ARCADIS
Infrastructure · Water · Environment · Buildings

ARCADIS of New York, Inc.
855 Route 146
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Transmittal Letter

To:
Mr. David Szymanski
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

Copies:
Dave Sordi, Ingersoll Rand
Scarlett Messier, NYSDOH
Marc Sanford, ARCADIS
Moh Mohiuddin, ARCADIS
File

From:
Todd Carignan

Date:
July 13, 2012

Subject:
Site Management- Periodic Review Report

ARCADIS Project No.:
AY000219.0018

We are sending you:

☒ **Attached** ☐ **Under Separate Cover Via ________ the Following Items:**

☐ Shop Drawings ☐ Plans ☐ Specifications ☐ Change Order
☐ Prints ☐ Samples ☐ Copy of Letter ☒ Reports
☐ Other: ____________

Copies	Date	Description	Action*
1	7/12/12	Site Management- Periodic Review Report (July 20, 2011 – June 15, 2012), DC Rollforms Site, Jamestown, New York (Site No. 907019)	AS

Action*
☐ A Approved ☐ CR Correct and Resubmit ☐ Resubmit _____ Copies
☐ AN Approved As Noted ☐ F File ☐ Return _____ Copies
☒ AS As Requested ☐ FA For Approval ☐ Review and Comment
☐ Other: ____________

Mailing Method
☐ U.S. Postal Service 1st Class ☐ Courier/Hand Delivery ☐ FedEx Priority Overnight ☐ FedEx 2-Day Delivery
☐ Certified/Registered Mail ☐ United Parcel Service (UPS) ☐ FedEx Standard Overnight ☐ FedEx Economy
☒ Other: Email

Comments: Signed original IC/EC Certification Forms were mailed under seperate cover.

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ENVIRONMENT

Mr. David Szymanski
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

Subject:
Site Management- Periodic Review Report, DC Rollforms Site, Jamestown, New York (Site No. 907019)

Date:
July 13, 2012

Contact:
Marc W. Sanford
Todd M. Carignan

Phone:
518.250.7300

Email:
marc.sanford@arcadis-us.com
todd.carignan@arcadis-us.com

Our ref:
AY000219.0018

Dear Mr. Szymanski:

On behalf of Ingersoll Rand Company, ARCADIS is submitting this cover letter and accompanying attachments to satisfy the request for the Annual Site Management-Periodic Review Report for DC Rollforms Site, covering the reporting period from July 20, 2011 through June 15, 2012, as requested by NYSDEC in a May 30, 2012 letter to Ingersoll Rand Company.

The following documents, which contain the information requested by Site Management- Periodic Review Report (Enclosure 3), have been provided:

§ NYSDEC Site Management Periodic Review Report Notice, Institutional Controls and Engineering Controls Certification Form;

§ 2011 Annual Monitoring Report; and,

§ First Quarter 2012 Remedial Status Report. This report covers the reporting period of January 1, 2012 through March 31, 2012 (submitted previously via email on June 14, 2012).

The Second Quarter 2012 Remedial Status Report for Remedial Action covering the reporting period from April 1, 2012 through June 30, 2012 will be submitted under separate cover.

If there are any questions or comments regarding this status report, please do not hesitate to contact us.

Sincerely,

ARCADIS of New York, Inc.

T. Carignan

Todd Carignan
Project Engineer

Imagine the result

Marc W. Sanford
Principal Scientist

Moh Mohiuddin, Ph.D., P.E., BCEE
Principal Engineer - Engineer of Record

Attachments:

1. NYSDEC Site Management Periodic Review Report Notice, Institutional Controls and Engineering Controls Certification Form.
2. 2011 Annual Monitoring Report.

Copies:
Dave Sordi, Ingersoll Rand
Scarlett Messier, NYSDOH
File

Attachment 1

Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. **907019**

Site Name D.C. (Dow Craft) Rollforms

Site Address: 583 Allen Street Zip Code: 14701
City/Town: Jamestown
County: Chautauqua
Site Acreage: 2.4

Reporting Period: July 20, 2011 to June 15, 2012

		YES	NO
1.	Is the information above correct?	X	☐
	If NO, include handwritten above or on a separate sheet.		
2.	Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	X
3.	Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	X
4.	Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	X
	If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5.	Is the site currently undergoing development?	☐	X

Box 2

		YES	NO
6.	Is the current site use consistent with the use(s) listed below? Commercial and Industrial	X	☐
7.	Are all ICs/ECs in place and functioning as designed?	X	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Not Applicable

Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 907019 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
307-13-2.2	Jamestown Allenco, Inc.	Ground Water Use Restriction Landuse Restriction Site Management Plan Soil Management Plan

Box 4

Description of Engineering Controls

Parcel	Engineering Control
307-13-2.2	Groundwater Containment Groundwater Treatment System Subsurface Barriers

Engineering Control Details for Site No. 907019

Parcel: 307-13-2.2

Deed Restrictions (7/19/2005) Recorded - 11/29/2005:
1. Property use: Commercial or Industrial
2. Prohibition of use of groundwater.

Site Management Plan:Soils Management Plan and Inspections of Cover System, Rip Rap, Plantings, and Erosion.

Groundwater Collection and Treatment System Operation, Maintenance, and Monitoring.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
X	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
X	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Not Applicable

Signature of Owner, Remedial Party or Designated Representative

Date

IC CERTIFICATIONS
SITE NO. 907019

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Marc Sanford at 855 Route 146, Suite 210, Clifton Park, NY 12065,
print name / print business address

am certifying as Remedial Party - ARCADIS of New York, Inc. (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Marc W. Sanford
Signature of Owner, Remedial Party, or Designated Representative Rendering Certification

7/12/12
Date

IC/EC CERTIFICATIONS

Box 7

Professional Engineer Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Moh Mohiuddin at 105 Fieldcrest Ave, Suite 305, Edison, NJ 08837,
print name / print business address

am certifying as a Professional Engineer for the Remedial Party - ARCADIS of New York, Inc.
(Owner or Remedial Party)

STATE OF NEW YORK
MOH MOHIUDDIN
074527
LICENSED PROFESSIONAL ENGINEER

Signature of Professional Engineer, for the Owner or Remedial Party, Rendering Certification

Stamp (Required for PE)

07/12/2012
Date

ARCADIS

Attachment 2

Imagine the result

2011 Annual Monitoring Report

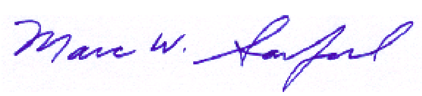
D.C. Rollforms Site
Jamestown, New York
Site # 907019

July 2012

2011 Annual Monitoring Report

D.C. Rollforms Site,
Jamestown, New York
Site Code 907019

Todd Carignan
Project Engineer



Marc W. Sanford
Principal Scientist

Moh Mohiuddin, Ph.D., P.E., BCEE
Principal Engineer-Engineer of Record
NY PE License #074527

Prepared for:
Ingersoll Rand Company

Prepared by:
ARCADIS of New York, Inc.
855 Route 146
Suite 210
Clifton Park
New York 12065
Tel 518 250 7300
Fax 518 250 7301

Our Ref.:
AY000219.0018

Date:
July 12, 2012

Tables

Figures

Appendices

Acronyms

AC - air compressor

acfm - actual cubic feet per minute

AGC - Annual Guidance Concentration

AS - air stripper

B - blower

BPU - Board of Public Utilities

CF - cartridge filters

COC - Constituents of Concern

DCE - Dichloroethene

DNAPL - Dense Non-aqueous Phase Liquid

DRO - Diesel Range Organics

FSP - Field Sampling Plan

gpm - gallons per minute

GRO - Gasoline Range Organics

In W.C. - Inches of Water Column

kg - kilograms

LPGOC - Liquid Phase Granular Organically Modified Clay

PLC - Programmable Logic Controller

MW - monitoring well

NAPL - Non-Aqueous Phase Liquid

ND - non-detect

NYSDEC - New York State Department of Environmental Conservation

O&G - Oil and Grease

O&M - Operation and Maintenance

OM&M - Operation, Maintenance and Monitoring

OW - observation well

OWS - oil/water separator

PCBs - polychlorinated Biphenyls

PLC - programmable logic controller

ppbv - parts per billion by volume

POTW - Publicly Owned Treatment Works

SMP - Site Management Plan

SP - sample port

SVE - soil vapor extraction

TCE - Trichloroethene

TP - transfer pump

TPH - Total Petroleum Hydrocarbons

TSS - Total Suspended Solids

µg/L - micrograms per liter

mg/L - milligrams per liter

USEPA - United States Environmental Protection Agency

VC - Vinyl Chloride

VEP - Vacuum Enhanced Pumping

VOCs - Volatile Organic Compounds

VPGAC - vapor phase granular activated carbon

1. Introduction

ARCADIS of New York, Inc. (ARCADIS), on behalf of the Ingersoll Rand Company, has prepared this 2011 Annual Monitoring Report for the former D.C. Rollforms Site (referred to hereafter as the Site) located in Jamestown, Chautauqua County, New York (Figure 1). The work was performed in accordance with the New York State Department of Environmental Conservation (NYSDEC) approved Groundwater Collection and Treatment System Operation, Maintenance, and Monitoring Plan (OM&M Plan; ARCADIS 2008), and Site Management Plan (SMP)(ARCADIS 2008). This 2011 Annual Monitoring Report covers the period from January 1, 2011 through December 31, 2011.

The groundwater collection and treatment system (referred to herein as the 'system') consists of a vacuum enhanced pumping (VEP) system for the collection of constituents of concern (COC). The treatment system comprises an oil/water separator, cartridge filters, carbon/clay filters, and an air stripper. The system was designed and constructed to recover and treat chlorinated volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and non-aqueous phase liquid (NAPL) present in the subsurface at the Site. The main COCs at the Site are trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride (VC).

This report summarizes the overall remedial system performance and documents inspections and Site activities related to the SMP. Extracted volumes of groundwater and vapor, contaminant mass removal estimates, and system performance data and evaluation are presented. The report also provides an outlook on the 2012 operating period and any recommendations for modification to the system operation and/or monitoring programs (if necessary) in order to achieve the remedial objectives of the site.

2. Background

2.1 Site Location and Description

The Site is located at 583 Allen Street in Jamestown, Chautauqua County, New York (Figure 1). The Site is approximately 2.38 acres in size, and is a vacant parcel. The vacant parcel is owned by Jamestown Allenco, LLC. and is bounded by Allen Street on the east, the Weber Knapp and Jamestown Urban Renewal Agency properties on the south, and the Chadakoin River on the west and northwest. The adjacent north parcel is owned by Heavy Press and Tool, Inc. This parcel contains a two-story building and parking lot (Figure 2). The Site is located in a mixed residential and commercial area, which is served by a public water supply and sanitary sewer. The Site was listed in the registry of Inactive Hazardous Waste Disposal Sites in New York State in 1994. The Site is currently classified as Class 2 under the NYSDEC Environmental Site Remediation Database and is in the State Superfund Program. Upon completion of the active remedial activities the Site will be reclassified as a Class 4, which indicates a site that has been properly remediated and will require continued management.

2.2 Summary of Remedial System Components

The remedy implemented for the D.C. Rollforms Site includes the following elements:

- Installation of a steel interlocking sheet-pile wall (i.e., vertical barrier wall) at the top of the riverbank between the Chadakoin River and the Site;

- Vacuum Enhanced Pumping technology utilizing submersible pneumatic pumps and a regenerative blower to remediate NAPL and VOCs in groundwater and soil;

- Groundwater and soil gas treatment system comprised an oil/water separator, solids filtration units, carbon filtration, and air stripping technologies;

- Excavation of the soil between the vertical barrier wall and Chadakoin River;

- Removal of abandoned Site storm water outfalls;

- Riverbank reconstruction/stabilization and restoration including live plantings;

- Covering and reseeding disturbed areas with 12-inches of clean soil;

- The removal of sediment from the Chadakoin River; and

- Fish habitat construction (e.g., wingwall structure) in the Chadakoin River.

The remedial system layout is shown on the site plan in Figure 2. The groundwater collection system is designed to extract groundwater impacted by NAPL and VOCs consisting primarily of TCE, total DCE, and VC. The extracted groundwater is treated via an oil/water separator (OWS), filtration, and air stripping prior to discharge to the publically owned treatment works (POTW) sanitary sewer under an Industrial Waste Water Discharge permit with the Jamestown Board of Public Utilities (BPU).

2.3 Engineering Controls

As part of the remedy as noted above in Section 2.2, engineering controls implemented and maintained at the D.C. Rollforms Site include:

- Installation of a steel interlocking sheet-pile wall (i.e., vertical barrier wall) at the top of the riverbank between the Chadakoin River and the Site;
- Vacuum Enhanced Pumping technology utilizing submersible pneumatic pumps and a regenerative blower to remediate NAPL and VOCs in groundwater and soil; and
- Groundwater and soil gas treatment system comprised an oil/water separator, solids filtration units, carbon filtration, and air stripping technologies.

2.4 Institutional Controls

Institutional controls have been implemented as part of the Remedial Action. The Declaration of Covenants and Restrictions dated June 2005 by Jamestown Allenco addresses prohibitions on the property. The prohibitions set forth in the declaration are summarized as follows:

- The property is prohibited from ever being used for purposes other than commercial or industrial;
- The use of groundwater underlying the property is prohibited without rendering it safe for drinking water or industrial/commercial purposes; and
- The owner of the property shall continue to not interfere with any institutional and engineering controls the NYSDEC required Ingersoll Rand to put into place and maintain.

The covenants and restrictions run with the land and are binding upon all future owners of the property.

3. System Operation Overview

The general layout (e.g., wells, piping, and treatment building) of the remedial system is shown on Figure 2. The remedial system includes fourteen (14) vacuum enhanced pumping wells (VEP-1 through VEP-14).

3.1 Liquid Phase

Groundwater and NAPL from the VEP wells is extracted by total fluids pneumatic pumps conveyed via below grade in individual 1-inch diameter piping to an onsite treatment building. The groundwater and NAPL is then pumped into a common manifold piped inside the treatment building. The groundwater and NAPL is then conveyed into the OWS (OWS-200) for removal of NAPL. As noted in previous reports, recovery wells VEP-11, VEP-13, and VEP-14 are piped directly to the OWS. A sequestering agent (Aries 2925) is injected into the process stream on the inlet side of the OWS to prevent iron and manganese-related fouling downstream in the system (e.g., OWS, process piping, cartridge filters and air stripper).

Once the groundwater is pre-treated by OWS-200, the water flows by gravity to a storage tank (ST-300). The water is then transferred in batch mode by transfer pump TP-300 through cartridge filters (CF-400 and CF-401) for the removal of residual suspended solids. Following the cartridge filters the treatment process is equipped with a 400-pound (lb) liquid phase granular organically modified clay (LPGOC) filter vessel (ACF-400) for the treatment and removal of residual emulsified NAPL in the liquid phase process stream. As noted in previous reports, the LPGOC vessel has been bypassed since shortly after startup due to the efficiency of the OWS. However, if warranted, the LPGOC treatment process will be brought back online.

Following filtration through the cartridge filters, groundwater is pumped through a low-profile air stripper (AS-700) for the removal of dissolved phase organic compounds. Influent water enters at the top of the air stripper and flows downward by gravity through four aeration trays. A countercurrent of air is blown up through $^{3}/_{16}$-in.-diameter holes in the aeration trays to create bubbles in the water, generating a large mass-transfer surface area from which the VOCs are volatilized. VOCs are stripped from the water and discharged to the atmosphere through an 8-inch diameter stack. The treated water flows into a sump at the bottom of the air stripper and is then discharged via transfer pump TP-700 from the air stripper to local Jamestown BPU sanitary sewer manhole 3T6 located on Allen Street, through a 2-inch force main pipe located below grade (Figure 2).

3.2 Vapor Phase

Soil gas is extracted from each VEP well via vacuum generated by a regenerative blower (B-900). The soil gas is conveyed from each well by 2-inch diameter piping which is then tied into a common header located below grade. Upon entering the treatment building the soil gas passes through a liquid knockout tank (KT-900) which is designed to remove/collect any groundwater or condensate that may be extracted from the subsurface. Following treatment through the knockout tank the soil gas passes through a heat exchanger (HX-500) in order to reduce the temperature of the soil gas stream discharged by the blower, thus maintaining the temperature of the soil gas stream within the acceptable temperature limits of the vapor phase granular activated carbon (VPGAC). The recovered soil gas is treated via two (2) 2,000-lb VPGAC vessels (ASC-501 and ASC-502) arranged in series. The VPGAC is used to remove VOCs from the soil gas stream prior to being discharged to the atmosphere.

3.3 Controls and Monitoring

The system is designed to allow monitoring of the operational status of critical systems on a continual basis during operation and is equipped with a programmable logic controller (PLC). System motors (e.g., air compressor, blowers, etc.) and sensors (e.g., transmitters, switches, etc.) are interlocked with the PLC. Each of the major pieces of equipment and/or sensors are programmed via the PLC to automatically shutdown the system in the event the system malfunctions or a component failure occurs. An automated system shutdown prevents the discharge of untreated groundwater or soil vapor and also protects the health and safety of system operators, should they be onsite during a system failure. Additionally, the PLC is programmed with several non-critical alarm interlocks which notify system operators that routine maintenance needs to be completed (e.g., sequestering agent drum replacement, cartridge filter change-out, etc.) or if the system is shutdown. The process and instrumentation diagrams and equipment layout record drawings are included in Appendix A.

3.4 Riverbank and Cover System Inspections

As outlined in the SMP, the following remedial design elements were constructed at the Site.

- Soil cover of 12 inches in areas disturbed during construction;
- Riverbank reconstruction including stabilization/erosion controls;
- Wingwall structure; and
- Riverbank plantings.

Each of these areas is inspected in accordance with the schedule below:

Frequency	Responsible Person	Actions
Quarterly	Project Engineer	Inspections
Annual	Professional Engineer	Certification

The cover system, riverbank, and wingwall structure were inspected for erosion, sloughing, settlement or other indication of loss of integrity. The riverbank plantings were observed for any signs of distress or lack of growth. The results of the riverbank, site cover, and well inspections are summarized Section 6.2.

3.5 Monitoring Well Inspections

Recovery well and monitoring well integrity surveys are conducted quarterly to observe the surface conditions around each well, the condition of the concrete surface seal and presence of a secure locking cap and/or bolt down road box. Periodically, the depth to bottom in all the wells is measured and compared to the original constructed well depth.

4. System Operation and Maintenance

The remedial system was operated from January to December during the 2011 reporting period with only brief periods of shutdown due to scheduled operation and maintenance (O&M) and/or alarm conditions, as well as repairs and non-routine maintenance activities as discussed in Section 4.2. It should be noted that the soil vapor extraction (SVE) component of the system was temporarily taken offline on March 22, 2011 as a result of a faulty transfer pump (TP-900). A replacement pump was installed on May 3, 2011 and the SVE portion of the system was restarted and resumed normal operation. due to excess groundwater extraction via the SVE system. Monthly O&M site visits consisted of system inspection, recording of operating parameters, influent and effluent system sampling, and investigation/troubleshooting of any alarm conditions. System alarm verification was performed remotely via desktop software. The O&M data generated during each monthly visit are summarized in quarterly progress reports as required by the Consent Order. O&M related to each of the major system components (collection system, liquid and vapor treatment) are discussed below.

4.1 Collection and Treatment System O&M

The following O&M tasks were performed monthly on the remedial system (pneumatic pumps, air compressor, regenerative blower, transfer pump, and related equipment).

4.1.1 Liquid Phase Treatment

The following OM&M tasks were performed monthly, or as needed, with regards to the liquid phase extraction and treatment portion of the system:

- Inspection of all pipes and fittings for potential leaks;
- Checking air compressor (AC-600) coolant oil level and temperature to assure proper operation;
- Inspection of pneumatic pumps (VEP-1 through VEP-14) for proper operation and repair/cleaning, as needed;
- Inspection and cleaning of air stripper (AS-700) as needed;
- Inspection of flow meter (FQI-700) to assure proper operation;
- Monitor and record the system field gauge readings to determine if the system is operating within the designed operational ranges;
- Check and record pressure readings at inlet and outlet of cartridge filters (CF-400 and 401) to assure proper operation;
- Change-out cartidge filters (CF-400 and 401), as needed;
- Record total volume of groundwater recovered and average recovery flow rates;
- Maintain sequestering agent dosing rate and change-out drum as needed;
- Collect system influent liquid phase samples and submit for laboratory analysis of site-specific COCs. These results are summarized in Section 5.3; and

- Collect system effluent liquid phase samples and submit for laboratory analysis as per the Industrial Wastewater Discharge permit, as set forth by the Jamestown BPU. These results are summarized in Section 5.4.

4.1.2 Vapor Phase Treatment

The following OM&M tasks were performed monthly, or as needed, with regards to the vapor extraction and treatment portion of the system.

- Inspection of all pipes and fittings for potential leaks;
- Recording of the blower outlet temperature (TI-901 and TI-902);
- Record extracted air flow rate (FIT-501);
- Check and record pressure readings at inlet and outlet of the heat exchanger and vapor phase activated carbon vessels (ASC-501 and ASC-502) to assure proper operation;
- Monitor the regenerative blower (B-900) for proper operation pressures and temperatures;
- Influent vapor samples are collected and submitted for laboratory analysis of site-specific COCs. These results are summarized in Section 5.5; and
- Effluent vapor samples are collected and submitted for laboratory analysis in order to monitor the system VOC emissions. The VOC emissions are compared to the allowable annual mass flow per the NYSDEC effluent air standards set forth in the Division of Air Resources (DAR-1) Guidance. These results are summarized in Section 5.5.

4.1.3 Recovery Well Inspections

The following O&M tasks were performed quarterly or as needed with regards to the system recovery wells.

- Record applied vacuum readings at individual extraction wells;
- Record induced vacuum readings at select monitoring wells;

- Observe pump operation (pump cycle-counter readings) at each recovery well and record cycle-counter total; and

- Recovery well integrity surveys are conducted to observe the surface conditions around each well, the condition of the concrete surface seal and presence of a secure bolt down road box.

4.1.4 Recordkeeping and Reporting

Monitoring data were recorded on OM&M checklists and submitted as part of the quarterly progress reports to the NYSDEC. As noted, influent and effluent liquid and vapor samples were submitted monthly for laboratory analysis. The analytical results are used to evaluate system performance and to estimate the contaminant mass removal.

4.2 Non-Routine O&M

During the 2011 reporting period, the following system non-routine O&M activities were performed:

- January 12, 2011 – Removed iron and manganese-related fouling from within the liquid phase effluent (i.e., force main) piping between air stripper AS-700 and the cleanout located between the treatment system building and Allen Street;

- March 31, 2011 – Converted VEP-11 components at the recovery well manifold from polyvinyl chloride (PVC) to stainless steel piping/fittings;

- May 3, 2011 – Replaced liquid transfer pump TP-900 on liquid knockout tank KT-900 skid;

- July 21, 2011 – Repaired rip-rap slough on northern end of riverbank near recovery well VEP-13;

- August 16, 2011 – Replaced total fluids pneumatic pump for recovery well VEP-14; and

- December 23, 2011 – Performed non-routine cleaning of iron and manganese-related fouling from oil/water separator OWS-200 and storage tank ST-300.System Modifications.

No system process modifications were made during the 2011 reporting period.

5. System Performance Monitoring

The operational data collected during the monthly inspections of the system operation are summarized in the following sections. Monthly system O&M logs have been provided with the quarterly Remedial Status Reports, and system liquid phase influent and vapor phase sample results have been submitted to NYSDEC's EIMS Administrator in the required EQuIS Electronic Data Deliverable (EDD) format. System liquid phase effluent analytical results have been provided with the Industrial Wastewater Discharge Monitoring Reports submitted on a monthly basis to the Jamestown BPU.

5.1 Objectives of Monitoring

During operation of the system, various data were collected and analyzed to evaluate the overall performance and effectiveness of the system. This performance monitoring is intended to achieve the following objectives:

- Evaluate total dissolved and vapor phase VOC and TPH, as well as NAPL recovered during the operational period;
- Evaluate performance of the remedial system;
- Determine if any modifications to the system are required to enhance the system performance; and
- Ultimately determine when remedial milestones or endpoints have been achieved.

The performance monitoring results for 2011 are summarized below.

5.2 System Operational Data

The system operational data for 2011 is summarized in Table 1. These data include the average and cumulative recovered groundwater and soil vapor flows, average applied vacuums to the recovery well network, and recovery well statuses.

5.2.1 Groundwater Recovery/Extracted Liquid Flowrate

During 2011, the groundwater collection system was operated with each VEP well online with the exception of temporary recovery well configuration changes and/or shutdowns associated with routine O&M activities, as well as non-routine O&M activities discussed in Section 4.2. Additionally, select recovery wells (VEP-1 and VEP-4 through VEP-9) were temporarily turned offline in February and April 2011 to mitigate excessive groundwater extraction by the remedial system.

It should be noted that recovery wells which were online but were in need of routine repairs and cleaning are identified as being online in Table 1.

Total extracted groundwater flow readings were collected from the totalizing flowmeter (FQI-700). The average monthly system groundwater extraction flow rates are included in Table 1. A cumulative total of 8,197,663 gallons of groundwater has been recovered by the system from startup (January 2008) through December 21, 2011 (Table 2). The total flow recovered in 2011 was 1,532,464 gallons. The 2011 total flow corresponds to an average recovery rate of approximately 3.0 gallons per minute (gpm).

5.2.2 Vapor Recovery/Extracted Vapor Flowrate

The vapor phase extraction system was operational during the 2011 period with the exception of isolated shutdowns and/or temporary recovery well configuration changes due to routine O&M activities, as well as non-routine O&M activities discussed in Section 4.2. Additionally, vapor phase extraction for select recovery wells was temporarily taken offline in January (VEP-1 and VEP-4 through VEP-11) and February 2011 (VEP-2, VEP-3, VEP-11, VEP-13, and VEP-14) to mitigate excessive groundwater extraction by the vapor extraction system due to the shallow groundwater table at the Site.

Extracted vapor flow rate readings were collected from the flowmeter (FIT-501) located in the vapor treatment system exhaust post the VPGAC vessel ASC-502 (i.e., post-blower/fresh air dilution valve) and ranged from 241 to 283 actual cubic feet per minute (acfm) during the operational months for the vapor phase extraction system during the 2011 reporting period (Table 1). These flow ranges correspond to an average recovery rate of approximately 270 acfm over the operational period for the vapor phase extraction system during 2011.

5.2.3 Applied and Induced Vacuum

The applied vacuum at the system knockout tank generated by regenerative blower B-900 generally ranged from 30 to 42 inches of water column (in.W.C.). The applied vacuum to the VEP wellheads was adjusted based on several factors which included observed vacuum at the wellhead, induced vacuum at select monitoring points, and seasonal groundwater elevations. The average monthly system applied vacuums are included in Table 1.

Induced vacuum measurements were recorded at select monitoring wells ESI-1, ESI-2, ESI-3, ESI-4R, PW-1, VEPOW-1, VEPOW-2, OW-5, OW-6, OW-7, MW-10R, and MW-4S. Induced vacuums ranged from 0.009 in.W.C. (MW-10R) to 7.1 in.W.C. (ESI-4R).

5.3 System Influent Liquid Phase Analytical Results

As outlined above, system influent groundwater samples were collected on a monthly basis. The samples were collected from sample port SP-115 (OWS-200 influent chamber). The samples were submitted for laboratory analysis of United States Environmental Protection Agency (USEPA) Method 624 for VOCs, USEPA Method 8015B for TPH gasoline range organics/diesel range organics (GRO/DRO), and USEPA Method 608 for PCBs (polychlorinated biphenyls). All samples were submitted to Accutest Laboratories in Marlborough, Massachusetts.

The influent sample concentrations were used to estimate total mass removal from the subsurface and to evaluate the relative changes in this mass removal rate over time. The mass removal estimate is generated using the monthly influent sample analytical data and the extracted groundwater flow totals. The liquid phase monthly influent concentrations of TCE, total DCE, VC, TPH GRO/DRO, and PCBs in groundwater are provided in Table 3 and are illustrated graphically on Figure 3.

It should be noted that temporary monitoring modifications made beginning in 2010 were continued into the first monthly sampling event of the 2011 reporting period. These modifications included collecting influent samples from select VEP well sampling ports and compositing in the field as opposed to collecting a single combined system influent sample. The first monthly liquid phase sample of 2011 was a composite sample from recovery wells VEP-10, VEP-11 and VEP-12. Recovery well statuses during influent liquid phase sampling events have been included in Table 3.

Liquid phase influent concentrations during 2011 ranged from 1.5 to 271 micrograms per liter (μg/L) for TCE, 20 to 524 μg/L for total DCE, and 2.7 to 333 μg/L for VC. Influent concentrations of TPH GRO and DRO ranged from non-detect to 0.303 mg/L and from 3.001 to 123 μg/L, respectively. It should be noted that the VOC and TPH concentrations detected in monthly system liquid samples are expected to vary based on what recovery wells are online during the sampling event, and cycling during the time of sample collection.

5.4 System Effluent Treated Liquid Phase Analytical Results

Pursuant to the effluent standards set by the Jamestown BPU Industrial Wastewater Discharge Permit (Permit No. 037), sampling consists of the monthly collection of four grab samples over an 8-hour period during a typical operational day. These samples are analyzed for VOCs using USEPA Method 624, oil and grease (O&G) using USEPA Method 1664A, total suspended solids (TSS) using USEPA Method 2540D, and PCBs using USEPA Method 608. All samples were submitted to Accutest Laboratories in Marlborough, Massachusetts. Prior to final discharge to local sanitary sewer manhole 3T6, the system effluent sample is collected from sample port SP-702 located post air stripper (AS-700).

During 2011, the effluent discharge monitoring parameters were non-detect (ND), estimated, and/or reported at quantities below the permitted effluent limits. The effluent sample results are provided in Table 4.

5.5 System Vapor Influent Sampling & Analytical Results

Influent vapor samples were collected on a monthly basis during the operational period for the soil vapor extraction portion of the system, and submitted for laboratory analysis of VOCs and TPH GRO by Method AM 4.02 to Microseeps, Inc. in Pittsburgh, Pennsylvania. As with the extracted groundwater sampling, the purpose of the influent vapor sampling is to estimate the total VOC and TPH GRO mass removal from the subsurface, and to evaluate the relative changes in vapor phase mass removal rate over time as a result of the system operation. The mass removal estimate is generated using the influent sample analytical data and the vapor flow rate recorded at the time of sampling.

The monthly influent vapor concentrations of TCE, total DCE, VC, and TPH GRO are presented in Table 5, and are illustrated graphically on Figure 4. The three predominant compounds detected in the influent vapor samples have been TCE, total DCE, and TPH GRO. TCE, which was detected in all but one influent vapor sample collected in 2011, had a maximum concentration of 290 parts per billion by volume (ppbv). Influent vapor concentrations of total DCE ranged from 26.5 to 630 ppbv. Influent VC was below the method detection limit for each monthly influent vapor sampling event. Influent TPH GRO vapor samples ranged from non-detect to 1,500 ppbv.

5.6 System Vapor Effluent Sampling & Analytical Results

The purpose of the effluent sample collection is to ensure that the permit equivalent standards/guidance values are met as an air permit is not required for the Site. During 2011, regulatory guidance values were not exceeded. The monthly effluent vapor concentrations of TCE, total DCE, VC, and TPH GRO are presented in Table 5. A summary of effluent vapor concentrations as compared to guidance values is provided in Table 7.

5.7 Groundwater Monitoring

Groundwater monitoring activities were conducted on a quarterly basis in March, June, October, and December 2011. Groundwater monitoring consisted of the collection of groundwater samples from monitoring wells and the measurement of water levels in monitoring wells to evaluate the hydraulic influence of the system.

Sampling included the following thirteen (13) monitoring wells during 2011 to evaluate VOC concentration trends during remediation:

- MW-8S, MW-12 and MW-13 (adjacent to VEP-2);
- MW-9 (adjacent to VEP-13);
- MW-10R (adjacent to VEP-12);
- MW-14 (adjacent to VEP-1 and VEP-2);
- ESI-1 (adjacent to VEP-8);
- ESI-2 (adjacent to VEP-6);
- ESI-4R (adjacent to VEP-14);
- ESI-6 (adjacent to VEP-1);
- OW-5 and OW-6 (adjacent to VEP-3 and VEP-4); and

- ESI-7 (adjacent to VEP-5).

Collection of groundwater samples was performed in accordance with the Field Sampling Plan (FSP) and consisted of purging three volumes of water from each well or purging until the well was dry. Samples were then collected using low flow sampling techniques where feasible, and select wells were sampled using disposable bailers due to lack of water. It should be noted that all groundwater sampling was conducted with the VEP system offline (i.e., static conditions). All samples were submitted to Accutest Laboratories in Marlborough, Massachusetts for analysis of VOCs using USEPA Method 8260. Groundwater analytical results are discussed in Section 6.3.2.

6. System Evaluation

The following sections summarize the remedial system performance monitoring data from January 1, 2011 through December 31, 2011.

6.1 Mass Recovery

The estimated total mass recovered was calculated using the system influent dissolved and vapor phase analytical sampling results with the corresponding extraction flow rates (summarized in Section 5.2.1) and the NAPL volumes collected.

6.1.1 Non-Aqueous Phase Liquid

During the 2011 reporting period, approximately 18 gallons of dense non-aqueous phase liquid (DNAPL) was recovered by the collection and treatment system in the oil/water separator (OWS-200). It should be noted that this volume includes approximately 11 gallons of DNAPL generated during the non-routine cleaning of oil/water separator OWS-200 and storage tank ST-300, as discussed in Section 4.2.

6.1.2 Dissolved Phase

Influent groundwater laboratory analytical data were used to estimate dissolved phase VOC and TPH GRO/DRO mass recovery rates. As shown in Table 2, influent VOC and TPH GRO/DRO levels and groundwater recovery rates were used to calculate the overall mass of VOCs recovered in the dissolved phase. As indicated in Table 2, a total estimated mass of approximately133 kilograms (kg) of VOCs and TPH GRO/DRO were recovered in the dissolved phase during the 2011 reporting period. The breakdown of total mass removed during the 2011 reporting period is summarized as follows; TCE, 0.38 kg; total DCE, 1.5 kg; VC, 0.99 kg; TPH/GRO, 0.63 kg; and TPH/DRO, 130 kg.

As the data presented in Table 2 indicate, total dissolved phase mass recovery rate estimates ranged from 25 to 2,131 grams per day, which corresponds to an average recovery rate of 374 grams per day. The fluctuation in dissolved phase mass recovery rate is related to variability in influent mass concentrations in the extracted groundwater due to VEP well configurations, extraction rate, and precipitation recharge to the groundwater system. The cumulative dissolved phase mass recovery of VOCs and TPH [GRO & DRO] is shown on Figure 5.

6.1.3 Vapor Phase

Influent vapor sampling results, molecular weights, and total vapor extraction flow rates were utilized to estimate the vapor phase VOC and TPH/GRO mass recovery rate for the reporting period. As the data presented in Table 6 indicate, the vapor phase mass recovery rate ranged from 2 to 64 grams per day during the operational period for the vapor extraction system. As mentioned in the discussion of dissolved phase mass recovery rates, the fluctuation in vapor phase mass recovery rate is related to the VEP well configuration and groundwater elevations. As Table 6 shows, a total estimated mass of 8.8 kilograms of VOCs and TPH/GRO were removed in the vapor phase during 2011, corresponding to an average vapor phase mass recovery rate of 25 grams per day over the entire reporting period. The breakdown of total mass removed during the reporting period is summarized as follows: TCE, 1.4 kg; total DCE, 1.7 kg; and TPH/GRO, 5.7 kg. The cumulative vapor phase mass recovered for VOCs and TPH [GRO] is shown on Figure 6.

The VOC concentrations emitted following vapor phase treatment were used to calculate the estimated actual annual impact by following procedures described in the NYSDEC DAR-1 guidance document. Neither the Short-Term Guidance Concentration (SGC) or Annual Guidance Concentration (AGC) values provided by NYSDEC DAR-1 were exceeded for the site-specific compounds. A summary of effluent vapor concentrations as compared to guidance values is provided in Table 7.

6.2 Site Cover and Riverbank Inspections

During the 2011 reporting period the Site cover material and riverbank were inspected and recorded on inspection checklists (Appendix B) on a quarterly basis for the following:

- Riverbank rip-rap stone condition;
- Wingwall deflector condition and operation;
- Riverbank live planting conditions; and
- Site cover and erosion.

No erosion of the Site cover was observed during the reporting period and the wingwall deflector appeared to be operating as intended. However, a slight sloughing of approximately 8 feet of riverbank was noted at the northern end of the Site in the area of recovery well VEP-13. As discussed in Section 4.2, additional rip-rap was placed in this area in July 2011 to repair the observed depression. It should be noted that approximately 50 -75 percent of the previously established live cuttings, most notably black willows (*Salix nigra*), that were fist planted in 2008 and again in 2009 within the Chadakoin riverbank area have been cut or browsed by local fauna. These chew marks, as well as others nearby along the Chadakoin River are most certainly the sign of the American Beaver (Castor Canadensis).

6.3 Groundwater Monitoring Results

The results of the groundwater monitoring program during 2011 are summarized in the following sections. The groundwater monitoring program was performed in accordance with the Groundwater Collection and Treatment System OM&M Plan (ARCADIS 2008) unless otherwise noted. Groundwater sampling was conducted with the system temporarily taken offline.

6.3.1 Groundwater Elevation Data

Water level data collected from the Site monitoring wells for 2011 are summarized in Table 8. The groundwater elevations reflect the position of the water table within the fill material layer at the Site. Groundwater elevations for the March, June and December monitoring events reflect non-pumping conditions with the VEP system temporarily offline, while the October data show the water levels under pumping conditions. Overall, the water level data indicated that the system influences water levels in the vicinity of the VEP recovery wells, with drawdown typically in the range consistent with design estimates of 2 to 6 feet in adjacent monitoring wells.

Water levels in Site wells will continue to be collected on a quarterly basis during the groundwater monitoring program, and periodically to check hydraulic influence of the VEP wells.

6.3.2 Laboratory Analytical Results

During the 2011 reporting period, groundwater samples were collected from thirteen (13) monitoring wells to monitor groundwater quality and evaluate the performance of the system. A summary of the 2011 groundwater monitoring analytical results, along with historical data, is shown in Table 9. The past four years of analytical results for VOCs for those monitoring wells sampled during 2011 are shown on Figure 7.

The following selected observations were made with respect to the groundwater analytical data during 2011:

- Consistent with the historical results for the Site, the primary VOCs detected in groundwater are TCE, total DCE and VC, with the majority of the VOC mass within the southern end of the Site near recovery wells VEP-1 and VEP-2.

- VOC concentrations at monitoring wells MW-8S, MW-12, MW-13 and MW-14 fluctuated within ranges established since the recovery system startup, which include MW-14 VOC concentrations being approximately an order of magnitude less than before the system startup in 2008. Total DCE and VC at MW-8S and MW-12 have been higher when groundwater levels are seasonably lower (i.e., during the June and October 2011 groundwater monitoring events).

- While VOC concentrations at monitoring wells OW-5 and OW-6 have shown fluctuation that is attributable to recovery well operation and seasonal groundwater levels, both have shown an overall downward trend in TCE, total DCE and VC over the past two years. Concentrations of TCE, total DCE and VC at OW-5 have all been less than 1 µg/L in two of the four 2011 groundwater sampling events, while historical lows of TCE and total DCE were measured for OW-6 during 2011.

- VOC concentrations at ESI-4R and MW-10R generally remained within ranges established since their installations in 2010, with the exception of total DCE (1,165 µg/L) and VC (248 µg/L) at ESI-4R in June 2011.

- Concentrations of TCE, total DCE and VC at monitoring wells ESI-1 and ESI-2, which are located adjacent to the Chadakoin River and upgradient from the vertical barrier wall, continue to remain below the laboratory detection limits and/or the NYSDEC groundwater standards since starting up the remedial system.

- VOC concentrations in ESI-7 during the March 2011 event did show continuation of a upward trend of TCE, total DCE and VC that was first observed with the December 2010 event. However, the June, October, and December groundwater sampling events of 2011 showed VOC concentrations at southwestern well ESI-7 consistent with other post-system startup levels and near or below the laboratory detection limits.

- Consistent with the historical Site results since the startup of the remedial system, TCE, total DCE, and VC are below or near detection levels in groundwater at the northwest corner of the Site in well MW-9 near the Chadakoin River, and the southeastern end of the Site at ESI-6.

7. Conclusions

The following sections summarize the system operation during the 2011 reporting period and also the operational goals for 2012.

7.1 System Performance Summary

Data from the 2011 reporting period indicate that the VEP system has been effective at recovering dissolved and vapor phase VOC mass and NAPL from the subsurface at the Site.

The performance effectiveness of the remedial system is summarized through the following metrics:

- A sustained average groundwater extraction rate of 3.0 gpm from the VEP well network was observed during the reporting period;

- An average soil vapor extraction rate of 270 acfm from the VEP well network was observed during the reporting period;

- The groundwater elevation data indicate that the VEP well network is effective at dewatering the fill material thus making more adsorbed phase mass available via vacuum extraction through in-situ stripping and bio-venting processes;

- Induced vacuums were measured at select monitoring wells which indicate pneumatic conductivity in the subsurface thus promoting lateral air flows in the sub-surface, and further indicating that lighter fraction petroleum compounds (e.g. VOCs and TPH GRO) can be stripped from the vadose soil and groundwater surface to address residual sheens;

- Field measurements of the system influent oxygen levels in the soil gas stream indicate that SVE is successfully increasing the oxygen levels in the subsurface thus enhancing the aerobic microbial degradation (i.e. bioventing) of the remaining residual, heavier fraction petroleum compounds (e.g. TPH DRO) detected in the subsurface soil and groundwater;

- Approximately 18 gallons of DNAPL were recovered by the remedial system during the 2011 reporting period. Since starting the system in January 2008, an estimated cumulative total of 309 gallons of DNAPL have been recovered;

- An estimated total mass of 133.2 kg and 8.8 kg were recovered in the dissolved and vapor phases in 2011, respectively. Since starting the system (January 2008) an estimated cumulative total mass of 326.3 kg and 160.6 kg have been recovered in the dissolved and vapor phases, respectively (Table 10);

- VOC concentrations in monitoring wells ESI-1, ESI-2, and ESI-6 continue to remain below NYSDEC groundwater standards; and

- Groundwater quality changes in the area of monitoring wells MW-8S, MW-12, MW-13, and MW-14 continue to fluctuate in response to the operation of the remedial system, however, VOC concentrations in monitoring well MW-14 remain below pre-system concentrations.

As part of the annual certification under the Site Management and OM&M Plans the Site engineering controls have been maintained and remain in place functioning as designed with the exception of noted shutdowns due to non-routine system maintenance. The engineering controls include the following:

- Soil cover and vegetative growth across the Site in previously disturbed areas;

- Riverbank and stabilization erosion controls;

- Wingwall deflector;

- Vertical hydraulic barrier wall;
- Groundwater recovery and soil vapor extraction via VEP (i.e., recovery) wells; and
- Remedial system operation and maintenance.

7.2 Goals for 2012 System Operation

System operation and performance monitoring will continue to focus on optimizing mass removal rates through the operation of VEP well network, evaluating individual recovery well mass removal rates, and continued operation and maintenance of the remedial system process equipment and components.

The goals for system operational activities during 2012, as well as activities already conducted in the first several months of 2012, are as follows:

- Conduct water level measurements at all monitoring wells to monitor hydraulic influence of the system. Water level measurements are generally collected during quarterly groundwater sampling events and periodically as deemed appropriate. Water level measurements have been collected during the first and second quarter groundwater monitoring events completed in March and May 2012, respectively.
- Collect groundwater samples on a quarterly basis from selected monitoring wells MW-10R, MW-12, MW-13, MW-14, and OW-6. The first and second quarterly groundwater sampling events were conducted in March and May 2012, respectively.
- Collect groundwater samples on a semi-annual basis from select monitoring wells ESI-1, ESI-2, ESI-4R, ESI- 6, MW-8S, MW-9, and OW-5. The first semi-annual groundwater sampling event was conducted in March 2012.
- Continue to monitor the treatment system for mass removal efficiency and VOC breakthrough based on field screening and/or laboratory analysis of samples collected from the system influent and effluent sample points.
- Collect monthly system effluent samples as required by the Jamestown BPU Industrial Wastewater Discharge Permit.

- Renew the Industrial Wastewater Discharge Permit with the Jamestown BPU prior to the expiration date of September 4, 2012.
- Continue operation of the system while performing the required liquid/vapor flow and vacuum adjustments at each of the recovery wells to optimize system performance and efficiency, and maximize contaminant mass removal rates.
- Continue NAPL recovery efforts.
- Monitor COC concentrations in the system vapor phase exhaust and compare to the NYSDEC DAR-1 Annual Guidance Concentration Air Modeling Analysis to ensure that the estimated actual annual mass emitted does not exceed the allowable annual mass flow, as per NYSDEC DAR -1.
- Monitor treatment system mechanical and electrical components remotely via the PLC.
- Collect monthly influent samples to track mass removal in the vapor and liquid phases. Monthly sampling has been conducted during the first two quarters of 2012.
- Perform O&M activities (e.g., liquid phase cartridge filter change-outs, pneumatic pump cleaning as needed, sequestering agent drum replacement, air stripper cleaning, air compressor/blower maintenance per OM&M plan).
- Monitor operation of the system and adjusted vacuum and pumping rates to recovery wells, as necessary, to optimize groundwater and vapor extraction rates.

8. References

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Tables

Table 1. System Operational Data for 2011, DC Rollforms Site, Jamestown, New York.

System Parameters			Date											
			1/31/11	2/16/11	3/23/2011[2]	4/26/2011[2]	5/17/2011[2]	6/15/11	7/21/11	8/17/2011[3]	9/14/11	10/11/11	11/18/11	12/22/11
SVE Blower Applied Vacuum (in. W.C.)			34	37	--	--	40	42	35	33	36	30	40	28
Vapor Extraction Flowrate (acfm)			274	280	--	--	260	241	274	274	272	275	260	283
Monthly System Flow (gallons)			84,619	48,811	119,710	113,721	144,923	279,289	180,843	26,741	46,578	75,355	228,783	183,091
Monthly System Influent (gpm)			1.8	2.1	2.4	2.3	4.8	6.7	3.5	0.7	1.2	1.9	4.2	3.7
Recovery Well Statuses[1]														
Vacuum Enhanced Pumping (VEP) Wells	**VEP-1**	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-2	Liquid Phase On (Y/N)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-3	Liquid Phase On (Y/N)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-4	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-5	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-6	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-7	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-8	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-9	Liquid Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-10	Liquid Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-11	Liquid Phase On (Y/N)	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-12	Liquid Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-13	Liquid Phase On (Y/N)	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-14	Liquid Phase On (Y/N)	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	N	N	N	Y	N	N	Y	Y	Y	Y	Y

Notes:

1. Recovery wells for which total fluids pneumatic pumps were online but observed to be in need of routine cleaning and/or repairs and therefore not recovering groundwater are considered to have liquid phases on in this table. Recovery well statuses do not necessarily reflect the recovery well configuration for the corresponding monthly influent sampling events.

2. Vapor phase portion of the system offline from 3/22/11 through 5/6/11 due to faulty liquid transfer pump on SVE skid. Transfer pump replaced on 5/3/11 and vapor phase extraction system restarted on 5/6/11. Recovery well configuration shown for 5/17/11 was established on 5/6/11.

3. Faulty recovery pump for VEP-14 replaced during August 2011 monthly event.

Definitions:

"--" - not applicable

acfm - actual cubic feet per minute

gpm - gallons per minute

in.W.C. - Inches of Water Column

N - No

SVE - Soil Vapor Extraction

VEP - Vacuum Enhanced Pumping

Y - Yes

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Table 2. Cumulative Dissolved Phase VOC and TPH Mass Recovery for 2011, DC Rollforms Site, Jamestown, New York.

Date	VOC and TPH [GRO & DRO] Mass Removed																			
	Influent VOC and TPH [GRO & DRO] Concentrations					Total[1] Cumulative Flow (gallons)	Total Flow Per Reporting Period (L)	Estimated Mass Removed Per [3] Reporting Period (kg)					Estimated Cumulative Mass Removed (kg)					Estimated 2011 Cumulative Mass Removal (kg)	Cumulative Days Operating	Estimated Mass Removal Rate Per Reporting Period (kg/day)
	TCE (µg/L)	DCE[2] (total) (µg/L)	VC (µg/L)	TPH [GRO] (mg/L)	TPH [DRO] (mg/L)			TCE	DCE[2] (total)	VC	TPH [GRO]	TPH [DRO]	TCE	DCE[2] (total)	VC	TPH [GRO]	TPH [DRO]			
2/1/11	4.5	26.1	2.7	ND	4.16	6,749,818	320,318	0.001	0.262	0.209	0.147	1.243	0.001	0.262	0.209	0.147	1.243	1.862	33	0.056
2/16/11	1.5	19.7	4.8	ND	3.001	6,798,629	184,770	0.001	0.004	0.001	0.000	0.662	0.002	0.266	0.209	0.147	1.904	2.529	48	0.044
3/23/11	202	513.4	313	0.303	6.59	6,918,339	453,151	0.046	0.121	0.072	0.069	2.173	0.048	0.387	0.281	0.216	4.077	5.010	83	0.071
4/16/11	2.7	49.4	20.3	ND	3.59	7,032,060	430,481	0.044	0.121	0.072	0.065	2.191	0.092	0.508	0.353	0.281	6.269	7.503	107	0.104
5/17/11	14.6	150	90.9	ND	5.77	7,176,983	548,593	0.005	0.055	0.031	0.000	2.567	0.097	0.563	0.384	0.281	8.836	10.160	138	0.086
6/14/11	192	423	333	0.231	11.8	7,456,272	1,057,223	0.109	0.303	0.224	0.122	9.288	0.206	0.866	0.608	0.403	18.124	20.206	166	0.359
7/22/11	68.6	330	188	0.124	7.5	7,637,115	684,565	0.089	0.258	0.178	0.122	6.606	0.295	1.124	0.786	0.525	24.730	27.459	204	0.191
8/17/11	57.7	257	69.3	ND	4.2	7,663,856	101,226	0.006	0.030	0.013	0.006	0.592	0.301	1.153	0.799	0.531	25.322	28.107	230	0.025
9/15/11	271	524	324	0.112	59.1	7,710,434	176,317	0.029	0.069	0.035	0.010	5.580	0.330	1.222	0.834	0.541	30.902	33.830	259	0.197
10/20/11	6	46	12.2	ND	123	7,785,789	285,250	0.040	0.081	0.048	0.016	25.972	0.370	1.304	0.882	0.557	56.874	59.986	294	0.747
11/17/11	6	85.4	32.2	ND	14.6	8,014,572	866,037	0.005	0.057	0.019	0.000	59.583	0.375	1.361	0.901	0.557	116.458	119.651	322	2.131
12/21/11	13.8	327	229	0.197	23.5	8,197,663	693,075	0.007	0.143	0.091	0.068	13.203	0.382	1.503	0.991	0.625	129.661	133.163	356	0.397

2011 Total Flow (gal)	1,532,464
2011 Avg. Flow (gpm)	3.0
2011 Cumulative Mass Recovery Rate (kg/day)	0.374

Notes:

1. Total cumulative flow is estimated based on the system flowmeter FQI-700.
2. DCE (total) is the sum of 1,1-Dichloroethene, cis-1,2-Dichloroethene, and trans-1,2-Dichloroethene.

monthly events.

Definitions:

DCE - Dichloroethene
DRO - Diesel Range Organics
GRO - Gasoline Range Organics
kg - kilograms
L - Liters
mg/L - milligrams per liter
ND - Non-detect
TCE - Trichloroethene
TPH - Total Petroleum Hydrocarbons
µg/L - micrograms per liter
VC - Vinyl Chloride
VOC - Volatile Organic Compounds
gal - gallons
gpm - gallons per minute

Table 3. TCE, DCE (total), VC, TPH, and PCBs in System Influent Water Samples in 2011, DC Rollforms Site, Jamestown, New York.

Date	VOCs (µg/L)[1]			TPH (mg/L)[1]		PCB (µg/L)[1]	VEP Wells Online During Monthly System Influent Sampling Event
	TCE	DCE (total)[2]	VC	GRO	DRO		
2/1/2011	4.5	26.1	2.7	ND	4.16	ND	VEP-10, VEP-11 & VEP-12
2/16/2011	1.5	19.7	4.8	ND	3.001	ND	VEP-1, VEP-4 through VEP-10, & VEP-12
3/23/2011	202	513.4	313	0.303	6.59	ND	VEP-1 through VEP-10, VEP-12, VEP-13 & VEP-14
4/16/2011	2.7	49.4	20.3	ND	3.59	ND	VEP-2, VEP-3 & VEP-10 through VEP-14
5/17/2011	14.6	150	90.9	ND	5.77	ND	VEP-1 through VEP-14
6/14/2011	192	423.3	333	0.231	11.8	ND	VEP-1 through VEP-13
7/22/2011	68.6	330	188	0.124	7.5	ND	VEP-1 through VEP-13
8/17/2011	57.7	257	69.3	ND	4.2	ND	VEP-1 through VEP-14
9/15/2011	271	523.9	324	0.112	59.1	ND	VEP-1 through VEP-14
10/20/2011	6.3	46.1	12.2	ND	123	ND	VEP-1 through VEP-14
11/17/2011	6	85.4	32.2	ND	14.6	ND	VEP-1 through VEP-14
12/21/2011	13.8	327	229	0.197	23.5	ND	VEP-1 through VEP-14

Notes:

1. Samples analyzed for VOCs using US EPA Method 624. Samples analyzed for TPH [GRO] and TPH[DRO] using US EPA Method 8015 B. Samples analyzed for PCB using US EPA Method 608.
2. DCE (total) includes the sum of 1,1-Dichloroethene, cis-1,2-Dichloroethene, and trans-1,2-Dichloroethene.

Definitions:

D - Identifies an analysis that used a secondary dilution factor
DCE - Dichloroethene
DRO - Diesel Range Organics
E - Sample concentration exceeded calibration range
GRO - Gasoline Range Organics
mg/L - milligrams per liter
ND - Non-Detect
NS - Not Sampled for
PCB - Polychlorinated Biphenyls
TCE - Trichloroethene
TPH - Total Petroleum Hydrocarbons
µg/L - micrograms per liter
VC - Vinyl Chloride
VOCs - Volatile Organic Compounds

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Table 4. TCE, DCE (total), VC, PCBs, TSS, Oil & Grease, and pH in System Effluent Water Samples in 2011, DC Rollforms Site, Jamestown, New York.

Date	Analyte[1]								
	VOCs			PCB (µg/L)	TSS (mg/L)	Oil & Grease (mg/L)		pH (s.u.)	
	TCE (µg/L)	DCE (total)[2] (µg/L)	VC (µg/L)						
	Local Discharge Limit								
	2,130 µg/L (Total VOCs)			ND	350	100		5.5	10
2/1/2011	ND	21.4	ND	ND	17.0	ND	ND	7.8	7.9
						ND	ND	7.9	7.9
2/15/2011	ND	ND	ND	ND	ND	ND	ND	7.9	8.0
						ND	ND	8.0	8.0
3/22/2011[3]	ND	9.5	ND	ND	ND	ND	ND	7.9	7.9
						ND	ND	8.0	8.0
4/26/2011	ND	ND	ND	ND	ND	ND	ND	8.3	8.1
						ND	ND	8.1	8.1
5/17/2011[3]	ND	ND	ND	ND	44.0	ND	ND	7.8	7.5
						ND	ND	7.8	7.8
6/14/2011	ND	ND	ND	ND	ND	ND	ND	8.0	7.8
						ND	ND	8.1	7.9
7/21/2011	ND	ND	ND	ND	ND	ND	ND	8.1	8.2
						ND	ND	8.1	8.2
8/17/2011	ND	ND	ND	ND	ND	ND	ND	8.0	7.9
						ND	ND	8.0	7.9
9/14/2011	ND	10.6	ND	ND	ND	ND	ND	7.9	8.0
						ND	ND	8.1	8.2
10/11/2011	ND	ND	ND	ND	8.0	ND	ND	8.0	7.7
						ND	ND	7.7	7.8
11/18/2011	ND	ND	ND	ND	ND	ND	ND	8.0	8.0
						ND	ND	8.0	8.1
12/20/2011[4]	ND	ND	ND	ND	6.0	ND	ND	7.6	8.1
						ND	--	7.4	7.8

Notes:

1. System effluent water samples collected via sample port SP-702 located after the air stripper. Samples analyzed for TCE, DCE (total), VC, PCB, and TSS consisted of four effluent samples collected during a typical operating day that were composited at the laboratory. Samples analyzed for Oil & Grease and pH were not composited. Samples analyzed for TCE, DCE (total), and VC using US EPA Method 624. Samples analyzed for PCB using US EPA Method 608. Samples analyzed for TSS using US EPA Method 160.2. Samples analyzed for Oil & Grease using US EPA Method 1664. pH measured in field.
2. DCE (total) includes the sum of 1,1-Dichloroethene, cis-1,2-Dichloroethene, and trans-1,2-Dichloroethene.
3. Monthly effluent samples from 3/22/11 and 5/17/11 were not composited in the laboratory for any analyses. The values shown for TCE, DCE (total), VC, PCBs, and TSS are the maximum concentrations detected from the four effluent samples.
4. One of the four effluent sample jars for Oil & Grease from 12/20/11 was damaged during transport.

Definitions:

"--" - Indicates data not available
DCE - Dichloroethene
mg/L - milligrams per liter
ND - Non-detect
PCB - Polychlorinated Biphenyls
s.u. - standard units
TCE - Trichloroethene
TSS - Total Suspended Solids
µg/L - micrograms per liter
VC - Vinyl Chloride

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Table 5. TCE, DCE (total), VC and TPH in System Influent and Effluent Vapor Samples in 2011,
DC Rollforms Site, Jamestown, New York

Date	Sample Location	Analyte (ppbv)(1)				VEP Wells Online During Monthly System Influent Sampling Event
		TCE	DCE (total)(2)	VC	TPH [GRO]	
2/1/2011	Influent	59	44.0	ND	ND	VEP-10, VEP-3, VEP-12, VEP-13 & VEP-14
	Effluent	ND	180	ND	ND	
2/16/2011	Influent	28	27	ND	ND	VEP-1, VEP-4 through VEP-10, & VEP-12
	Effluent	ND	184	ND	ND	
3/23/2011(3)	Influent	NS	NS	NS	NS	-
	Effluent	NS	NS	NS	NS	
4/26/2011(3)	Influent	NS	NS	NS	NS	-
	Effluent	NS	NS	NS	NS	
5/16/2011	Influent	ND	42	ND	ND	VEP-1 through VEP-14
	Effluent	ND	190	ND	ND	
6/14/2011	Influent	29	49	ND	920	VEP-1 through VEP-13
	Effluent	ND	140	ND	ND	
7/22/2011	Influent	290	220	ND	720	VEP-1 through VEP-13
	Effluent	ND	430	ND	1,200	
8/17/2011	Influent	150	140	ND	1,200	VEP-1 through VEP-14
	Effluent	ND	200	ND	960	
9/15/2011	Influent	92	630	ND	910	VEP-1 through VEP-14
	Effluent	ND	200	ND	800	
10/11/2011	Influent	52	51	ND	ND	VEP-1 through VEP-14
	Effluent	ND	140	ND	ND	
11/17/2011	Influent	28	44	ND	ND	VEP-1 through VEP-14
	Effluent	ND	73	ND	950	
12/21/2011	Influent	41	88	ND	1,500	VEP-1 through VEP-14
	Effluent	ND	140	ND	1,300	

Notes:

1. Influent vapor sample collected via sample port SP-900 located before the liquid knockout tank. Effluent vapor sample collected via sample port SP-503 located after VPGAC vessel ASC-502. Samples analyzed using Microseeps, Inc. Method AM 4.02.
2. DCE (total) includes the sum of 1,1-Dichloroethene, cis-1,2-Dichloroethene, and trans-1,2-Dichloroethene.
3. Vapor phase samples not collected 3/23/11 or 4/26/11 due to vapor extraction portion of the system being offline due to faulty liquid transfer pump on SVE skid.

Definitions:

DCE - Dichloroethene
GRO - Gasoline Range Organics
J - Indicates an estimated value
ND - Non-detect
NS - Not Sampled
ppbv - parts per billion by volume
SVE - Soil Vapor Extraction
TCE - Trichloroethene
TPH - Total Petroleum Hydrocarbons
VC - Vinyl Chloride

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Table 6. Cumulative Vapor Phase VOC and TPH Mass Recovery for 2011, DC Rollforms Site, Jamestown, New York.

Date	VOC and TPH [GRO] Mass Recovered																					
	Influent VOC and TPH [GRO] Concentrations (ppmv)				Influent VOC and TPH [GRO] Concentrations (µg/L)				Vapor Extraction Flow Rate (acfm)(5)	Reporting Period			Mass of Component Recovered(2) Per Reporting Period (kg)				Cumulative Mass Recovered (kg)				Estimated(2) 2011 Cumulative Mass Recovery (kg)	Cumulative Days Operating	Estimated(2) Mass Recovery Rate Per Reporting Period (kg/day)
	TCE	DCE(3) (total)	VC	TPH [GRO]	TCE	DCE(3) (total)	VC	TPH(4) [GRO]		Period Duration (days)	Period Duration (min)	Volume Of(1) Air Treated (L)	TCE	DCE(3) (total)	VC	TPH [GRO]	TCE	DCE(3) (total)	VC	TPH [GRO]			
1/31/11	0.0585	0.0443	ND	ND	0.315	0.176	ND	ND	274	33	47520	368,698,328	0.074	0.068	0.000	0.480	0.074	0.068	0.000	0.480	0.621	33	0.019
2/16/11	0.028	0.0265	ND	ND	0.151	0.105	ND	ND	280	16	23040	182,677,340	0.043	0.026	0.000	0.000	0.116	0.093	0.000	0.480	0.690	49	0.004
3/22/2011(5)	Vapor Extraction System Turned Offline(5)								280	34	48960	388,189,348	0.059	0.041	0.000	0.000	0.175	0.134	0.000	0.480	0.789	83	0.003
5/6/11	Vapor Extraction System Turned Online(5)								-	45	64800	0	0.000	0.000	0.000	0.000	0.175	0.134	0.000	0.480	0.789	128	0.000
5/16/2011(5)	ND	0.042	ND	ND	ND	0.167	ND	ND	260	10	14400	106,018,099	0.000	0.018	0.000	0.000	0.175	0.152	0.000	0.480	0.807	138	0.002
6/14/11	0.029	0.049	ND	0.92	0.156	0.195	ND	3.165	241	29	41760	284,984,806	0.022	0.052	0.000	0.451	0.197	0.203	0.000	0.931	1.332	167	0.018
7/22/11	0.29	0.22	ND	0.72	1.562	0.874	ND	2.477	274	38	54720	424,561,711	0.365	0.227	0.000	1.198	0.562	0.430	0.000	2.129	3.121	205	0.047
8/17/11	0.15	0.14	ND	1.2	0.808	0.556	ND	4.128	274	26	37440	290,489,592	0.344	0.208	0.000	0.959	0.906	0.638	0.000	3.088	4.632	231	0.058
9/15/11	0.092	0.63	ND	0.91	0.495	2.503	ND	3.130	272	29	41760	321,642,602	0.210	0.492	0.000	1.167	1.116	1.130	0.000	4.255	6.501	260	0.064
10/11/11	0.052	0.051	ND	ND	0.280	0.203	ND	ND	275	26	37440	291,549,773	0.113	0.394	0.000	0.456	1.229	1.524	0.000	4.712	7.464	286	0.037
11/17/11	0.028	0.044	ND	ND	0.151	0.175	ND	ND	260	37	53280	392,266,967	0.084	0.074	0.000	0.000	1.313	1.598	0.000	4.712	7.623	323	0.004
12/21/11	0.041	0.088	ND	1.5	0.221	0.350	ND	5.160	283	34	48960	392,348,519	0.073	0.103	0.000	1.012	1.386	1.701	0.000	5.724	8.811	357	0.035
																		2011 Cumulative Mass Recovery Rate (kg/day)				0.025

Notes:

1. Volumes of air treated are estimated values.
2. Estimated mass recovery rate calculated from monthly influent mass concentration and estimated vapor extraction rate. Influent concentrations used are averages of those from the previous and current monthly events.
3. DCE (total) is the sum of 1,1-Dichloroethene, cis-1,2-Dichloroethene, and trans-1,2-Dichloroethene.
4. Conversion of TPH[GRO] from ppmv to µg/L assumes molecular weight approximately equal to hexane, temperature of 25ºC, and pressure of 1 atmosphere.
5. Vapor extraction portion of system was offline from 3/22/11 through 5/6/11 due to faulty SVE skid liquid transfer pump. Influent concentrations used to calculate mass recovered for reporting period ending 3/22/11 are only those from 2/16/11 sampling event, and volume of air treated for this reporting period is estimated using the vapor extraction flow rate from 2/16/11. Influent concentrations used to calculate mass recovered for reporting period ending 5/16/11 are only those from 5/16/11 sampling event.

Definitions:

acfm - actual cubic feet per minute
DCE - Dichloroethene
GRO - Gasoline Range Organics
kg - kilograms
L - Liters
min - minutes
ND - Non-detect
NS - Not Sampled
ppmv - parts per million by volume
TCE - Trichloroethene
TPH - Total petroleum hydrocarbons
µg/L - micrograms per liter
VC - Vinyl Chloride
VOC - Volatile Organic Compounds

Table 7. Summary of Effluent VOC Concentrations vs. Guidance Concentrations in 2011, DC Rollforms Site, Jamestown, New York.

Volatile Organic Compound	AGC(1) (µg/m^3)	SGC(1) (µg/m3)	Maximum Effluent Concentration (ppmv)	Maximum Effluent Concentration (µg/m3)	Maximum (2) Emission Rate (lb/day)	Actual Annual Impact (µg/m3)(3)	Actual Annual Impact Percentage of AGC (%)
Trichloroethene	0.5	14,000	ND	ND	NA	NA	NA
1,1-Dichloroethene	70	-	ND	ND	NA	NA	NA
cis-1,2-Dichloroethene	63	-	0.430	1708.390	0.043	0.113	0.18
trans-1,2-Dichloroethene	63	-	ND	ND	NA	NA	NA
Vinyl Chloride	0.11	180,000	ND	ND	NA	NA	NA

Notes:

1. AGC and SGC values obtained from NYSDEC DAR-1 AGC/SGC Tables, dated 9/10/07.
2. Maximum emission rate calculated using the maximum concentrations for each volatile organic compound detected in 2011 system effluent samples and the maximum effluent flow rate (283 acfm) recorded for any one month during the entire 2011 reporting period.
3. Actual annual impact calculated by following procedures described in NYSDEC DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants (NYSDEC 1991). Note effective stack height of 20 feet.

Definitions:

"-" - indicates no guideline as been established
AGC - Annual Guideline Concentration
lb/day - pounds per day
NA - Not Applicable
ND - Non-Detect
ppmv - parts per million by volume
SGC - Short-term Guideline Concentration
µg/m^3 - micrograms per cubic meter

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Table 8. Summary of Groundwater Elevation Data, DC Rollforms Site, Jamestown, New York.

Well ID	Measuring (1) Point Elevation (ft amsl)	Non-pumping Conditions 3/22/2011		Operational Conditions 6/27/2011		Non-pumping Conditions 10/19/2011		Non-pumping Conditions 12/7/2011	
		Depth to (2) Water	Water-Level Elevation (3)	Depth to (2) Water	Water-Level Elevation (3)	Depth to (2) Water	Water-Level Elevation (3)	Depth to (2) Water	Water-Level Elevation (3)
ESI-1	1296.37	5.70	1290.67	12.74	1283.63	8.08	1288.29	6.94	1289.43
ESI-2	1295.08	4.95	1290.13	12.26	1282.82	9.85	1285.23	6.30	1288.78
ESI-3(4)	1295.75	5.08	1290.67	11.06	1284.69	7.00	1288.75	5.55	1290.20
ESI-4R	1294.96	6.42	1288.54	12.11	1282.85	9.18	1285.78	7.91	1287.05
ESI-5	1293.08	3.52	1289.56	5.74	1287.34	5.98	1287.10	4.58	1288.50
ESI-6	1295.24	5.35	1289.89	8.68	1286.56	7.34	1287.90	5.38	1289.86
ESI-7	1295.12	4.95	1290.17	10.90	1284.22	9.88	1285.24	6.35	1288.77
MW-4S	1295.75	6.19	1289.56	13.01	1282.74	9.00	1286.75	7.38	1288.37
MW-7D	1295.37	5.27	1290.10	10.04	1285.33	9.09	1286.28	7.03	1288.34
MW-8S	1295.21	5.33	1289.88	8.35	1286.86	7.21	1288.00	5.94	1289.27
MW-8D	1295.48	5.00	1290.48	6.16	1289.32	6.10	1289.38	5.85	1289.63
MW-9	1291.95	5.01	1286.94	6.55	1285.40	6.30	1285.65	5.68	1286.27
MW-10R	1295.11	6.52	1288.59	11.85	1283.26	8.15	1286.96	7.27	1287.84
MW-12	1294.91	4.69	1290.22	7.85	1287.06	6.60	1288.31	5.52	1289.39
MW-13	1294.20	4.06	1290.14	7.23	1286.97	5.94	1288.26	4.69	1289.51
MW-14	1294.59	4.58	1290.01	7.83	1286.76	6.29	1288.30	5.33	1289.26
OW-1	1292.59	5.96	1286.63	12.66	1279.93	10.78	1281.81	7.30	1285.29
OW-2	1293.96	6.91	1287.05	14.11	1279.85	11.65	1282.31	8.27	1285.69
OW-3	1292.01	2.50	1289.51	2.80	1289.21	5.73	1286.28	3.83	1288.18
OW-4	NS	4.71	NA	11.10	NA	8.55	NA	5.98	NA
OW-5	1295.59	5.36	1290.23	12.15	1283.44	10.10	1285.49	6.32	1289.27
OW-6	1295.67	5.53	1290.14	11.53	1284.14	10.18	1285.49	6.81	1288.86
OW-7	NS	4.79	NA	11.51	NA	9.58	NA	6.14	NA
IW-1	1295.32	5.50	1289.82	8.82	1286.50	8.63	1286.69	6.68	1288.64
IW-2	1295.32	5.07	1290.25	8.55	1286.77	6.89	1288.43	5.62	1289.70
IW-3	1294.93	4.95	1289.98	8.38	1286.55	6.81	1288.12	5.25	1289.68
IW-4	1294.90	4.76	1290.14	8.21	1286.69	6.80	1288.10	5.27	1289.63
IW-5	1294.81	4.67	1290.14	8.60	1286.21	8.16	1286.65	6.15	1288.66
RW-1	1292.06	1.88	1290.18	5.32	1286.74	3.84	1288.22	3.74	1288.32
RW-2	1292.52	2.88	1289.64	6.32	1286.20	6.45	1286.07	4.17	1288.35
RW-3	1292.46	3.32	1289.14	6.73	1285.73	6.23	1286.23	4.24	1288.22
PW-1	1296.93	6.23	1290.70	13.45	1283.48	11.05	1285.88	7.56	1289.37

Notes:

1. Wells ESI-1, ESI-2, ESI-4R, ESI-5, ESI-6, OW-1, OW-2, MW-9, and MW-10R: water level elevations have been estimated based on field measurements following well casing repairs made in June 2008 and 2010.
2. Depths to water are presented as feet below the measuring point.
3. Water level elevations are presented as feet above mean sea level.
4. Well ESI-3: depth to top of LNAPL 5.01 ft (3/22/11). Oil absorbent sock used for LNAPL recovery for remainder of 2011.

Definitions:

NA - Not Applicable
NS - Not Surveyed

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Table 9. Summary of TCE, DCE, and VC in Groundwater Samples, DC Rollforms Site, Jamestown, New York.

Monitoring Well	Date	Analyte (µg/L)[1]		
		TCE	DCE (total)[2]	VC
MW-8S	December 1998	< 5	8,500	1,100
	January 1999	< 5	9,300	2,100
	February 1999	3,000	2,500	< 10
	March 1999	120	1,406	330
	April 1999	130	4,416	480
	May 1999	320	2,110 J	62 J
	July 1999	35 J	1,600	290
	September 1999	96 J	7,100	1,600
	January 2000	9	50	72
	July 2000	< 5	1,107 J	820
	December 2001	85	11 J	1 J
	March 2002	6	51 J	18
	July 2002	< 5	4.6 J	5 J
	October 2002	< 20	410	130
	December 2002	3 J	37 J	23
	August 2003	9	8.8	3
	December 2003	< 5	50 J	49
	June 2004	< 5	9.6 J	35
	November 2004	< 20	400	93
	July 2005	< 20	320	180
	March 2008	150 D	758 DJ	60 DJ
	June 2008	< 100	3,100 D	910
	September 2008	46 J	6,029 DJ	1,800
	December 2008	26	69 J	1.5
	March 2009	23	92	< 1
	June 2009	42	3,000	350
	September 2009	57	7,800 D	870
	December 2009	67	4,400	270
	March 2010	< 25	4,700	580
	June 2010	< 25	5,400 D	690
	October 2010	58	1,811	57
	December 2010	14	66	< 1
	March 2011	25	145	3
	June 2011	10	3,902 D	334 D
	October 2011	12	2,744 D	115 D
	December 2011	16	158	< 1
MW-9	March 2008	3.4 J	6.9 J	3.6 J
	June 2008	10	< 5	< 5
	September 2008	9.8 J	2.2 J	< 25
	December 2008	6.8	0.52 J	< 1
	March 2009	4.8	2.7	1.4
	June 2009	7.2	< 1	< 1
	September 2009	11	< 1	< 1
	December 2009	4.1	< 1	< 1
	March 2010	2.1	2.7	1.9
	June 2010	5.3	< 1	< 1
	October 2010	8.4	< 1	< 1
	December 2010	4.7	< 1	< 1
	March 2011	4	4.2	1.5
	June 2011	9	< 1	< 1
	October 2011	8.6	< 1	< 1
	December 2011	6.7	< 1	< 1
MW-10R[4]	June 2010	3.9	12	< 2
	October 2010	56	260	< 2
	December 2010	22	9.4	< 1
	March 2011	76	17	< 1
	June 2011	9.3	273	1.8
	October 2011	86	143	< 1
	December 2011	11	31	< 1
MW-12	December 1998	81	524 J	260
	January 1999	60	460	120
	February 1999	4,400 B	9,800	< 10
	March 1999	66 J	4,516	380
	April 1999	510	9,200	710 J
	May 1999	300	7,438 J	360 J
	July 1999	6	29 J	83
	September 1999	56	1,000	120
	January 2000	12 J	1,100	920
	July 2000	< 5	< 5	< 10
	December 2001	< 5	15 J	< 10
	March 2002	7	172 J	120
	July 2002	< 5	35	24
	October 2002	10	48 J	37
	December 2002	64	301 J	130
	August 2003	42	40	100
	December 2003	22	140	220
	June 2004	< 5	11	26
	November 2004	32	140	140
	July 2005	0.76	51	86
	March 2008	44	1,808 DJ	400
	June 2008	< 100	1,900	470
	September 2008	< 50	810	410
	December 2008	1,600 D	1,808 D	30
	March 2009	540	760	14
	June 2009	280	2,300	140
	September 2009	< 20	5,800 D	230
	December 2009	470	3,500	59
	March 2010	510	3,800	140
	June 2010	110	4,800	440
	October 2010	36	970	310
	December 2010	230	1,200	< 10
	March 2011	127	620	9.4
	June 2011	194	3,843 D	364 D
	October 2011	1,750 D	1,942 D	15
	December 2011	828 D	2,032 D	25
MW-13	July 2000	< 5	6	4 J
	December 2001	24	< 5	< 5
	July 2002	0.9 J	< 5	< 5
	October 2002	< 5	< 5	< 5
	December 2002	51	3 J	< 5
	August 2003	3	< 5	< 5
	December 2003	< 5	< 5	< 5
	June 2004	< 5	< 5	< 5
	November 2004	< 5	< 5	< 5
	July 2005	< 5	< 5	< 5
	March 2008	2.7 J	48 J	24
	June 2008	6.7	1,306 DJ	85
	September 2008	< 100	1,700 D	890
	December 2008	61	523 DJ	200 D
	March 2009	41	1,700	630
	June 2009	< 50	6,200	1,700
	September 2009	< 25	2,600	170
	December 2009	< 5	900	400
	March 2010	< 5	510	170
	June 2010	< 5	1,400 D	530
	October 2010	< 10	5,157 D	4,500 D
	December 2010	< 25	4,500 D	4,300
	March 2011	5.8	363	612
	June 2011	5.7	325	377
	October 2011	85	1,538 D	1,310 D
	December 2011	79	916 D	494 D
MW-14	July 2000	13 J	4,700	1,400
	December 2001	< 5	3,000	610
	March 2002	< 5	6,600	1,100
	July 2002	NA	14,000	3,800
	October 2002	< 500	8,400	2,000
	December 2002	< 250	6,816 J	1,400
	August 2003	< 1,200	20,000	1,900
	December 2003	< 500	16,000	2,200
	June 2004	< 1,000	19,000	2,500
	December 2004	< 500	16,000	2,300
	March 2008	1.7 J	1,009 DJ	340
	June 2008	< 100	1,800	550
	September 2008	< 100	1,814 J	3,900 D
	December 2008	3.7	975 DJ	390 D
	March 2009	< 5	620	150
	June 2009	< 10	1,100	450
	September 2009	< 2.5	190	300
	December 2009	< 2.5	710 D	310
	March 2010	< 5	1,307 D	510
	June 2010	< 2	220	280
	October 2010	< 1	85	170
	December 2010	3.4	1,607 D	390 D
	March 2011	66	1,809	451
	June 2011	< 1	1,419 D	544
	October 2011	3.4	2,230 D	476 D
	December 2011	3.1	1,282 D	353
ESI-1	July 2002	< 100	210	2,300
	October 2002	< 20	21	460
	August 2003	< 20	16	420
	December 2003	< 5	1 J	1 J
	June 2004	< 500	92 J	1,300
	December 2004	< 5	< 5	< 5
	July 2005	< 50	70	1,200
	March 2008	< 50	< 50	< 50
	June 2008	< 50	< 50	< 50
	September 2008	< 50	< 50	< 50
	December 2008	< 1	< 1	< 1
	March 2009	< 1	< 1	< 1
	June 2009	< 1	< 1	< 1
	September 2009	< 1	3.2	< 1
	December 2009	< 1	< 1	< 1
	March 2010	< 1	3.6	< 1
	June 2010	< 1	< 1	< 1
	October 2010	< 1	< 1	< 1
	December 2010	< 1	< 1	< 1
	March 2011	< 1	< 1	< 1
	June 2011	< 1	< 1	< 1
	October 2011	< 1	< 1	< 1
	December 2011	< 1	< 1	< 1
ESI-2	July 2002	< 20	21	390
	October 2002	< 10	< 10	52
	August 2003	< 5	< 5	36
	December 2003	< 20	230	500
	June 2004	< 5	5 J	190
	December 2004	< 5	< 5	12
	July 2005	< 5	< 5	75
	March 2008	< 25	< 25	< 25
	December 2008	< 1	< 1	< 1
	March 2009	< 1	< 1	< 1
	March 2010	< 1	< 1	< 1
	June 2010	< 1	< 1	< 1
	October 2010	< 1	< 1	< 1
	December 2010	< 1	< 1	< 1
	March 2011	< 1	< 1	< 1
	June 2011	4.1	< 1	1.1
	October 2011	< 1	< 1	< 1
	December 2011	< 1	< 1	< 1
ESI-4R[3]	October 2010	150	186	38
	December 2010	12	410	39
	March 2011	134	410	52
	June 2011	15	1,165 D	248 D
	October 2011	4.2	391	102
	December 2011	2.5	480 D	101
ESI-6	December 1998	2 J	19	13
	January 1999	< 5	30	34
	February 1999	360	22	< 10
	March 1999	390	82	50
	April 1999	520	75	45 J
	May 1999	280	39	42
	July 1999	120	12	11
	September 1999	610	8 J	< 10
	January 2000	130	46	24
	July 2000	< 5	< 5	< 10
	December 2001	3	14	5
	March 2002	< 5	49	26
	July 2002	1 J	4 J	2 J
	October 2002	< 5	1 J	< 5
	December 2002	< 5	14	9
	August 2003	< 5	2	< 5
	December 2003	4 J	67	23
	June 2004	< 5	6	12
	November 2004	< 5	43	11
	July 2005	< 5	14	6
	March 2008	< 5	1.6 J	3.6 J
	June 2008	< 5	< 5	1.5 J
	September 2008	< 5	2.6 J	3.2 J
	December 2008	< 1	2.2	1.1
	March 2009	9.1	6.8	2.4
	June 2009	1.4	1.1	< 1
	September 2009	< 1	< 1	< 1
	December 2009	< 1	2.1	< 1
	March 2010	< 1	< 1	< 1
	June 2010	< 1	< 1	< 1
	October 2010	< 1	< 1	< 1
	December 2010	< 1	1.6	< 1
	March 2011	1.1	2.5	< 1
	June 2011	< 1	< 1	< 1
	October 2011	< 1	< 1	< 1
	December 2011	< 1	1.5	< 1
ESI-7	December 1998	320	8	< 10
	January 1999	< 5	3	< 10
	February 1999	16	19	< 10
	March 1999	100	40	2 J
	April 1999	180	37	4 J
	May 1999	77	83 J	88
	July 1999	89	2.5 J	4 J
	September 1999	190	4 J	< 10
	January 2000	33	49.7 J	3 J
	July 2000	4 J	14	< 10
	December 2001	7	17 J	2 J
	March 2002	65	261 J	2 J
	July 2002	9	204 J	33
	October 2002	1 J	7	2 J
	December 2002	24	83 J	1 J
	August 2003	10	93	5
	December 2003	13	171 J	4 J
	July 2004	< 5	17 J	11
	November 2004	10	66	< 5
	July 2005	< 5	19	18
	March 2008	2.2 J	20	2.4 J
	June 2008	< 5	< 5	< 5
	September 2008	< 5	1.1 J	0.55 J
	December 2008	0.79 J	3.2	< 1
	March 2009	7.9	5.7	< 1
	June 2009	< 1	< 1	< 1
	September 2009	< 1	1.4	< 1
	December 2009	< 1	1.8	1.4
	March 2010	1.1	5.6	3.2
	June 2010	< 1	1.1	1.2
	October 2010	< 1	2.6	1.2
	December 2010	7.3	13	< 1
	March 2011	44	168	6.8
	June 2011	< 1	1.3	1.6
	October 2011	< 1	1.2	< 1
	December 2011	1.2	9.1	< 1
OW-5	March 2008	< 5	< 5	< 5
	June 2008	< 5	6,656 DJ	11,000 D
	September 2008	< 25	7,213 DJ	11,000 D
	December 2008	< 1	< 1	< 1
	March 2009	< 1	< 1	< 1
	June 2009	< 5	930	780
	September 2009	< 5	3,200 D	5,400 D
	December 2009	< 1	130	130
	March 2010	< 1	1,709 D	1,400 D
	June 2010	< 10	5,100 D	4,200 D
	October 2010	< 2	46	110
	December 2010	< 1	< 1	< 1
	March 2011	< 1	< 1	< 1
	June 2011	1	2,558 D	1,650
	October 2011	< 1	187	137 D
	December 2011	< 1	< 1	< 1
OW-6	March 2008	42	343 DJ	76
	June 2008	11 J	100	310
	September 2008	14 J	130	330
	December 2008	230 D	98 D	0.8 J
	March 2009	480	210	< 2.5
	June 2009	94	290	40
	September 2009	35	300	120
	December 2009	200	640 D	9.8
	March 2010	59	606	150
	June 2010	20	420	120
	October 2010	32	223	220
	December 2010	190 D	180	1.4
	March 2011	3.6	6.1	< 1
	June 2011	15	249	17
	October 2011	2.7	11.7	< 1
	December 2011	610 D	362 D	< 1

Notes:

1. Samples analyzed using US EPA Method 8260.
2. DCE (total) includes the sum of 1,1-Dichloroethene, cis-1,2-Dichloroethene, and trans-1,2-Dichloroethene.
3. ESI-4R was installed as a replacement to ESI-4 in the First Quarter 2010.
4. MW-10R was installed as a replacement to MW-10 in the First Quarter 2010.

Definitions:

< - Indicates the sample concentration was less than the laboratory detection limit
D - Identifies an analysis that used a secondary dilution factor
DCE - Dichloroethene
J - Indicates an estimated value
TCE - Trichloroethene
µg/L - Micrograms per liter
VC - Vinyl Chloride

Table 10. Annual Mass Recovery, DC Rollforms Site, Jamestown, New York.

Year	Estimated Annual Mass Recovery[1]		
	Dissolved Phase (kg)	Vapor Phase (kg)	DNAPL (gallons)[2]
2008	30.4	116.2	117
2009	90.7	27.5	135
2010	72.0	8.1	39
2011	133.2	8.8	18
Total	**326.3**	**160.6**	**309**

Notes:

1. Estimated cumulative mass recovery includes mass recovered since the system was brought online at the beginning of 2008.
2. Total volume of DNAPL recovered is based on volumes removed and containerized from oil/water separator (OWS-200) during the reporting period.

Definitions:

DNAPL - Dense Non-Aqueous Phase Liquid
kg - kilograms

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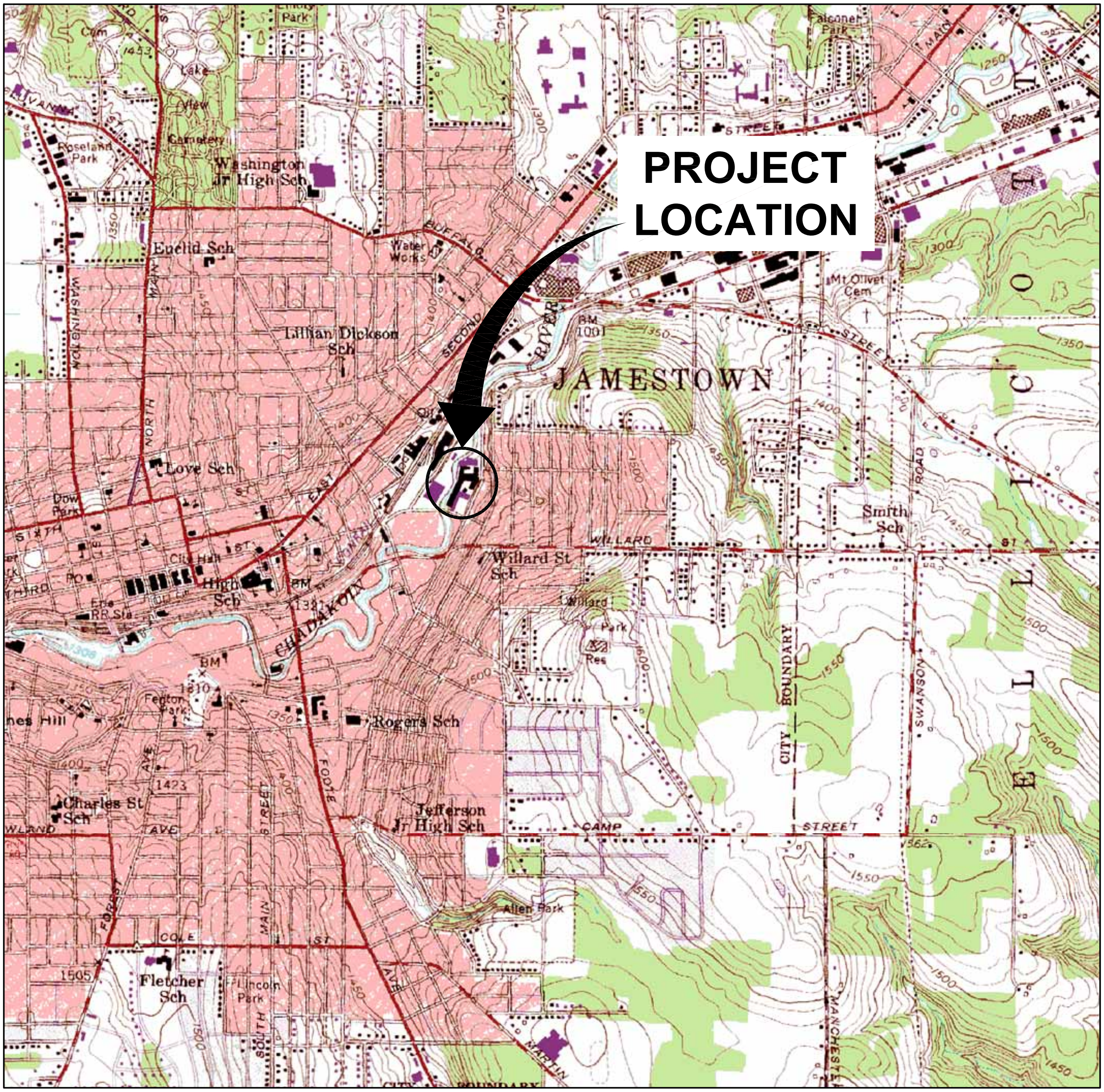
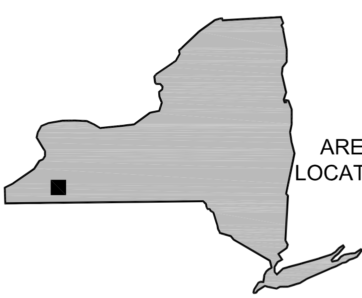
Figures



REFERENCE: U.S. GEOLOGICAL SURVEY, 7.5 X 15 MINUTE QUADRANGLE., JAMESTOWN, NEW YORK, ALLEN STREET, 1954.

0 2000' 4000'

GRAPHIC SCALE



INGERSOLL RAND - DC ROLLFORMS SITE
JAMESTOWN, NEW YORK

2011 ANNUAL MONITORING REPORT

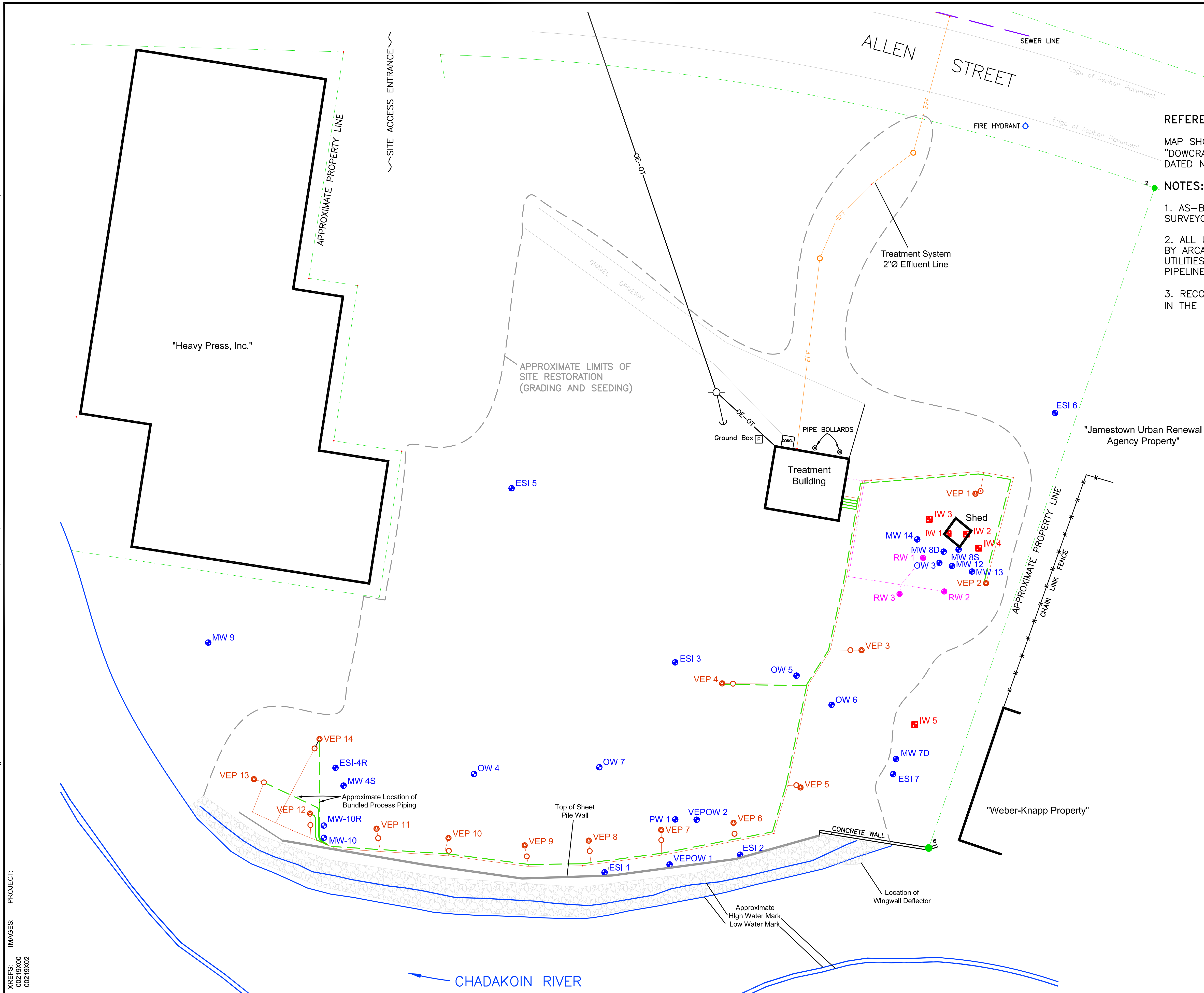
SITE LOCATION

ARCADIS

FIGURE

1

CITY: Syracuse DIV/GROUP: EnvCADD DB: P. LISTER, A.Schilling PM: M.Sanford TM: T.Carignan LYR: ON=*, OFF=REF
G:\ENVCAD\SYRACUSE\ACTAY\000219\0017\00004\DWG\00219B01.dwg LAYOUT: 1 SAVED: 6/21/2012 9:50 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 6/21/2012 9:50 AM BY: SCHILLING, ADAM
XREFS: IMAGES: 00219X01.tif PROJECTNAME: ----



REFERENCE:

MAP SHOWING BOUNDARY & TOPOGRAPHIC SURVEY AT ALLEN STREET "DOWCRAFT CORPORATION PROPERTY" BY PAUL W. SCHRECKENGOST, LS DATED NOV. 23, 1996 AND LAST REVISED DEC. 21, 1998.

NOTES:

1. AS-BUILT SURVEY PERFORMED BY MICHAEL J. RODGERS LAND SURVEYOR, PC.

2. ALL UNDERGROUND UTILITY LOCATIONS ARE PER INFORMATION PROVIDED BY ARCADIS AND SHOULD BE CONSIDERED APPROXIMATE. UNDERGROUND UTILITIES ARE NOT DRAWN ON PLAN BASED ON DIRECT LOCATION OF PIPELINES, CONDUITS, ETC.

3. RECOVERY WELLS (RW) WERE RENAMED FROM "VER" WELLS REFERENCED IN THE 100% REMEDIAL DESIGN (ARCADIS 2006).

LEGEND:

- MONITORING WELL
- OBSERVATION WELL
- RECOVERY WELL (PASSIVE)
- INJECTION WELL (INACTIVE)
- VACUUM ENHANCED PUMPING WELL (ACTIVE)
- VACUUM VALVE VAULT
- IRON STAKE/MONUMENT
- FIRE HYDRANT
- OE/OT – OVERHEAD ELECTRIC/TELEPHONE
- UTILITY POLE
- GUY WIRE
- SANITARY SEWER MAIN
- BUNDLED PROCESS LINE (AIR/WATER)
- VACUUM PROCESS PIPE (SOIL VAPORS)
- RECOVERY WELL PROCESS PIPE
- EFF – TREATMENT SYSTEM EFFLUENT PIPE (TREATED GROUNDWATER)
- SHEET PILE WALL
- HIGH/LOW RIVER WATER MARK
- APPROXIMATE PROPERTY LINE
- RIP RAP
- LIMITS OF SITE RESTORATION (GRADING AND SEEDING)

0 40' 80'

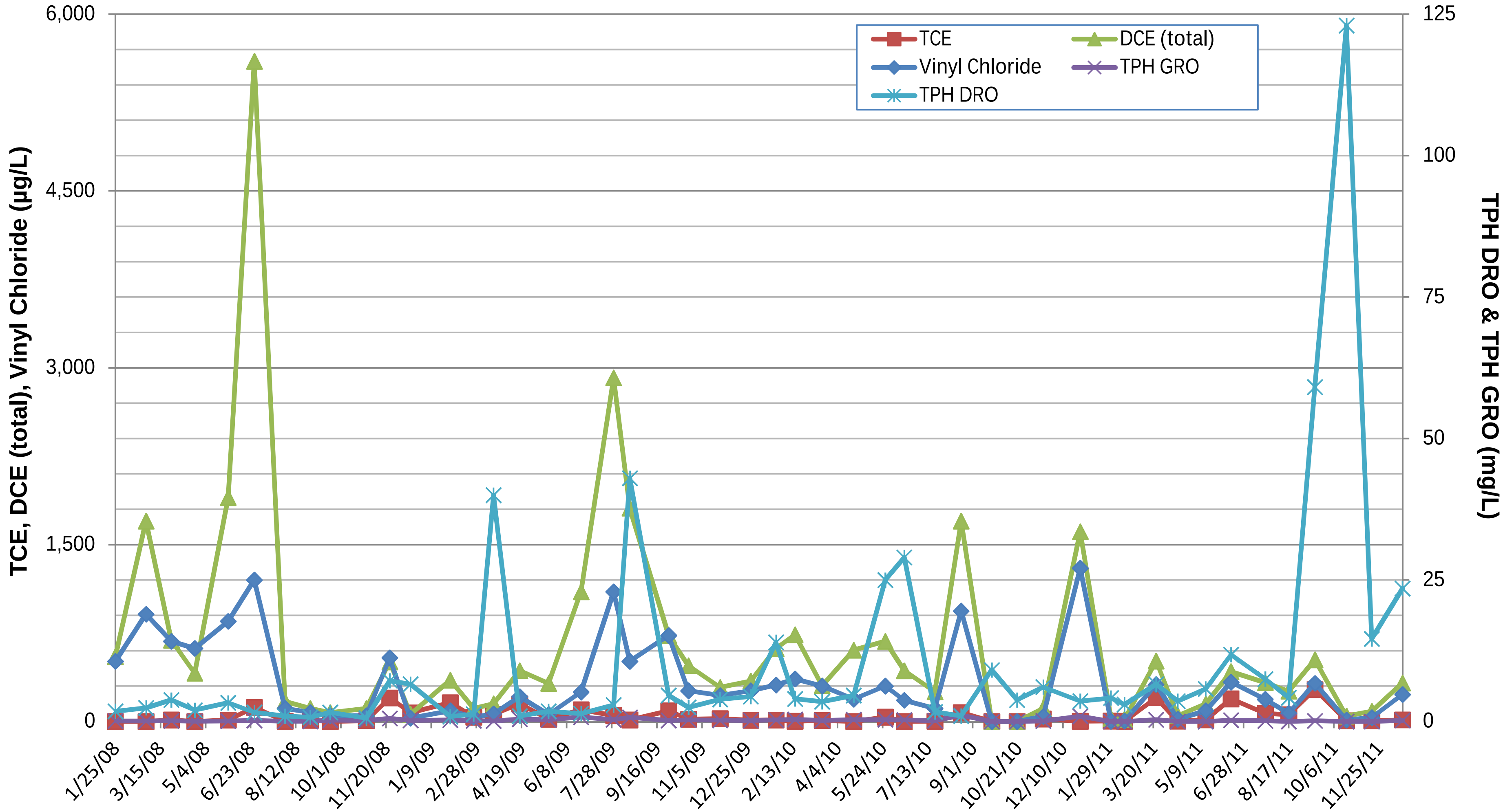
GRAPHIC SCALE

INGERSOLL RAND - DC ROLLFORMS SITE
JAMESTOWN, NEW YORK
2011 ANNUAL MONITORING REPORT

SITE PLAN AND REMEDIAL SYSTEM LAYOUT

ARCADIS

FIGURE
2



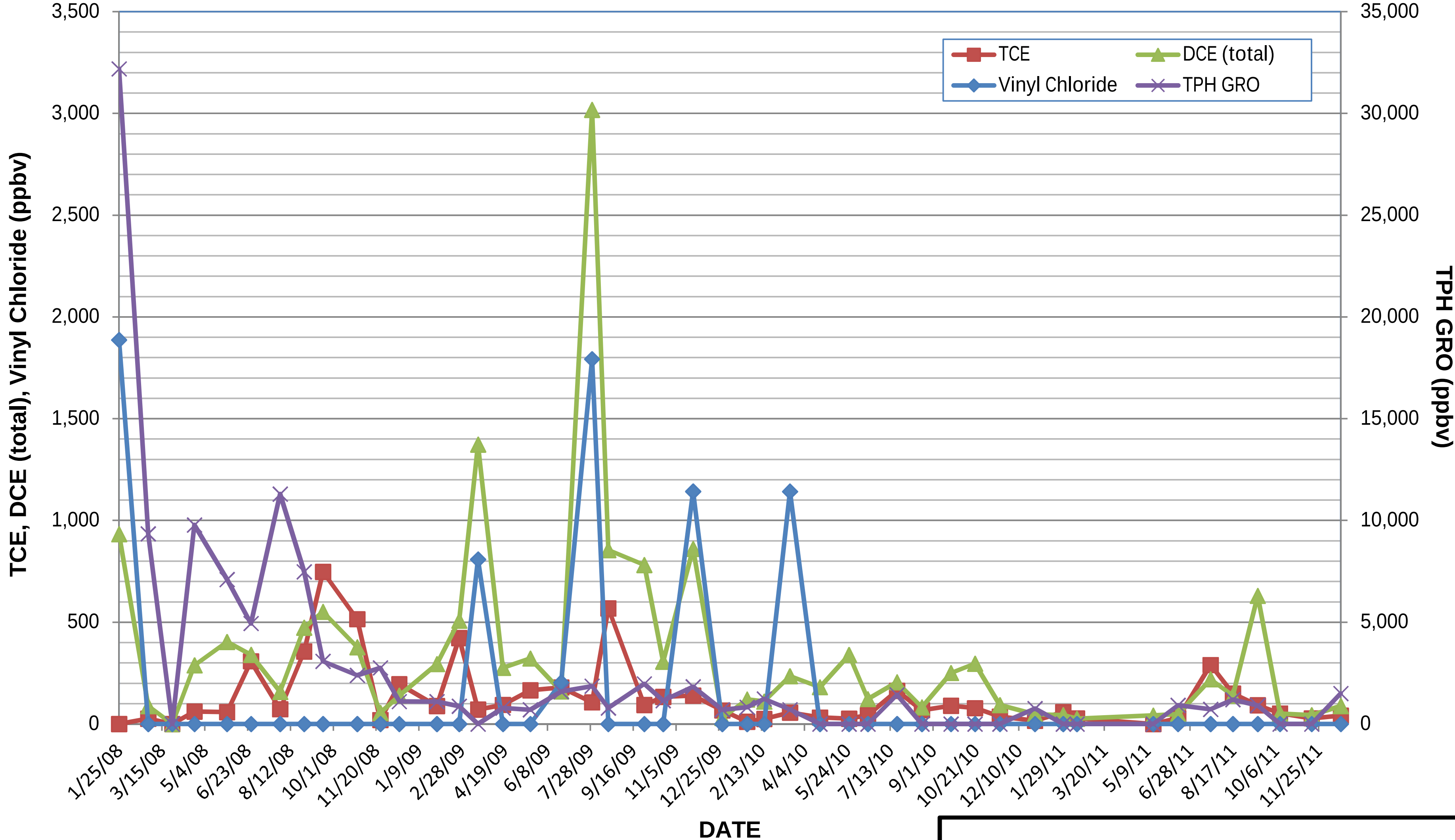
Abbreviations:
DCE – Dichloroethene
DRO – Diesel Range Organics
GRO – Gasoline Range Organics
mg/L – milligrams per liter
TCE – Trichloroethene
TPH – Total Petroleum Hydrocarbons
µg/L – micrograms per liter

INGERSOLL RAND • DC ROLLFORMS SITE
JAMESTOWN, NEW YORK
2011 ANNUAL MONITORING REPORT

System Influent Dissolved Phase Concentrations

ARCADIS

FIGURE
3



Abbreviations:

DCE – Dichloroethene
GRO – Gasoline Range Organics
ppbv – parts per billion by volume
TCE – Trichloroethene
TPH – Total Petroleum Hydrocarbons

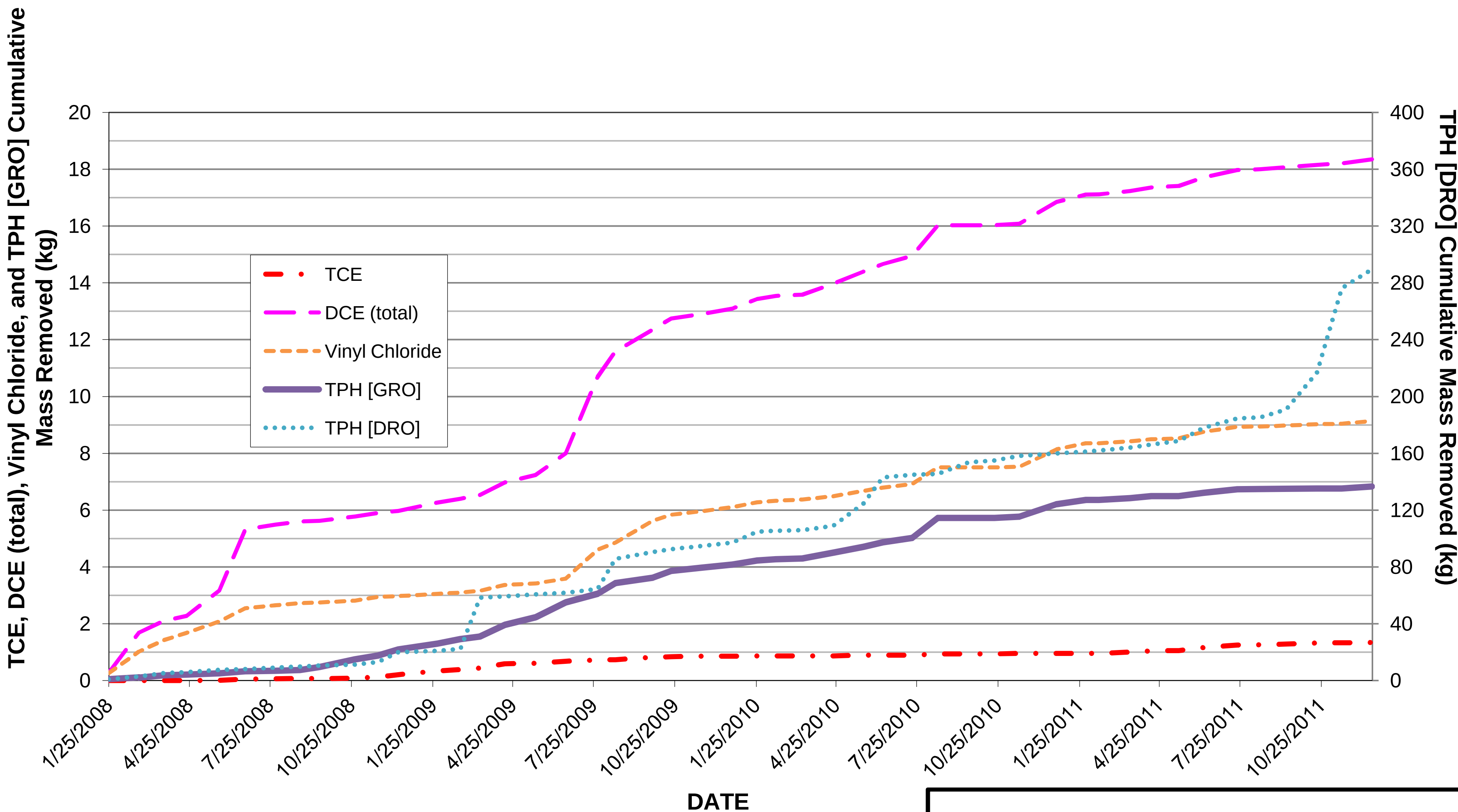
INGERSOLL RAND • DC ROLLFORMS SITE
JAMESTOWN, NEW YORK
2011 ANNUAL MONITORING REPORT

System Influent Vapor Phase Concentrations

ARCADIS

FIGURE

4



Abbreviations:
DCE – Dichloroethene
DRO – Diesel Range Organics
GRO – Gasoline Range Organics
kg - kilograms
TCE – Trichloroethene
TPH – Total Petroleum Hydrocarbons

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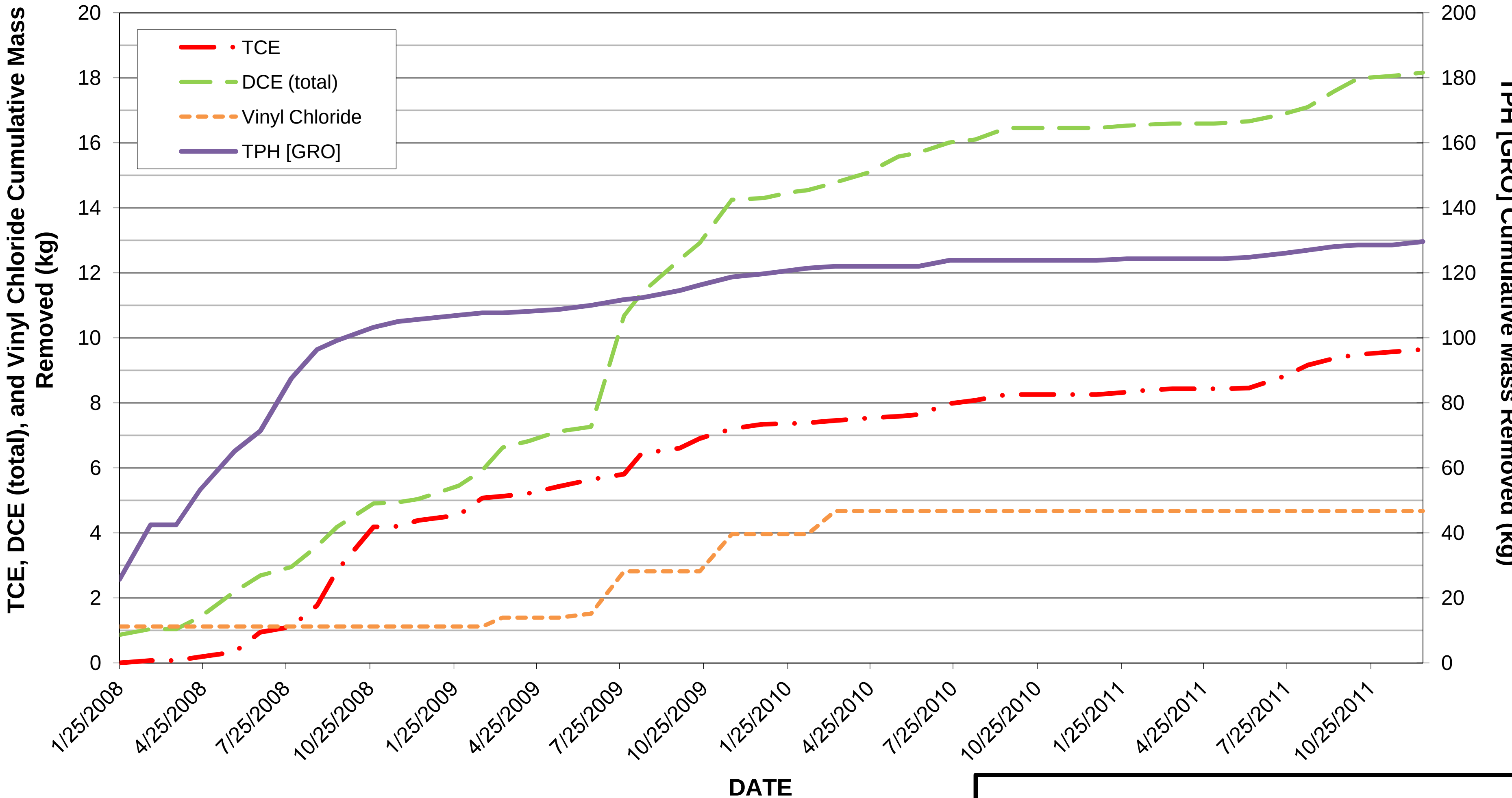
JAMESTOWN, NEW YORK
2011 ANNUAL MONITORING REPORT

Cumulative Dissolved Phase VOC and TPH [GRO & DRO] Mass Recovery

ARCADIS

FIGURE
5



Abbreviations:
DCE – Dichloroethene
GRO – Gasoline Range Organics
kg - kilograms
TCE – Trichloroethene
TPH – Total Petroleum Hydrocarbons

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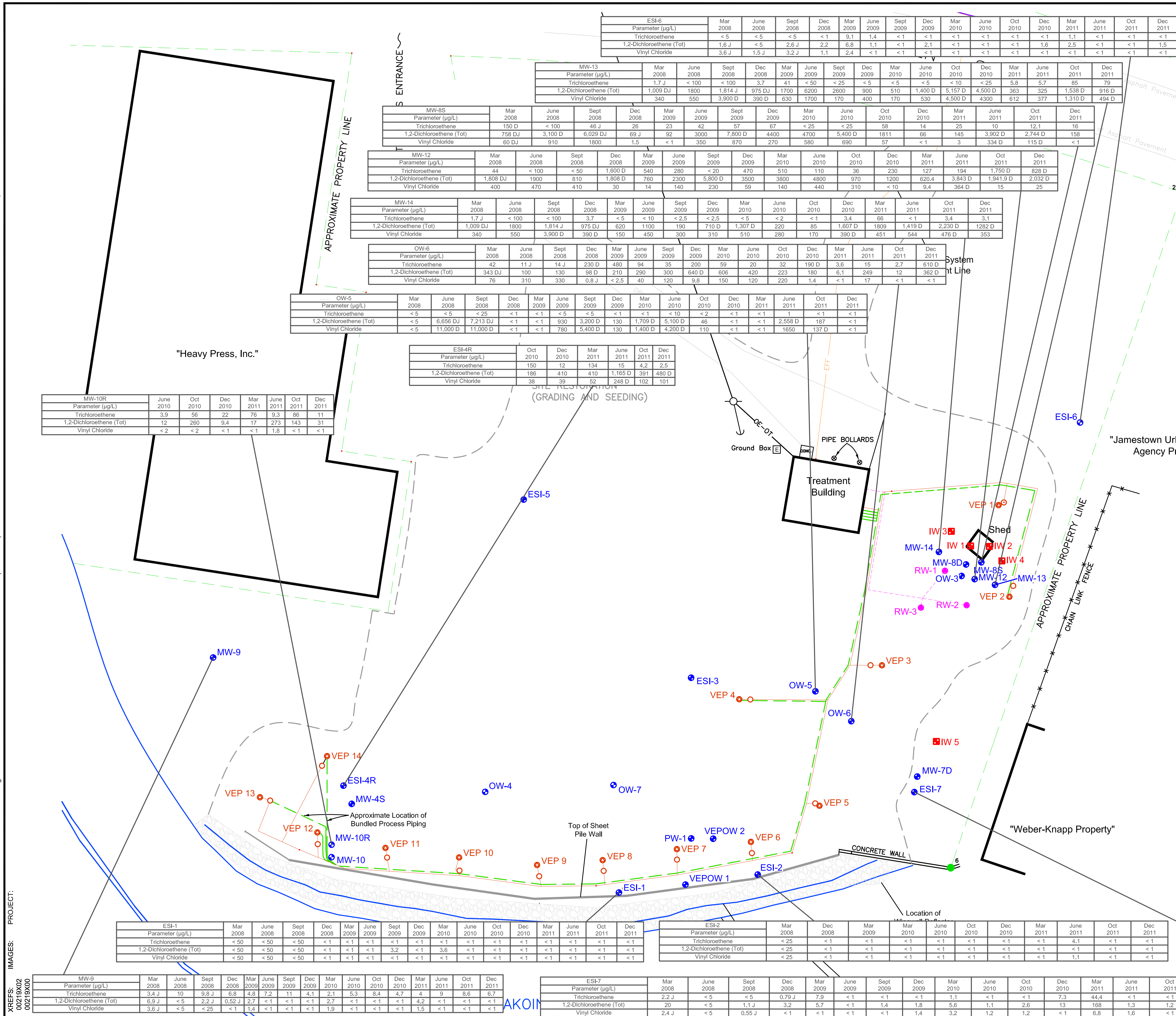
JAMESTOWN, NEW YORK
2011 ANNUAL MONITORING REPORT

Cumulative Vapor Phase VOC and TPH [GRO] Mass Recovery

ARCADIS

FIGURE
6



ESI-6 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	< 5	< 5	< 5	< 1	9.1	1.4	< 1	< 1	< 1	< 1	< 1	< 1	1.1	< 1	< 1	< 1
1,2-Dichloroethene (Tot)	1.6 J	< 5	2.6 J	2.2	6.8	1.1	< 1	2.1	< 1	< 1	< 1	1.6	2.5	< 1	< 1	1.5
Vinyl Chloride	3.6 J	1.5 J	3.2 J	1.1	2.4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

MW-13 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	1.7 J	< 100	< 100	3.7	41	< 50	< 25	< 5	< 5	< 5	< 10	< 25	5.8	5.7	85	79
1,2-Dichloroethene (Tot)	1,009 DJ	1800	1,814 J	975 DJ	1700	6200	2600	900	510	1,400 D	5,157 D	4,500 D	363	325	1,538 D	916 D
Vinyl Chloride	340	550	3,900 D	390 D	630	1700	170	400	170	530	4,500 D	4300	612	377	1,310 D	494 D

MW-8S Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	150 D	< 100	46 J	26	23	42	57	67	< 25	< 25	58	14	25	10	12.1	16
1,2-Dichloroethene (Tot)	758 DJ	3,100 D	6,029 DJ	69 J	92	3000	7,800 D	4400	4700	5,400 D	1811	66	145	3,902 D	2,744 D	158
Vinyl Chloride	60 DJ	910	1800	1.5	< 1	350	870	270	580	690	57	< 1	3	334 D	115 D	< 1

MW-12 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	44	< 100	< 50	1,600 D	540	280	< 20	470	510	110	36	230	127	194	1,750 D	828 D
1,2-Dichloroethene (Tot)	1,808 DJ	1900	810	1,808 D	760	2300	5,800 D	3500	3800	4800	970	1200	620.4	3,843 D	1,941.9 D	2,032 D
Vinyl Chloride	400	470	410	30	14	140	230	59	140	440	310	< 10	9.4	364 D	15	25

MW-14 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	1.7 J	< 100	< 100	3.7	< 5	< 10	< 2.5	< 2.5	< 5	< 2	< 1	3.4	66	< 1	3.4	3.1
1,2-Dichloroethene (Tot)	1,009 DJ	1800	1,814 J	975 DJ	620	1100	190	710 D	1,307 D	220	85	1,607 D	1809	1,419 D	2,230 D	1282 D
Vinyl Chloride	340	550	3,900 D	390 D	150	450	300	310	510	280	170	390 D	451	544	476 D	353

OW-6 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	42	11 J	14 J	230 D	480	94	35	200	59	20	32	190 D	3.6	15	2.7	610 D
1,2-Dichloroethene (Tot)	343 DJ	100	130	98 D	210	290	300	640 D	606	420	223	180	6.1	249	12	362 D
Vinyl Chloride	76	310	330	0.8 J	< 2.5	40	120	9.8	150	120	220	1.4	< 1	17	< 1	< 1

OW-5 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	< 5	< 5	< 25	< 1	< 1	< 5	< 5	< 1	< 1	< 10	< 2	< 1	< 1	1	< 1	< 1
1,2-Dichloroethene (Tot)	< 5	6,656 DJ	7,213 DJ	< 1	< 1	930	3,200 D	130	1,709 D	5,100 D	46	< 1	< 1	2,558 D	187	< 1
Vinyl Chloride	< 5	11,000 D	11,000 D	< 1	< 1	780	5,400 D	130	1,400 D	4,200 D	110	< 1	< 1	1650	137 D	< 1

ESI-4R Parameter (µg/L)	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	150	12	134	15	4.2	2.5
1,2-Dichloroethene (Tot)	186	410	410	1,165 D	391	480 D
Vinyl Chloride	38	39	52	248 D	102	101

MW-10R Parameter (µg/L)	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	3.9	56	22	76	9.3	86	11
1,2-Dichloroethene (Tot)	12	260	9.4	17	273	143	31
Vinyl Chloride	< 2	< 2	< 1	< 1	1.8	< 1	< 1

ESI-1 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	< 50	< 50	< 50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dichloroethene (Tot)	< 50	< 50	< 50	< 1	< 1	< 1	3.2	< 1	3.6	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	< 50	< 50	< 50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

ESI-2 Parameter (µg/L)	Mar 2008	Dec 2008	Mar 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	< 25	< 1	< 1	< 1	< 1	< 1	< 1	< 1	4.1	< 1	< 1
1,2-Dichloroethene (Tot)	< 25	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	< 25	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1	< 1	< 1

MW-9 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	3.4 J	10	9.8 J	6.8	4.8	7.2	11	4.1	2.1	5.3	8.4	4.7	4	9	8.6	6.7
1,2-Dichloroethene (Tot)	6.9 J	< 5	2.2 J	0.52 J	2.7	< 1	< 1	< 1	2.7	< 1	< 1	< 1	4.2	< 1	< 1	< 1
Vinyl Chloride	3.6 J	< 5	< 25	< 1	1.4	< 1	< 1	< 1	1.9	< 1	< 1	< 1	1.5	< 1	< 1	< 1

ESI-7 Parameter (µg/L)	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009	Sept 2009	Dec 2009	Mar 2010	June 2010	Oct 2010	Dec 2010	Mar 2011	June 2011	Oct 2011	Dec 2011
Trichloroethene	2.2 J	< 5	< 5	0.79 J	7.9	< 1	< 1	< 1	1.1	< 1	< 1	7.3	44.4	< 1	< 1	1.2
1,2-Dichloroethene (Tot)	20	< 5	1.1 J	3.2	5.7	< 1	1.4	1.8	5.6	1.1	2.6	13	168	1.3	1.2	9.1
Vinyl Chloride	2.4 J	< 5	0.55 J	< 1	< 1	< 1	< 1	1.4	3.2	1.2	1.2	< 1	6.8	1.6	< 1	< 1

REFERENCE:

MAP SHOWING BOUNDARY & TOPOGRAPHIC SURVEY AT ALLEN STREET "DOWCRAFT CORPORATION PROPERTY" BY PAUL W. SCHRECKENGOST, LS DATED NOV. 23, 1996 AND LAST REVISED DEC. 21, 1998.

NOTES:

1. AS-BUILT SURVEY PERFORMED BY MICHAEL J. RODGERS LAND SURVEYOR, PC.
2. ALL UNDERGROUND UTILITY LOCATIONS ARE PER INFORMATION PROVIDED BY ARCADIS AND SHOULD BE CONSIDERED APPROXIMATE. UNDERGROUND UTILITIES ARE NOT DRAWN ON PLAN BASED ON DIRECT LOCATION OF PIPELINES, CONDUITS, ETC.
3. RECOVERY WELLS (RW) WERE RENAMED FROM "VER" WELLS REFERENCED IN THE 100% REMEDIAL DESIGN (ARCADIS 2006).
4. ALL CONCENTRATIONS DETECTED IN GROUNDWATER REPORTED IN MICROGRAMS PER LITER (µg/L), EQUIVALENT TO PARTS PER BILLION (ppb).
5. SAMPLES ANALYZED USING USEPA METHOD 8260.
6. DICHLOROETHENE (TOTAL) INCLUDES THE SUM OF 1,1-DICHLOROETHENE, cis-1,2-DICHLOROETHENE, AND trans-1,2-DICHLOROETHENE.
7. ESI-4R WAS INSTALLED AS A REPLACEMENT TO ESI-4 IN THE FIRST QUARTER 2010. MW-10R WAS INSTALLED AS A REPLACEMENT TO MW-10 IN THE FIRST QUARTER 2010. MW-10 WAS NOT SAMPLED DUE TO DAMAGE TO THE WELL CASING.

LEGEND:

NORTH FROM PRIOR SURVEYS

- MONITORING WELL
- OBSERVATION WELL
- RECOVERY WELL (PASSIVE)
- INJECTION WELL (INACTIVE)
- VACUUM ENHANCED PUMPING WELL (ACTIVE)
- VACUUM VALVE VAULT
- IRON STAKE/MONUMENT
- FIRE HYDRANT
- -OE/OT- OVERHEAD ELECTRIC/TELEPHONE
- UTILITY POLE
- GUY WIRE
- SANITARY SEWER MAIN
- BUNDLED PROCESS LINE (AIR/WATER)
- VACUUM PROCESS PIPE (SOIL VAPORS)
- RECOVERY WELL PROCESS PIPE
- -EFF- TREATMENT SYSTEM EFFLUENT PIPE (TREATED GROUNDWATER)
- SHEET PILE WALL
- HIGH/LOW RIVER WATER MARK
- APPROXIMATE PROPERTY LINE
- RIP RAP
- LIMITS OF SITE RESTORATION (GRADING AND SEEDING)
- ND – NOT DETECTED
- NS – NOT SAMPLED
- D – DILUTED SAMPLE
- J – ESTIMATED VALUE
- < – CONCENTRATION WAS LESS THAN THE LABORATORY DETECTION LIMIT

MONITORING WELL ID — DATE OF GROUNDWATER SAMPLE EVENT

OW-6	DEC 2010
Analyte (µg/L)	
Dichloroethene (total)	180
Trichloroethene	190 D
Vinyl Chloride	1.4

GROUNDWATER CONSTITUENT — CONCENTRATION OF GROUNDWATER CONSTITUENT

0 40' 80'

GRAPHIC SCALE

INGERSOLL RAND - DC ROLLFORMS SITE
JAMESTOWN, NEW YORK
2011 ANNUAL MONITORING REPORT

GROUNDWATER MONITORING ANALYTICAL RESULTS

ARCADIS

FIGURE 7

CITY: SYRACUSE, NY DIV/GROUP: ENV/CADD DB: P. LISTER, R. BASSETT, P. LISTER PM: M. SANFORD TM: T. CARIGNAN TR: C. DAVERN LYR: ON=*; OFF=REF, (FRZ) G:\ENVCAD\SYRACUSE\ACT\AY000219\0017\00004\DWG\00219C01.dwg LAYOUT: 7 SAVED: 6/21/2012 10:05 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 6/21/2012 10:05 AM BY: SCHILLING, ADAM

PROJECT:
IMAGES:
XREFS: 00219X02 00219X00

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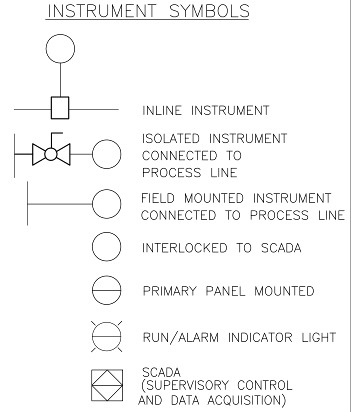
Appendix A

Record Drawings

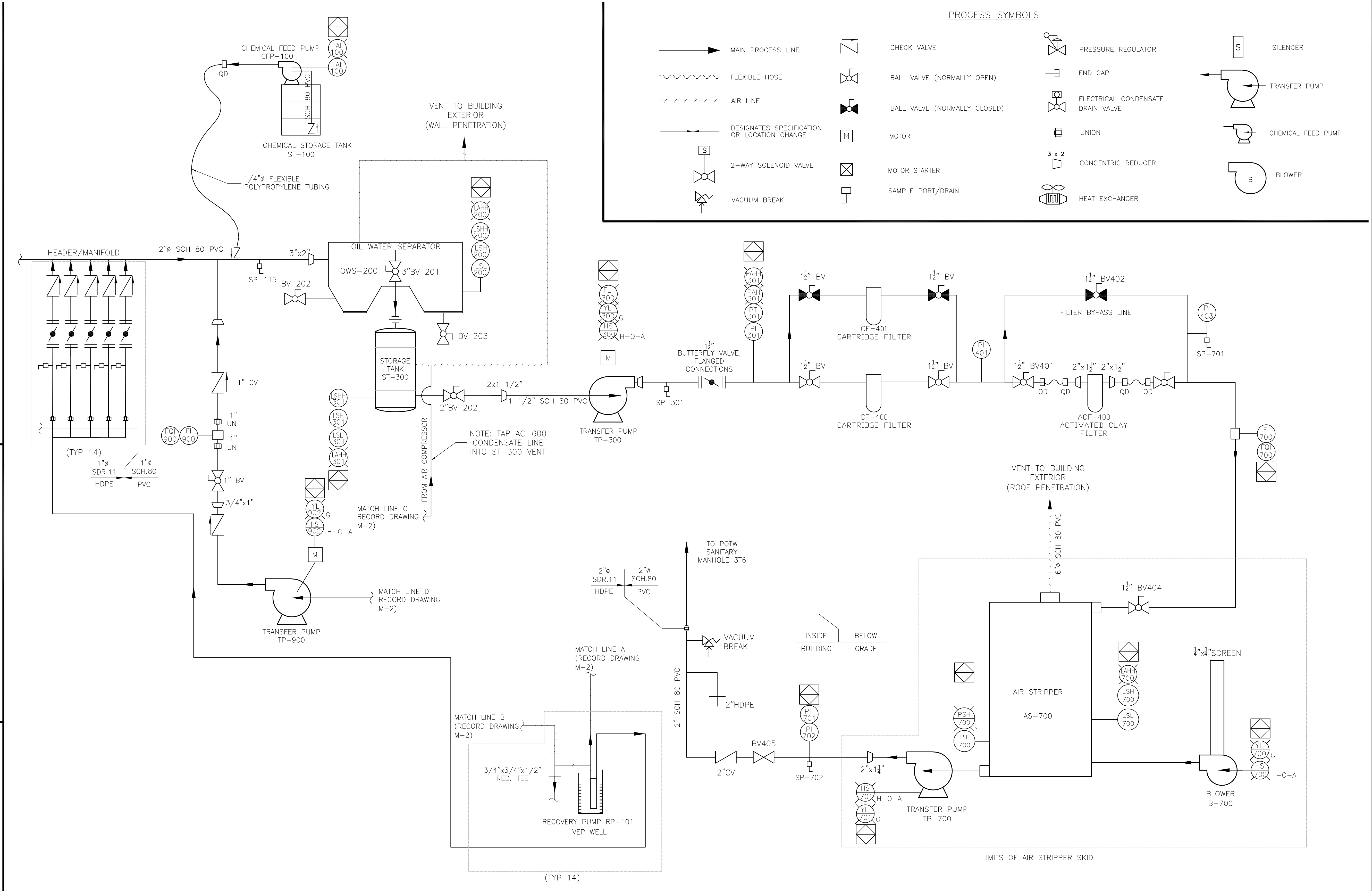
ABBREVIATIONS

AS AIR STRIPPER
B BLOWER
BV BALL VALVE
CS CARBON STEEL
CV CHECK VALVE
FAL FLOW ALARM LOW
FL FAULT LIGHT
FIT FLOW TOTALIZER INDICATOR
FT FLOW TRANSMITTER
G GREEN LIGHT
GAC GRANULAR ACTIVATED CARBON
GALV GALVANIZED
GPM GALLONS PER MINUTE
HDPE HIGH DENSITY POLYETHYLENE
HP HORSE POWER
HOA HAND-OFF-AUTO
HZ HERTZ
HC HOSE CONNECTION
HS HAND SWITCH
LAHH LEVEL ALARM HIGH HIGH
LALL LEVEL ALARM LOW LOW
LSH LEVEL SENSOR HIGH
LSHH LEVEL SENSOR HIGH HIGH
LSL LEVEL SENSOR LOW
M MOTOR
PAHH PRESSURE ALARM HIGH HIGH
PAH PRESSURE ALARM HIGH
PAL PRESSURE ALARM LIGHT LOW
PI PRESSURE INDICATOR
PRV PRESSURE RELIEF VALVE
PSL PRESSURE SWITCH LOW
PSH PRESSURE SWITCH HIGH
PT PRESSURE TRANSMITTER
PVC POLYVINYL CHLORIDE
QD QUICK DISCONNECT
R RED LIGHT
SCH SCHEDULE
SG SIGHT GAUGE
SP SAMPLE PORT
SV SOLENOID VALVE
SDR STANDARD DIMENSION RATIO
TAH TEMPERATURE ALARM HIGH
TI TEMPERATURE INDICATOR
TP TRANSFER PUMP
TYP TYPICAL
UN UNION
VI VACUUM INDICATOR
V VOLT
YL INDICATING LIGHT

INSTRUMENT SYMBOLS



PIPE IDENTIFICATION



LIQUID PHASE PROCESS FLOW

DRAWING NOT TO SCALE

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
5	11.18.08	RECORD DRAWING	TC	MM
4	6.12.08	DRAFT RECORD DRAWING SUBMITTAL TO NYSDEC	TC	TC
3	5.30.06	100 % REMEDIAL DESIGN SUBMITTAL TO NYSDEC	TC	KL
2	4.17.06	BID SUBMISSION TO CONTRACTORS	TC	KL
1	2.9.06	90% SUBMITTAL TO NYSDEC	TC	KL
0	1.13.06	DRAFT	TC	KL

Professional Engineer's Name: **MOH MOHIUDDIN**
Professional Engineer's No.: 074527
State: NY | Date Signed: 11/18/08 | Project Mgr.: M.SANFORD
Designed by: T.CARIGNAN | Drawn by: TP/TC/LE | Checked by: C.DAVERN

ARCADIS

ARCADIS OF NEW YORK, INC.

INGERSOLL RAND • D.C. ROLLFORMS
JAMESTOWN, NEW YORK

LIQUID PHASE PROCESS & INSTRUMENTATION DIAGRAM, AND GENERAL LEGEND

MECHANICAL

ARCADIS Project No. AY000219.0014.00006
Date 11.18.08
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M-1

CITY:ALBANY DIV/GROUP:SER-1 DB:TP/TC/LE LD:T.CARIGNAN PIC:M.SANFORD PM:M.SANFORD
G:\APROJECT\INGERSOL\DC Rollforms\AY000219.0014 2008\Engineering Construction Completion Report\As-built Construction Drawings

CITY:ALBANY DIV/GROUP:SER-1 DB:TP/TC/LE LD:T.CARIGNAN PIC:M.SANFORD PM:M.SANFORD
G:\APROJECT\INGERSOLL\DC Rollforms\AY000219.0014 2008\Engineering Construction Completion Report\As-built Construction Drawings

ALARMS

Alarm #	Alarm Name	Alarm Description
0	LAHH-901	High High liquid level alarm in SVE knockout tank. Alarm shuts down SVE blower B-900 and heat exchanger HX-500.
1	LAHH-200	High high liquid level in oil/water separator OWS-200. Alarm shuts down air compressor AC-600, chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
2	LAHH-301	High high liquid level in storage tank ST-301. Alarm shuts down air compressor AC-600, chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
3	LAHH-700	High high liquid level in air stripper sump. Alarm shuts down transfer pump TP-300.
4	PAH-301	High pressure alarm indicating pressure greater than 22 psi for pressure transmitter PT-301. Alarm only sends warning and does not affect system components.
5	PAHH-301	High high pressure alarm indicating pressure greater than 27 psi for pressure transmitter PT-301. Alarm shuts down transfer pump TP-300, air compressor AC-600, and SVE blower B-900. Alarm also disables SVE knockout tank transfer pump TP-900 and relieves pressure to pneumatic pumps in recovery wells.
6	PAH-501	High pressure alarm indicating pressure greater than 35 psi for pressure transmitter PT-501. Alarm only sends warning and does not affect system components.
7	PAHH-501	High high pressure alarm indicating pressure greater than 50 psi for pressure transmitter PT-501. Alarm shuts down SVE blower B-900 and heat exchanger HX-500.
8	PAL-601	Low pressure alarm indicating pressure less than 40 psi for the air compressor AC-600. Alarm shuts down only air compressor AC-600.
9	TP-300 Fault	Transfer pump TP-300 motor fault. Alarm shuts down chemical feed pump CFP-100, SVE blower B-900, heat exchanger HX-500, transfer pump TP-300, and transfer pump TP-900. Alarm also relieves pressure to pneumatic pumps in recovery wells.
10	Power Failure	Power failure alarm. Alarm de-energizes chemical feed pump CFP-100, SVE blower B-900, heat exchanger HX-500, and air compressor AC-600. Alarm also relieves pressure to pneumatic pumps in recovery wells.
11	HX-500 Fault	Heat exchanger motor fault. Alarm shuts down chemical feed pump CFP-100, SVE blower B-900, heat exchanger HX-500, and air compressor AC-600. Alarm also relieves pressure to pneumatic pumps in recovery wells.
12	B-900 Fault	SVE blower B-900 motor fault. Alarm shuts down chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
13	TP-900 Fault	Transfer pump TP-900 motor fault. Alarm shuts down transfer pump TP-900, SVE blower B-900, heat exchanger HX-500, and air compressor AC-600.
14	FSL-100	Low flow chemical feed pump alarm. Alarm shuts down only chemical feed pump CFP-100.
15	AC-600 Fault	Air compressor AC-600 motor fault. Alarm shuts down SVE blower B-900 and heat exchanger HX-500.
16	TP-300 Thermal	Transfer pump TP-300 overheat alarm. Alarm shuts down transfer pump TP-300, chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
17	B-900 Thermal	SVE blower B-900 overheat alarm. Alarm shuts down chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
18	HX-500 Thermal	Heat exchanger HX-500 overheat alarm. Alarm shuts down chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
19	PAL-700	Low pressure alarm for air stripper sump. Alarm shuts down transfer pump TP-300, chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
20	LSHH-201 Prod.	High high product level in oil/water separator OWS-200. Alarm shuts down chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.
21	LAH-200	High liquid level in oil/water separator OWS-200. Alarm only sends warning and does not affect system components.
22	PAHH-701	High high pressure alarm indicating pressure greater than 30 psi for pressure transmitter PT-701. Alarm shuts down transfer pump TP-300, chemical feed pump CFP-100, SVE blower B-900, and heat exchanger HX-500. Alarm also relieves pressure to pneumatic pumps in recovery wells.

DRAWING NOT TO SCALE

ALARM LOGIC:

The air compressor, which supplies air to the pneumatic pumps in each VEP recovery well, automatically shuts down in the event of the following alarm conditions for system parameters: high–high level alarm in oil/water separator OWS–200 (LAHH–200), high–high level in storage tank ST–300 (LAHH–301), high–high product level in the oil/water separator oil capturing reservoir (LAHH–201 PROD), low pressure alarm in air compressor AC–600 (PAL–601), high–high level alarm in the air stripper (AS–700) sump (LAHH–700), low pressure alarm in the air stripper (AS–700) sump (PAL–700), high–high pressure alarm after the storage tank transfer pump from pressure transmitter PT–301 (PAHH–301), and a high–high pressure alarm after the discharge pump from PT–701 (PAHH–701). A pair of two–way solenoid valves (SV–1 and SV–2) located between the air compressor and the recovery wells are also interlocked with the above alarms. Upon the occurrence of any of these alarms, one of the solenoid valves closes to shut off the air supply from the compressor, while the other solenoid valve opens to allow the air supply line to the recovery wells to de–pressurize.

The SVE blower (B–900) automatically shuts down in the event of any of the critical alarm conditions listed above for the air compressor and solenoid valves. Given that the vapor extraction pipeline at each VEP well is located above the water recovery pipeline, operation of the SVE blower while the recovery well pumps are not dewatering the wells could result in the unwanted extraction of groundwater by the SVE blower. In addition to the alarm conditions listed above for the air compressor and solenoid valves, the following conditions will result in the automatic shutdown of only the SVE blower: high–high level alarm in SVE knock–out tank KT–900 (LAHH–901) and a high–high pressure alarm directly upstream from the vapor phase granular activated carbon units from pressure transmitter PT–501 (PAHH–501).

In addition to the alarm conditions that will disable components of the remediation system, alarm conditions have been established to provide early warning that a system component may require servicing. The following alarm conditions result in only a notification to operating personnel, and do not cause a system shutdown: a low flow alarm from chemical feed pump CFP–100 (FSL–100), a high pressure alarm from pressure transmitter PT–301 (PAH–301), a high pressure alarm from pressure transmitter PT–501 (PAH–501), a high pressure alarm from pressure transmitter PT–701 (PAH–701), and a high level in oil/water separator OWS–200 (LAH–200).

PROCESS DESCRIPTION:

Groundwater and non–aqueous phase liquid (NAPL) from the vacuum enhanced pumping (VEP) wells is conveyed via underground piping to an on–site treatment building. Prior to reaching the first component of the treatment system (i.e., the oil/water separator OWS–200) a sequestering agent is injected into the process stream. The purpose of the sequestering agent is to prevent iron and manganese related fouling downstream in the system (e.g. process piping, cartridge filters and the air stripper). The groundwater and NAPL is then pumped directly into the oil/water separator (OWS–200) for removal of residual non–emulsified NAPL.

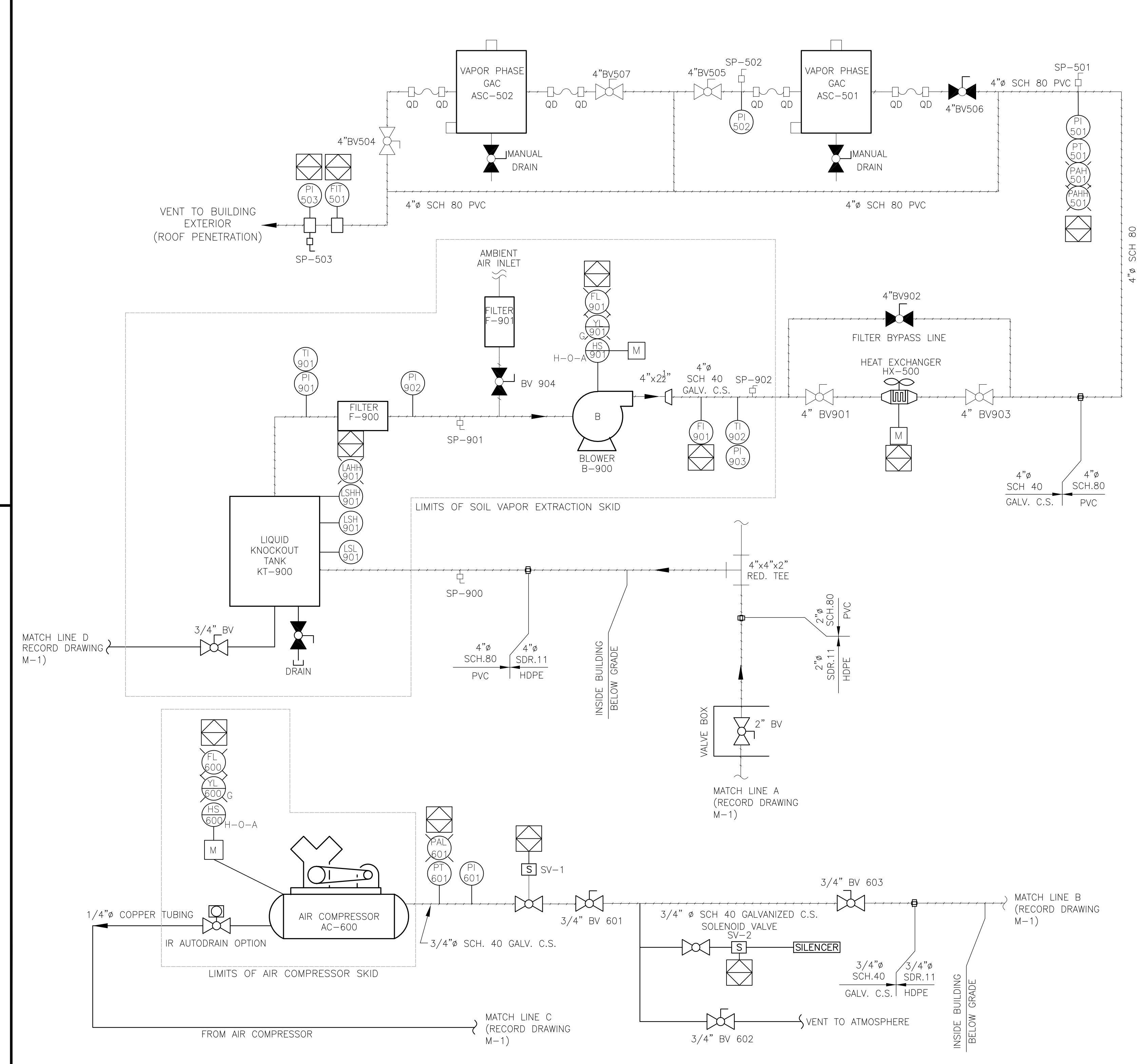
Once the groundwater has passed through the oil/water separator, the water flows by gravity to the storage tank (ST–300). The water is then transferred in batch mode by transfer pump TP–300 through two cartridge filters housings (CF–400 and CF–401) arranged in parallel for removal of residual suspended solids. Following the cartridge filters, groundwater and residual emulsified NAPL is pumped through a liquid phase granular organically modified clay (LPGOC) filter vessel for the removal of emulsified NAPL.
Groundwater is pumped through a low–profile air stripper (AS–700) series for the removal of dissolved phase organic compounds. Treated groundwater is then discharged to the local POTW sanitary sewer manhole 3T6 via a single 2–inch standard dimension ratio (SDR) 11 high density polyethylene (HDPE) below grade pipe.

Soil vapors are collected from each VEP well via a regenerative blower (B–900). The recovered soil gas is treated via two (2) vapor–phase granular activated carbon units (VPGAC) arranged in series (ASC–501 and ASC–502).

The system has been designed to monitor the operational status of critical systems on a continual basis during operation. The system is interlocked with sensors and alarms which can temporarily shut down the system in the event the system malfunctions. A system component failure results in a system shutdown to assure that the discharge of untreated groundwater or soil vapor is prevented and also to protect system operators.

GENERAL NOTE:

SEE RECORD DRAWING M–1 FOR GENERAL ABBREVIATIONS, PROCESS SYMBOLS, INSTRUMENT SYMBOLS, AND PIPE IDENTIFICATION.



VAPOR PHASE PROCESS FLOW

5	11.18.08	RECORD DRAWING	TC	MM
4	6.12.08	DRAFT RECORD DRAWING SUBMITTAL TO NYSDEC	TC	TC
3	5.30.06	100 % REMEDIAL DESIGN SUBMITTAL TO NYSDEC	TC	KL
2	4.17.06	BID SUBMISSION TO CONTRACTORS	TC	KL
1	2.9.06	90% SUBMITTAL TO NYSDEC	TC	KL
0	1.13.06	DRAFT	TC	KL
No.	Date	Revisions	By	Ckd

SCALE(S) AS INDICATED

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Professional Engineer's Name: MOH MOHIUDDIN
Professional Engineer's No.: 074527
State: NY | Date Signed: 11/18/08 | Project Mgr.: M.SANFORD
Designed by: T.CARIGNAN | Drawn by: TP/TC/LE | Checked by: C.DAVERN

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VAPOR PHASE PROCESS & INSTRUMENTATION DIAGRAM, AND CONTROL LOGIC

MECHANICAL

ARCADIS Project No. AY000219.0014.00006
Date 11.18.08

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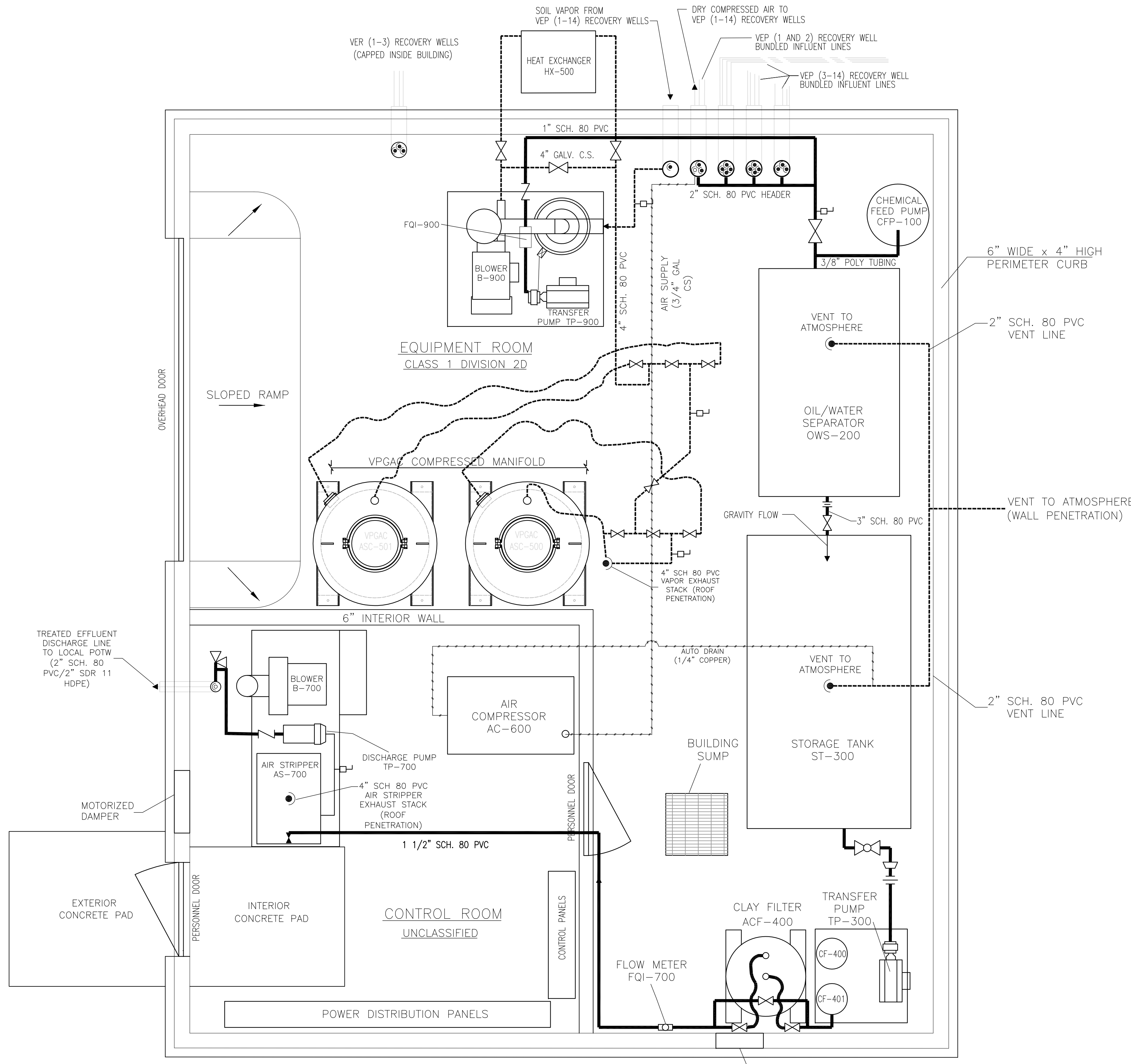
M-2



TREATMENT BUILDING LAYOUT

SCALE: 1" = 2'

LEGEND

- WATER PROCESS LINE
- VAPOR PROCESS LINE
- COMPRESSED AIR PROCESS LINE

EQUIPMENT DESCRIPTIONS

FILTRATION UNITS

VAPOR PHASE CARBON UNITS
ASC-500 AND 501
MAKE: US FILTER
MODEL: VSC-2000
SIZE: 2000-LB

STORAGE TANK
ST-300
MAKE: CHEM-TAINER INDUSTRIES, INC.
MODEL: ST-300
TYPE: ROUND HORIZONTAL BULK STORAGE W/ SUMP
SIZE: 1300 GALLONS

ACTIVATED CLAY/CARBON FILTRATION UNIT
ACF-400
MAKE: US FILTER
TYPE: LIQUID PHASE ADSORBER
MODEL: PV-500

OIL/WATER SEPARATOR
OWS-200
MAKE: HYDROFLO
MODEL: EVS-036-SS34P
TYPE: SS, RECTANGULAR CHANNEL
CAPACITY: 70 GPM
MEDIA: COALESCING PVC MEDIA

CARTRIDGE FILTERS
CF-400 AND CF-401
MAKE: HARMSCO
MODEL: HIF-14
FILTER: 20 MICRON CARTRIDGE
CAPACITY: 60 GPM

MISCELLANEOUS

TRANSFER PUMP
TP-300
MAKE: GOULDS
MODEL: G&L SERIES NPE 316SS
TYPE: POSITIVE DISPLACEMENT
CAPACITY: 20 GPM, 75 FT TDH
MOTOR RATINGS: 1 HP, 3ø, 460V, EXP

RECOVERY PUMP
RP-1-14
MAKE: QED
TYPE: PNEUMATIC
MODEL: SPECIAL SHORT AP-4T TOP LOADING
CAPACITY: 4 GPM @ 20 PSI.

CHEMICAL HOLDING TANK
CT-100
CHEMICAL: ARIES 2925 SEQUESTERING AGENT
TYPE: PLASTIC DRUM
SIZE: 55 GALLON

CHEMICAL FEED PUMP
CFP-100
MAKE: LMI
TYPE: ELECTRONIC METERING PUMP
MODEL: E70-1-30
MOTOR RATINGS: 1ø, 120V
CAPACITY: 1.3 GPH (4.9 L/H), 300 PSI
OPTIONS: LMI MICROPACE, MP-100 W/ DIGI-PULSE FLOW MONITOR SERIES FM-200

HEAT EXCHANGER
HX-500
MAKE: XCHANGER, INC.
CAPACITY: 322 SCFM, 150 F IN/80F OUT
MODEL: AA-500 (REF#83360)
MOTOR RATINGS: 3ø, 460V, XP

AIR COMPRESSOR SKID

AIR COMPRESSOR
AC-600
MAKE: INGERSOLL-RAND
MODEL: UP6-10TAS-125
CAPACITY: 80 GALLON, 38 ACFM, 125 PSI
MOTOR RATINGS: 10 HP, 1ø, 120 V
OPTIONS: INTERNAL AIR DRYER

SVE SKID

AIR FILTER
F-900
MAKE: SOLBERG
MODEL: CSL-235P-300
CAPACITY: 300 CFM

AIR FILTER
F-901
MAKE: EM PRODUCTS
MODEL: EMF-2

LIQUID KNOCKOUT TANK
KT-900
MAKE: J.E. GASHO & ASSOC.
MODEL: GX-90
SIZE: 90 GALLON

REGENERATIVE BLOWER
B-900
MAKE: ROTRON
MODEL: EN 858 BD72WL
MOTOR RATINGS: 10 HP, 3ø, 460 V, 60 HZ

TRANSFER PUMP
TP-900
MAKE: OBERDORFER
MODEL: 992R
CAPACITY: 4 GPM
MOTOR RATINGS: 0.5 HP, 3ø, 460 V

AIR STRIPPER SKID

AIR STRIPPER
AS-700
MAKE: QED
MODEL: EZ-4.4SS
TYPE: LOW PROFILE
CAPACITY: 1.0-25 GPM
MOTOR RATINGS: 3ø, 460 V, 60HZ

TRANSFER PUMP
TP-700
MAKE: GOULDS
MODEL: NPE SERIES 316L
TYPE: POSITIVE DISPLACEMENT
CAPACITY: 30 GPM, 50 FT TDH.
MOTOR RATINGS: 1 HP, 3ø, 460 V

CITY:ALBANY DIV/GROUP:SER-1 DB:TP/TC/LE LD:T.CARIGNAN PIC:M.SANFORD PM:M.SANFORD
G:\APROJECT\INGERSOL\DC Rollforms\AY000219.0014 2008\Engineering Construction Completion Report\As-built Construction Drawings

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
5	11.18.08	RECORD DRAWING	TC	MM
4	6.12.08	DRAFT RECORD DRAWING SUBMITTAL TO NYSDEC	CD	TC
3	5.30.06	100 % REMEDIAL DESIGN SUBMITTAL TO NYSDEC	TC	KL
2	4.17.06	BID SUBMISSION TO CONTRACTORS	TC	KL
1	2.9.06	90% SUBMITTAL TO NYSDEC	TC	KL
0	1.13.06	DRAFT	TC	KL

Professional Engineer's Name		
MOH MOHIUDDIN		
Professional Engineer's No. 074527		
State: NY	Date Signed: 11/18/08	Project Mgr.: M.SANFORD
Designed by: T.CARIGNAN	Drawn by: TP/TC/LE	Checked by: C.DAVERN

ARCADIS OF NEW YORK, INC.

INGERSOLL RAND • D.C. ROLLFORMS
JAMESTOWN, NEW YORK

EQUIPMENT LAYOUT AND DESCRIPTIONS

MECHANICAL

ARCADIS Project No.
AY000219.0014.00006

Date
11.18.08

ARCADIS OF NEW YORK, INC.
465 NEW KARNER ROAD
FIRST FLOOR
ALBANY, NEW YORK
TEL. 518.452.7826

M-3

ARCADIS

Appendix B

Site Cover and Riverbank Inspection Checklist

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information		
Figure Reference:	3/24/11	Weather: Sunny high 20's
Date / Time Monitoring Performed:	~~3/25/11 @ 13:00~~	

Cover material(s)	☐ Soil	☑ Vegetated Topsoil	☑ Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:	X			
Are they functioning as intended?	X			
Are they still required (i.e., has a healthy stand of vegetation been established)?			X	Winter, can't tell what is thriving
Vegetated Topsoil Isolation Cover				
Are there areas of scour?			X	
Is any geotextile fabric exposed?			X	
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.			X	
Is there any sign of distressed vegetation?			X	
Do any areas require seeding?			X	
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?			X	
Is any geotextile fabric exposed?			X	
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?			X	
Is 30" dia. Rip Rap in place?			X	
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?			X	
Photograph Numbers				
Chadakoin River (USGS 03014500, Falconer, NY)				
Discharge, Cubic Feet Per Second?	1,530			3/25/11 @ 1330
Gage Height, Feet?	3.63			

Other Observations: Describe any other relevant observations noted during this monitoring period.

Water is very high (~ 3½' below surface). There is standing water in the middle of the site. Gage reached as high as 3.83' on Tues. March 22nd 2011.

Performed by: Jeff Hull	Signature: Jeffrey Hull	Date: 3/24/11

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information		
Figure Reference:		Weather: Cloudy 60's
Date / Time Monitoring Performed: 1530 6/14/11		
Cover material(s) ☐ Soil	X Vegetated Topsoil	X Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:	✓			
Are they functioning as intended?	✓			
Are they still required (i.e., has a healthy stand of vegetation been established)?	✓			
Vegetated Topsoil Isolation Cover				
Are there areas of scour?		✓		Area in center of lot has some stone co
Is any geotextile fabric exposed?	✓			By VEP-12 at top of bank. limiting the vegetation growth
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.				90%
Is there any sign of distressed vegetation?		✓		
Do any areas require seeding?	✓			Possibly the center of the lot.
Photograph Numbers (if applicable)	Photos in this month's online folder.			
Rip Rap Stone Cover				
Are there areas of scour?	✓			
Is any geotextile fabric exposed?	✓			B/t VEP9 & 13
Photograph Numbers (if applicable)	Several photos			
Wing Wall Deflector				
Are there areas of scour?				
Is 30" dia. Rip Rap in place?	✓			
Photograph Numbers (if applicable)	Several.			
Riverbank Plantings				
Are the live stake cuttings thriving?		✓		About 40% are alive, not many higher on the bank
Photograph Numbers				
Chadakoin River (USGS 03014500, Falconer, NY)				
Discharge, Cubic Feet Per Second?	89.0 fps 6/14/11			
Gage Height, Feet?	0.69' 6/14/11			

Other Observations: Describe any other relevant observations noted during this monitoring period.

Performed by: Jeff Hull	Signature: Jeffrey Hull	Date: 6/14/11

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information

Figure Reference:	Weather: 100°, sunny
Date / Time Monitoring Performed: 7/22/11 14 30	

Cover material(s)	☐ Soil	X Vegetated Topsoil	X Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:		X		
Are they functioning as intended?			X	
Are they still required (i.e., has a healthy stand of vegetation been established)?			X	
Vegetated Topsoil Isolation Cover				
Are there areas of scour?		X		
Is any geotextile fabric exposed?		X		
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.	X			100% growth
Is there any sign of distressed vegetation?	X			Dry/dead grass throughout center of site
Do any areas require seeding?		X		
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?		X		Repaired downstream rip-rap today
Is any geotextile fabric exposed?		X		
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?		X		
Is 30" dia. Rip Rap in place?	X			
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?	X			> 50% growth in scootubes
Photograph Numbers				
Chadakoin River (USGS 03014500, Falconer, NY)				
Discharge, Cubic Feet Per Second?	67			
Gage Height, Feet?	not available			

Other Observations: Describe any other relevant observations noted during this monitoring period.

Performed by: Chris Daven	Signature: [signature]	Date: 7/22/11

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information			
Figure Reference:		Weather: Overcast, recent rain, high 40's	
Date / Time Monitoring Performed: 12/22/11 16:45			
Cover material(s)	☐ Soil	☐ Vegetated Topsoil	☐ Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:		X		
Are they functioning as intended?			X	
Are they still required (i.e., has a healthy stand of vegetation been established)?			X	
Vegetated Topsoil Isolation Cover				
Are there areas of scour?				
Is any geotextile fabric exposed?		X		
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.	X			> 95%
Is there any sign of distressed vegetation?		X		
Do any areas require seeding?		X		
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?		X		
Is any geotextile fabric exposed?		X		
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?		X		None visible, high water level
Is 30" dia. Rip Rap in place?	X			Cannot visualize all 30" dia rip-rap due to W.L.
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?		X		See below.
Photograph Numbers				
Chadakoin River (USGS 03014500, Falconer, NY)				
Discharge, Cubic Feet Per Second?	720			
Gage Height, Feet?	Data not available			

Other Observations: Describe any other relevant observations noted during this monitoring period.

Stakes halfway up rip-rap have branches remaining but presently no buds. No stakes @ top of rip-rap w/ any buds. 10' tall tree observed on very north end of concrete wall adjacent to wing-wall; unknown species.

Performed by: Chris Davern	Signature: [signature]	Date: 12/22/11