solid arrow within the compass rose indicates the current wind direction. Arrow caps indicate up to six different 10-minute dominant wind directions to provide a history of the dominant wind directions for the past hour.

4. Press WIND a second time to display the wind direction in degrees instead of the wind speed. When displayed in degrees, Due North displays as 360° for consoles with firmware dated May 2005 or later. Previous releases marked Due North at 0°.

   Each additional WIND key press toggles the display between wind speed and wind direction in degrees.



Note: If your anemometer arm is not pointing true north, you should recalibrate the wind direction reading on your console. See “Calibrate Wind Direction Reading” on page 25 for more information.

Outside and Inside Temperature

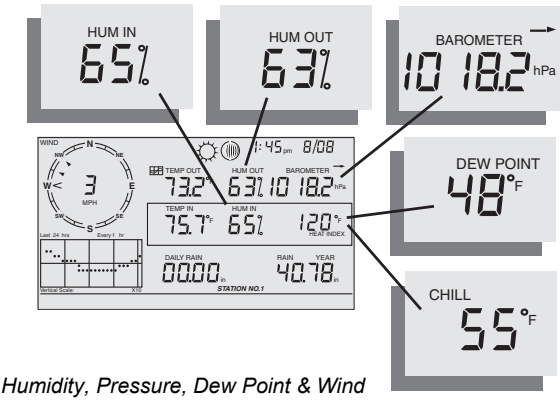
1. Press TEMP to select outside temperature.

Temperature may be displayed in degrees Fahrenheit (ºF) or Celsius (ºC). Temperatures can also be displayed in degrees or in tenths of a degree.

TEMP

2. Press TEMP again to select inside temperature.

   Each consecutive press of TEMP displays temperature readings for any optional temperature, temperature/humidity, soil temperature, soil moisture stations also connected to your console. The order of the optional sensors readings display depends on your station configuration. Temperatures for temperature stations display, with soil temperature and moisture stations displaying consecutively.



Humidity, Pressure, Dew Point & Wind

Humidity

DEW HUM

Press HUM to select outside humidity. Pressing HUM a second time selects inside humidity. Humidity is displayed in percent relative humidity. Each consecutive press of HUM displays humidity readings for any optional humidity, leaf wetness, and leaf temperature stations also connected to your console. The order of the optional sensors readings display depends on your station configuration. Humidity readings for humidity stations display, with leaf wetness and leaf temperature readings displaying consecutively.

Wind Chill

Press 2ND then press CHILL to select Wind Chill. Wind Chill is displayed in either Fahrenheit (ºF) or Celsius (ºC) in whole degrees.

2ND CHILL WIND

The console uses the ten-minute average wind speed to calculate wind chill.

Dew Point

Press 2ND then press DEW to select Dew Point. Dew Point is displayed in either Fahrenheit (ºF) or Celsius (ºC) in whole degrees.

2ND DEW HUM

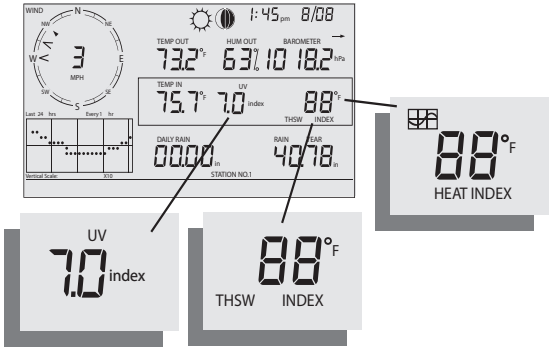
Barometric Pressure

BAR

Press BAR to select barometric pressure. Barometric pressure may be displayed in inches (in), millimeters (mm), millibars (mb) or hectoPascals (hPa).

Pressure Trend

The pressure trend arrow indicates the current barometric trend, measured over the last three hours. The pressure trend is updated every 15 minutes. The pressure trend requires three hours of data in order to be calculated so it won't display right away on a new station. The pressure trend is indicated on the console screen, as long as the required data is available.



UV, Heat, and THSW Index

UV (Ultraviolet Radiation)

2ND UV RAIN YR

Press 2ND and UV to display the current UV index. The current UV index is the amount of ultraviolet radiation the sensor is currently reading.

Press 2ND and UV again to display the accumulated UV index for the day. The accumulated UV index is the total ultraviolet radiation that the sensor has read throughout the day. The accumulated UV index for the day is reset to zero every night.

Note: Requires a UV sensor. See "Optional Sensors & Transmitting Stations" on page 2.

Heat Index

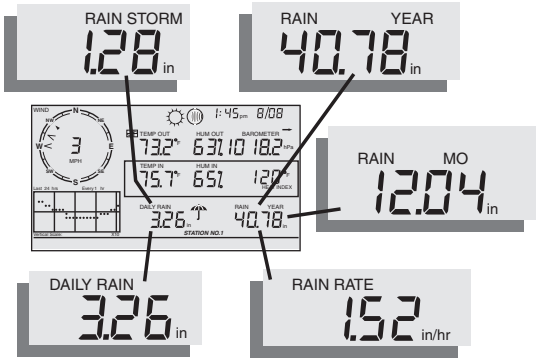
2ND HEAT TEMP

Press 2ND then press HEAT to display the Heat Index.

THSW Index

After you have selected the Heat Index, press 2ND then press HEAT again to select the Temperature Humidity Sun Wind (THSW) Index. The THSW Index is only available on stations equipped with a solar radiation sensor.

The Heat Index and the THSW Index display in the same place on the screen and are displayed in degrees Fahrenheit (ºF) or Celsius (ºC).



Daily Rain, Rain Storm, Rain Year, Rain Month, & Rain Rate

Rain Rate

Press RAINYR to display the current rain rate. Rain Rate may be displayed as either inches per hour (in/hr.) or millimeters per hour (mm/hr.). Rain Rate will show zero and the umbrella icon does not appear until two tips of the rain bucket within a 15–minute period.

UV
RAIN$_{YR}$

Month–to–date precipitation

Press RAINYR again to select the month–to–date precipitation record. Monthly rain displays the precipitation accumulated since the calendar month began. Month–to–date precipitation is displayed in inches or millimeters (mm).

Year–to–date precipitation

Press RAINYR a third time to display the year–to–date precipitation record. Yearly rain displays the precipitation accumulated since the 1st of the month you've chosen as the beginning of your rain season in Setup Mode (See "Screen 13: Rain Season" on page 16). Year–to–date precipitation is displayed in inches (in) or millimeters (mm).

Daily Rain

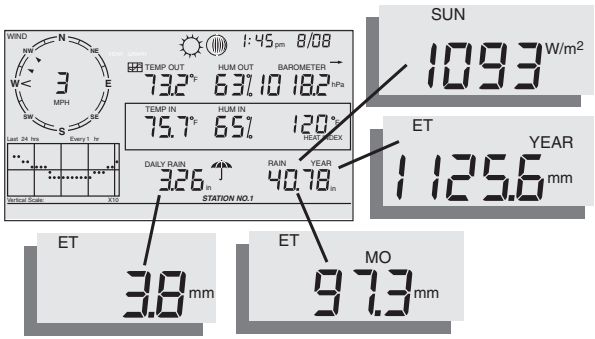
Press RAINDAY to display the rain accumulated since 12 midnight. Any rain accumulated in the last 24 hours displays in the ticker at the bottom of the screen.

RAIN$_{DAY}$

Rain Storm

Rain Storm displays the rain total of the last rain event. It takes two tips of the rain bucket to begin a storm event and 24 hours without rain to end a storm event.

Press RAINDAY to toggle between the daily rain total and the Rain Storm total. Rain accumulation may be displayed as either millimeters (mm) or inches (in).



Solar Radiation, Current ET, ET Month & ET Year

Solar Radiation

Press and release 2ND then press SOLAR to display the current solar radiation reading. Solar radiation is displayed as Watts per square meter (W/m^2).

2ND SOLAR RAIN DAY

Current Evapotranspiration (ET)

Press and release 2ND then press ET to display the current evapotranspiration reading.

2ND ET BAR

Monthly Evapotranspiration (ET)

Press 2ND then press ET, then repeat the key sequence to display Monthly ET.

Yearly Evapotranspiration (ET)

Press 2ND then press ET, then repeat this key sequence two more times to display the ET reading since January 1st of the current year.

Note: A solar radiation sensor is required to take readings listed above. See “Optional Sensors & Transmitting Stations” on page 2.

Lamps

Press 2ND then press LAMPS to turn on the backlight for the screen display. Press 2ND then LAMPS again to turn the backlight off.

LAMPS 2ND

Use the backlight when the LCD is not clearly visible. When the console is battery operated, the backlight remains on as long as keys are pressed or a ticker tape message is scrolling across the screen. If no keys are pressed, the backlight automatically turns off about fifteen seconds after it is turned on. If any key is pressed while it is turned on, it will stay illuminated for 60 seconds from the last key press. When battery power is low, the backlight does not light.

Note: When the console receives power from the AC adapter, the backlight remains on until it is toggled off. Leaving the backlight on raises the inside temperature reading and lowers the inside humidity reading.

Displaying the Forecast

Your console generates a weather forecast based on the barometric reading & trend, wind speed & direction, rainfall, temperature, humidity, latitude & longitude, and time of year. Included in the forecast is a prediction of the sky condition (sunny, cloudy, etc.) and changes in precipitation, temperature, wind direction or wind speed.

Press FORECAST to display the forecast. The forecast ticker message at the bottom of the screen predicts the weather up to 48 hours in advance.

The forecast is updated once an hour, on the hour. Predictions are made for cloud cover, temperature trends, the likelihood of precipitation, timing, severity and windy conditions.

Forecast Icons

The forecast icons show the predicted weather for the next 12 hours. If rain and/or snow is possible but not necessarily likely, the partly cloudy icon along with the rain or snow icon displays. When both the rain and snow icons display together, a chance of rain, freezing rain, sleet and/or snow is likely.

Displaying Time & Date or Sunrise & Sunset

Your console shows the sunrise and sunset time in the same place on the screen used by the current time and date. Press 2ND and then press TIME to toggle the screen between the current time and date or the sunrise and sunset times for the current day.

Note: See “Screen 4: Time & Date” on page 12 to change the console time and date or to select a 12- or 24-hour clock.

Calibrating, Setting, and Clearing Variables

To fine-tune your station, you can calibrate most of the weather variables. For example, if your outside temperature seems consistently too high or too low, you can enter an offset to correct the deviation.

Calibrating Temperature And Humidity

You can calibrate inside & outside temperature, inside & outside humidity, as well as any extra temperature/humidity sensor readings you have transmitting to your Vantage Pro2.

1. Select a variable to be calibrated. See "Selecting Weather Variables" on page 18.
2. Press and release 2ND, then press and hold SET.

   After a moment, the variable you've selected begins to blink. Keep holding SET until the Calibration Offset message displays in the ticker.

   The ticker displays the current calibration offset.
3. Press the+ and - keys to add or subtract from the temperature offset value.

   Inside and outside temperature are calibrated in 0.1° F or 0.1° C increments, up to a maximum offset of +12.7 (°F or °C) and a minimum offset of -12.8 (°F or °C). The variable will change value and the ticker will show the offset you've entered.
4. Press DONE to exit calibration.

Calibrate Wind Direction Reading

If the anemometer arm cannot be mounted pointing to true north, use this procedure to correct the wind direction console reading.

1. Check the current direction of the wind vane on the anemometer. Compare it to the wind direction reading on the console.
2. Press WIND as necessary to display the wind direction in degrees.
3. Press and release 2ND, then press and hold SET.
4. The wind direction variable will begin to blink.
5. Continue holding the key until the CAL message appears in the ticker. The ticker displays the current wind direction calibration value.
6. Press the < and > keys to select digits in the anemometer's current reading.
7. Press the + and - keys to add/subtract from the anemometer reading.
8. Repeat steps 6 and 7 until you have entered the offset value from Step 1.
9. Press DONE to exit calibration.

Calibrating Barometric Pressure

Before calibrating the barometric pressure, be sure the station is set to the correct elevation. See "Screen 10: Elevation" on page 14 for more information.

1. Press BAR to select barometric pressure.
2. Press and release 2ND, then press and hold SET.

   The pressure variable blinks.
3. Continue holding the key until the ticker reads "set barometer . . . ".
4. Press the < and > keys to select digits in the variable.
5. Press + and - keys to add to or subtract from the digit's value.

6. Press DONE to exit calibration.

Setting Weather Variables

You can set values for the following weather variables:

- **Daily Rain**—Sets the daily rain total. Monthly and yearly rain totals are updated.
- **Monthly Rain**—Sets the current months total rain. Does not affect yearly rain total.
- **Yearly Rain**—Sets the current year's rain total.
- **Daily ET (Evapotranspiration)**—Sets the daily ET total. Monthly and yearly ET totals are updated.
- **Monthly ET**—Sets the current month's ET. Does not affect yearly total.
- **Yearly ET**—Sets the current year's total ET.

To set a weather variable's value:

1. Select the variable you wish to change.
2. Press and release 2ND, then press and hold SET. The variable blinks.
3. Keep holding SET until all digits are lit and only one digit is blinking.
4. Press the < or > keys to select digits in the value.
5. Press the + and - keys to add to or subtract from the selected digit.
6. When you are finished, press DONE to exit.

Clearing Weather Variables

The following weather variables can be cleared:

- **Barometer**—Clears any pressure offset used to calibrate the station, and the elevation entry.
- **Wind**—Clears the wind direction calibration.
- **Daily rain**—Clearing the daily rain value is reflected in the daily rain total, the last 15 minutes of rain, the last three hours of rain sent to the forecast algorithm, the umbrella icon, and the monthly and yearly rain totals. Clear the daily rain total if the station accidentally recorded rain when the ISS was installed.
- **Monthly rain**—Clears the monthly rain total. Does not affect the yearly rain total.
- **Yearly rain**—Clears the yearly rain total.
- **Daily ET**—Clears daily ET and subtracts the old daily ET total from the monthly and yearly ET totals.
- **Monthly ET**—Clears the current monthly ET total. Does not affect the yearly ET total.
- **Yearly ET**—Clears the current yearly ET total.

To clear a single weather variable:

1. Select the weather variable.

   See "Selecting Weather Variables" on page 18.

2. Press and release 2ND, then press and hold CLEAR.

   The variable you've chosen blinks. Keep holding the key until the value changes to zero or, in the case of the barometer, the raw barometer value. Clearing the barometer value also clears the elevation setting.

Clear All Command

This command clears all stored high and low weather data including monthly and yearly highs and lows and clears alarm settings all at once.

1. Make sure wind speed is showing in the wind compass. If wind direction is showing, press WIND on the console until wind speed appears.
2. Press 2ND then press and hold CLEAR for at least six seconds.
3. Release CLEAR when “CLEARING NOW” displays at the bottom of the console’s screen.

Highs and Lows Mode

The Vantage Pro2 records highs and lows for many weather conditions over three different periods: days, months, and years. Except for Yearly Rainfall, all high and low registers are cleared automatically at the end of each period.

For example, daily highs are cleared at midnight, monthly highs are cleared at month–end midnight, yearly highs are cleared at year–end midnight. You may enter the month that you would like the Yearly Rainfall accumulation to clear. The Yearly Rainfall clears on the first day of the month you chosen. The Yearly High Rain rate clears using the same setting.

The following table lists the high and low modes for all the weather variables:

Weather Variable	High	Low	Day, Time & Date	Month	Year	Additional Information
Outside Temperature	Yes	Yes	Yes	Yes	Yes	
Inside Temperature	Yes	Yes	Yes	Yes	Yes*	
Outside Humidity	Yes	Yes	Yes	Yes	Yes*	
Inside Humidity	Yes	Yes	Yes	Yes	Yes*	
Barometer	Yes	Yes	Yes	Yes	Yes*	
Heat Index	Yes		Yes	Yes	Yes*	
Temp/Hum/Wind/Sun (THSW) Index	Yes		Yes	Yes	Yes*	requires solar radiation sensor
Wind Chill		Yes	Yes	Yes	Yes*	
Wind Speed	Yes		Yes	Yes	Yes	Includes direction
Rainfall Rate	Yes		Yes	Yes	Yes	
Daily Rain			Total	Total	Total	
UV Index	Yes		Yes	Yes**	Yes*	requires UV sensor
Solar Radiation	Yes		Yes	Yes**	Yes*	requires solar radiation sensor
Dew Point	Yes	Yes	Yes	Yes	Yes*	
Evapotranspiration			Total	Total	Total	requires solar radiation sensor
Soil Moisture	Yes	Yes	Yes	Yes**	Yes*	requires soil moisture sensor
Leaf Wetness	Yes	Yes	Yes	No	Yes*	requires leaf wetness sensor

* Only stores the yearly high for the current year.
** Only stores monthly high for the current month.

Weather Data Highs and Lows

Viewing Highs and Lows

1. Press HI/LOW to enter the Highs and Lows mode.

   The DAY and HIGHS icons light up and the station displays the highs for all visible fields.

2. Press the + and - keys to scroll between Day Highs, Day Lows, Month Highs, Month Lows, Year Highs and Year Lows.

   The HIGH or LOW icon, as well the DAY, MONTH or YEAR icon lights to display which High/Low screen you've selected.
3. Press the < and > keys to scroll back and forth through the last 24 values.

   Pressing the < key displays the previous day's highs. Each time you press the < key, the date moves back another day. The 24 dots in the graph field also represent each of the last 24 days, months, or years; the right-most dot is the present. As you move backward and forward the flashing dot changes to show what value you're looking at.
4. Use the console keys to select a different weather variable.

   The console's time displays time of the selected variable's high or low.
5. Press DONE to exit the Highs and Lows mode. The console screen switches to the Current Weather mode.

Alarm Mode

The Vantage Pro2 features more than 30 alarms that can be programmed to sound whenever a reading exceeds or drops below a set value. With the exception of barometric pressure and time, all alarms sound when a reading reaches the alarm threshold. For example, if the high outside temperature alarm is set at 65º F, the alarm sounds when the temperature rises to 65.0º F.

When an alarm condition exists, the audible alarm sounds, the alarm icon blinks repeatedly, and an alarm description appears in the ticker at the bottom of the screen. The alarm sounds for a maximum of two minutes if the console is battery-powered, but the icon continues to blink and the message stays in the ticker until you clear the alarm or the condition clears. If you're using the AC adapter, the alarm will continue sounding as long as the condition exists.

The alarm will sound again for each new alarm. If more than one alarm is active, the description for each active alarm cycles onto the screen every four seconds. A "+" symbol appears at the end of the alarm text if more than one alarm is tripped.

Low alarms work the same way. For example, if the wind chill threshold is set for 30ºF, the alarm condition begins when the wind chill drops to 30º and will continue until the wind chill rises above 30º.

Four Special Alarms

ET (Evapotranspiration)

ET is updated only once an hour, on the hour. If during a given hour the ET Value exceeds the alarm threshold, the ET alarm sounds at the end of that hour. This is true for daily, monthly, and yearly ET alarms. You must have the optional Solar Radiation Sensor to use this alarm. See "Evapotranspiration (ET)" on page 46. for a description of this variable.

Barometric Pressure

The Vantage Pro2 allows you to set two barometric pressure alarms: a "rise" alarm and a "fall" alarm. You may select any rate of change per three hours between 0.00 and 0.25 inches (6.35 mm) Hg, (8.5 mb, hPa); the alarm will sound if the rate of change (in either direction) exceeds the threshold you set. This alarm is updated every 15 minutes.

Time

The time alarm is a standard “alarm clock” alarm. It sounds for one minute at the set time. Make sure you choose AM or PM, if you’re in 12-hour mode.

UV Dose

The UV dose alarm sounds when the accumulated UV dose has exceeded the dose you set. The UV dose alarm does not arm unless the initial UV dose for the day has been reset. Once the UV dose alarm value is set, clear the accumulated UV dose. See “Clearing Weather Variables” on page 26.

Setting Alarms

1. Press ALARM to enter the Alarm Mode to view or set the high alarm thresholds. The screen displays the current high alarm thresholds. The ALARM and HIGHS icons also appear.
2. Press the < and > keys to select one of the variables displayed on the screen or use the console keys to select any weather variable. Also, press HI/LOW to display the toggle between the high and low alarm threshold settings.
3. Press 2ND then press ALARM to activate the currently selected weather variable.
4. Press the < and > keys to select digits in the threshold value.
5. Press the + and - keys to change the digit’s value up and down.
6. Press DONE to finish changing the alarm setting.
7. Repeat steps 3 through 6 to change additional alarm settings.
8. Press DONE to exit Alarm Mode.

Vantage Pro2 Station AlarmsVantage Pro2 Station Alarms

Variable	Alarms
Barometric Pressure Trend	Storm Warning - uses trend value falling rate Storm Clearing - uses trend value rising rate
Evapotranspiration	ET Alarm - uses total ET for the day
Humidity, Inside	High and Low
Humidity, Outside	High and Low
Dew Point	High and Low
Leaf Wetness	High and Low
Rain	Flash Flood Alarm - uses current 15 minute rainfall total 24 Hour Rain Alarm - uses current 24 hour rainfall total
Storm	Storm Alarm - uses current storm rainfall total
Rain Rate	High
Soil Moisture	High and Low
Solar Radiation	High
Inside Temperature	High and Low
Outside Temperature	High and Low
Extra Temperature	High and Low
Heat Index Temperature	High
THSW Index Temperature	High
Wind Chill Temperature	Low
UV Radiation Index	High
UV Radiation MED	High - uses the current total if variable has been reset
Wind Speed	High
Time & Date	Yes - the alarm sounds for 1 minute.

Setting the Time Alarm

1. Press ALARM to enter alarm mode.
   The ALARM and HIGHS icons appear.
2. Press 2ND, then press TIME, then press 2ND again**,** and then press ALARM.
   The time field begins blinking.
3. Press the < and > keys to select hours, minutes, or AM/PM.
4. Press + and - keys to change the digit's value up and down.
5. Press DONE to exit Alarm Mode.

Clearing Alarm Settings

1. Press ALARM to enter alarm mode.
   The ALARM and HIGHS icons appear.
2. Select the alarm setting you wish to clear.
3. Press 2ND, then press and hold CLEAR until the setting changes to all dashes.
   You have cleared the alarm setting.
4. Press DONE to exit Alarm Mode.

Note: To clear **all** alarms, enter Alarm mode (press and release the ALARM key), then press and hold the ALARM key until all the fields become dashed.

Silencing Alarms

1. Press DONE to silence an alarm when it sounds.

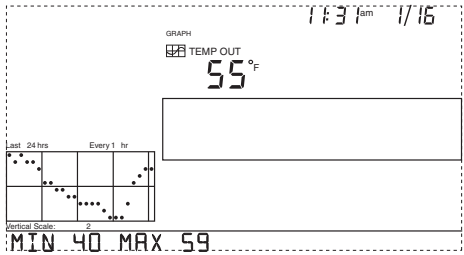
Graph Mode

The Vantage Pro2 console includes a powerful Graph Mode that allows you to view over 100 graphs of different kinds right on the screen, all without connecting to a personal computer.

Viewing Graphs

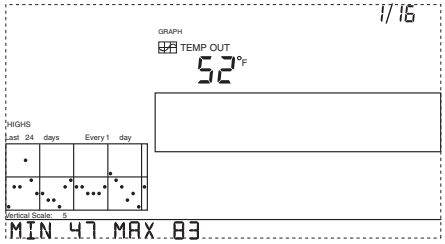
Although the graphs available may vary for each weather variable, you display the graphs in the same way.

1. Select a variable to graph.
   Only the date, graph, graph icon, and selected variable are visible. The rest of the screen is blank.
2. Press GRAPH to enter Graph Mode.
   Values for the each of the last 24 hours are displayed in the graph, each hour represented by a dot.
   The dot at right end of the graph is the value for the current hour. You'll notice that the dot is blinking.



3. Press the < key and the second dot from the right starts to blink.
   The screen displays the new dot's value. The time display shows what hour of the last 24 is being viewed.
4. Press the < and > keys to view the variable's values for each of the last 24 hours. The console also displays the maximum and minimum temperatures recorded in the last 24 hours.
5. Press the + and - keys to shift the graph's time span.

If you press the - key the graph shifts from the last 24 hours to the last 24 days. Now each dot represents the high recorded on the day shown in the date field. To see the lows recorded in the last 24 days, press HI/LOW. Press the < and > keys to move between days.



By pressing the - key again, the graph shifts to show the highs of the last 24 months. As before, use the < and > keys to move between months. Press HI/LOW to shift between the highs and lows.

By pressing the - key again, the graph shifts one more time to show the highs of the last 24 years. Press HI/LOW to shift between highs and lows.

The console beeps when you've reached the first or last possible value or time span for the graph. Since the console only graphs data collected by the station, the graphs can only show data collected since the station was first installed.

View graphs of all other variables the same way.

1. Select the variable you want to view.
2. Press GRAPH.
3. Use the < and > keys to select different variables.
4. Press the + key to shorten the time range.
5. Press the - key to lengthen the time range.
6. Press HI/LOW to shift between highs and lows.
7. Press DONE to exit.

Vantage Pro2 Console Graphs

Weather Variable	Available Graphs*							
	Current	1 Min	10 Min	15 Min	Hourly	Daily	Monthly	Yearly
Barometric Pressure	C	C			C	H, L	H, L	
Evapotranspiration (ET)**	T				T	T	T	T
Humidity, Inside	C				C	H, L	H, L	
Humidity, Outside	C				C	H, L	H, L	
Dew Point	C				C	H, L	H, L	
Leaf Wetness***	C				C	H, L		
Rain	T			T	T	T	T	T
Storm****								
Rain Rate	H	H			H	H	H	H
Soil Moisture	C				C	H, L		
Solar Radiation**	A				A	H		
Inside Temperature	C				C	H, L	H, L	
Outside Temperature	C				C	H, L	H, L	H, L
Heat Index Temperature	C				C	H	H	
Temp/Hum/Sun/Wind (THSW) Index**	C				C	H	H	
Wind Chill Temperature	L				L	L	L	
UV Radiation Index*****	A				A	H	C	
UV Radiation MED (Minimal Erythermal Dose)*****	T				T	T		
Wind Speed	A		A		A, H	H	H	H
Direction of High Wind Speed	Y					Y	Y	Y
Dominant Wind Direction	A				A	A	A	

* A = Average, H = Highs, L = Lows, T =Totals, Y = Yes, C = Current reading at the end of each period

** Requires solar radiation sensor, *****Requires UV sensor

*** Requires Wireless Leaf & Soil Moisture Temperature station

**** Graphs the last 24 storm events and doesn't follow the same graph conventions as other variables.

Chapter 4
Troubleshooting and Maintenance

Vantage Pro2 Troubleshooting Guide

While your Vantage Pro2 weather station is designed to provide years of trouble-free operation, occasional problems may arise. If you are having a problem with your station, please consult this troubleshooting guide before calling Davis technical support. You may be able to quickly solve the problem yourself. Please see "Contacting Davis Technical Support" on page 53.

Note: Refer to the ISS Installation Manual for additional troubleshooting information.

TABLE 4-1: TROUBLESHOOTING GUIDE

	Problem	Solution
Display	Display shows only "RECEIVING FROM....."	Indicates that console has rebooted. Hold the DONE key to return to Current Weather Mode. (Check time setting if power was lost.)
	Display is blank	Unit is not receiving power. Check the power adapter connections and/or replace batteries.
	Display shows dashes in place of weather data	• ISS not plugged in (cabled station). See ISS manual. • Sensors not transmitting (wireless station). See ISS (or other transmitter) manual. • Console not receiving (wireless station) - See "Troubleshooting Reception Problems" on page 35. • A reading has exceeded the limits indicated in the specifications table. • Calibration numbers may be causing readings to exceed display limits. Check calibration number and adjust if necessary.
	Console is sluggish or does not work at low temperatures	The console and display may not work below 32º F (0º C). Use an External Temperature sensor in low-temperature locations or install the console indoors.
	Display shows "odd" values or missing values.	You may have synchronized with another weather station nearby. Change the transmission and reception IDs to a different ID.
	Display "locks up"	Reset the console by removing AC and battery power then restoring power. If this occurs frequently in an AC-powered console, plug the AC power-adapter into a surge suppressor.
Humidity	Inside humidity seems too high or too low	Make sure the console is not near a humidifier or de-humidifier. Check calibration number and adjust if necessary. If inside humidity is low, and inside temperature is too high, see "inside temp" below. Also make sure the console backlight is not on.
Wind Speed	Wind speed reading seems too high or too low.	For low readings, remove wind cups and check for friction sources. Check the anemometer location. Is it sheltered from the wind? See ISS manual for additional wind speed troubleshooting information.
	Wind speed reads 0 either all the time or intermittently	The problem may be with the anemometer. Test anemometer by spinning wind cups. Check reed switch fields on diagnostic screen (see page 37) and call technical support.
Dew	Dew Point reading seems too high or too low	Check calibration numbers for temperature. Dew point depends on temperature and outside humidity. Make sure they're working.

TABLE 4-1: TROUBLESHOOTING GUIDE

	Problem	Solution
Temperature	Outside temperature sensor reading seems too high	Check to see if ISS is near mechanical or radiant heat source. Check calibration number and adjust if necessary. ISS or temp sensor may need to be relocated. See ISS or other transmitter manual.
	Inside temperature sensor reading seems too high	Move the console out of direct sunlight. Make sure that the console or sensor is not in contact with an exterior wall that heats up in sunlight or when outside temperature rises. Make sure the console or sensor is not near a heater or other internal heat source (lamps, appliances, etc.). Also make sure the console backlight is not on. Check calibration number and adjust if necessary.
	Outside temperature seems too low	Check calibration number and adjust if necessary. Sprinklers may be hitting the ISS radiation shield. Relocate. See ISS manual.
	Inside temperature sensor reading seems too low	Make sure the console or other temperature sensor is not in contact with an exterior wall that cools down when outside temperature drops. Make sure the console or other temperature sensor is not near an air conditioning vent. Check calibration number and adjust if necessary.
Wind Direction	Wind direction reading is dashed out	• Wireless model - check reception. See Reception Problems below. • Cabled model - cable may be faulty. If these steps do not reveal the problem, the anemometer may be faulty. Call technical support.
	Wind direction always says north	Usually a problem in the ISS, either with the transmitter or anemometer cable. See the ISS manual for troubleshooting information.
Chill	Wind chill reading seems too high or too low	Check calibration numbers for temperature. Wind chill depends on temperature and wind speed. Make sure they're working.
Heat	Heat Index reading seems too high or too low	Check calibration numbers for temperature. The heat index depends on temperature and outside humidity. Make sure the sensors are working.
Rain	No rain readings	Make sure cable-tie is removed from inside the rain collector. See the ISS manual.
UV/Solar	Readings are too high	Can be caused by high thin cirrus clouds.
Time	Incorrect times for sunrise and sunset	Check your latitude, longitude, time zone, and daylight savings time settings. Sunrise and sunset times are calculated from the console using all of these settings.

Troubleshooting Reception Problems

While we have tested the Wireless Vantage Pro2 radio extensively, each site and each installation presents its own issues and challenges. Obstructions, particularly metallic ones, often cut down your station's reception distance. Be sure to test reception between the console and ISS, in the locations you intend to install them, before permanently mounting your ISS or other transmitter(s).

The console's reception status displays at the lower right corner of the screen.

- An “X” flashes for every data packet received by the console.
- An “R” displays when the console is trying to re-establish a lost connection. The console tries for 10 minutes to re-establish a connection before going into L Mode.When no data packets have been received for 10 minutes, the console dashes-out any missing sensor readings.
- An “L” displays when the signal is lost (and the console is “asleep.”) The console stays in this mode for 15 minutes until returned to “R” mode. To force the console into “R” mode (“wake up” the console), enter and exit Setup Mode.

Check Console Reception

Enter Setup mode by pressing and holding DONE, then pressing the - key at the same time. Wait a few minutes while the console lists all the stations transmitting within range (See “Screen 1: Active Transmitters” on page 10 for more information). If the console does not detect your transmitter, check the following:

- Adjust the console and ISS antennas so that they are in line of sight with each other.
- Reduce the distance between the ISS and the console.
- If the console is directly beneath the ISS, the antennas should be horizontal.
- Try distancing your console from your ISS, at least 10 feet apart.
- Change the Transmitter ID (on both the console and the ISS) to a number other than 1.

Refer to the *ISS Installation Manual* or other station manual for instructions on how to check the station for potential transmission problems.

Console Diagnostic Mode

In addition to logging weather data, the console continuously monitors the station’s radio reception. You may find this information very helpful, especially when you are choosing locations for your console and ISS.

The Console Diagnostics Mode consists of two screens, the Statistical Diagnostic Screen and the Reception Diagnostic Screen. The Statistical Diagnostic screen applies for both cabled and wireless weather stations. The Reception Diagnostic screen applies only to wireless weather stations and is not accessible to a cabled weather station.

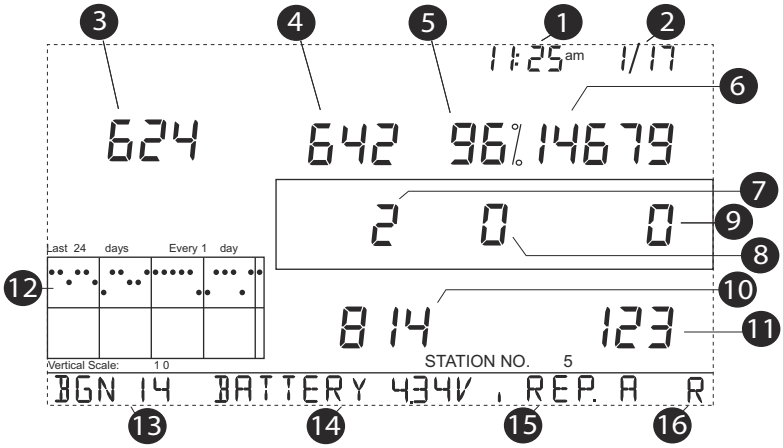
Note: Radio transmission data used by the diagnostic screens clears each day at midnight.

Diagnostic Screen Commands

- Press and hold TEMP, then press HUM to display the Statistical Diagnostic screen.
- Press the > key to display signal statistics for the next installed transmitter ID.
- Press 2ND and then press CHILL to toggle between the Statistical and Reception Diagnostic screens.
- A degree (°) sign displays in right corner of value 1 of the Reception Diagnostic screen (screen 2) to differentiate which screen is currently displayed.
- Press DONE to exit the diagnostic screen.

Screen 1: Statistical Diagnostic Screen

The Statistical Diagnostic displays information about how data is being received from the weather station to the console. The information that is displayed in this screen includes:



Screen 1: Statistical Diagnostics Screen

Note: All values with a * mark the value as being for Davis Instruments Internal use. All values with a ‡ mark values that are the same on both the Statistical and Reception Diagnostic screens.

1. Time of day or number of times the anemometer reed switch was seen closed*. The reed switch closes once each revolution of the anemometer wind cups. Press WIND to toggle between these two values.
2. Date or the number of times the anemometer reed switch was seen open*. Press WIND to toggle between these two values.

Note: The time and date displays can be toggled in both statistical and reception diagnostic screens.

3. Number of packets containing CRC errors received. The system runs a CRC check on data packets. Any data packets that don't pass this check are considered to contain errors and are discarded. These are considered bad packets.
4. The total number of bad data packets including missed packets and CRC errors. Missed packets are described as when a data packet is expected, but is not recognized as a data packet by the console.
5. Percentage of good packets received.
6. Total number of good packets received.
7. Number of times the console resynchronized with the transmitter. The console will attempt to resynchronize with the station after 20 consecutive bad packets.
8. Maximum number of bad packets in a row without resynchronization.
9. Current streak of consecutive bad packets. The counter increments when the console is synchronized but the packet is bad. This value is reset to zero when a good packet is received.

10. Longest streak of consecutive good packets received.
11. Current streak of consecutive good packets received.
12. Graph of the daily percentage of good data packets received over the last 24 days.
13. Background noise level. This refers to the undesirable signal level the console hears while it is in the process of acquiring a signal from a station. The range displayed is from 5 to 60. When the noise level is high, try to move the console closer to the station to get a stronger signal. Small background noise level does not always guarantee good reception. The signal strength between the station and the console needs to be stronger than the background noise level in order for the console to receive clearly. If there are reception problems while a small background noise level is still being displayed, make sure the console is within reasonable range of the station.

    If the console currently has acquired all the station signals it is set to receive, the background noise level displayed is the last noise level measurement taken before acquisition finished.
14. Current console battery voltage. Ignore this value if using the AC Adapter only to power the console.
15. Repeater ID currently communicating with the console. If a repeater or group of repeaters is used to relay station information to the console, the Repeater ID displayed is the repeater that the console is set to receive. If the console is not listening to repeaters, this section remains blank. Please see Application Note 25 available on the Davis Instruments Support web page for more information on using repeaters.

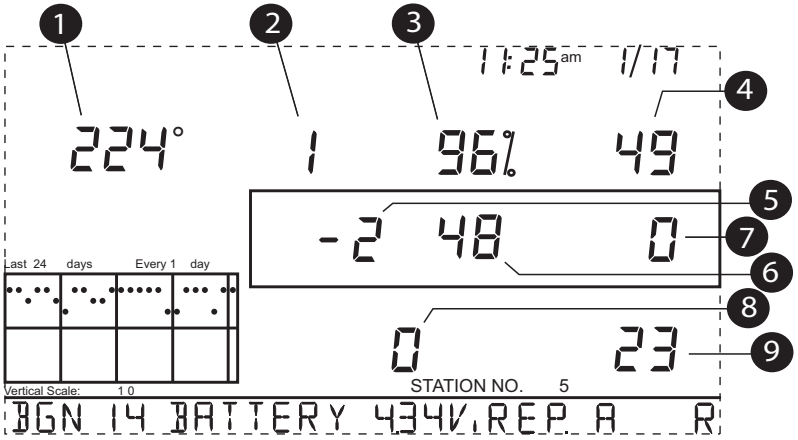
Note: The Repeater ID does not display in the ticker banner in firmware versions earlier than May 2005, or Version 1.6. If you want your console to support repeater communication, upgrade your console to the most recent console firmware version.

16. The console's reception status. See "Troubleshooting Reception Problems" on page 35 for information on the status types.

Screen 2: Reception Diagnostic Screen

The Reception Diagnostic screen displays information pertinent to the console's wireless reception. To view this screen from the Statistical Diagnostic screen, press 2ND and then press CHILL. The degree sign displaying in the upper left corner next to value 1 verifies that the Reception Diagnostic screen is currently displayed.

The information that is displayed in this screen includes:



Screen 2: Reception Diagnostics Screen

1. 8-bit timer value of next reception.*
2. Radio frequency error of the last packet received successfully. In normal operation, this value is +1, -1, or 0. This value affects the value of #5 on the next page.
3. Percentage of good data packets.‡
4. Signal strength of the last packet received. The values displayed in this field should generally be between 20 and 60. If a packet is not received successfully, the signal strength field is dashed out (--).
5. Current frequency correction factor. Shows the Automatic Frequency Control setting.
6. Frequency index of the next packet to be received.*
7. Current number of consecutive bad packets.‡
8. The number of times that the Phase Lock Loop did not lock.*
9. Current streak of consecutive good packets received.‡

Console Firmware Versions

In some cases, the problem may be that your console firmware doesn't support what you are trying to do. Use this command to determine the firmware revision level in your console. You can find more information on Vantage Pro2 console firmware versions and changes in the Weather Software Support section of our website. - for information.

Press and hold DONE then press the + key at the same time to display the console firmware version in the ticker at the bottom of the screen.

Console Maintenance

Changing Batteries

Use this procedure to change console batteries without losing any stored weather data or console configuration settings.

1. Plug in the AC adapter or, if the AC adapter is not present, enter Setup Mode by pressing DONE and then the - key.

Note: If you cannot plug in the AC Adapter, entering Setup Mode makes sure the station isn't writing any data to memory when power is removed and avoids data loss.

2. Remove the battery cover located on the back of the console by pressing down on the two latches at the top of the cover.
3. Place the console face down on a flat, firm surface.
4. Insert a fingertip between the two exposed batteries then press the middle battery down toward the notch (toward the "hidden" battery). This will relieve tension on the first battery and allow you to remove it.
5. Remove the old batteries and install the new batteries.
6. Replace the battery cover and remove the AC power adapter, if used.
7. Check and set date and time if power was lost.

One Year Limited Warranty

For details on our warranty policy, please refer to the *Maintenance, Service, and Repair Information* brochure included with your station.

Appendix A
Weather Data

Refer to this appendix to learn more about the weather variables that are measured, displayed, and logged by your Vantage Pro2 Station. Some weather variables require optional sensors. See “Optional Sensors & Transmitting Stations” starting on page 2.

Wind

The anemometer measures wind speed and direction, and is part of the Integrated Sensor Suite (ISS). The console calculates a 10-minute average wind speed and 10-minute dominant wind direction. The 10-minute average wind speed is displayed in the console ticker whenever wind has been selected on the console. The last six 10-minute dominant wind directions are included in the compass rose wind display.

Temperature

The ISS houses the outside temperature sensor in a vented and shielded enclosure that minimizes the solar radiation induced temperature error. The console houses the inside temperature sensor. Additional temperature sensors are available for wireless stations and can measure up to eight locations.

Apparent Temperatures

Vantage Pro2 calculates three apparent temperature readings: Wind Chill, Heat Index, and the Temperature/Humidity/Sun/Wind (THSW) Index. Apparent temperatures use additional weather data to calculate what a human body perceives the temperature to be in those conditions.

Wind chill

Wind chill takes into account how the speed of the wind affects our perception of the air temperature. Our bodies warm the surrounding air molecules by transferring heat from the skin. If there’s no air movement, this insulating layer of warm air molecules stays next to the body and offers some protection from cooler air molecules. However, wind sweeps that warm air surrounding the body away. The faster the wind blows, the faster heat is carried away and the colder you feel. Wind has a warming effect at higher temperatures.

Note: Wind chill is not calculated above 92° F (33° C).

Heat Index

The Heat Index uses temperature and the relative humidity to determine how hot the air actually “feels.” When humidity is low, the apparent temperature will be lower than the air temperature, since perspiration evaporates rapidly to cool the body. However, when humidity is high (*i.e.*, the air is more saturated with water vapor) the apparent temperature “feels” higher than the actual air temperature, because perspiration evaporates more slowly.

Note: Heat Index is equal to the air temperature at or below 0° F (-18° C).

Temperature/Humidity/Sun/Wind (THSW) Index

The THSW Index uses humidity and temperature like for the Heat Index, but also includes the heating effects of sunshine and the cooling effects of wind (like wind chill) to calculate an apparent temperature of what it "feels" like out in the sun. The THSW Index requires a solar radiation sensor.

Humidity

Humidity itself simply refers to the amount of water vapor in the air. However, the total amount of water vapor that the air can contain varies with air temperature and pressure. Relative humidity takes into account these factors and offers a humidity reading which reflects the amount of water vapor in the air as a percentage of the amount the air is capable of holding. Relative humidity, therefore, is not actually a measure of the amount of water vapor in the air, but a ratio of the air's water vapor content to its capacity. When we use the term humidity in the manual and on the screen, we mean relative humidity.

It is important to realize that relative humidity changes with temperature, pressure, and water vapor content. A parcel of air with a capacity for 10 g of water vapor which contains 4 g of water vapor, the relative humidity would be 40%. Adding 2 g more water vapor (for a total of 6 g) would change the humidity to 60%. If that same parcel of air is then warmed so that it has a capacity for 20 g of water vapor, the relative humidity drops to 30% even though water vapor content does not change.

Relative humidity is an important factor in determining the amount of evaporation from plants and wet surfaces since warm air with low humidity has a large capacity to absorb extra water vapor.

Dew Point

Dew point is the temperature to which air must be cooled for saturation (100% relative humidity) to occur, providing there is no change in water vapor content. The dew point is an important measurement used to predict the formation of dew, frost, and fog. If dew point and temperature are close together in the late afternoon when the air begins to turn colder, fog is likely during the night. Dew point is also a good indicator of the air's actual water vapor content, unlike relative humidity, which takes the air's temperature into account. High dew point indicates high water vapor content; low dew point indicates low water vapor content. In addition a high dew point indicates a better chance of rain, severe thunderstorms, and tornados.

You can also use dew point to predict the minimum overnight temperature. Provided no new fronts are expected overnight and the afternoon relative humidity is greater than or equal to 50%, the afternoon's dew point gives you an idea of what minimum temperature to expect overnight, since the air can never get colder than the dew point. Dew point is equal to air temperature when humidity = 100%.

Rain

Vantage Pro2 incorporates a tipping-bucket rain collector in the ISS that measures 0.01" for each tip of the bucket. A metric adapter can be installed to measure 0.2 mm for each tip of the bucket.Your station logs rain data in the same units it is measured in and converts the logged totals into the selected display units (inches or millimeters) at

the time it is displayed. Converting at display time reduces possible compounded rounding errors over time.

Four separate variables track rain totals: “rain storm,” “daily rain,” “monthly rain,” and “yearly rain.” Rain rate calculations are based on the interval of time between each bucket tip, which is each 0.01" rainfall increment or 0.2 mm.

Barometric Pressure

The weight of the air that makes up our atmosphere exerts a pressure on the surface of the earth. This pressure is known as atmospheric pressure. Generally, the more air above an area, the higher the atmospheric pressure, this means that atmospheric pressure changes with altitude. For example, atmospheric pressure is greater at sea level than on a mountaintop. To compensate for this difference and facilitate comparison between locations with different altitudes, atmospheric pressure is generally adjusted to the equivalent sea level pressure. This adjusted pressure is known as barometric pressure. In reality, the Vantage Pro2 measures atmospheric pressure. When you enter your location’s altitude in Setup Mode, the Vantage Pro2 stores the necessary offset value to consistently translate atmospheric pressure into barometric pressure.

Barometric pressure also changes with local weather conditions, making barometric pressure an extremely important and useful weather forecasting tool. High pressure zones are generally associated with fair weather while low pressure zones are generally associated with poor weather. For forecasting purposes, however, the absolute barometric pressure value is generally less important than the change in barometric pressure. In general, rising pressure indicates improving weather conditions while falling pressure indicates deteriorating weather conditions.

Solar Radiation

What we call “current solar radiation” is technically known as Global Solar Radiation, a measure of the intensity of the sun’s radiation reaching a horizontal surface. This irradiance includes both the direct component from the sun and the reflected component from the rest of the sky. The solar radiation reading gives a measure of the amount of solar radiation hitting the solar radiation sensor at any given time, expressed in Watts/sq. meter (W/m^2). Solar radiation requires the solar radiation sensor.

UV (Ultra Violet) Radiation

Energy from the sun reaches the earth as visible, infrared, and ultraviolet (UV) rays. Exposure to UV rays can cause numerous health problems, such as sunburn, skin cancer, skin aging, cataracts, and can suppress the immune system. The Vantage Pro2 helps analyze the changing levels of UV radiation and can advise of situations where exposure is particularly unacceptable. UV radiation requires the UV radiation sensor. The Vantage Pro2 displays UV readings in two scales: MEDs and UV Index.

Note: Your station’s UV readings do not take into account UV reflected off snow, sand, or water, which can significantly increase your exposure. Nor do your UV readings take into account the dangers of prolonged UV exposure. The readings do not suggest that any amount of exposure is safe or healthful. Do not use the Vantage Pro2 to determine the amount of UV radiation to which you expose yourself. Scientific evidence suggests that UV exposure should be avoided and that even low UV doses can be harmful.

UV MEDs

MED (Minimum Erythemal Dose) is defined as the amount of sunlight exposure necessary to induce a barely perceptible redness of the skin within 24 hours after sun exposure. In other words, exposure to 1 MED will result in a reddening of the skin. Because different skin types burn at different rates, 1 MED for persons with very dark skin is different from 1 MED for persons with very light skin.

Both the U.S. Environmental Protection Agency (EPA) and Environment Canada have developed skin type categories correlating characteristics of skin with rates of sunburn.

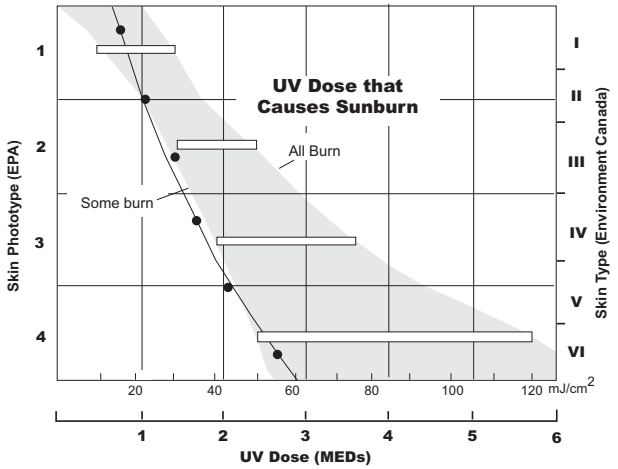
TABLE A-1: EPA SKIN PHOTOTYPES

Skin Phototype	Skin Color	Tanning & Sunburn history
1 - Never tans, always burns	Pale or milky white; alabaster	Develops red sunburn; painful swelling, skin peels
2 - Sometimes tans, usually burns	Very light brown; sometimes freckles	Usually burns, pinkish or red coloring appears; can gradually develop light brown tan
3 - Usually tans, sometimes burns	Light tan; brown, or olive; distinctly pigmented	Rarely burns; shows moderately rapid tanning response
4 - Always tans; rarely burns	Brown, dark brown, or black	Rarely burns; shows very rapid tanning response

TABLE A-2: ENVIRONMENT CANADA SKIN TYPES AND REACTION TO THE SUN[A]

Skin Type	Skin Color	History of Tanning & Sunburning
I	White	Always burns easily, never tans
II	White	Always burns easily, tans minimally
III	Light Brown	Burns moderately, tans gradually
IV	Moderate Brown	Burns minimally, tans well
V	Dark Brown	Burns rarely, tans profusely
VI	Black	Never burns, deep pigmentation

a. Developed by T. B. Fitzpatrick of the Harvard Medical School. More about the Fitzpatrick Skin Types is available in: Fitzpatrick TB. Editorial: the validity and practicality of sun-reactive skin types I through VI. Arch Dermatol 1988; 124:869-871



UV Dose and Sunburn - Use this plot to estimate the MED dose leading to sunburn. A person with Type II (Environment Canada) skin type might choose 0.75 MED as the maximum for the day; in contrast, a person with Type V (Environment Canada) Skin Type might consider 2.5 MEDs a reasonable dose for the day. NOTE: the Vantage Pro2 assumes a Fitzpatrick (Environment Canada) Skin Type of II.

UV Index

Vantage Pro2 can also display UV Index, an intensity measurement first defined by Environment Canada and since been adopted by the World Meteorological Organization. UV Index assigns a number between 0 and 16 to the current UV intensity. The US EPA categorizes the Index values as shown in table A-3. The lower the number, the lower the danger of sunburn. The Index value published by the U.S. National Weather Service is a forecast of the next day's noontime UV intensity. The index values displayed by the Vantage Pro2 are real-time measurements.

TABLE A-3: UV INDEX

Index Values	Exposure Category
0 - 2	Low
3 - 4	Moderate
5 - 6	High
7 - 9	Very High
10+	Extreme

Evapotranspiration (ET)

Evapotranspiration (ET) is a measurement of the amount of water vapor returned to the air in a given area. It combines the amount of water vapor returned through evaporation (from wet surfaces) with the amount of water vapor returned through transpiration (exhaling of moisture through plant stomata) to arrive at a total. Effectively, ET is the opposite of rainfall, and it is expressed in the same units of measure (inches, millimeters).

The Vantage Pro2 uses air temperature, relative humidity, average wind speed, and solar radiation data to estimate ET, which is calculated once an hour on the hour. ET requires the optional solar radiation sensor.

Leaf Wetness

Leaf wetness (see "Optional Sensors & Transmitting Stations" on page 2) provides an indication of whether the surface of foliage in the area is wet or dry by indicating how wet the surface of the sensor is. The leaf wetness reading ranges from 0 (dry) to 15. Leaf wetness requires an optional Leaf & Soil Moisture/Temperature Station and is only available for Wireless Vantage Pro2 Stations.

Soil Moisture

Soil Moisture, as the name suggests, is a measure of the moisture content of the soil. Soil moisture is measured on a scale of 0 to 200 centibars, and can help choose times to water crops. The soil moisture sensor measures the vacuum created in the soil by the lack of moisture. A high soil moisture reading indicates dryer soil; a lower soil moisture reading means wetter soil. Soil Moisture requires an optional Leaf & Soil Moisture/Temperature Station or Soil Moisture Station and is only available for Wireless Vantage Pro2 Stations.

Time

The console has a built-in clock and calendar track the time and date. It automatically adjusts for daylight saving time in most of North America and Europe (and allows manual adjustment elsewhere) and for leap years, providing you have entered the correct year, latitude and longitude, and daylight saving settings in the Setup Mode.

Appendix B
Specifications

See complete specifications for your Vantage Pro2 Station at our website: www.davisnet.com.

Console Specifications

Console Operating Temperature	+32° to +140°F (0° to +60°C)
Non-operating Temperature	+14° to +158°F (-10° to +70°C)
Console Current Draw	Wireless: 0.9 mA average, 30 mA peak, (add 120 mA for display lamps, add 0.125 mA for each optional transmitter station received by console) at 4 to 6 VDC Cabled: 10 mA (average), 15 mA (peak) (+80 mA for illuminated display) at 4 to 6 VDC
Power Adapter	5 VDC, 300 mA, regulated
Battery Backup	3 C-cells
Battery Life (no AC power)	Wireless: up to 9 months; (Cabled: approximately 1 month)
Connectors	Modular RJ-11
Housing Material	UV-resistant ABS plastic
Console Display Type	LCD Transflective
Display Backlight	LEDs
Dimensions:	
Console (with antenna)	10.625" x 6.125" x 1.625" (270 mm x 156 mm x 41 mm)
Console (no antenna)	9.625" x 6.125" x 1.625" (244 mm x 156 mm x 41 mm)
Display	5.94" x 3.375" (151 mm x 86 mm)
Weight (with batteries)	1.88 lbs. (.85 kg)

Wireless Communication Specifications

Transmit/Receive Frequency	
US Models:	902 - 928 MHz FHSS
Overseas Models:	868.0 - 868.6 MHz FHSS
ID Codes Available	8
Output Power	902 - 928 MHz FHSS: FCC-certified low power, less than 8 mW, no license required 868.0 -868.6 MHz: CE-certified, less than 8 mW, no license required
Range	
Line of Sight	up to 1000 feet (300 m)
Through Walls	200 to 400 feet (75 to 120 m)

Console Data Display Specifications

Historical Data	Includes the past 24 values listed unless otherwise noted; all can be cleared and all totals reset.
Daily Data	Includes the earliest time of occurrence of highs and lows; period begins/ends at 12:00 am.
Monthly Data	Period begins/ends at 12:00 am on the first of every month.
Yearly Data	Period begins/ends at 12:00 am on January 1st unless otherwise noted.
Current Graph Data	Current data appears in the right most column in the console graph and represents the latest value within the last period of the graph; totals can be set or reset.
Graph Time Interval	1 min., 10 min., 15 min., 1 hour, 1 day, 1 month, 1 year (user-selectable, availability depends upon variable selected).
Graph Time Span	24 Intervals + Current Interval (see Graph Intervals to determine time span).
Graph Variable Span (Vertical Scale)	Automatic (varies depending upon data range); maximum and minimum value in range appear in ticker.
Alarm Indication	Alarms sound for 2 minutes (time alarm is 1 minute) if operating on battery power. Alarm message displays in ticker as long as threshold is met or exceeded. Alarms can be silenced, but not cleared, by pressing DONE.
Transmission Interval	Varies with transmitter ID code - from 2.25 seconds (ID1 = shortest) to 3 seconds (ID8 = longest).
Update Interval	Varies with sensor - see individual sensor specs.

Forecast:

Variables Used	Barometric reading & trend, wind speed & direction, rainfall, temperature, humidity, latitude & longitude, time of year.
Update Interval	1 hour
Display Format	Icons on top center of display; detailed message in ticker at bottom.
Variables Predicted	Sky condition, precipitation, temperature changes, wind direction and speed changes.

Weather Data Specifications

Note: These specifications include optional sensors that may not be installed in your Vantage Pro2 Station.

Weather Data Specifications

Variable	Required Sensors	Resolution	Range	Nominal Accuracy (+/-)
Barometric Pressure*	Included in Console	0.01" Hg; 0.1 mm; 0.1 hPa; 0.1 mb	16" to 32.5" Hg 410 to 820 mm 540 to 1100 hPa 540 to 1100 mb**	0.03" Hg 0.8 mm Hg 1.0 hPa 1.0 mb
Barometric Trend (3 hour)		Change Rates Rapidly: ≥.06" Hg 1.5 mm Hg 2 hPa, 2 mb; Slowly: ≥.02" Hg 0.5 mm Hg 0.7 hPa, 0.7 mb	5 Arrow Positions: Rising Rapidly Rising Slowly Steady Falling Slowly Falling Rapidly	
Evapotranspiration (ET)	ISS or Temp/ Hum Station & Solar Radiation sensor	0.01"; 0.1 mm	Daily to 32.67"; 832.1 mm Monthly & Yearly to 199.99"; 1999.9 mm	greater of 5% or 0.01"; 0.25 mm
Inside Humidity	Included in Console	1%	1 to 100%	3% RH; 4% above 90%
Outside Humidity	ISS or Temp/ Hum Station	1%	1 to 100%	3% RH; 4% above 90%
Extra Humidity	ISS or Temp/ Hum Station	1%	1 to 100%	3% RH; 4% above 90%
Dew Point (overall)	ISS or Temp/ Hum Station	1°F; 1°C	-105° to +130°F; -76° to +54°C	3°F; 1.5°C
Leaf Wetness	Leaf & Soil Station	1	0 to 15	0.5
Soil Moisture	Leaf & Soil Station or Soil Moisture Station	1 cb	0 to 200 cb	
Daily & Storm Rainfall	Rain Collector	0.01"; 0.2 mm	to 99.99"; 999.8 mm	greater of 4% or 1 tip,
Monthly & Yearly Rainfall		0.01"; 0.2 mm (1mm at totals over 2000 mm)	to 199.99"; 6553 mm	greater of 4% or 1 tip
Rain Rate		0.01"; 0.2 mm	to 96"/hr.; 2438 mm/hr.	greater of 5% or 0.04"/hr.; 1 mm/hr.

*Barometric pressure readings are standardized to sea level. Elevation Range: -999' to +15,000'; -600 to + 4570 m. Note: The console screen limits display of lower elevation to -999' when using feet as elevation unit. For elevations lower than -999', use meters.

**This is the reduced value after standardizing to sea level.

Weather Data Specifications

Variable	Required Sensors	Resolution	Range	Nominal Accuracy (+/-)
Solar Radiation	Solar sensor	1 W/m^2	0 to 1800 W/m^2	5% of full scale
Inside Temperature	Included in Console	0.1°F; 0.1°C	+32° to +140°F; 0 to +60°C	1°F; 0.5°C
Outside Temperature***	ISS, Temp Station or Temp Hum Station	0.1°F; 0.1°C	-40° to +150°F; -40° to +65°C	1°F; 0.5°C
Extra Temperature	ISS, Temp Station, Temp Hum Station, Leaf Soil Station or Soil Station	1°F; 1°C	-40° to +150°F -40° to +65°C	1°F; 0.5°C
Heat Index	ISS or Temp/ Hum Station	1°F; 1°C	-40° to +165°F; -40° to +74° C	3°F (1.5°C)
Temp-Hum-Sun-Wind index (THSW)	ISS & Solar Radiation	1°F; 1°C	-90° to +165°F; -68° to +74° C	4°F (2°C)
Time	Included in Console	1 min	24 hours	8 sec./mon.
Date		1 day	month/day	8 sec./mon.
UV Index	UV Radiation	0.1 Index	0 to 16	5% of full scale
UV Dose		0.1 MED < 20, 1 MED > 20	0 to 199 MEDs	5%
Wind Direction	Anemometer	1°	0 to 360°	3°
Compass Rose		22.5°	16 compass pts	0.3 compass pt
Wind Speed (large cups)		1 mph; 1 kt; 0.4 m/ s; 1 km/h	2 to 180 mph; 2 to 156 kts 3 to 290 km/h, 1 to 80 m/s	greater of 2 mph/kts; 1 m/s; 3 km/h or 5%
Wind Chill	ISS	1°F; 1°C	-110° to +135°F -79° to +57°C	2°F;1°C

***Outside temperature accuracy is based on the temperature sensor itself and not on the sensor and the passive shielding together. The solar radiation induced error for standard ration shield: +4°F (2°C) at solar noon; for fan aspirated radiation shield: +0.6°F (0.3°C) at solar noon (insolation = 1040 W/m^2, avg. wind speed ≤ 2 mph (1 m/s), reference: RM Young Model 43408 Fan-Aspirated Radiation Shield).

Appendix C
Wireless Repeater Configuration

A Vantage Pro2 Wireless Repeater (#7626, #7627) or Long-Range Wireless Repeater (#7653, #7654) increase transmission distances or improve transmission quality between a station and a console. A repeater receives information transmitted from a Vantage Pro2 station and retransmits it to a console. Depending on transmission distance, one repeater or several repeaters can be used to collect and retransmit weather data.

All consoles communicating with repeaters must be set up with the correct Transmitter ID and Repeater ID before the console can correctly receive station information.

To set Repeater ID on the console:

1. Press DONE and the - keys to enter Setup Mode.
2. If Setup Mode has previously been completed, press DONE to display Screen 2: Configuring Transmitter IDs.
3. See “Screen 2: Configuring Transmitter IDs — Wireless Only” on page 10 for more information on configuring Transmitter IDs.
4. Press 2ND and then press WIND to enter Repeater Setup Mode and to select a Repeater ID. Pressing 2ND and WIND sets the console to receive the signal from a repeater instead of directly from a station. Once the console is in the repeater setup mode, subsequent pressing of WIND continue to cycle through the all the repeater IDs.
5. Press WIND repeatedly to cycle through all eight repeater IDs possible or to clear the repeater ID in the right hand corner. When no repeater ID is shown, the console is configured to listen directly to a station and not to a repeater.

   In the example below, the console is set up to receive an ISS station on transmitter ID 1 from repeater A.

6. For each station using a repeater, select the station and turn on the repeater function and select the correct repeater ID.
7. Press DONE to continue to the other screens in the Setup Mode, or press and hold DONE to return to the Current Weather Mode.

Note: In console with the October 2005 version of firmware, the only way to exit Repeater Setup mode is to press DONE to continue to the next setup screen.

Verifying Setup

To verify that you have successfully set up your console to receive a repeater in the console’s Current Weather Mode:

1. View the transmitter information displaying at the bottom of the console screen.

If the transmitter ID being repeated is displayed and an “X” flashes in the bottom right corner of the ticker tape, the transmitter is being repeated and received by the console successfully.

The repeater’s information also displays at the bottom of the console’s diagnostics screens.

Clearing Repeater ID

If a repeater ID is being displayed in Screen 2 and you are not using a repeater with the selected station, you must turn off the repeater function to receive station information successfully.

In Setup Screen 2:

Press 2ND and then press WIND repeatedly so that the console cycles through the list of repeater IDs (Repeaters A-H) until the section where the repeater ID was displayed is blank. Press DONE to continue to the next screen or press and hold DONE to return to the Current Weather Mode.

Vantage Pro2 Console Icons

Console icons indicate weather conditions and special functions.

Forecast

Indicates the weather forecast for the next 12 hours.

Moon Phase

Shows the current moon phase. Sequence shown for Northern Hemisphere. The sequence of the icons is reversed in the Southern Hemisphere.

Alarm Bell

Flashes when an alarm is triggered. Also indicates when the console is in Alarm Mode.

Graph

Appears next to the currently selected weather variable. Also indicates the graphed variable on most screens.

Second Function

Appears when you press 2ND key. Indicates that console key secondary functions are enabled.

Rain

Appears when the console is currently detecting rain.

Barometric Pressure Trend

Arrows show direction of pressure change for last three hours.

Contacting Davis Technical Support

For questions about installing or operating your Vantage Pro2 weather station, please contact Davis Technical Support. We'll be glad to help.

(510) 732-7814 — Monday - Friday, 7:00 a.m. - 5:30 p.m. Pacific Time. We are unable to accept collect calls.

(510) 670-0589 — Technical Support Fax.

support@davisnet.com — E-mail to Technical Support.

info@davisnet.com — General e-mail.

www.davisnet.com — Davis Instruments web site. See the Weather Support section for copies of user manuals, product specifications, application notes, and information on software updates. Watch for FAQs and other updates.

Appendix C

Particulate Monitoring Equipment Specifications

DUSTTRAK™ II AEROSOL MONITORS MODELS 8530, 8530EP AND 8532

DESKTOP OR HANDHELD UNITS FOR ANY ENVIRONMENT, ANY APPLICATION

DustTrak™ II Aerosol Monitors are battery-operated, data-logging, light-scattering laser photometers that give you real-time aerosol mass readings. They use a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance. From desktop and desktop with external pump models to a handheld model, the DustTrak II offers a suitable solution for harsh industrial workplaces, construction and environmental sites and other outdoor applications, as well as clean office settings. The DustTrak II monitors measure aerosol contaminants such as dust, smoke, fumes and mists.

Features and Benefits

All Models

+ Real-time mass concentration readings and data-logging allow for data analysis during and after sampling
+ Measure aerosol concentrations corresponding to PM1, PM2.5, Respirable, and PM10 size fractions, using a variety of inlet conditioners
+ Easy-to-use graphical user interface with color touch-screen for effortless operation

Handheld Model (8532)

+ Long life internal pump for continuous sampling
+ Single-point data collection for walk through surveys
+ Lightweight design with ergonomic handle for portable applications

Desktop Models (8530 and 8530EP)

+ Energy-efficient, long lasting external pump for continuous, unattended, 24/7, outdoor monitoring applications (Model 8530EP only)
+ Long life internal pump for shorter work-shift or IAQ sampling applications (Model 8530)
+ Gravimetric reference sampling capability for custom reference calibrations
+ Automatic zeroing (with optional zero module) to minimize the effect of zero drift
+ STEL alarm setpoint for tracking 15-minute average mass concentrations
+ Environmental protected and tamper-proof secure (with an optional environmental enclosure)
+ Inlet sample conditioning (with optional heated inlet sample conditioner) to reduce the effect of humidity on photometric mass measurements (for use with an environmental enclosure)
+ Cloud Data Management System as hosted by Netronix™

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Desktop Models: Ideal for Long-Term Surveys and Remote Monitoring Applications

The DustTrak II is offered as a standard desktop (Model 8530), as well as a desktop with external pump (Model 8530EP.) Both models have manual and programmable data logging functions, making them ideal for unattended applications. The standard desktop model is most suitable for indoor, continuous monitoring, while the desktop with external pump is designed for 24/7 unattended, remote monitoring outdoors.

The DustTrak II desktop models come with USB (device and host), Ethernet, and analog and alarm outputs allowing remote access to data. User adjustable alarm setpoints for instantaneous or 15-minute short-term excursion limit (STEL) are also available on desktop models. The alarm output with user-defined setpoint alerts you when upset or changing conditions occur.

The DustTrak II desktop monitors have several unique features:

+ Measure aerosols in high concentrations up to 400 mg/m3.
+ External pump (Model 8530EP) with low power consumption for continuous, unattended monitoring in remote outdoor locations.
+ Gravimetric sampling capability using a 37-mm filter cassette which can be inserted in-line with the aerosol stream allowing you to perform an integral gravimetric analysis for custom reference calibrations.
+ Zeros automatically using the external zeroing module. This optional accessory is used when sampling over extended periods of time. By zeroing the monitor during sampling, the effect of zero drift is minimized.
+ STEL alarm feature for tracking 15-minute average mass concentrations when alarm setpoint has been reached for applications like monitoring fugitive emissions at hazardous waste sites.
+ Provide for environmental protection and tamper-proof security using an environmental enclosure. This optional accessory encloses the instrument within a waterproof, lockable, custom-designed case.
+ Condition the sample air stream before entering the instrument optics using a heated inlet sample conditioner (designed for use with an environmental enclosure.) This optional accessory is used in humid environments. By conditioning the sample, the humidity and water vapor are minimized, reducing elevated measurements.

Handheld Models: Perfect for Walk-Through Surveys and Single-Point Data Collection Applications

The DustTrak II Handheld Model 8532 is lightweight and portable. It is perfect for industrial hygiene surveys, point source location monitoring, indoor air quality investigations, engineering control evaluations/validation, and for baseline trending and screening. Like the desktop models, it has manual and programmable data logging functions. In addition, the handheld model also has a single-point data logging capability. Single-point data collection is used for walk-through industrial hygiene surveys and indoor air quality investigations.

Applications	Desktop	Handheld
Aerosol research studies	+	+
Baseline trending and screening	+	+
Engineering control evaluations		+
Engineering studies		+
Epidemiology studies	+	+
Indoor air quality investigations	+	+
Industrial/occupational hygiene surveys	+	+
Point source monitoring		+
Outdoor environmental monitoring	+	
Process monitoring	+	+
Remote monitoring	+	
Battery Performance		
Models 8530 and 8530EP (Typical) 6600 mAH Li-Ion Battery Pack (P/N 801680)	1 Battery	2 Batteries
Battery runtime (hours)	Up to 6	Up to 12
Charge time* (hours) in DustTrak	4	8
Charge time* (hours) in external battery charger (P/N 801685)	4	8

Model 8532 (Typical) 3600 mAH Li-Ion Battery Pack (P/N 801681)	Battery
Battery runtime (hours)	Up to 6
Charge time* (hours) in DustTrak	4
Charge time* (hours) in external battery charger (P/N 801686)	4

* Of a fully depleted battery

DustTrak II Aerosol Monitor Features

All Models

+ Li-Ion rechargeable batteries
+ Internal and external battery charging capabilities
+ Outlet port for isokinetic sampling applications
+ User serviceable sheath flow and pump filters
+ Logged test pause and restart feature
+ Logged test programming
  + Color touch screen–either manual mode or program mode
  + TrakPro™ Data Analysis Software via a PC
+ User adjustable custom calibration settings
+ Instantaneous alarm settings with visual and audible warnings
+ Real-time graph display
+ View statistical information during and after sampling
+ On-screen instrument status indicators: FLOW, LASER and FILTER
+ Filter service indicator for user preventative maintenance

Desktop Models (8530 and 8530EP)

+ Long life external pump (8530EP)
+ Internal pump (8530)
+ Hot swappable batteries
+ Gravimetric reference sample capability
+ STEL alarm setpoint

Optional Accessories

+ Auto zeroing module
+ Protective environmental enclosure (8535 and 8537)
+ Heated inlet sample conditioner (for use with an environmental enclosure)
+ Cloud Data Management System as hosted by Netronix™

Handheld Model (8532)

+ Long life internal pump
+ Single-point data collection for walk through surveys

Easy to Program and Operate

The graphical user interface with color touch-screen puts everything at your fingertips. The easy-to-read display shows real-time mass concentration and graphical data, as well as other statistical information along with instrument pump, laser and flow status, and much more. Perform quick walk-through surveys or program the instrument's advanced logging modes for long-term sampling investigations. Program start times, total sampling times, logging intervals, alarm setpoints and many other parameters. You can even set up the instrument for continuous unattended operation.

TrakPro™ Software Makes Monitoring Easier than Ever

TrakPro™ Data Analysis Software allows you to set up and program directly from a PC. It even features the ability for remote programming and data acquisition from your PC via wireless communication options or over an Ethernet network. As always, you can print graphs, raw data tables, and statistical and comprehensive reports for record keeping purposes.

Desktop Monitor with
External Pump, Model 8530EP

SPECIFICATIONS

DUSTTRAK™ II AEROSOL MONITORS
MODELS 8530, 8530EP AND 8532

Sensor Type
90° light scattering

Particle Size Range
0.1 to 10 µm

Aerosol Concentration Range

8530 Desktop	0.001 to 400 mg/m³
8530EP Desktop with External Pump	0.001 to 400 mg/m³
8532 Handheld	0.001 to 150 mg/m³

Resolution
±0.1% of reading or 0.001 mg/m³, whichever is greater

Zero Stability
±0.002 mg/m³ per 24 hours at 10 sec time constant

Flow Rate
3.0 L/min set at factory, 1.40 to 3.0 L/min, user adjustable

Flow Accuracy
±5% of factory set point, internal flow controlled

Temperature Coefficient
+0.001 mg/m³ per °C

Operational Temp
32 to 120°F (0 to 50°C)

Storage Temp
-4 to 140°F (-20 to 60°C)

Operational Humidity
0 to 95% RH, non-condensing

Time Constant
User adjustable, 1 to 60 seconds

Data Logging
5 MB of on-board memory (>60,000 data points)
45 days at 1 minute logging interval

Log Interval
User adjustable, 1 second to 1 hour

Physical Size (H x W x D)

Handheld	4.9 x 4.8 x 12.5 in. (12.5 x 12.1 x 31.6 cm)
Desktop	5.3 x 8.5 x 8.8 in. (13.5 x 21.6 x 22.4 cm)
External Pump	4.0 x 7.0 x 3.5 in. (10.0 x 18.0 x 9.0 cm)

Weight

Handheld	2.9 lb (1.3 kg), 3.3 lb (1.5 kg) with battery
Desktop	3.5 lb (1.6 kg), 4.5 lb (2.0 kg)-1 battery, 5.5 lb (2.5 kg)-2 batteries
External Pump	3.0 lb (1.4 kg)

Communications

8530	USB (host and device) and Ethernet. Stored data accessible using flash memory drive
8530EP	USB (host and device) and Ethernet. Stored data accessible using flash memory drive plus, cable assembly for external pump
8532	USB (Hose and device). Stored data accessible using flash memory drive

Power-AC
Switching AC power adapter with universal line cord included, 115-240 VAC

Analog Out

8530/8530EP	User selectable output, 0 to 5 V or 4 to 20 mA. User selectable scaling range

Alarm Out

8530/8530EP	Relay or audible buzzer Relay Non-latching MOSFET switch + User selectable set point + -5% deadband + Connector 4-pin, Mini-DIN connectors
8532	Audible buzzer

Screen

8530	5.7 in. VGA color touchscreen
8532	3.5 in. VGA color touchscreen

Gravimetric Sampling

8530/8530EP	Removable 37 mm cartridge (user supplied)

CE Rating

Immunity	EN61236-1:2006
Emissions	EN61236-1:2006

Specifications are subject to change without notice.

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Germany	**Tel:** +49 241 523030		

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Appendix D

VOC Monitoring Equipment Specifications

MiniRAE 3000

Portable Handheld VOC Monitor

The MiniRAE 3000 is the most advanced handheld volatile organic compound (VOC) monitor on the market. Its photoionization detector's (PID) extended range of **0 to 15,000 ppm** makes it an ideal instrument for applications from industrial hygiene to leak detection and HazMat.

The **RF modem allows real-time data transmissions** with a base controller located up to 500 feet away from the MiniRAE 3000 (or two miles with optional RAELink3 portable modem). A personal computer can be used as the base station for a MiniRAE 3000 system. The standard ProRAE Remote software is capable of monitoring the input of up to 64 remotely located monitors, including MiniRAE 3000, AreaRAE, etc.

Wireless

AutoRAE Compatible

Key Features

- **Proven PID technology**
  The patented sensor provides the following unique features:
  - 3-second response time
  - Extended range up to 15,000 ppm with improved linearity
  - Humidity compensation with integral humidity and temperature sensors
- **Real-time wireless** data transmission with built-in RF modem or Bluetooth
- **Designed for simple service** Easy access to lamp and sensor in seconds without tools
- **Big graphic display** for easy overview of gas type, Correction Factor and concentration
- **Field-interchangeable battery pack** replaced in seconds without tools
- **Integrated flashlight** for better view in dark conditions
- **User-friendly screens, including dataplot chart view**
- **Integrated RAE Systems Correction Factors list for more than 200 compounds** to measure more chemicals than any other PID
- **Multi-language support** with 12 languages encoded
- **Rugged housing** withstands use in harsh environments
  - IP67 waterproof design for easy cleaning and decontamination in water
  - Strong protective removable rubber boot

Additional Advantages

- View real-time sensor data and alarm status at headquarters or command center
- Automatic lamp type recognition
- Duty-cycling™ lamp and sensor auto-cleaning technology
- Tough, flexible inlet Flexi-Probe™
- 3 large keys operable with 3 layers of gloves
- Strong, built-in sample pump draws up to 100 feet (30m) horizontally or vertically
- Loud, 95dB audible alarm
- Bright red flashing visual alarm
- Interchangeable drop-in Lithium-Ion and alkaline battery packs
- Charging cradle doubles as an external battery charger
- Compatible with AutoRAE™ calibration station
- ProRAE Remote software simultaneously controls and displays readings for up to 64 remote detectors
- License-free, ISM band RF transmission with communication range up to 500 feet (2 miles with optional RAELink3 modem)
- Optional RAELink3 modem provides GPS capability to track and display readings from remote detectors and provide up to 2 miles' long-distance transmission
- Datalogging with up to 6 months of data at one-minute intervals
- 3-year 10.6 eV lamp warranty

MiniRAE 3000

Specifications*

Detector Specifications

Size	10" L x 3.0" W x 2.5" H (25.5 cm x 7.6 cm x 6.4 cm)
Weight	26 oz (738 g)
Sensors	Photoionization sensor with standard 10.6 eV or optional 9.8 eV or 11.7 eV lamps
Battery	• Rechargeable, external field-replaceable Lithium-Ion battery pack • Alkaline battery adapter
Operating Hours	16 hours of operation (12 hours with alkaline battery)
Display Graphic	4 lines, 28 x 43 mm, with LED backlight for enhanced display readability
Keypad	1 operation and 2 programming keys, 1 flashlight on/off
Direct Readout	Instantaneous reading • VOCs as ppm by volume • High values • STEL and TWA • Battery and shutdown voltage • Date, time, temperature
Alarms	95dB at 12" (30 cm) buzzer and flashing red LED to indicate exceeded preset limits • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms latching with manual override or automatic reset • Additional diagnostic alarm and display message for low battery and pump stall
EMI/RFI	Highly resistant to EMI/RFI. Compliant with EMC directive (2004/108/EC); R & TTE directive (1999/5/EC)
IP Rating	• IP67 unit off and without flexible probe • IP65 unit running
Datalogging	Standard 6 months at one-minute intervals
Calibration	Two-point or three-point calibration for zero and span. Calibration memory for 8 calibration gases, alarm limits, span values and calibration dates
Sampling Pump	• Internal, integrated flow rate at 500 cc/mn • Sample from 100' (30m) horizontally and vertically
Low Flow Alarm	• Auto pump shutoff at low-flow condition
Communication	• Download data and upload instrument set-up from PC through charging cradle or optional Bluetooth™ • Wireless data transmission through built-in RF modem
Frequency	902 to 928 MHz (license-free), 2.400 to 2.4835 GHz (license-free), 433 MHz, 869 MHz
RF Range	Up to 500' (152m; 900 MHz, 433 Mhz, 869 Mhz), extendable with RAELink3 Repeater to 2 miles (3.2km)
Hazard Area Approval	• **US and Canada:** c CSP us, Classified as Intrinsically Safe for use in Class I, Division 1 Groups A, B, C, D • **Europe:** ATEX II 2G EEx ia IIC T4
Temperature	-4° to 122° F (-20° to 50° C)
Humidity	0% to 95% relative humidity (non-condensing)
Attachments	Durable bright yellow rubber boot
Warranty	3 years for 10.6 eV lamp, 1 year for pump, battery, sensor and instrument

*Specifications are subject to change

Sensor Specifications

Gas Monitor	Range	Resolution	Response Time T90
VOCs	0 to 999.9 ppm 1000 to 15,000 ppm	0.1 ppm 1 ppm	< 3 s < 3 s

Monitor only includes:

- MiniRAE 3000 Monitor, Model PGM-7320
- Wireless communication module built in, as specified
- Datalogging with ProRAE Studio Package for Windows™ 98, 2000, NT, ME & XP
- Charging/download adapter
- RAE UV lamp, as specified
- Flex-I-Probe™
- External filter
- Rubber boot
- Alkaline battery adapter
- Lamp-cleaning kit
- Tool kit
- Operation CD-ROM
- Operation & Maintenance manual
- Soft leather case

Monitor with accessories kit adds:

- Hard transport case with pre-cut foam padding
- Charging/download cradle
- 5 Porous metal filters and O-rings
- Organic vapor zeroing kit
- Gas outlet port adapter and tubing

Optional calibration kit adds:

- 100 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance service

RAE Systems Inc.
3775 North First Street
San Jose, CA 95134 USA
raesales@raesystems.com

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Appendix B

Site-Specific Health and Safety Plan

Health and Safety Plan for Investigation and Remedial Activities

at

The Former Ithaca Gun Factory BCP Site
121-125 Lake Street
City of Ithaca, Tompkins County, New York

Site No. C755019

Prepared by:

C&S Engineers, Inc.
499 Col Eileen Collins Blvd.
Syracuse, New York 13212

July 2022

EMERGENCY PHONE NUMBERS

Emergency Service 911

Police: Ithaca Police Department ..... (607) 272-9973

Fire: Ithaca Fire Department ..... (607) 272-1234

Hospital: Cayuga Medical Center ..... (607) 274-4011

Department of Public Works ..... (607) 274-6527

National Response Center ..... (800) 424-8802

Poison Control Center ..... (800) 222-1222

Center for Disease Control ..... (800) 311-3435

NYSDEC Region 7 (Cortland, New York) ..... (607) 753-3095

C&S Engineers ..... (315) 455-2000

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FIGURES

APPENDICES

SECTION 1 – GENERAL INFORMATION

This Health and Safety Plan (HASP) addresses health and safety considerations for the activities that personnel employed by C&S Engineers, Inc., may be engaged in during site investigation and remedial activities at the Former Ithaca Gun Factory BCP site located in Ithaca, New York (Site). Figure 1 shows the approximate location of the Site. This HASP will be implemented by the Health and Safety Officer (HSO) during site work. All personnel engaged in site investigation, soil excavation and handling, remediation, and other activities associated with the implementation of the site investigation and remedy are required to maintain current HAZWOPER training, including initial 40-hour training, on-the-job training, and consistent annual 8-hour refresher training, as per the requirements of 29 CFR 1910.120.

Compliance with this HASP is required of C&S personnel who enter this Site. The content of the HASP may change or undergo revision based upon additional information made available to the health, safety, and training (H&S) committee, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by the H&S committee.

1.1 Responsibilities

Project Manager……	Nevin Bradford Phone: (315) 703-4284 Cell: (315) 529-0482
Health and Safety Manager……	Brent Testut Phone: (315) 703-4376 Cell: (707) 631-8846
Site Health and Safety Officer……..	Hayden Haas Phone: (315) 703-4158 Cell: (315) 317-2446
Emergency Coordinator…….	Hayden Haas Phone: (315) 703-4158 Cell: (315) 317-2446

1.2 Applicable Standards and Regulations References

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where a conflict or overlap among regulations and/or these specifications exist, the most stringent requirements shall apply. The Hazardous Material Engineer will determine which requirements are most stringent.

1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

a. ANSI Z89.1, Personnel Protective Equipment-Protective Headwear for Industrial Workers-Requirements (Latest Revision)
b. ANSI Z87.1, Occupational and Educational Personal Eye and Face Protection Devices
c. *ANSI Z9.2,* Fundamentals Governing the Design and Operation of Local Exhaust Systems
d. *ANSI Z88.2-80,* Practices for Respiratory Protection

2. CODE OF FEDERAL REGULATIONS (CFR)
    a. 29 CFR Subpart DWalking-Working Surfaces
    b. 29 CFR 1910 Occupational Safety and Health Standards-All Sections
    c. 29 CFR 1926 Safety and Health Regulations for Construction-All Sections
    d. 40 CFR 50.6 National Primary and Secondary Ambient Air Quality Standards for Particulate Matter
    e. 40 CFR 61 National Emissions Standards for Hazardous Air Pollutants (NESHAPS)-Subpart A-General Provisions
    f. 49 CFR 172 Hazardous Material Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

3. NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)
    a. Publication Number 87-108 Respiratory Decision Logic
    b. NIOSH/OSHA Booklet 3142 Lead in Construction
    c. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH Publication 85-115)

4. U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
    a. PUB 3126 Working with Lead in the Construction Industry
    b. 29 CFR 1910, Subpart I, Appendix B-Non-Mandatory Compliance Guidelines for Hazard Assessment and Personal Protective Equipment Selection

SECTION 2 – HEALTH AND SAFETY PERSONNEL

The following information briefly describes the health and safety designations and general responsibilities for this Site.

2.1 Project Manager (PM)

The PM is responsible for the overall project including the implementation of the HASP. Specifically, this includes allocating adequate manpower, equipment, and time resources to conduct Site activities safely.

2.2 Health and Safety Manager

- Has the overall responsibility for coordinating and reporting health and safety activities and the health and safety of Site Workers.
- Must have completed, at a minimum, the OSHA 30-Hour Construction Safety Training, and either the 24-Hour training course for the Occasional Hazardous Waste Site Worker or the 40-Hour training course for the Hazardous Waste Operations Worker that meets OHSA 29 CFR 1910.
- Must have completed the 8-Hour Site supervisor/manager's course for supervisors and managers having responsibilities for hazardous waste Site operations and management.
- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial on-site specific training prior to Site Workers commencing work.
- Conducts and documents daily and periodic safety briefings.
- Ensures that field team members comply with this HASP.
- Immediately notifies the Project Manager of all accident/incidents.
- Determines upgrading or downgrading of PPE based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as the manufacturer's instructions determine.
- Provides daily summaries of field operations and progress to the Project Manager.
- Submits and maintains all documentation required in this HASP and any other pertinent health and safety documentation.

2.3 Health and Safety Officer (HSO)

- Must be designated by the Health and Safety Manager and at a minimum, have the OSHA 10-Hour Construction Safety Training.
- Must schedule and attend a Pre-Construction Safety Meeting with the Health and Safety Manager to discuss the Subcontractor Safety Requirements and must attend the Weekly Subcontractor Coordination Meeting.
- Responsible for ensuring subcontractors and their lower tier contractors comply with project safety requirements.
- Must make frequent and regular inspections of their work areas and activities and ensure hazards that are under their control are corrected immediately and all other hazards are reported to the Project Manager and Health and Safety Manager.
- Must report all work-related injuries, regardless of severity, to the Project Manager and the Health and Safety Manager within 24 hours after they occur.

2.4 Emergency Coordinator

- The Emergency Coordinator or his on-site designee will, in coordination with The Town of Ithaca, implement the emergency response procedures outlined in Section 12 whenever conditions at the Site warrant such action.
- The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

2.5 Site Workers

- Report any unsafe or potentially hazardous conditions to the HSO and the Health and Safety Manager.
- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.
- Comply with rules, regulations, and procedures as set forth in this HASP, including any revisions that are instituted.
- Prevent unauthorized personnel from entering work Site.

SECTION 3 – PERTINENT SITE INFORMATION

3.1 Site Location and General History

The property is located at 121-125 Lake Street, in the City of Ithaca, in Tompkins County, New York. Ithaca Falls and Fall Creek are situated to the north, Cornell University to the east, Lake Street to the south, and a residential neighborhood to the west.

The 1.63-acre site consists of two separate parcels. The eastern parcel historically operated as Ithaca Gun Factory with several manufacturing buildings that previously occupied the property and were demolished in 2009. The western parcel is currently occupied by a single-story building and a boiler stack on the site.

The site property is positioned on the side of a hill; however, most of the site is terraced with significant level areas suitable for development. Elevations at the site range from approximately 490 feet above mean sea level (amsl) in the western portion of the site to 545 feet amsl in the eastern portion of the site.

Current Zoning/Uses: Currently the site is vacant and consists mostly of open land; it is zoned industrial. Surrounding land uses to the east, south and west are mostly residential. Property that is contiguous along the northern and western portions of this site are part of Ithaca Falls Overlook Environmental Restoration Program (ERP) site, which is maintained and owned by the City of Ithaca.

Site History and Suspect Recognized Environmental Conditions

Past Use of the Site: The site was originally developed for industrial use in 1813. Companies that may have operated at the site prior to the Ithaca Gun Company include the Ithaca Manufacturing Company (agricultural equipment) and the W.H. Baker & Company gun factory.

The Ithaca Gun Company operated at the site from 1885 through 1986. The main operations included manufacture of firearms and munitions. Supporting manufacturing activities and site uses included spray-painting, drying gun stocks in ovens, firing ranges, metal plating, machine shop, and forging. Prior uses by the Ithaca Gun Company appear to have led to contamination of both on-site and near off-site areas.

From 1995 to 1998, following discovery of lead shot in the Falls Creek gorge area, soil sampling was conducted in on-site and off-site areas. In 2000, leaking transformers and associated PCB-contaminated soils were removed from the site. From 2000 to 2002, the EPA conducted a removal assessment, limited building demolition, and soil removal activities mostly on adjacent off-site areas; however, some portions of the former Ithaca Gun Factory property were included. In 2001, an Environmental Site Assessment and a Site Investigation were completed for and funded by the site owner at that time. In 2002, this site was part of the property included within the Voluntary Cleanup Agreement for the Ithaca Gun Company Site, with the site identification of V00511. In 2009, the on-site

buildings were demolished and removed from the site. Funding for the demolition activities was at least partially supported by the Empire State Development Restore NY program. Post-demolition site investigation activities have included surface soil screening and sampling, and groundwater sampling.

The primary contaminant of concern in surface and subsurface soil is lead, found at concentrations exceeding restricted residential soil cleanup objectives. A few other metals, some semi-volatile organic compounds (SVOCs) and PCBs have also been detected in isolated areas of subsurface soil and will be addressed by the site-wide remedy. The thickness of soil and fill materials at the site ranges from 0 to 15.5 feet on the site.

The primary contaminants of concern in groundwater are volatile organic compounds (VOCs), specifically cis-1,2- dichloroethane (CDCE), tetrachloroethene (PCE), trichloroethene (TCE) and vinyl chloride (VC). The highest concentrations of contaminants occur on-site within the eastern parcel groundwater in the fractured bedrock. Although the movement of groundwater is reduced vertically by a decrease in fractures with increased depth, contaminated groundwater does migrate off-site.

Off-site groundwater has been investigated and continues to be monitored by the NYSDEC as part of the Former Ithaca Gun Factory – Off-site remedial program (Site No.: C755019A). Based on sampling results, only one site-related compound, TCE, has been detected in off-site groundwater, but at concentrations that meet the groundwater standard. Due to the presence of TCE, the NYSDEC has conducted a soil vapor intrusion evaluation as part of the off-site remedial program.

Various organic and inorganic contaminants are present in soil, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), various heavy metals, and pesticides. The majority of these contaminants exist within the historic fill material or where it has been deposited.

Various organic and inorganic contaminants are present in groundwater, including VOCs and heavy metals. The majority of these contaminants exist within the site groundwater.

The specific contaminants currently known to exist in each media are as follows:

Media	Contaminant Class	Identified Compounds
Soil	PCBs	Total PCBs
	SVOCs	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Indeno(1,2,3-c,d)pyrene Dibenzo(a,h)anthracene
	Metals	Arsenic Cadmium

Media	Contaminant Class	Identified Compounds
		Copper Lead Nickel Mercury Silver Selenium Zinc
	Pesticides	4.4'-DDD 4,4'-DDE 4,4'-DDT
Groundwater	VOCs	1,1,1-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethene Benzene Chloroform cis-1,2-Dichloroethene Tetrachloroethene 1,2-Dichloroethene Trichloroethene Vinyl Chloride
	Metals	Iron Manganese Sodium

Based on the nature of site contaminants, direct contact with contaminated soil or inhalation of airborne dust originating from contaminated areas of the site pose the primary exposure risk. Due volatile organic compound contamination identified at the sites there is a potential for inhalation of VOCs causing a low exposure concern (see section 8 for exposure monitoring).

SECTION 4 – SITE HAZARDS EVALUATION

4.1 Chemical Hazards

Nature of Chemical Hazards

The Site soils and groundwater have been sampled and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, PCBs, pesticides, and herbicides. In addition, soil vapor has been sampled and analyzed for VOCs; and suspect asbestos-containing building materials (ACBMs) and lead-based paints (LBPs) have been sampled and analyzed, all ACM and LBP materials are believed to have since been removed. No sampling/analysis for perfluorinated compounds (PFCs) has been conducted to date. The associated laboratory analysis and on-site observations revealed that the following chemicals / materials of concern exist at the Site:

- Metals (including lead, arsenic, cadmium, copper, nickel, mercury, silver, selenium, and zinc)
- Chlorinated volatile organic compounds (CVOCs)
- Semi-volatile organic compounds (including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-c,d)pyrene, and dibenzo(a,h)anthracene)
- Benzene
- Pesticides (including 4.4-DDD, 4,4-DDE, and 4,4-DDT)
- Polychlorinated biphenyls (PCBs)

Common Routes of Exposure

The contaminants at the Site may enter the human body in a variety of ways. Based on the nature of site contaminants, the chemical routes of exposure anticipated from the remedial activities at this site include:

Route	Mechanism	Control
Absorption	Dermal (skin) contact with impacted soil on-site resulting in absorption of chemicals of concern through the skin and into the blood stream.	Proper use of PPE will minimize risks of exposure at the site.
Ingestion	Chemicals / materials of concern can come in direct contact with the mouth from soil or other contaminated areas (PPE, skin, tools, etc.) and enter the bloodstream through the stomach lining.	Proper care in handling PPE and tools, refraining from eating and drinking at the Site, and frequent hand washing with soap and water will minimize risks of exposure.
Inhalation	Volatile vapors and/or contaminants attached to dust and particulates can be entrained by wind and become airborne across the site and be subsequently inhaled through the nose and / or mouth. This exposure	Conduct monitoring of air quality for particulates and VOC in worker breathing zones and at downwind perimeters of work zones. Employ methods that minimize the creation of dust and utilize dust suppression

Route	Mechanism	Control
	route is the most likely way for worker exposure to occur.	techniques to minimize dust and particulates. Respirators with appropriate filtration and organic adsorption cartridges should be available to on-site workers in case volatile compounds become a nuisance or health hazard.

4.2 Physical Hazards

Based upon the anticipated field activities, the following potential physical hazardous conditions may exist:

Category	Mechanism	Control
Mechanical Equipment	The use of typical mechanical equipment such as drill rigs and sampling vehicles can create a potential for crushing and pinching hazards due to movement and positioning of the equipment, movement of lever arms and hydraulics, and entanglement of clothing and appendages in exposed drives and tracks. Mechanical equipment can also create a potential for impact of steel tools, masts, and cables should equipment rigging fail, or other structural failures occur during hydraulic equipment operation.	Heavy equipment work must be conducted only by trained, experienced personnel. If possible, personnel must remain outside the turning radius of large, moving equipment. At a minimum, personnel must maintain visual contact with the equipment operator. When not operational, equipment must be set and locked so that it cannot be activated, released, dropped, etc. The mechanical equipment stated above represents typical equipment that is ordinarily used during this scope of work, but is not meant to be an all-inclusive list. Similar precautions should be used around other mechanical equipment deployed to the Site that is not listed above.
Excavations and Trenches	The use of excavation/trenching such as removal of overburden soils, installation of utilities, and site grading operations can cause potential for suffocation, crushing, or other injury from falling material. Advancement of excavation and trenches can also create possible damage/failure of any installed underground utility services and create hazards. Other hazards created can included tripping, slipping, or falling. Entering an excavation or trench could have the possibility of an explosive, flammable,	Ensure compliance with OSHA's construction standard for excavations (29 CFR 1926 Subpart P). Designate a Competent Person responsible for selecting and implementing the appropriate protective system(s), assuring appropriate means of access and egress for excavations greater than four (4) feet in depth, and for ensuring that potential atmospheric and physical hazards associated with any excavation / trenching activities are completed in accordance with Subpart P and other applicable OSHA Standards.

Category	Mechanism	Control
	toxic, or oxygen-deficient atmosphere within the excavation or trench.	
Noise	Work around large equipment often creates excessive noise. Noise can cause workers to be startled, annoyed, and/or distracted; as well as causing pain, physical damage to the ear, and temporary and/or permanent hearing loss; and can interfere with communication.	If workers are subjected to noise exceeding an 8-hour time-weighted average sound level of 85 dBA, hearing protection will be required with an appropriate noise reduction rating to comply with 29 CFR 1910.95 and to reduce noise levels below levels of concern.
Slips/Trips/Falls	Personnel may encounter slip, trip, and fall hazards associated with excavations, manways, and construction debris and materials. Precautionary measures should be taken by identifying and removing slip, trip, and fall hazards prior to commencing work.	In the event slip, trip, and fall hazards cannot be removed or minimized, site workers will be shown the location of the physical hazard and be asked to avoid it during work activities.
Fire/Explosion	The potential for fire and/or explosion emergencies is always present on the Site.	Field vehicles will be equipped with a fire extinguisher. Employees, contractors and workers must be trained in the proper use of fire suppression equipment. However, large fires that cannot be controlled with a fire extinguisher shall be handled by professionals. The proper authorities shall be notified in these instances, as well as the HSO and Health and Safety Manager.
Cold Exposure	Persons working in the outdoors in temperatures at or below freezing may be subject to frostbite. Extreme cold for a short time may cause injury to exposed body surfaces or result in a profound generalized cooling which can cause death. Areas of the body such as fingers, toes, and ears, are the most susceptible to cold stress. Ambient air temperature and wind velocity are two factors which influence the development of a cold weather injury. Local injury resulting from exposure to cold temperatures is known as “frostbite.” There are several degrees of damage in which frostbite of the extremities can be categorized, as follows: ○ Frost nip or incipient frostbite is characterized by sudden bleaching or whitening of the skin.	Wear several layers of dry clothes so that you can vary the amount of clothing to match the conditions. If there is wind, wear a windbreaker, since wind increases the effects of cold air and in turn lowers your body’s core temperature even faster. Don’t get overheated. Sweat can dampen clothing and in turn lead to over-cooling. Keep hands, feet, ears, and face warm. These are the areas of the body where frostbite tends to strike first. Heart disease and the use of sedatives or excessive alcohol will make you more susceptible to cold stress. If you feel chilly or sleepy, or have pain in your extremities, go to a warm shelter to recover.

Category	Mechanism	Control
	○ Superficial frostbite occurs when the skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. ○ Deep frostbite is characterized by tissues that are cold, pale, and solid; this is an extremely serious injury.	
Heat Exposure/Stress	Heat stress can result from a number of contributing factors, including environmental conditions, clothing, and workload as well as the physical condition of the individual. Since heat stress is one of the most common injuries / symptoms associated with outdoor work conducted with direct solar load, and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Signs and symptoms of heat-related illnesses which all on-site personnel should be aware, include the following: ○ Heat rash may result from continuous exposure to heat or humid air. ○ Heat cramps are caused by heavy sweating and may include muscle spasms and pain in the hands, feet, and abdomen. ○ Heat exhaustion is indicated by pale, cool, and moist skin; heavy sweating; dizziness; nausea; and fainting. ○ Heat stroke is indicated by red, hot, and unusually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; rapid pulse; and coma. Immediate action must be taken to cool the body before serious injury or death occurs.	The following will steps will be taken to limit heat exposure: adjust schedules, take breaks, limit heavy work in protective clothing or in a hot environment may require more time resting than working. Schedule heavy work in the coolest part of the day. Have shaded rest shelters with chairs or benches. Drink Fluids. Sweating cools the body, but it also robs the body of fluid. Drink enough fluids to replace what you lose. You may not feel thirsty until you've become dehydrated. Drink regularly throughout the day. Don't wait until you're thirsty. Monitor for signs of potential heat exposure and stress through use of the "buddy system', with frequent communication between site personnel. Take scheduled breaks and hydrate frequently throughout the day. Maintain an adequate supply of cold water and electrolyte containing drinks in support zone of site. In the event that personnel are observed to exhibit dizziness, disorientation, heat rash, slurred speech, dry mouth, heat cramps, or other symptoms of heat stress, discontinue work immediately and move affected person(s) to a location that is free from direct sunlight. Perform personal decontamination procedures outlined in Section 10.4 of this HASP and provide fluids (preferably "Gatorade" or similar product that will replenish electrolytes). Monitor condition during

Category	Mechanism	Control
		to evaluate whether there is notable improvement in their condition.
Utilities	Overhead and underground utilities exist within the Work Area, which may expose workers to electrocution hazards, explosive hazards, and volatile vapors.	Dig Safely New York shall be contacted a minimum of three business days prior to initiating the field activities, to arrange for the identification and markout of buried utilities at the site. The contact number for Dig Safely New York is 1-800-962-7962. In the event of inadvertent damage to buried utilities, all work shall cease, and the situation shall be evaluated by the HSO.

4.3 Environmental Hazards

Based upon the anticipated field activities, the following potential environmental hazardous conditions may exist:

Category	Hazard	Control
Biological	Ticks, bees/wasps, mosquitos, spiders, snakes, rabid animals	There are no known species of poisonous spiders or snakes common to the area. Minimize potential exposure to by wearing wear long pants and safety shoes. Change clothing and carefully examine for evidence of insects and ticks upon undressing, immediately following return from the site. Avoid contact with any animals, either wild or domestic, that may be encountered while conducting the field activities, and notify the local office of the New York State Department of Health (NYSDOH) in the event that animals are observed to elicit strange behavior. In the event of contact with an animal that is behaving in a strange manner, the NYSDOH should be contacted immediately.
Biological	Poison Ivy, Poison Oak	Familiarize yourself with the characteristics and appearance of poison ivy and poison oak. Be cognizant of vegetation while conducting work activities. Minimize potential exposure to by wearing

Category	Hazard	Control
		wear long pants and safety shoes. Change clothing immediately following return from the site.
Weather	Wet surfaces, lighting, high winds (falling objects, contaminated dust), hail, excessive heat, extreme cold, snow and ice.	Remain cognizant of weather conditions, forecasts, and changing weather conditions. Exercise extra caution during wet and inclement site conditions to minimize risk of slips and falls. Avoid work during periods of high winds to reduce risk of injury from falling objects and airborne contaminant migration. Cease work and monitor conditions in the event that lightning is observed or suspected in the area, or in the event that other weather conditions pose a health or safety hazard.

SECTION 5 – TRAINING

5.1 Site-Specific Training

Training will be provided that specifically addresses the activities, procedures, monitoring, and equipment for the Site operations prior to going on Site. Training will include familiarization with Site and facility layout, known and potential hazards, and emergency services at the Site, and details all provisions contained within this HASP. This training will also allow Site Workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

5.2 Safety Briefings

C&S project personnel will be given briefings by the HSO on a daily or as needed basis to further assist Site workers in conducting their activities safely. Pertinent information will be provided when new operations are to be conducted. Changes in work practices must be implemented due to new information made available, or if Site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices. When conformance with these practices is not occurring or if deficiencies are identified during safety audits, the project manager will be notified.

5.3 Daily Tailgate Safety Meeting

The HSO or the HSO designee will be responsible for conducting a daily tailgate safety meeting prior to start of any work activities. The contractor and workers will be responsible for attending daily tailgate safety meetings, as well as providing any additional insight into any possible hazards which might be anticipated or encountered throughout the day on the Site. The meeting will discuss any measures which will be implemented throughout the day to mitigate any hazards. The meetings are designed to create awareness of any hazards and their associated mitigation measures at the Site. If conditions at the Site change and new hazards are determined to be present, work will be stopped and an additional safety meeting will be conducted. The daily tailgate meetings discussions will be logged, as well as all who attended.

SECTION 6 – SITE CONTROL

6.1 Authorized Entry

Personnel authorized to enter the Site while operations are being conducted must be approved by the HSO. Authorization will involve completion of appropriate training courses, medical examination requirements, and review and sign-off of this HASP. No C&S personnel should enter the work zone alone. Each site visitor should check in with the HSO or Project Manager prior to entering the work zones.

6.2 Site Control Measures

Site control measures will minimize potential contamination of on-site personnel, protect the public from potential on-site hazards, and prevent vandalism of equipment and materials. Site control measures also enhance response in emergency situation. For this project, the primary site control measure will be a temporary fence or other barrier installed along the Site boundary for the duration of the project.

Areas where intrusive work will occur will be routinely divided into three distinct areas: an Exclusion Zone, a Contamination Reduction Zone (CRZ), and a Support Zone.

Exclusion Zone

The Exclusion Zone will be designated as the area where the highest potential for exposure by dermal or inhalation routes exists. The Exclusion Zone coincides with areas being excavated. PPE is required and a daily log will be kept of all personnel entering this zone.

The Exclusion Zone for work areas will be demarcated with barrier tape.

Approval for entry into the Exclusion Zone will require compliance with OSHA training and medical surveillance requirements (29 CFR 1910.120). Subcontractor and vendor equipment will not be permitted to enter the Exclusion Zone without prior authorization and will be subject to Site decontamination procedures. All personnel and equipment shall be decontaminated when leaving the Exclusion Zone. No eating, drinking, or smoking will be permitted in the Exclusion Zone.

Contamination Reduction Zone (CRZ)

The Contractor will establish the CRZ in an area between the Exclusion Zone and Support Zone. Approval for entry into the CRZ will require compliance with OSHA training and medical surveillance requirements (29 CFR 1910.120). Access to the Exclusion Zone will be through the CRZ. The CRZ will be designated as the area immediately adjacent to and surrounding the Exclusion Zone. The probability of dermal and inhalation exposure is lower in the CRZ than in the Exclusion Zone. The CRZ includes facilities for personnel and equipment decontamination. PPE worn in the Exclusion Zone may not be worn outside the CRZ, except during emergencies. No eating, drinking, or smoking will be permitted in the CRZ.

Support Zone

The Support Zone includes all areas outside the CRZ and Loading Zone. The exposure potential in the Support Zone is minimal. The Support Zone provides a changing area for personnel entering the CRZ and Exclusion Zone, as well as an area for the storage of clean equipment and materials. Protective clothing worn in the Exclusion Zone will not be allowed to be worn in the Support Zone, except in emergencies. It is the responsibility of the Project Manager to control access to the Site and to assure proper security. Any evidence of unauthorized entry will be noted in the daily log.

Under no circumstances will the general public be permitted to access the work area. All preapproved visitors will be briefed on the HASP, and shall sign the Daily Site Sign-In / Sign-Out Log. Pre-approved visitors will be permitted in the immediate area of active operations only with approval from the Contractor's HSO or Project Manager. All personal vehicles are restricted to the Support Zone.

6.3 Communications

A phone will be located on Site to be utilized by personnel conducting investigation. Cell phones will be the primary means of communicating with emergency support services/facilities.

SECTION 7 – PERSONAL PROTECTIVE EQUIPMENT

7.1 Personal Protective Equipment – General

The level of protection to be worn by field personnel will be defined and controlled by the HSO. Depending upon the type and levels of material present or anticipated at the site, varying degrees of protective equipment will be needed. If the possible hazards are unknown, a reasonable level of protection will be taken until sampling and monitoring results can ascertain potential risks. The levels of protection listed below are based on USEPA Guidelines. A list of the appropriate clothing for each level is also provided.

Level A protection must be worn when a reasonable determination has been made that the highest available level of respiratory, skin, eye, and mucous membrane protection is needed. It should be noted that while Level A provides maximum available protection, it does not protect against all possible hazards. Consideration of the heat stress that can arise from wearing Level A protection should also enter into the decision-making process. Level A protection includes:

- Open circuit, pressure-demand self-contained breathing apparatus (SCBA)
- Totally encapsulated chemical resistant suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level B protection must be used when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (e.g., the back of the neck) is unlikely. Level B protection includes:

- Open circuit, pressure-demand SCBA or pressure airline with escape air bottle
- Chemical protective clothing: Overalls and long sleeved jacket; disposal chemical resistant coveralls; coveralls; one or two piece chemical splash suit with hood
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level C must be used when the required level of respiratory protection is known, or reasonably assumed to be, not greater than the level of protection afforded by air purifying respirators; and hazardous materials exposure to the few unprotected areas of the body (e.g. the back of the neck) is unlikely. Level C protection includes:

- Full or half face air-purifying respirator

- Chemical protective clothing: Overalls and long-sleeve jacket; disposable chemical resistant coveralls; coveralls; one- or two-piece chemical splash suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level D is the basic work uniform. It cannot be worn on any site where respiratory or skin hazards exist. Level D protection includes:

- Safety boots/shoes
- Safety glasses
- Hard hat with optional face shield

Note that the use of SCBA and airline equipment is contingent upon the user receiving special training in the proper use and maintenance of such equipment.

7.2 Personal Protective Equipment – Site Specific

Level D with some modification will be required when working in the work zone on this Site. In addition to the basic work uniform specified by Level D protection, Nitrile gloves will be required when contact with soil and/or groundwater is likely. Hearing protection will be worn when power equipment is used to perform subsurface work. An upgrade to a higher level (Level C) of protection may occur if determined necessary by the HSO.

SECTION 8 – MONITORING PROCEDURES

8.1 Monitoring During Site Operations

All Site environmental monitoring should be accompanied by periodic meteorological monitoring of appropriate climatic conditions. All ground intrusive activities will also be monitored under the Community Air Monitoring Plan (CAMP) included in the Pre-Designed Investigation work plan.

8.1.1 Surface Soil Operation

Monitoring will be performed by the HSO or field personnel during the conduct of work. A photoionization detector (PID) equipped with a 10.6 eV lamp will be utilized to monitor for the presence of volatile organic vapors within the breathing zone, the surface soil holes, and sursurface samples upon their retrieval. The PID will be field checked for calibration accuracy three times per day (morning, lunch, and end of day.

8.1.2 Drilling / Test Pit Operations (Monitoring Well Installation and Subsurface Borings)

Monitoring will be performed by the HSO or drilling observer during the conduct of work. A photoionization detector (PID) equipped with a 10.6 eV lamp will be utilized to monitor for the presence of volatile organic vapors within the breathing zone, the borehole, and subsurface samples upon their retrieval. Drill cuttings and excavation spoils will also be monitored by use of the PID. The PID will be field checked for calibration accuracy three times per day (morning, lunch, and end of day. If subsurface conditions warrant, a combustible gas indicator (CGI) with oxygen alarm may also be used to monitor the borehole for the presence of combustible gases. Similar monitoring of fluids produced during well development will also be conducted.

8.1.3 Soil Excavation and Trenching Operation (Soil Removal, Hauling, Staging, and Grading)

Monitoring will be performed by the HSO or remedial observer during the conduct of work. A photoionization detector (PID) equipped with a 10.6 eV lamp will be utilized to monitor for the presence of volatile organic vapors within the breathing zone, the excavation or trench, and any subsurface samples upon their retrieval. Excavation and trenching spoils will also be monitored by use of the PID. The PID will be field checked for calibration accuracy three times per day (morning, lunch, and end of day. If subsurface conditions warrant, a combustible gas indicator (CGI) with oxygen alarm may also be used to monitor the borehole for the presence of combustible gases.

8.2 Action Levels

If readings on the PID exceed 10 ppm for more than fifteen minutes consecutively, then personal protective equipment should be upgraded to Level C. The air purifying respirator used with Level C protective equipment must be equipped with organic vapor cartridges. If readings on the explosive gas meter are within a range of 10%-25% of the LEL then continuous monitoring will be implemented. Readings above 25% of the LEL indicate the potential for an explosive condition. Sources of ignition should be removed and the Site should be evacuated.

8.3 Personal Monitoring Procedures

Personal monitoring shall be performed as a contingency measure in the event that VOC concentrations are consistently above the 10-ppm action level as detected by the PID. If the concentration of VOCs is above this action level, then amendments to the HASP must be made before work can continue at the Site.

SECTION 9 – SAFETY CONSIDERATIONS FOR SITE OPERATIONS

9.1 General

Standard safe work practices that will be followed include:

- Do not climb over/under drums, or other obstacles.
- Do not enter the work zone alone.
- Practice contamination avoidance, on and off-site.
- Plan activities ahead of time, and use caution when conducting concurrently running activities.
- No eating, drinking, chewing or smoking is permitted in work zones.
- Due to the unknown nature of waste placement at the Site, extreme caution should be practiced during excavation activities.
- Apply immediate first aid to any and all cuts, scratches, abrasions, etc.
- Be alert to your own physical condition. Watch your buddy for signs of fatigue, exposure, etc.
- A work/rest regimen will be initiated when ambient temperatures and protective clothing create a potential heat or cold stress situation.
- No work will be conducted without adequate natural light or without appropriate supervision.
- Task safety briefings will be held prior to onset of task work.
- Ignition of flammable liquids within or through improvised heating devices (barrels, etc.) or space heaters is forbidden.
- Entry into areas of spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment is prohibited.
- Any injury or unusual health effect must be reported to the Site HSO.
- Prevent splashing or spilling of potentially contaminated materials.
- Use of contact lenses is prohibited while on site.
- Beards and other facial hair that would impair the effectiveness of respiratory protection are prohibited if respiratory protection is necessary.
- Field crew members should be familiar with the physical characteristics of investigations, including:
    - Wind direction in relation to potential sources
    - Accessibility to co-workers, equipment, and vehicles
    - Communication
    - Hot zones (areas of known or suspected contamination)

- Site access
- Nearest water sources

- The number of personnel and equipment in potentially contaminated areas should be minimized consistent with site operations.

9.2 Field Operations

The HSO or designee will be present on-site during all intrusive work, e.g., drilling operations, excavations, trenching, and will provide monitoring to oversee that appropriate levels of protection and safety procedures are utilized by C&S Engineers, Inc., personnel. The use of salamanders or other equipment with an open flame is prohibited and the use of protective clothing, especially hard hats and boots, will be required during drilling or other heavy equipment operations. First aid kits will be located in designated locations on the Site, these locations will be known to all contractors and site workers prior to begging work.

SECTION 10 – DECONTAMINATION PROCEDURES

10.1 General Decontamination

Decontamination involves physically removing contaminants and/or converting them chemically into innocuous substances. Only general guidance can be given on methods and techniques for decontamination. Decontamination procedures are designed to:

- Remove contaminant(s).
- Avoid spreading the contamination from the work zone.
- Avoid exposing unprotected personnel outside of the work zone to contaminants.

10.2 Contamination Avoidance

Contamination avoidance is the first and best method for preventing spread of contamination from a hazardous site. Each person involved in site operations must practice the basic methods of contamination avoidance listed below. Additional precautions may be required in the HASP.

- Know the limitations of all protective equipment being used.
- Do not enter a contaminated area unless it is necessary to carry out a specific objective.
- When in a contaminated area, avoid touching anything unnecessarily.
- Walk around pools of liquids, discolored areas, or any area that shows evidence of possible contamination.
- Walk upwind of contamination, if possible.
- Do not sit or lean against anything in a contaminated area. If you must kneel (e.g., to take samples), use a plastic ground sheet.
- If at all possible, do not set sampling equipment directly on contaminated areas. Place equipment on a protective cover such as a ground cloth.
- Use the proper tools necessary to safely conduct the work.

10.3 Reducing Contamination

Specific methods that may reduce the chance of contamination are:

- Use of remote sampling techniques.
- Opening containers by non-manual means.
- Bagging monitoring instruments.
- Use of drum grapplers.
- Watering down dusty areas.

10.4 Personal Decontamination

All personnel leaving the contaminated area of a site (or the Exclusion Zone) must be decontaminated to remove any harmful chemicals or hazards that may have adhered to them. Decontamination methods can include the following

- Physically remove contaminants
- Inactivate contaminants by chemical detoxification
- Remove contaminants by a combination of both physical and chemical means.

Physical removal of any contaminated is the method which will be use at the Site. First any gross material can be removed by physical means involving dislodging or displacement of any materials followed by rinsing and wiping off any remaining materials.

Loose contaminants such as dust and soil that cling to workers clothing, can be removed with water or a liquid rinse. Removal of electrostatically attached materials can be enhanced by coating the clothing with anti-static solutions. These are available commercially as wash additives or anti-static sprays.

If needed, any grossly contaminated clothing will be disposed of in the same manner as outline in Section 11.

10.5 Equipment Decontamination

Equipment which will need to be decontaminated includes tools, monitoring equipment, and personal protective equipment. Items to be decontaminated will be brushed off, rinsed, and dropped into a plastic container supplied for that purpose. They will then be washed with a detergent solution and rinsed with clean water. Monitoring instruments may be wrapped in plastic bags prior to entering the field in order to reduce the potential for contamination. Instrumentation that is contaminated during field operations will be carefully wiped down. Heavy equipment, if utilized for operations where it may be contaminated, will have prescribed decontamination procedures to prevent contaminant materials from potentially leaving the Site. On-site contractors, such as drillers or backhoe operators, will be responsible for decontaminating all construction equipment prior to demobilization.

SECTION 11 – DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to reduce or eliminate the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary and segregated for proper disposal. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory provisions. All non-contaminated materials shall be collected and bagged for appropriate disposal. Investigation Derived Waste (IDW) will be managed and characterized. Characterization of IDW may require TCLP sampling and analysis consistent with the work plan for the Site and DER-10 Technical Guidance for Site Investigation and Remediation dated May 2010.

SECTION 12 – EMERGENCY RESPONSE PROCEDURES

As a result of the hazards at the Site, and the conditions under which operations are conducted, there is the possibility of emergency situations. This section establishes procedures for the implementation of an emergency plan.

12.1 Emergency Coordinator

Emergency Coordinator: ..... Hayden Haas……. Work Phone: (315) 703-4349

The Emergency Coordinator or his on-site designee will, in concert with the City of Ithaca, implement the emergency response procedures whenever conditions at the site warrant such action. The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel or workers as necessary, and notification of emergency response units (**refer to phone listing** in the beginning of this HASP) and the appropriate management staff.

12.2 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of toxic gases, etc., all personnel will evacuate and assemble in a designated assembly area. The Emergency Coordinator or his on-site designee will have authority to contact outside services as required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The Emergency Coordinator or his on-site designee must see that access for emergency equipment is provided and that all ignition sources have been shut down once the emergency situation is established. Once the safety of all personnel is established, the Fire Department and other emergency response groups will be notified by telephone of the emergency.

12.3 Potential / Actual Fire or Explosion

Immediately evacuate the Site and notify local fire and police departments, and other appropriate emergency response groups, if LEL values are above 25% in the work zone or if an actual fire or explosion has taken place.

12.4 Environmental Incident (Spread or Release of Contamination)

Control or stop the spread of contamination if possible. Notify the Emergency Coordinator and the Project Manager. Other appropriate response groups will be notified as appropriate.

12.5 Personnel Injury

Emergency first aid shall be applied on-site as necessary. Then, decontaminate (en route if necessary) and transport the individual to nearest medical facility if needed. The

ambulance/rescue squad shall be contacted for transport as necessary in an emergency. A map of directions to the nearest hospital is shown in Attachment A.

12.6 Personnel Exposure

- *Skin Contact*: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.
- *Inhalation*: Move to fresh air and/or, if necessary, decontaminate and transport to emergency medical facility.
- *Ingestion*: Decontaminate and transport to emergency medical facility.
- *Puncture Wound/Laceration*: Decontaminate, if possible, and transport to emergency medical facility.

12.7 Adverse Weather Conditions

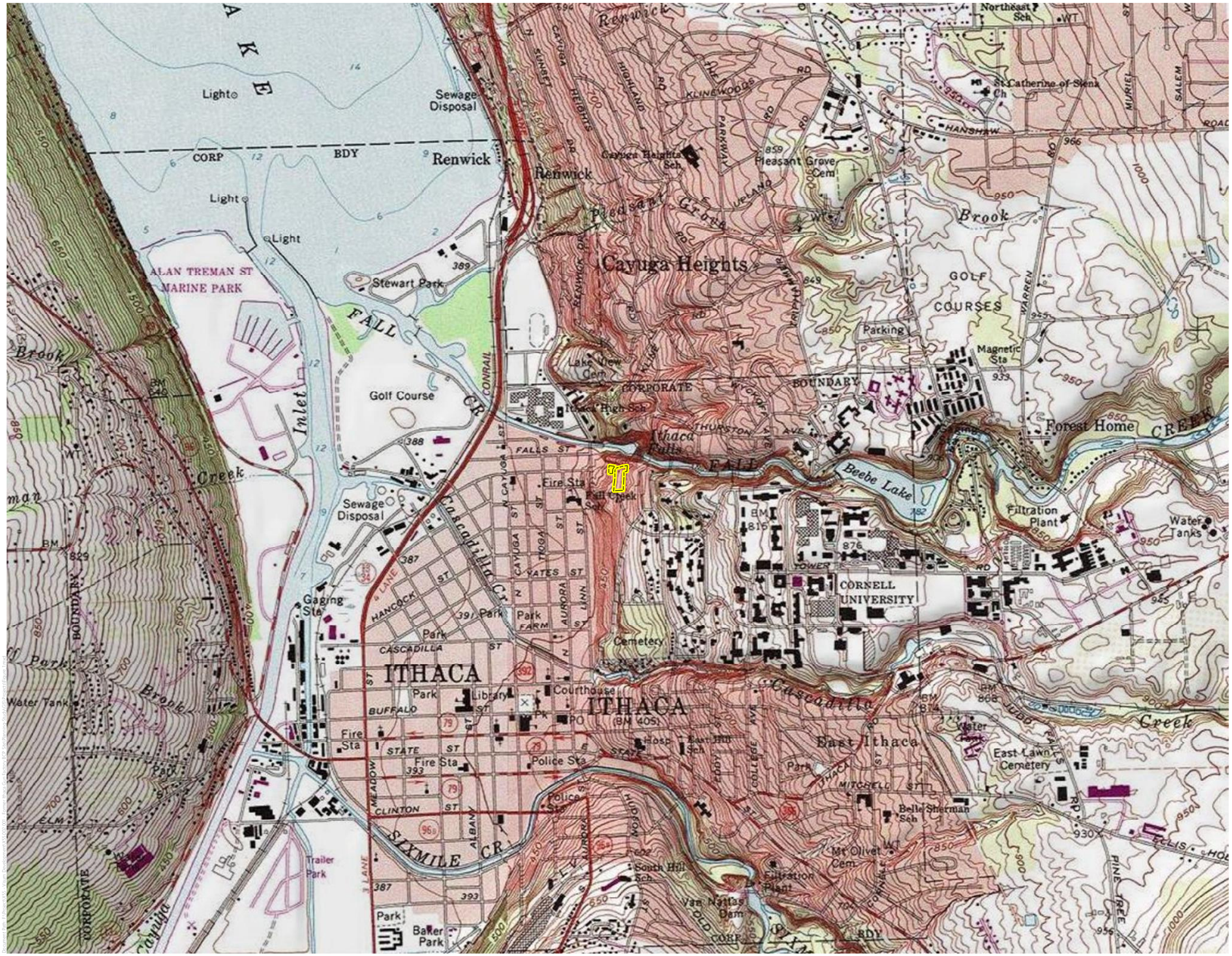
In the event of adverse weather conditions, the HSO will determine if work can continue without sacrificing the health and safety of field workers.

12.8 Incident Investigation and Reporting

In the event of an incident, procedures discussed in the Medical Emergency/Incident Response Protocol, presented in **Appendix B** of this HASP, shall be followed.

FIGURE 1

SITE LOCATION MAP



C&S COMPANIES®

Figure 1

Site Location Map

Legend

Subject Parcel

N

0 750 1,500 3,000 Feet

1 inch = 2,000 feet
When printed at 11 in. by 17 in.

Former Ithaca Gun Factory
Pre-Design Investigation

Sources: . Created by C&S Engineers, Inc.

FIGURE 2

SITE LAYOUT

C&S COMPANIES®

Figure 2

BCP Site Boundary

Legend

BCP PARCEL BOUNDARY

N

0 20 40 80 Feet

1 inch = 40 feet
When printed at 11 in. by 17 in.

Client Logo(s)

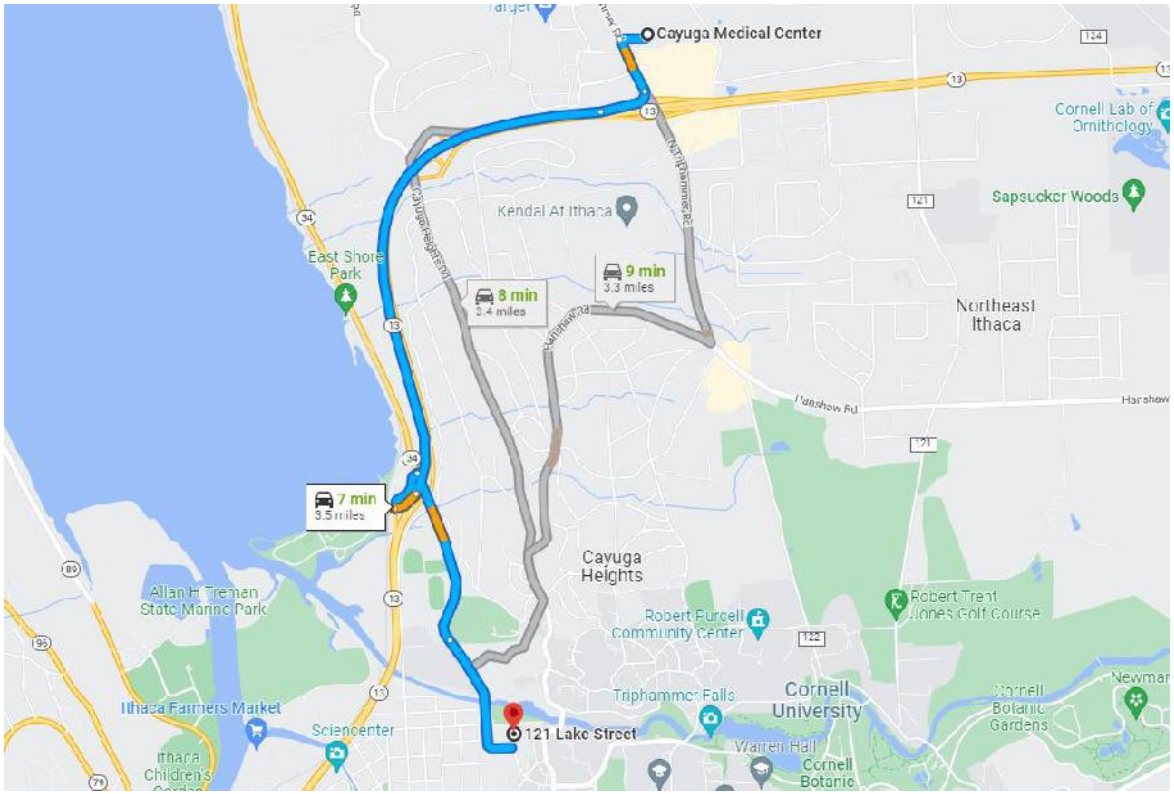
Former Ithace Gun Factory
Pre-Design Investigation

Sources: . Created by C&S Engineers, Inc.

Attachment A

MAP AND DIRECTIONS TO HOSPITAL

Attachment A – Map and Directions to Cayuga Medical Center



Cayuga Medical Center
2333 N Triphammer Rd # 302, Ithaca, NY 14850

- Get on NY-13 S from N Triphammer Rd
  - 2 min (0.4 mi)
  - Head west toward N Triphammer Rd
  - 430 ft
  - Turn left onto N Triphammer Rd
  - 0.2 mi
  - Turn right to merge onto NY-13 S
  - 0.2 mi
- Follow NY-13 S to Gibbs Dr/James L Gibbs Dr in Ithaca. Take the exit toward NY-34 N/Stewart Park/Auburn from NY-13 S
  - 2 min (1.8 mi)
  - Merge onto NY-13 S
  - 1.8 mi
  - Take the exit toward NY-34 N/Stewart Park/Auburn
  - 443 ft
- Take E Shore Dr to Lake St
  - 3 min (1.2 mi)
  - Turn right onto Gibbs Dr/James L Gibbs Dr
  - 0.2 mi
  - Turn right onto NY-34 S/E Shore Dr
    Continue to follow E Shore Dr
  - 0.6 mi
  - Continue onto Lake St
    Destination will be on the left
  - 0.5 mi

Appendix B

GUIDANCE ON INCIDENT INVESTIGATION AND REPORTING

MEDICAL EMERGENCY / INCIDENT RESPONSE PROTOCOL

1.0 PURPOSE

From time to time employees of C&S Engineers, Inc. will sustain an injury while working on the job. While every effort is being made to prevent this, in the event of an injury or illness on the job, the following procedures will be implemented. This format may also be utilized in the event of a property damage incident.

2.0 SCOPE

This guideline applies to all C&S Engineers, Inc. job sites and employees.

3.0 GUIDELINES

Upon notification or awareness of an incident/accident with injuries or illness the Emergency Coordinator or his On-Site Designee will:

1. Ensure that the injured employee is receiving immediate first aid and medical care.
2. Notify Emergency Services (911) if injuries are severe.
3. Stabilize the work area; ensure that no one else can be injured.
4. Notify the Project Manager at the earliest possible convenience**.**
5. Notify the Owner/Client at the earliest possible convenience.

To assist the Health and Safety Manager in the root cause analysis, the Emergency Coordinator or his On-Site Designee will also make an attempt to:

1. Obtain the names and phone numbers of witnesses.
2. Preserve the accident scene if possible for analysis.

3.1 Injury Management

1. If the patient is stable with non-life threatening injuries, the foreman will ensure the employee is transported to the emergency medical facility listed in Section 1 of the HASP. Directions to the nearest emergency medical facility are located in **Attachment A** of the HASP.

At no time will an injured employee drive themselves to medical care.

2. If the patient has serious or life threatening injuries, the emergency coordinator or his on- site designee will notify the emergency services for the area for treatment and transport to a hospital or emergency room. Serious injuries can be considered but not limited to head injuries, loss of consciousness, severe laceration or amputation, fractured bones, burns and eye injuries.

3. Following the treatment and care of the injured employee, the emergency coordinator or his on-site designee and the project manager will initiate the completion of the first injury report. The Health & Safety Manager will assist.

3.2 Project Manager

1. Upon notification of a personal injury or illness on the job site, will notify C&S Engineers, Inc, President and Corporate Legal and C&S Companies Health and Safety Manager.
2. Will report to the worksite to initiate the first injury report.
3. Will report to the treatment facility to check on the well being of the injured employee.
4. The project manager will ensure that the treatment facility is aware that this is a workers compensation case.
5. Will assist the Health and Safety Manager in the analysis of the incident.

3.3 Health & Safety Manager

1. Upon notification of the personal injury will determined if it is necessary to report to the treatment facility or the accident site, depending on the nature of the injuries and the circumstances of the accident.
2. Will report to the worksite to begin a root cause analysis investigation of the accident.
3. The investigation may include interview of witnesses, field crew , and project manager, the photographing of the scene, reconstruction of the accident scene, using test instruments and taking measurements. The Health and Safety Manager may draw diagrams from the information learned.
4. The Health and Safety Manager will work with the owner/client as necessary to investigate the accident.
5. The Health & Safety manager will ensure that the site is safe to resume work.
6. The Health & Safety Manager shall initiate the New York State Compensation form requirements (C-2) and forward a copy of the C-2 to the C & S Engineers, Inc. controller for transmittal to the Compensation Carrier within 8 hrs of notification of the incident or by the end of the next business day.
7. The Health and Safety manager, upon completion of the investigation, will provide the
8. Project Manager with a written investigative report (copy to the President)
9. The accident will be reviewed at the next Project Managers meeting with the intent to prevent further or similar events on other projects.
10. The Health & Safety Manager will assess the incident to determine OSHA record ability and make record if necessary on the OSHA 300 form, within five working days.

4.0 INCIDENT RESPONSE

4.1 Purpose

To prevent the occurrence of accidents on C&S Engineers, Inc., work sites and to establish a procedure for investigation and reporting of incidents occurring in, or related to C&S work activities.

4.2 Scope

Applies to all incidents related to C&S Engineers, Inc. work activities.

4.3 Definitions

Accident - An undesired event resulting in personal injury and/or property damage, and/or equipment failure.

Fatality - An injury or illness resulting in death of the individual.

Incident - Any occurrence which results in, or could potentially result in, the need for medical care or property damage. Such incidents shall include lost time accidents or illness, medical treatment cases, unplanned exposure to toxic materials or any other significant occurrence resulting in property damage or in "near misses."

Incidence Rate - the number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The rate is calculated as:

N/EH x 200,000

N = number of injuries and illnesses or lost workday cases; EH = total hours worked by all associates during calendar year. 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

Injury - An injury such as a cut, fracture, sprain, amputation, etc. which results from a work accident or from a single instantaneous event in the work environment.

Lost Workday Case - A lost workday case occurs when an injured or ill employee experiences days away from work beginning with the next scheduled work day. Lost workday cases do not occur unless the employee is effected beyond the day of injury or onset of illness.

Recordable Illness - An illness that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These illnesses require medical treatment and evaluation of work related injury. For example, dermatitis, bronchitis, irritation of eyes, nose, and throat can result from work and non-work related incidents.

Recordable Injury - An injury that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These injuries require medical treatment; may involve loss of consciousness; may result in restriction of work or motion or transfer to another job; or result in a fatality.

Near Miss - An incident which, if occurring at a different time or in a different personnel or equipment configuration, would have resulted in an incident.

4.4 Responsibilities

Employees - It shall be the responsibility of all C&S Engineers, Inc. employees to report all incidents as soon as possible to the HSC, regardless of the severity.

Human Resources - has overall responsibility for maintaining accident/ incident reporting and investigations according to current regulations and recording injuries/ illness on the OSHA 300 log, and posting the OSHA 300 log.

Emergency Coordinator - It is the responsibility of the Emergency Coordinator to investigate and prepare an appropriate report of all accidents, illnesses, and incidents occurring on or related to C&S Engineers, Inc. work. The Emergency Coordinator shall complete Attachment A within 24 hours of the incident occurrence.

Health and Safety Manager (HSM) - It is the responsibility of the HSM to investigate and prepare an appropriate report of all lost time injuries and illnesses and significant incidents occurring on or related to C&S Companies. The HSM shall maintain the OSHA 300 form.

Project Managers (PM) - It shall be the PM's responsibility to promptly correct any deficiencies in personnel, training, actions, or any site or equipment deficiencies that were determined to cause or contribute to the incident investigated.

5.0 GUIDELINES

5.1 Incident Investigation

The Project Manager will immediately investigate the circumstances surrounding the incident and will make recommendations to prevent recurrence. The HSM shall be immediately notified by telephone if a serious accident/ incident occurs. The incident shall be evaluated to determine whether it is OSHA recordable. If the incident is determined to be OSHA 300 recordable, it shall be entered on the OSHA 300 form.

The Project Manager with assistance from the HSM must submit to the office an incident report form pertaining to any incident resulting in injury or property damage.

5.2 Incident Report

The completed incident report must be completed by the Project Manager within 12 hours of the incident and distributed to the HSM, and Human Resources. This form shall be maintained by Human Resources for at least five years for all OSHA recordable cases. This form serves as an equivalent to the OSHA 101 form.

5.3 Incident Follow-up Report

The Incident Follow-Up Report (Attachment B) shall be distributed with the Incident Report within one week of the incident. Delay in filing this report shall be explained in a brief memorandum.

5.4 Reporting of Fatalities or Multiple Hospitalization Accidents

Fatalities or accidents resulting in the hospitalization of three or more employees must be reported to OSHA verbally or in writing within 8 hours. The report must contain 1) circumstances surrounding the accident(s), 2) the number of fatalities, and 3) the extent of any injuries.

5.5 OSHA 300A Summary Form

Recordable cases must be entered on the log within six workdays of receipt of the information that a recordable case has occurred. The OSHA log must be kept updated to within 45 calendar days.
OSHA 300 forms must be updated during the 5 year retention period, if there is a change in the extent or outcome of an injury or illness which affects an entry on a log. If a change is necessary, the original entry should be lined out and a corrected entry made on that log. New entries should be made for previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year. Log totals should also be modified to reflect these changes.

5.6 Posting

The log must be summarized at the end of the calendar year and the summary must be posted from February 1 through May 31.

5.7 OSHA 300A

Facilities selected by the Bureau of Labor Statistics (BLS) to participate in surveys of occupational injuries and illnesses will receive the OSHA 300A. The data from the annual summary on the OSHA 300 log should be transferred to the OSHA 300A, other requested information provided and the form returned as instructed by the BLS.

5.8 Access to OSHA Records

All OSHA records (accident reporting forms and OSHA 300 logs) should be available for inspection and copying by authorized Federal and State government officials.

Employees, former employees, and their representatives must be given access for inspection and copying to only the log, OSHA No. 300, for the establishment in which the employee currently works or formerly worked.

6.0 REFERENCES

29 CFR Part 1904

7.0 ATTACHMENTS

Attachment A - Incident Investigation Form
Attachment B - Incident Follow-Up Report
Attachment C - Establishing Recordability

ATTACHMENT A

INCIDENT INVESTIGATION FORM

Accident investigation should include:

Location: _____

Time of Day: _____

Accident Type: _____

Victim: _____

Nature of Injury: _____

Released Injury: _____

Hazardous Material: _____

Unsafe Acts: _____

Unsafe Conditions: _____

Policies, Decisions: _____

_____

Personal Factors: _____

_____

Environmental Factors: _____

_____

_____

ATTACHMENT B

INCIDENT FOLLOW-UP REPORT

Date _____

Foreman: _____

Date of Incident: _____

Site: _____

Brief description of incident: _____

_____

_____

_____

_____

Outcome of incident: _____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

Date the injured returned to work: _____

Project Manager Signature: _____

Date: _____

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT B

ATTACHMENT ESTABLISHING RECORDABILITY

1. Deciding whether to record a case and how to classify the case.

   Determine whether a fatality, injury or illness is recordable.

   A fatality is recordable if:

   - Results from employment

   An injury is recordable if:

   - Results from employment and
   - It requires medical treatment beyond first aid or
   - Results in restricted work activity or job transfer, or
   - Results in lost work day or
   - Results in loss of consciousness

   An illness is recordable if:

   - It results from employment

2. Definition of "Resulting from Employment"

   Resulting from employment is when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of: 1) The employer's premises, and 2) other locations where associates are engaged in work-related activities or are present as a condition of their employment.

   The employer's premises include company rest rooms, hallways, cafeterias, sidewalks and parking lots. Injuries occurring in these places are generally considered work related.

   The employer's premises EXCLUDES employer controlled ball fields, tennis courts, golf courses, parks, swimming pools, gyms, and other similar recreational facilities, used by associates on a voluntary basis for their own benefit, primarily during off work hours.

   Ordinary and customary commute, is not generally considered work related.

   Employees injured or taken ill while engaged in consuming food, as part of a normal break or activity is not considered work related. Employees injured or taken ill as the result of smoking, consuming illegal drugs, alcohol or applying make up are generally not considered work related. Employee injured by un authorized horseplay is generally not considered work related, however, an employee injured as a result of a fight or other workplace violence act, may be considered work related.

Associates who travel on company business are considered to be engaged in work related activities all the time they spend in the interest of the company. This includes travel to and from customer contacts, and entertaining or being entertained for purpose of promoting or discussing business. Incidents occurring during normal living activities (eating, sleeping, recreation) or if the associate deviates from a reasonably direct route of travel are not considered OSHA recordable.

3. Distinction between Medical Treatment and First Aid.

First aid:

Any one-time treatment, and any follow up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care. Such one time treatment, and follow up visit for the purpose of observation, is considered first aid even though provided by a physician or registered professional personnel.

Medical Treatment (recordable):

a) Must be treated only by a physician or licensed medical personnel.
b) Impairs bodily function (i.e. normal use of senses, limbs, etc.).
c) Results in damage to physical structure of a non-superficial nature (fractures).
d) Involves complications requiring follow up medical treatment.

Appendix C

Field Sampling Forms

(Date) DAILY CAMP LOG

Project Number/Name:			
Client:			
Address:			
Weather Conditions:			**Temp: AM / PM**
Wind Direction / Strength:		**AM**	**PM**
Date:	**Start Time:**	**Stop Time:**	**Equipment Calibrated: ___ Yes ___ No**

Upwind Station	**Downwind Station 1**	**Downwind Station 2**
Station ID:	**Station ID:**	**Station ID:**
DUST ID:	**DUST ID:**	**DUST ID:**
PID ID:	**PID ID:**	**PID ID:**

Downwind Station 3	**Fixed Station 1 (4 ft - 5 ft)**	**Fixed Station 2 (10 ft - 12 ft)**
Station ID:	**Station ID:**	**Station ID:**
DUST ID:	**DUST ID:**	**DUST ID:**
PID ID:	**PID ID:**	**PID ID:**

Weather Station (conditions documented four times a shift)

Time	Wind Direction	Wind Speed (mph)	Temp	Humidity	Precipitation

Type of soil intrusive work: Soil Excavation __ Waste Soil Handling ___ Test Pitting ___ Soil Borings___ Monitoring Well Installation ___ Bedrock Coring/Drilling __ Utility Trenching ___ Other:

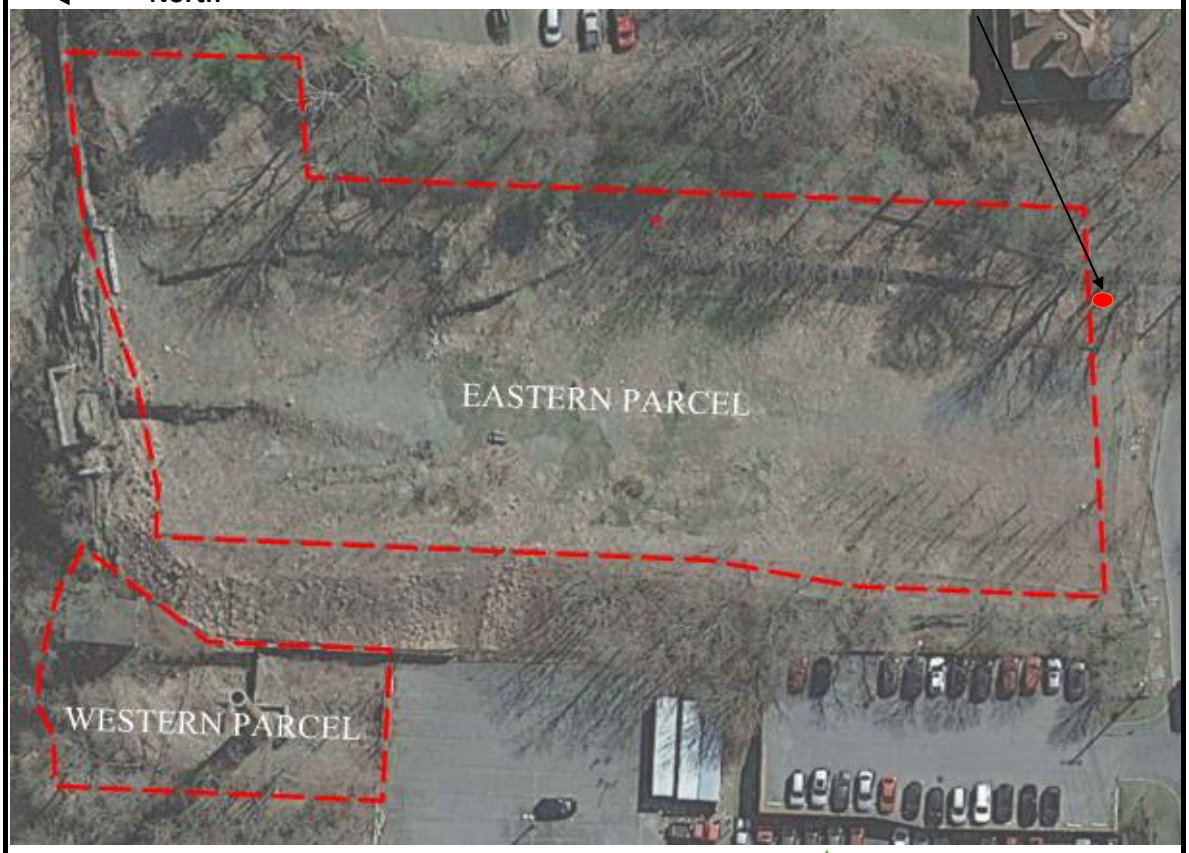
Daily Work Description:

Any visible dust observed leaving the Site? ___ Yes ___ No	**Observed Direction:**
Explain dust suppression methods implemented:	
Any exceedances of the CAMP response levels? __ Yes ___ No	**VOC or DUST?**
Explain exceedances and suppression methods implemented:	

CAMP/ Work Area Location Sketch

North

Fixed Air Monitoring Station



Upwind Station

Downwind Station

Wind Direction

Additional Notes:

Photo Log	
Site conditions prior to start of work on (DATE)	
Site conditions post work on (DATE)	
Photo Notes:	

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Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667

Rock Core LOG

							Core No.	
							Sheet No.:	___ of ___
							Project No.:	
Project Name:							***Surface Elev.:***	
Location:							***Datum:***	
Client:							***Start Date/Time:***	
Drilling Firm:							***Finish Date/Time:***	
Groundwater	***Depth***	***Date & Time***	***Drill Rig:***				***Inspector:***	
While Drilling:			***Core Legnth:***		***Diameter:***		***Undist:***	
Before Casing Removal:			***Sampler:***		***GPS Coordinates:***			
After Casing Removal:			***Hammer:***					

Depth (ft)	Core Run Time	Run #	Rate of Advancment	**MATERIAL DESCRIPTION**	**COMMENTS** (e.g., weathering, natl vs. mech breaks, RQD, % Recovered)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Notes:

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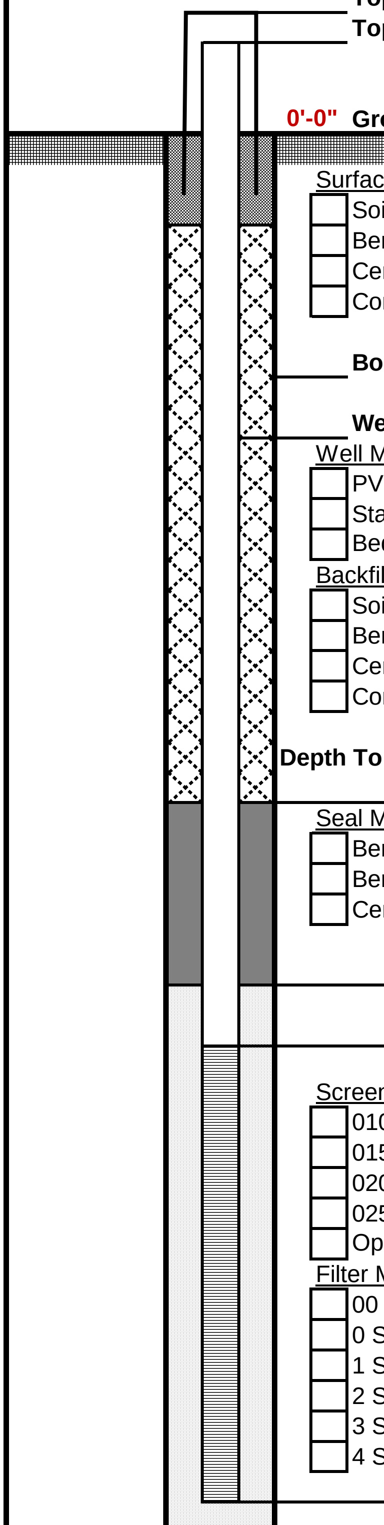
GROUNDWATER OBSERVATION WELL CONSTRUCTION LOG

Well No.	
Project No.:	
Surface Elev.:	

Project Name:		***Datum:***	
Location:		***Start Date:***	
Client:		***Finish Date:***	
Drilling Firm:		***Inspector:***	
Drill Rig:		***Casing:***	

Notes: (provide description of observation well location, method of construction, development method and any other information)



Top Protective Casing
Top of Riser

0'-0" **Ground Surface**

Surface Backfill Material
- ☐ Soil Cuttings
- ☐ Bentonite Slurry
- ☐ Cement/Bentonite Grout
- ☐ Concrete

Bore Hole Diameter

Well Diameter

Well Material
- ☐ PVC
- ☐ Stainless Steel
- ☐ Bedrock

Backfill Material
- ☐ Soil Cuttings
- ☐ Bentonite Slurry
- ☐ Cement/Bentonite Grout
- ☐ Concrete

Depth To:

Top of Seal

Seal Material
- ☐ Bentonite Chips/Pellets
- ☐ Bentonite Slurry
- ☐ Cement/Bentonite Grout

Top of Filter Pack

Top of Screen

Screen Slot Size
- ☐ 010 in
- ☐ 015 in
- ☐ 020 in
- ☐ 025 in
- ☐ Open Bedrock

Filter Material
- ☐ 00 Sand Pack
- ☐ 0 Sand Pack
- ☐ 1 Sand Pack
- ☐ 2 Sand Pack
- ☐ 3 Sand Pack
- ☐ 4 Sand Pack

Bottom of Screen
Bottom of Bore Hole

Groundwater Measurement Data

Date	Time	Depth to Water	Water Elevation	Tide Status

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Well Sampling Field Data Sheet

Well Casing Unit Volume (gal/l.f.)		
1¼" = 0.08	2" = 0.17	3" = 0.38
4" = 0.66	6" = 1.5	8" = 2.6

Client Name: _____

Site Name: _____

Project No.: _____

Field Staff: _____

WELL DATA

Date		
Time		
Water meter utilized and date last calibrated		
Well Number		
PID Reading (ppm)		
Diameter (inches)		
Total Sounded Depth (feet)		
Static Water Level (feet)		
H_2O Column (feet)		
Pump Intake (feet)		
Well Volume (gallons)		
Amount to Evacuate (gallons)		
Amount Evacuated (gallons)		

SAMPLE DATA

Sample Date		
Sample Time		
Sampler Initials		
Sample I.D.		
Dupe Collected?	☐ Yes ☐ No	ID:
MS Collected?	☐ Yes ☐ No	ID:
MSD Collected?	☐ Yes ☐ No	ID:
Trip Blank Collected?	☐ Yes ☐ No	ID:
EQ Blank Collected?	☐ Yes ☐ No	ID:
Comments		

FIELD READINGS

Date	Stabilization Criteria								
Time									
Volume Extracted	gallons								
Static Water Level (feet)	NA								
pH (Std. Units)	+/-0.1								
Conductivity (mS/cm)	3%								
Turbidity (NTU)	10%								
D.O. (mg/L)	10%								
Temperature (ºC) (ºF)	3%								
ORP[3](mV)	+/-10 mv								
Appearance									
Free Product (Yes/No)									
Odor									

Date	Stabilization Criteria								
Time									
Volume Extracted	gallons								
Static Water Level (feet)	NA								
pH (Std. Units)	+/-0.1								
Conductivity (mS/cm)	3%								
Turbidity (NTU)	10%								
D.O. (mg/L)	10%								
Temperature (ºC) (ºF)	3%								
ORP[3](mV)	+/-10 mv								
Appearance									
Free Product (Yes/No)									
Odor									

C = Clear T = Turbid ST = Semi Turbid VT = Very Turbid

Comments

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Hydraulic Conductivity Field Data Log

Slug Unit of Volume (gal/l.f.)	**Client Name:**		**Well ID:**
	Site Name:		
	Project No.:		**Date:**
	Field Staff:	**State Time:**	**End Time:**

Well Details		**K - Test Details**		**Transducer Details**	
Static Water Level (ft):		Screen Interval (ft):	to	Type:	
Total Well Depth (ft):		Screen Length (ft):		Model:	
Well Diameter (in):		Screen Submerged?:	YES or NO	SN #:	

Slug Details

Slug Length: Slug Diameter: Slug Volume Displacement:

Water Level Notes (1 - 5 Minute Checks)

Date								
Time								
Water Level (feet)								
Date								
Time								
Water Level (feet)								
Date								
Time								
Water Level (feet)								

Notes:

(Date(s)) GREEN REMEDATION METRICS TRACKING LOG

(to be used for Daily / Weekly / or Phase Tracking)

Project Number / Name:

Client:

Address:

Project Start Date: **Project End Date:** **___ of ___**

Equipment Emissions

Equipment Type	Fuel Type	Hours of Operation	Time of Idling or not in Use
On-site diesel equipment			
Other:			
Other:			
Other:			
Other:			
Other:			

VOC Emissions

Type of Equipment	Hours of Operation	Volume of VOCs Emitted	lbs VOCs Emitted
Soil remediation equipment			
Groundwater remediation equipment			
Other:			
Other:			

Materials & Waste Totals

(See truck logs for more detail)

Imported Materials

Type of Material	Total Quantity	Origin	# of Trips	Miles from Site
Topsoil				
Fill				
Silt Fence				
Silt Logs				
Aggregate Base Course				
Geotextile				
Solidification Additives				
Activated Carbon				
Other:				
Other:				

Total Waste Generated On-Site

Type of Material	Total Quantity	Origin	Exported?	Miles from Site
Remedy Generated Waste				
Contractor Generated Waste				
Other:				
Other:				

Solid Waste Disposal and Diversion

Type of Material	Total Quantity	Disposal Location	# of Trips	Miles from Site
TSCA Contaminated Sediment				
Non-TSCA Contaminated Sediment				
Cleared Vegetation				
Spent Granular Activated Carbon				
Monitoring Well Removal Debris				
Other:				
Other:				

Recycled / Bio-Based Products

Type of Material	Total $ Value	% Recycled Content	% Bio-based Content

Energy Usage

Energy Type	KWh	Total Used	Type of Generation
Total Electricity Usage			
Total Renewable			
Other:			
Other:			

Water Usage

Type of Water	Gallons	Reason for Usage	Provider
Total Water Usage			
Public potable water supply			
Surface water			
On-site treated groundwater			
Reclaimed treated groundwater			
Collected or diverted storm water			
Re-Injected groundwater			
Other:			
Other:			

Land / Ecosystem Tracking

Land Disturbance Type	Total Area	Land Finished / Restored Type	COC Type
Total land area disturbed			
total land area restored			
Increase in area for storm water infiltration (vs pre-disturbed)			
Increase in area of native species plantings (vs pre-disturbed)			
Total area of land impacted by contamination			
Total area of land remediated to unrestricted use			
Total area of land remediated to other future use			

Additional Comments:

See Daily CAMP Log or Daily Truck Log for more details on work completed, materials imported/exported, and materials/resources used.