From: "Sherman, Adam" <ASherman@Brwncald.com>
To: "John Spellman" <jtspellm@gw.dec.state.ny.us>
CC: "Caputi, Jeff" <JCaputi@Brwncald.com>, "Jones, William R. (NYED)" <Willi...
Date: 7/20/2010 9:22 PM
Subject: RE: Troy Water St. MGP, B&C April 2010 Focused Feasibility Study
Attachments: FS072010(FFS_Covers&PE_Cert).pdf

Hi John,

Attached, please find updated cover sheets and the PE certification.

Thanks,

Adam

From: Geraci, Catherine M. [mailto:Catherine.Geraci@us.ngrid.com]
Sent: Tuesday, July 20, 2010 3:08 PM
To: John Spellman
Cc: Sherman, Adam; Caputi, Jeff; Jones, William R. (NYED)
Subject: RE: Troy Water St. MGP, B&C April 2010 Focused Feasibility Study

Hi John:

We received the approval letter yesterday - thank you. Brown and Caldwell will provide the certification and a revised (final) cover page for the FFS to you shortly.

Thanks again -

Cathy

From: John Spellman [mailto:jtspellm@gw.dec.state.ny.us]
Sent: Tuesday, July 20, 2010 9:13 AM
To: Geraci, Catherine M.
Cc: ASherman@Brwncald.com; Jeffrey R. Caputi
Subject: Troy Water St. MGP, B&C April 2010 Focused Feasibility Study

Hi Cathy,

By now you should have received electronically the Department's approval of the subject report.

I inadvertently overlooked the professional engineer's certification. I would be appreciative if you could provide this certification; I have enclosed guidance from the Department's DER-10.

Also, a cover page pdf with "Draft" removed would be helpful, but is not critical.

Thank you for your assistance.

If you do not have the approval letter let me know.

John

John Spellman, P.E.
New York State Department of
Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
(518) 402-9648

FOCUSED FEASIBILITY STUDY TROY (WATER STREET) SITE – AREA 2 TROY, NEW YORK

Prepared for

Niagara Mohawk Power Corporation d/b/a
National Grid, Syracuse, New York

July 2010

FOCUSED FEASIBILITY STUDY
TROY (WATER STREET) SITE – AREA 2
TROY, NEW YORK

Prepared for

Niagara Mohawk Power Corporation d/b/a National Grid

300 Erie Boulevard West

Syracuse, New York 13202

July 2010

Project Number: 132071.502

Brown AND Caldwell

Associates

110 Commerce Drive
Allendale, New Jersey 07401

234 Hudson Avenue
Albany, New York 12210

ENGINEER'S CERTIFICATION

FOCUSED FEASIBILITY STUDY
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

I, Jeffrey R. Caputi, certify that I am currently a NYS registered professional engineer and that this Report [Focused Feasibility Study] was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

Jeffrey R. Caputi, P.E., CHMM, QEP
New York State P.E. License #082196

7/20/10
Date

Vice President
Brown and Caldwell
110 Commerce Drive
Allendale, New Jersey 07401
(201) 574-4700

From: "Sherman, Adam" <ASherman@Brwncald.com>
To: jtspellm@gw.dec.state.ny.us
CC: Catherine.Geraci@us.ngrid.com
Date: 4/2/2010 3:28 PM
Subject: FW: Troy (Water St) Site - Area 2: Draft Focused Feasibility Study
Attachments: Draft_Focused_Feasibility_Study_April_2010.pdf

Hi John,

Attached is the draft Focused Feasibility Study (FFS) for Area 2 of the Troy (Water St) Site. The attachment includes the main section of the report. The figures will following in separate emails. The appendices have not been included in this transmittal due to their file size. Hard copies of the full report will be sent out on Monday 4/5 (for delivery on Tues 4/6). In addition, we will provide a full pdf of the report on CD.

The Proposed Amended Remedy is consistent with discussions at the 11/6/09 meeting and subsequent correspondence, including your emails dated 2/3/10 and 2/26/10. The conceptual plan of the Proposed Amended Remedy is consistent with that submitted to you on 2/19/10 and includes the modifications to address your 2/26/10 e-mail. One correction to the figure has been made to be consistent with the conceptual plan. Along the northern bank of the former Wynantskill Creek, ISS to a depth of 30' as opposed to 32' has been included. This correction has been made since no visible tar/NAPL or PAHs > 500 ppm have been observed in the 30-32 ft bgs interval. In addition, this correction allows this area to be consistent with other locations in the ISS treatment area in that it would maintain an undisturbed layer of alluvial deposits below the ISS interval.

Please contact us if you have any comments or questions you would like to discuss.

Have a nice weekend.

Thank you, Adam

Adam Sherman
Principal Engineer
Brown and Caldwell | Albany, NY
ASherman@brwncald.com
T 518.472.1988 | C 201.602.0075 | F 518.472.1986

<http://www.brownandcaldwell.com/>

110 Commerce Drive
Allendale, New Jersey 07401

Tel: 201-574-4700
Fax: 201-236-1607

www.brownandcaldwell.com

Brown AND Caldwell

April 5, 2010 28-132071.502

John Spellman, P.E.
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 11th Floor
Albany, NY 12233-7010

Subject: DRAFT Focused Feasibility Study
Troy (Water Street) Site - Area 2
Troy, Rensselaer County, New York

Dear Mr. Spellman:

On behalf of Niagara Mohawk Power Corporation, doing business as (d/b/a) National Grid, enclosed please find three (3) copies of the Draft *Focused Feasibility Study, Troy (Water Street) Site – Area 2, Troy, New York* (FFS). The FFS presents the Proposed Amended Remedy to address environmental impacts identified at the Site and to revise the remedy selected in the July 2003 Record of Decision (ROD). The Proposed Amended Remedy is based on the results of additional site investigation activities and remedial alternatives evaluations, and has been developed in consultation with the New York State Department of Environmental Conservation (NYSDEC).

Please contact Cathy Geraci (Arcadis) at (315) 428-6529 if you have any questions or require additional information.

Very truly yours,
Brown and Caldwell Associates

Adam R. Sherman

Adam R. Sherman, P.E.
Principal Engineer

Enclosures
cc: Maureen Schuck, NYSDOH
Brian Stearns, National Grid (w/o enclosure)
Cathy Geraci, Arcadis (2 copies)
Jeffrey Caputi, P.E., Brown and Caldwell

P:\National_Grid\Nimo_Troy\132071(SI&IRMs)\Remedy_Mod(501&502)\FFS_Doc\L040510JS(draft_foc_feas_study).docx 04/05/10

DRAFT

FOCUSED FEASIBILITY STUDY
TROY (WATER STREET) SITE – AREA 2
TROY, NEW YORK

Prepared for

Niagara Mohawk Power Corporation d/b/a
National Grid, Syracuse, New York

April 2010

DRAFT

FOCUSED FEASIBILITY STUDY
TROY (WATER STREET) SITE – AREA 2
TROY, NEW YORK

Prepared for

Niagara Mohawk Power Corporation d/b/a National Grid

300 Erie Boulevard West

Syracuse, New York 13202

April 2010

Project Number: 132071.502

____

Jeffrey R. Caputi, P.E., CHMM, QEP

Vice President

New York State P.E. License #082196

Brown AND Caldwell

Associates

110 Commerce Drive
Allendale, New Jersey 07401

234 Hudson Avenue
Albany, New York 12210

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

EXECUTIVE SUMMARY

This document presents the Proposed Amended Remedy to address environmental impacts identified at Area 2 of the Troy (Water Street) Site located in the City of Troy, Rensselaer County, New York (hereafter referred to as the "Site"), which was the location of a former Manufactured Gas Plant (MGP) and other industrial operations, and to revise the remedy selected in the July 2003 Record of Decision (ROD) for the Site issued by the New York State Department of Environmental Conservation (NYSDEC). The Proposed Amended Remedy is based on the results of additional site investigation activities and remedial alternatives evaluations and has been developed in consultation with the NYSDEC. This Focused Feasibility Study (FFS) document has been prepared by Brown and Caldwell Associates (BC) on behalf of Niagara Mohawk Power Corporation, doing business as (d/b/a) National Grid (referred to herein as National Grid), at the request of the NYSDEC [electronic mail from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) on February 3, 2010], to identify and develop the Proposed Amended Remedy and present the results of an evaluation against the criteria identified in the NYSDEC guidance document entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites" (TAGM 4030) (NYSDEC, May 1990), which are consistent with the New York State Part 375 regulations (6 NYCRR Part 375).

The remedial alternative selected in the July 2003 ROD consisted of the following nine elements: (1) Remedial Design Program; (2) Excavation and Off-Site Treatment/Disposal of soil containing total PAHs > 500 parts per million (ppm) or visual tar or non aqueous phase liquid (NAPL) to a depth of 18 ft bgs and demolition of the former Water Gas Building; (3) In Situ Chemical Oxidation (ISCO) of soil deeper than 18 ft bgs containing total PAHs > 500 ppm or visual tar or NAPL and NAPL collection; (4) Removal of Structure Contents; (5) Removal and Off-Site Disposal of Purifier Waste; (6) Site-wide Asphalt Cap or Permeable Soil Cover; (7) Monitored Natural Attenuation (MNA) of groundwater; (8) Institutional Controls; and (9) Long-Term Monitoring Program.

Since issuance of the ROD in July 2003, Pre-Design Investigation (PDI) activities were conducted from 2003 to 2006 to satisfy portions of the ROD-Selected Remedy. The PDI activities primarily focused on delineation of soil with total PAHs greater than 500 ppm or visual tar or NAPL; investigation of pipes, tanks, and other structures; and evaluation of in situ chemical oxidation (ISCO). In addition, a Supplemental Investigation (SI) was implemented from 2007 to 2008. The SI activities further evaluated the site hydrogeology and geology and refined the delineation of the extent of visual NAPL. In addition to investigation activities, Post-ROD activities have include removal of the contents of four of the structures identified in the ROD (i.e., tar liquor sump, oil/water separator, air plenum tunnels, and underground vault) and purifier waste deposits.

The PDI and SI activities have generated new data/observations and information that substantially affect the scope, performance, and cost of components of the ROD-Selected Remedy. The volume of soil meeting the ROD criteria for excavation or in situ treatment is substantially larger than estimated in the ROD. In addition, pilot testing demonstrated that in situ treatment via ISCO cannot achieve remedial objectives in NAPL-impacted areas and would, therefore, be infeasible for treatment of NAPL-impacted soil below 18 feet. Based on the findings from the PDI and SI, changes to the ROD-Selected Remedy are required, specifically the excavation and in situ treatment components.

The PDI and SI activities have provided additional information and increased the understanding of current Site conditions and the Conceptual Site Model. The Conceptual Site Model is summarized below:

- The Site is currently used for commercial/industrial uses and there are no significant exposure pathways to MGP-related constituents under current Site use. Potential direct contact to MGP-related constituents is low under current conditions as the areas of the Site which are currently used either have not been found to contain surface impacts and/or are covered by either pavement or concrete.
- Data from the PDI activities indicates that potential vapor intrusion from the subsurface into on-site buildings is also not a significant exposure pathway as soil gas sampling results indicated that MGP-related constituents were generally below conservative screening criteria and often within range of the concentrations that were found in ambient air at the Site.
- There is no exposure to groundwater as Site groundwater is not used and the depth to groundwater is typically 14 or more feet below grade.
- There are no indications of ongoing migration of NAPL/tar to surface water or sediments in the Hudson River or Wynantskill Creek. Groundwater quality data indicate that dissolved-phase constituent concentrations attenuate rapidly and are approaching or below groundwater quality standards/guidance values before Site groundwater discharges to surface water.
- Transport of constituents via soil erosion is also not a significant pathway impacting adjacent water bodies, since impacted soil at the Site is primarily at depth and where surface impacts are present crushed stone or pavement is generally present, which limits erosion.

The remedial goals for the Site, which were established in the July 2003 ROD, are to eliminate or reduce to the extent practicable:

1. Exposures of persons at or around the site to contaminants in soil, waste material and groundwater;
2. Exposures of flora or fauna to contaminants in soil and waste material;
3. The release of contaminants from soil and waste material into groundwater that may create exceedances of groundwater quality standards; and
4. The release of contaminants from soil and waste material into surface water and sediment through storm water erosion, NAPL migration and groundwater discharge to the river.

The remaining two ROD-defined goals are to attain to the extent practicable:

5. NYSDEC groundwater quality standards; and
6. NYSDEC's recommended soil cleanup objectives as identified in TAGM 4046* for the contaminants of concern.

   **Note that since issuance of the ROD, revisions to the New York State Part 375 Regulations ("Environmental Remedial Program" 6 NYCRR Part 375) have been promulgated, which include unrestricted- and restricted-use soil clean-up objectives, which may supersede those in the TAGM 4046.*

Based on the current Conceptual Site Model, an alternative employing the remaining seven (7) of the nine (9) elements identified in the ROD-Selected Remedy would achieve the remedial goals outlined in the July 2003 ROD and provide long-term protection of human health and the environment through a combination of excavation and off-site treatment/disposal (i.e., structure contents and purifier waste deposits) and engineering and institutional controls. Protection of human health would be achieved through implementation of a site cover and institutional controls [including restriction of site uses, restriction of site groundwater use, vapor intrusion evaluation and mitigation (if necessary), and requirement that future site work comply with a Soil Management Plan]. Protection of the environment would be achieved through implementation of MNA, which has been demonstrated to be effective in controlling dissolved phase constituent migration, NAPL monitoring and recovery (if necessary), and the site cover, which would provide a barrier to control contact by wildlife and would prevent erosion/migration of impacted soils to adjacent water bodies.

Although implementation of seven (7) of nine (9) elements identified in the ROD-Selected Remedy would achieve remedial goals, such a remedy would leave a substantial volume of impacted soil at the Site and would not satisfy the threshold criteria of compliance with SCGs, to the extent practicable. Therefore, the Proposed Amended Remedy, which is depicted on Figure ES-1, would employ these seven (7) elements identified in the ROD-Selected Remedy along with excavation and in situ treatment via in situ stabilization/solidification (ISS). Similar to the July 2003 ROD-Selected Remedy, the Proposed Amended Remedy would achieve remedial goals and satisfy the threshold criteria of protection of human health and the environment and compliance with SCGs, to the extent practicable, through a combination of excavation, in situ treatment, engineering controls, and institutional controls. However, the Proposed Amended Remedy includes amended criteria for determining where the excavation and treatment components of the remedy would be applied. The potential risks to human health and the environment associated with residual constituent concentrations remaining above SCGs following excavation and treatment would be effectively managed by other planned remedial components (i.e., Site Cover, Monitored Natural Attenuation, Long-term Monitoring, and Institutional Controls).

The Proposed Amended Remedy would remove and/or treat via ISS the vast majority of soil where visible tar or NAPL and/or soil containing total PAH concentrations greater than 500 mg/kg are present. Removal of structure contents and purifier waste deposits eliminates concentrated waste materials from the Site and the potential direct contact risks and potential sources of groundwater impacts associated with these areas. Excavation and ISS would remove or stabilize soil in areas where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where NAPL and groundwater impacts are most extensive. The excavation and ISS components address soil which meets the following criteria:

- Visible tar or NAPL (including hardened tar deposits) is present in soil proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL; and/or
- Visible tar or NAPL is present in soil, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. Addressing these areas would also address the areas where groundwater data indicates the NAPL is acting as a source impacting groundwater.

In addition to the estimated soil volumes that meet the above criteria for removal or ISS (i.e., approximately 27,000 cy via excavation and 69,000 cy via ISS), an additional approximate 36,000 cy would require excavation to access this soil (i.e., approximately 6,000 cy for the excavation component and 29,000 cy for the ISS component).

The potential risks associated with residual impacts would be effectively managed by other planned remedial components (i.e., Site Cover, MNA, Long-term Monitoring, and Institutional Controls). In addition, the depth of the ISS component of the Proposed Amended Remedy would be designed to maintain a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone, such that the alluvial layer, which has demonstrated its long-term effectiveness in controlling the vertical migration of constituents (including NAPL and dissolved-phase), can continue to provide a natural barrier to protect the underlying LSG unit.

The following represents a summary of the elements of the Proposed Amended Remedy:

- **Element 1: Remedial Design Program** - The Remedial Design Program would be performed to verify the components of the conceptual design, resolve uncertainties identified in the RI/FS, and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Some components of Element 1 have been completed since issuance of the ROD, including the investigation activities (i.e., PDI and SI) and ISCO pilot testing. Additional activities may include:
  - Potential investigation activities to collect additional data which may be required for the design and construction of the Proposed Amended Remedy; and
  - Design of the construction elements of the Proposed Amended Remedy and development of plans for the operation, maintenance, and monitoring of the remedy.
- **Element 2: Excavation** – The excavation component removes of near-surface impacts in the northern portion of the Site, at the mouth of the former Wynantskill Creek and along the Hudson River shoreline, and in the southern portion of the Site in the vicinity of the By-Products Building, where shallow-zone impacts are most extensive. The excavation component would include removal of shallow unsaturated zone soil, to the extent practicable, which meets the following criteria (estimated to be approximately 27,000 cy):
  - Visible tar or NAPL (including hardened tar deposits) is present in soil proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL; and/or
  - Visible tar or NAPL is present, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging.
- **Element 3: In Situ Stabilization/Solidification (ISS)** - The ISS component addresses deep zone impacts in the unsaturated and saturated zone in the northern portion of the Site where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where deep-zone NAPL impacts are most extensive. The ISS component would include stabilization/ solidification of deep unsaturated zone soil and saturated zone soil, to the extent practicable, which meets the following criterion:
  - Visible tar or NAPL is present in soil, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. Based on existing data, addressing these areas would also address the areas where groundwater data suggests the NAPL is acting as a source impacting groundwater.
- **Element 4: Removal of Structure Contents** - This component includes removal of the structure contents followed by inspection of the interior surfaces. The structures of interest identified in the ROD include: A) Sump 1; B) Underground Air Plenum (completed in 2009); C) Underground Vault (completed in 2009); D) Sump 4; E) Tar-Liquor Sump (contents removal completed in 2008, structure to be removed under future remedial action); and F) Aboveground Oil/Water Separator (completed in 2008). This element also includes investigation of the potential presence of MGP impacts within pipes traversing the Wynantskill Creek. With the exception of removal of the TLS, removal of structure contents from Sumps 1 and 4, and the investigation of the pipes traversing the Wynantskill Creek, previously conducted remedial action activities have addressed the other items in Element 4.
- **Element 5: Removal and Off-Site Disposal of Purifier Waste** - In accordance with the ROD, this component includes removal and off-site disposal of purifier waste deposits in two locations: 1) on the surface near the former 2,000,000-cf gas holder; and 2) on the surface in the former Wynantskill Creek alignment along the Hudson Riverbank. Based on the findings from test pitting activities performed during the SI in August 2007, no indications of purifier waste were identified in the area near the former

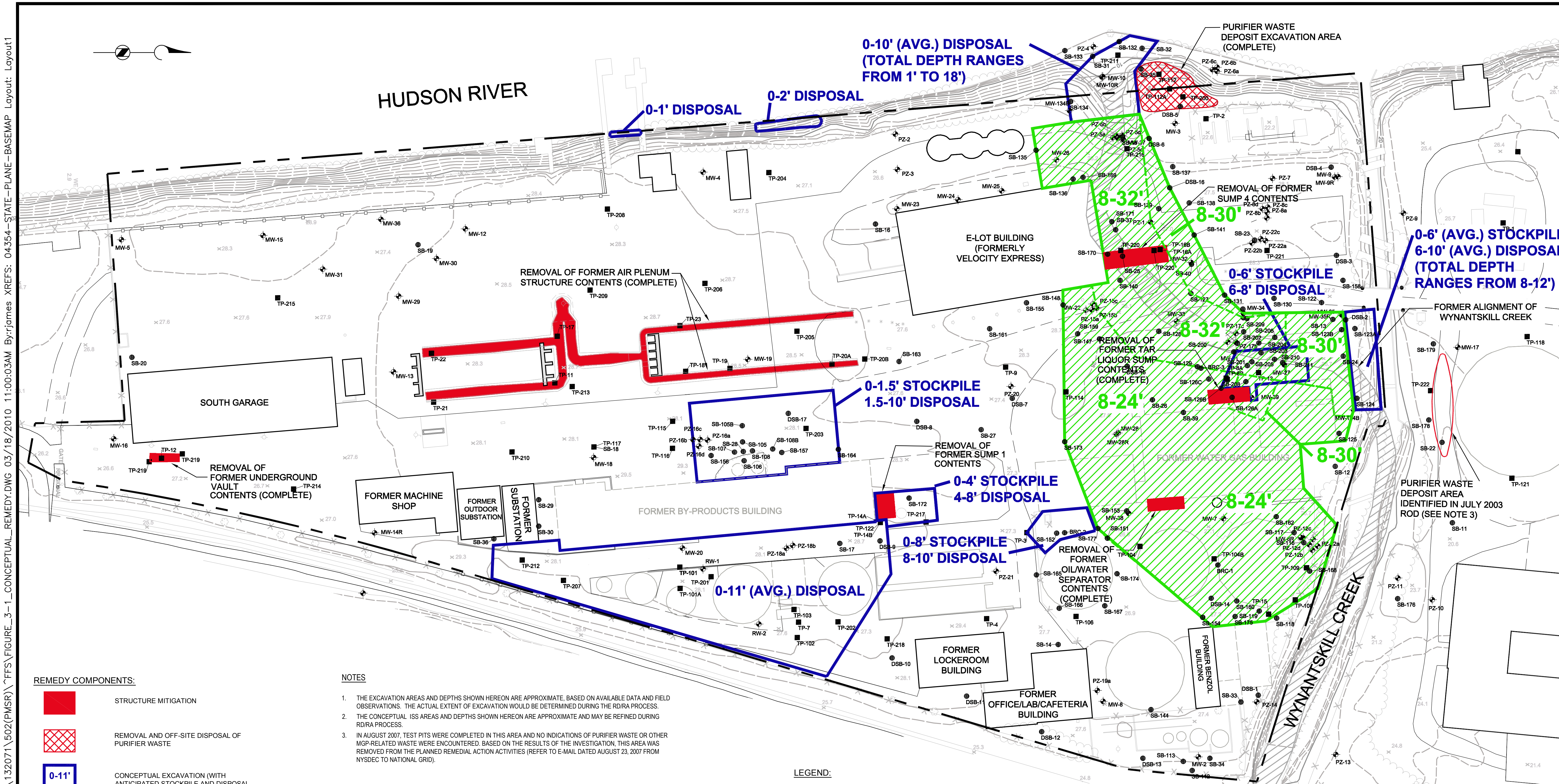
2,000,000-cf gas holder and thus, this component has since been removed from the requirements for Element 5, as approved by the NYSDEC in an e-mail dated August 9, 2007. Excavation of the purifier waste deposits on the surface along the Hudson Riverbank was completed in April 2008.

- **Element 6: Asphalt Cap or Permeable Soil Cover** - To control potential direct contact exposure, reduce erosion, and wind transport of constituents, an asphalt cap or permeable soil cover would be placed over the entire Site, excluding building footprints. The site cover would also facilitate re-development of the Site for industrial and commercial purposes. As discussed in a meeting with representatives from the NYSDEC and National Grid on September 25, 2008, the permeable soil cover would be a minimum of one-foot thick and include a demarcation layer. This represents a modification of the minimum two foot thickness identified in the July 2003 ROD.
- **Element 7: Monitored Natural Attenuation (MNA)** – MNA was selected in the ROD to address dissolved-phase constituents of concern associated with Plume A, located in the southwestern portion of the Site, and Plume B, which is located in the northern portion of the Site. MNA may not be required for Plume B as this area is addressed by the proposed ISS component.
- **Element 8: Institutional Controls** – Institutional controls including groundwater usage and zoning restrictions would be established as part of the remedy. In addition, protection of engineering controls associated with the remedy would be established. In the event that changes from the current use of on-site buildings occur in the future, an evaluation of potential soil vapor on indoor air quality would be conducted.
- **Element 9: Long-Term Monitoring Program** – Institution of a long-term monitoring program would be established to: 1) evaluate the effectiveness of ISS (Element 3) and MNA (Element 7) through groundwater quality monitoring; 2) evaluate the soil and/or asphalt cover (Element 6) through routine inspections; and 3) assess potential migration of NAPL through NAPL gauging efforts.

The Proposed Amended Remedy is estimated to require a construction period of approximately two years to complete the remaining structure mitigation, perform the excavation/restoration and ISS, and install the surface cover. This timeframe does not include the timeframe for potential additional pre-design investigation/treatability testing activities, remedial design, or permitting, which would be required prior to the start of construction. The remaining components of the remedy would be implemented as part of the long-term OM&M program. The construction activities and schedule would be coordinated with the property owner (i.e., the Troy Local Development Corporation) and may include implementation using a phased-approach to accommodate potential development plans.

The estimated capital cost for implementation of the Proposed Amended Remedy is $35 Million (Note: this capital cost includes approximately $5.4 Million, which has already been incurred, for completion of components of the remedy since issuance of the ROD, including post-ROD investigations and structure mitigation). The estimated O&M cost is $96,000 per year. The estimated net present worth is $37 Million.

P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\502(PMSR)\~FFS\FIGURE_3-1_CONCEPTUAL_REMEDY.DWG 03/18/2010 11:00:03AM By:rjames XREFS: 04354-STATE-PLANE-BASEMAP Layout: Layout1



REMEDY COMPONENTS:

- STRUCTURE MITIGATION
- REMOVAL AND OFF-SITE DISPOSAL OF PURIFIER WASTE
- 0-11' CONCEPTUAL EXCAVATION (WITH ANTICIPATED STOCKPILE AND DISPOSAL INTERVALS)
- 8-30' CONCEPTUAL IN SITU SOLIDIFICATION/ STABILIZATION (ISS) (WITH TARGET INTERVALS); 0-8' INTERVAL TO BE EXCAVATED PRIOR TO ISS

REMEDY COMPONENTS:

- SITE-WIDE SOIL OR ASPHALT COVER
- MONITORED NATURAL ATTENUATION (MNA) OF GROUNDWATER
- NAPL MONITORING AND RECOVERY (AS NECESSARY)
- INSTITUTIONAL CONTROLS TO: (A) PROTECT ENGINEERING CONTROLS; (B) RESTRICT ON-SITE GROUNDWATER USE; (C) PROHIBIT SITE USE FOR RESIDENTIAL PURPOSE; (D) REQUIRE VAPOR INTRUSION EVALUATION FOR ON-SITE BUILDINGS IF BUILDING USE CHANGES FROM CURRENT USE.
- LONG-TERM MONITORING PROGRAM

NOTES

1. THE EXCAVATION AREAS AND DEPTHS SHOWN HEREON ARE APPROXIMATE, BASED ON AVAILABLE DATA AND FIELD OBSERVATIONS. THE ACTUAL EXTENT OF EXCAVATION WOULD BE DETERMINED DURING THE RD/RA PROCESS.
2. THE CONCEPTUAL ISS AREAS AND DEPTHS SHOWN HEREON ARE APPROXIMATE AND MAY BE REFINED DURING RD/RA PROCESS.
3. IN AUGUST 2007, TEST PITS WERE COMPLETED IN THIS AREA AND NO INDICATIONS OF PURIFIER WASTE OR OTHER MGP-RELATED WASTE WERE ENCOUNTERED. BASED ON THE RESULTS OF THE INVESTIGATION, THIS AREA WAS REMOVED FROM THE PLANNED REMEDIAL ACTION ACTIVITIES (REFER TO E-MAIL DATED AUGUST 23, 2007 FROM NYSDEC TO NATIONAL GRID).

LEGEND:

- BELOW-GRADE STRUCTURE/PAD
- FORMER ABOVE-GRADE BUILDING
- EXSITING ABOVE-GRADE STRUCTURE/BUILDING
- PROPERTY LINE
- PZ-3 PIEZOMETER LOCATION
- MW-23 MONITORING WELL LOCATION
- TP-3 TEST PIT LOCATION
- SB-65 SOIL BORING LOCATION

0 50 100
SCALE IN FEET

MAP SOURCE DATA:
REFER TO FIGURE 1-2 "SITE PLAN"

DRAFT

FIGURE ES-1
CONCEPTUAL SITE PLAN - PROPOSED AMENDED REMEDY
EXCAVATION, ISS, SITE COVER, CLOSURE OF STRUCTURES, REMOVAL OF PURIFIER WASTE, MNA, INSTITUTIONAL CONTROLS, AND LONG-TERM MONITORING

NATIONAL GRID TROY (WATER STREET) SITE-AREA 2 TROY, NEW YORK	DATE 03/10	PROJECT NUMBER 132071
	BROWN AND CALDWELL ASSOCIATES ALLENDALE, NEW JERSEY	

1. INTRODUCTION

1.1 Overview

This document presents the Proposed Amended Remedy to address environmental impacts at Area 2 of the Troy (Water Street) Site located in the City of Troy, Rensselaer County, New York (hereafter referred to as the "Site"), which was the location of a former Manufactured Gas Plant (MGP) and other industrial operations. The Site location is depicted on Figure 1-1 and a plan of the current Site configuration is shown on Figure 1-2. The Proposed Amended Remedy is intended to revise the remedy selected in the July 2003 Record of Decision (ROD) for the Site issued by the New York State Department of Environmental Conservation (NYSDEC). Area 2 is identified as Operable Unit No. 1 (OU-1) of Site No. 4-42-029 and is not included in the NYSDEC's Registry of Inactive Hazardous Waste Disposal Sites as a Class 2 site.

The Proposed Amended Remedy is based on the results of additional site investigation activities and remedial alternatives evaluations and has been developed in consultation with the NYSDEC. This Focused Feasibility Study (FFS) document has been prepared by Brown and Caldwell Associates (BC) on behalf of Niagara Mohawk Power Corporation, doing business as (d/b/a) National Grid (referred to herein as National Grid), at the request of the NYSDEC [email from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) on February 3, 2010], to identify and develop the Proposed Amended Remedy and present the results of an evaluation against the criteria identified in the NYSDEC guidance document entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites" (TAGM 4030) (NYSDEC, May 1990), which are consistent with the New York State Part 375 regulations (6 NYCRR Part 375).

In a letter dated July 7, 2006, the NYSDEC indicated that, based on the results of Pre Design Investigation (PDI) activities conducted from 2003 to 2006, and a meeting between representatives of NYSDEC, National Grid and BC on June 20, 2006, components of the remedy selected in the July 2003 ROD warrant re evaluation. The NYSDEC also agreed that supplemental investigatory activities were required to be conducted at the Site, particularly to support evaluation of barrier wall systems as a potential component of a comprehensive Site remedy. Accordingly a Supplemental Investigation (SI) was conducted and the results documented in the "Supplemental Investigation Report; Troy (Water Street) Site – Area 2; Troy, New York" submitted to NYSDEC in February 2008 (BC, February 2008).

Based on the results of SI activities conducted from 2006 to 2008, and meetings between representatives of NYSDEC, National Grid and BC on June 4, 2008 and September 25, 2008, a range of remedial alternatives were assembled for detailed analysis to support selection of a modified comprehensive remedy. The remedial action alternatives were identified in a letter from National Grid to NYSDEC dated October 21, 2008. In a letter dated October 30, 2008, NYSDEC approved the list of remedial alternatives. A detailed evaluation of the approved list of remedial alternatives was conducted and following NYSDEC's review of the evaluation and subsequent meetings/correspondence between representatives of NYSDEC, National Grid and BC, the Proposed Amended Remedy, presented herein, was formulated.

This FFS document has been prepared in accordance with applicable regulations and guidance documents, including the following:

- New York State regulations for "Environmental Remedial Program" 6 NYCRR Part 375;
- NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4030 entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites," dated May 15, 1990;
- NYSDEC guidance document DER-2 entitled "Making Changes to Selected Remedies," dated May 4, 1998 (Last Revised April 1, 2008).

NYSDEC draft guidance document DER 10 entitled "Technical Guidance for Site Investigation and Remediation" (November 2009) was also considered in preparation of this FFS.

Since issuance of the ROD in July 2003, Site investigation, remedy evaluations, and other remedial activities have been conducted and are discussed in the documents/correspondence identified in Appendix A.

Sections 1.1.2 and 1.1.3 identify the components of the ROD-Selected Remedy, summarize post ROD activities that are relevant to remedy evaluation/selection, and present the reasons for the proposed changes to the ROD-Selected Remedy.

1.1.1 Report Organization

The organization of this FFS document is as follows:

- **Section 1: Introduction** – Provides the purpose and objectives of the FFS document, an overview of the ROD-Selected Remedy, a description of and findings from post-ROD activities that are relevant to remedy evaluation/selection, and reasons for the proposed amendments to the remedy. Section 1 also provides a summary of the site characteristics, site history, the Conceptual Site Model, and provides the remedial goals established for the Site in the ROD.
- **Section 2: Standards, Criteria, and Guidance** – Identifies the applicable standards, criteria, and guidance that apply to the development and selection of remedial alternatives.
- **Section 3: Description of the Proposed Amended Remedy** – Identifies the components of the July 2003 ROD-Selected Remedy that are retained and proposed alternate remedy components, which in combination constitute the overall proposed amended site remedy.
- **Section 4: Evaluation of the Proposed Amended Remedy** – Presents the results of a detailed analysis of the Proposed Amended Remedy against seven evaluation criteria.
- **Section 5: Summary and Conclusions** – Presents a summary of the Proposed Amended Remedy and discusses how the Proposed Amended Remedy satisfies the evaluation criteria and remedial goals.
- **Section 6: References** – Lists the references cited in this FFS document.

1.1.2 Components of the ROD-Selected Site Remedy

The remedial alternative selected in the July 2003 ROD includes the following elements:

- **Remedial Design Program** to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program;
- **Excavation and Off-Site Treatment/Disposal** of soil containing concentrations of total polycyclic aromatic hydrocarbons (PAHs) > 500 parts per million (ppm) or visual tar or non-aqueous phase liquid (NAPL) to a depth of 18 ft below ground surface (bgs). (ROD-Estimated Volume: 11,000 to 17,000 cubic yards [cy]);

- **In-Situ Chemical Oxidation (ISCO)** of soil deeper than 18 ft bgs containing total PAHs > 500 ppm or visual tar or NAPL. Treatment to continue until groundwater concentrations achieve standards for BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) or NYSDEC determines groundwater concentrations have achieved asymptotic levels. Installation of NAPL collection system in treatment areas. (ROD-Estimated Volume: 23,000 cy);
- **Removal of Structure Contents** followed by inspection of the interior surfaces. If the inspection concludes that no contaminants were released then the structure will be backfilled. Otherwise, the structure itself will be removed. (ROD-Estimated Volumes: 1,500 cy of tar/soil/debris and 5,000 gallons of liquids);
- **Removal and Off-Site Disposal** of Purifier Waste (ROD-Estimated Volume: 1,200 cy);
- **Asphalt Cap or Permeable Soil Cover** placed over the entire site. Excludes building footprints. (The ROD specified that the permeable soil cover would be a minimum of two-feet thick and include a demarcation layer. ROD-Estimated Area: 16 acres);
- **Monitored Natural Attenuation (MNA)** of groundwater;
- **Institutional Controls** to (a) protect engineering controls; (b) restrict on-site groundwater use; (c) prohibit use of the Site for purposes other than appropriate recreational, industrial, or commercial uses; and (d) require evaluation of potential soil vapor on indoor air quality in on-site buildings; and
- **Long-Term Monitoring Program**, including groundwater quality monitoring and soil cover/cap monitoring and maintenance, as required.

1.1.3 Post-ROD Investigation Activities and Reasons for Remedy Change

Since issuance of the ROD in July 2003, PDI activities were conducted from 2003 to 2006 as required for Element No. 1 of the ROD-Selected Remedy, i.e., the Remedial Design. The PDI activities primarily focused on the following:

- Further delineation of soil with total PAHs greater than 500 parts per million (ppm) or visual tar or NAPL;
- Further investigation of pipes, tanks, and other structures; and
- Evaluation of in situ chemical oxidation (ISCO).

Based on the results of the PDI a Supplemental Investigation (SI) was implemented, in accordance with an NYSDEC-approved work plan, from 2007 to 2008. The SI activities ("Supplemental Investigation Report", BC, February 2008) further evaluated the subsurface stratigraphy and hydrogeologic characteristics at the Site, refined the delineation of the extent of visual NAPL, and improved the conceptual site model.

The PDI and SI activities have generated new data/observations and information that substantially affect the scope, performance, and cost of components of the ROD-Selected Remedy. The following conclusions from information generated from the PDI and SI activities represent the primary reasons for proposing changes to the ROD-Selected Remedy:

- The volume of soil meeting the ROD criteria for excavation in the upper 18 feet is substantially larger than estimated in the ROD.

- The areas and volume of soil meeting the ROD criteria for in situ treatment below 18 feet is substantially larger than estimated in the ROD.
- Pilot testing demonstrated that ISCO cannot achieve remedial objectives in NAPL-impacted areas and would, therefore, be infeasible for treatment of NAPL-impacted soil below 18 feet.

The substantial increase in the estimated volume of soil to be removed or treated impacts the scope and cost of Elements No. 2 (excavation) and No. 3 (ISCO) of the ROD-Selected Remedy. The ineffectiveness of ISCO to treat NAPL-impacted also affects the scope, performance, and cost of Element No. 3 of the ROD-Selected Remedy. Based on this new data/information generated from the post-ROD activities, re-evaluation of those components of the remedy is required. The significant soil volume increase, infeasibility of ISCO, and need to re-evaluation alternative remedial approaches was agreed to by NYSDEC in a letter dated July 7, 2006.

1.2 Site Description

The Site is located in the City of Troy, Rensselaer County, New York. A plan of the current Site configuration is shown on Figure 1-2. National Grid currently owns a small parcel in the northwest portion of the Site (approximately 0.5 acre), on which a natural gas regulator station is situated. The approximately 16 acre Site is bordered by: a railroad to the east (owned by CSX Transportation, Inc.); a former asphalt batch plant owned by Chevron USA, Inc. to the south (Area 3) which was recently demolished; and the Hudson River to the west. The northern limit of Area 2 extends approximately 50 feet north of the remnants of the former 2,000,000-cubic foot (cf) gas holder. Wynantskill Creek flows from east to west through the northern part of the Site, directly to the south of the former 2,000,000-cf gas holder.

The area in the vicinity of the Site generally slopes to the west toward the Hudson River. The Site itself is a generally flat lying area between the relatively steep slope east of the railroad, and the steep bank from the Site down to the Hudson River. The Hudson River in this area is tidal; the level in the river fluctuates approximately four to five feet twice per day. As described above, Wynantskill Creek flows from east to west through the northern part of the Site. East of the Site, the creek has a steep gradient. At the Site, the gradient flattens, but the flow remains swift. The creek enters a concrete-lined channel just north of the former Water Gas Building. This concrete channel extends to the mouth of the creek where it discharges to the Hudson River. East of the concrete channel, the banks of Wynantskill Creek are steep and composed of fill material.

As depicted on Figure 1-2, several buildings existed during the active operation of the MGP, including the following: (1) former Water Gas Building (including boiler house and water gas generator house); (2) former Benzol Building; (3) former Office/Lab/Cafeteria Building; (4) former Lockeroom building; (5) former By Products Building; (6) former Maintenance Shop; and (7) South Garage. In addition, a warehouse building constructed in the 1980's, which currently houses an electronics recycling business (E Lot), is located in the northwestern portion of the Site. The former Water Gas and By-Products buildings were razed during demolition activities managed by the current property owner [Troy Local Development Corporation (LDC)] in the summer of 2009.

Outside of the building footprints, the Site cover consists primarily of asphalt pavement or crushed stone. As stated in the NYSDEC approved Final Feasibility Study Report, Troy (Water Street) Site, Area 2, Troy, New York (IT Corporation, March 2002) ("FS Report"), the Site is zoned commercial-industrial. The Troy LDC has targeted the Site for redevelopment.

1.3 Site History

A description of the Site history was presented in the FS Report (IT Corporation, March 2002) and the July 2003 ROD. As presented in those documents, industrial operations in Area 2 began in the mid-1800's with several generations of iron and steel making facilities. Manufactured gas production evolved to support the iron and steel industry.

In 1924 the Site was acquired by Hudson Valley Coke Products (HVCP) and the first coke plant was constructed on site. By 1925, the coke plant was providing coke and manufactured gas for public consumption. HVCP sold the facility to Hudson Valley Fuel Products, which merged into New York Power and Light, which in turn was consolidated into Niagara Mohawk Power Corporation (NMPC) in 1950. During the time of NMPC's (including their predecessor companies) involvement, manufactured gas was produced in the coke ovens (known as the main plant site) and at two auxiliary plants known as the producer plant and the water gas plant. In the 1930's the western segment of Wynantskill Creek was re-aligned and channelized in a concrete lined channel and the former channel was backfilled with approximately 40 feet of fill. NMPC sold most of the property to Republic Steel in 1951. The Public Service Commission required NMPC to retain the water gas plant as a standby source of gas from 1951 until 1956 when the MGP was retired.

King Fuels began operating a bulk petroleum terminal and distribution center at the Site in 1957 and, through a series of transactions during the 1960's and concluding in 1973, had acquired the entire Site from Republic Steel except for the small natural gas regulator station retained by NMPC. King Fuels' operations resulted in the release and mobilization of hazardous substances and petroleum at the Site. The NYSDEC documented a number of King Fuels' petroleum spills (e.g., see NYSDEC Spill Report numbers 860974, 8707424, 9007392, and 9006318). In its February 11, 2005 letter to King Fuels' counsel, the NYSDEC stated that Niagara Mohawk has no liability for "historical petroleum contamination at the Site resulting from the operation of King Fuels". In the July 2003 ROD, the NYSDEC identifies King Fuels as a potentially responsible party. In November 2003, the United States District Court, Northern District of New York, ruled that King Fuels is liable as both a current owner and an arranger under CERCLA. In 2004, the 2,000,000 cf gas holder was demolished by King Fuels for scrap steel.

King Fuels filed for bankruptcy and the property was subsequently purchased by the Troy LDC in 2006. National Grid maintains ownership of the approximate 0.5 acre property associated with the natural gas regulator station, located in the northwestern portion of the Site.

1.4 Investigation/Remedial History

Area 2 is one of four areas into which the former MGP site was subdivided for investigation purposes. The July 2003 ROD identifies the four areas. Three of the four areas, including Area 2, are identified by NYSDEC Site No. 4-42-029. Area 2 is identified as OU-1 of Site No. 4-42-029 and is not included in the NYSDEC's Registry of Inactive Hazardous Waste Disposal Sites as a Class 2 site. Note that the Hudson River is considered a separate operable unit of Site No. 4-42-029.

Remedial activities at the Site were initially conducted in accordance with the 1992 Administrative Order on Consent (Index # D0-0001-9210) between Niagara Mohawk and the NYSDEC. The investigation and remedial activities at the Site are now being conducted under a more recent Administrative Order on Consent (Index # A4-0473-0000) executed in November 2003.

The remedial history chronology of Area 2, including the additional investigation activities reported herein, is as follows:

- Preliminary Site Assessment (PSA) (June 1994 – September 1995)
- Interim Remedial Measure (IRM) to remove Lime Sump and its contents (December 1997 to March 1998)
- Interim Remedial Measure (IRM) to remove 300,000-cf Gasholder and its contents (December 1997 to March 1998)
- Remedial Investigation (September 1996 – September 1998)
- Supplemental Investigations and Feasibility Study (September 1998 – 2002)
- Proposed Remedial Action Plan (February 2003)
- Record of Decision (ROD) (July 2003)
- Pre-Design Investigation and Report (October 2003 – February 2004)
- Supplemental Pre-Design Investigation Activities (April – December 2004)
- Initial In Situ Chemical Oxidation (ISCO) Pilot Test Activities (October 2004 – January 2005)
- Second ISCO Pilot Test and Reporting (July 2005 – May 2006)
- Resumption of Supplemental PDI Activities and Report (July 2005 – March 2006)
- Review of PDI findings with NYSDEC, and agreement that certain components of the remedy selected in the July 2003 ROD warrant re evaluation; and that supplemental investigatory activities were required for this re-evaluation (June 2006)
- Supplemental Investigation and Report (April 2007 to February 2008)
- Remedial Action to remove Purifier Waste Deposits and the contents of Tar Liquor Sump and Oil/Water Separator structures (April to May 2008)
- Remedial Action to remove contents of the Air Plenum and Underground Vault structures (October 2008 to February 2009)

1.5 Site Characterization

A detailed discussion of the Site characterization based on the findings from investigations conducted prior to issuance of the ROD and the PDI and SI activities was presented in the SI Report (BC, February 2008). A summary of the site characterization is provided in Appendix B, which includes a discussion of stratigraphy, hydrostratigraphy, groundwater flow, and nature and extent of impacts. Figures associated with Site characterization are also provided in Appendix B.

Briefly, the geologic materials encountered on the Site generally consist of (in ascending order): dark gray shale bedrock; locally discontinuous glacial deposits (glacial till and lacustrine); a lower sand and gravel (LSG) unit; predominantly fine-grained alluvial deposits; and anthropogenic fill. The fill is composed of various materials including sand, gravel, slag, cinders and demolition debris and overlies the alluvial deposits over the majority of the Site. In the eastern portion of the Site, where the alluvial deposits do not exist, the fill materials overly glacial deposits.

Figure 1-3 depicts orientations for the geologic cross-sections that illustrate the Site stratigraphy, which are presented in Figures 1-4a through 1-4d. Figure 1-3 also depicts the location of soil borings, test pits, monitoring wells, and piezometers completed during the Site investigation activities.

1.5.1 Conceptual Site Model

Based on available data, the current conceptual model for the Site is summarized below:

- **Environmental Impacts:** MGP- and petroleum-related impacts are present at the Site, including the presence of NAPL (coal tar NAPL and petroleum LNAPL) in the subsurface, PAHs in soil, and BTEX and PAHs in groundwater. BTEX and PAHs are considered the constituents of concern (COCs) at the Site. MGP impacts are the result of historic MGP activities at the Site.
- **NAPL Observations:** NAPL impacts are most extensive in three general areas: (1) the northern area of the Site (i.e., in the vicinity of the former Water Gas Building and former alignment of Wynantskill Creek); (2) west of the former By-Products Building; and (3) east of the former By-Products Building. In addition, NAPL has been observed in historic MGP structures including the TLS, OWS, air plenum, sumps, and an underground vault.
- **NAPL Mobility:**
  - NAPL at the Site has low mobility based on descriptions of NAPL observations ("viscous", "thick", "hard", "brittle") and the results of NAPL gauging, which indicate that the NAPL typically does not enter the wells or piezometers. NAPL present within the former alignment of Wynantskill Creek is likely the result of past migration along the former creek (i.e., before the creek was filled, NAPL had reached residual saturation, or weathering had reduced the mobility of the NAPL) or as a result of filling the creek with impacted materials.
  - Fine-grained alluvial deposits impede the vertical and lateral migration of NAPL. NAPL observed at the Site is predominately within the fill above either the fine grained alluvial deposits or glacial deposits or, to a lesser extent, within the fine-grained alluvial deposits. In the 148 borings that penetrated into or through the alluvial deposits, observations at approximately 84% (i.e., 124 out of 148) indicate that NAPL has not entered the unit. Where NAPL has entered the alluvial deposits, it is typically contained within this unit. In addition to visual observations, the limited vertical penetration of constituents into the alluvial deposits is supported by PAH data in soil, which indicates total PAH concentrations are non-detect or less than 10 mg/kg within or immediately below the NAPL observations in the alluvial deposits, with one exception at SB-161. At SB-161, total PAHs were 599 mg/kg in the interval approximately two feet below the observed NAPL, however, no NAPL was observed in the approximate 10-foot interval between the visible NAPL and the base of the boring. There are few incidences where NAPL is present in the LSG unit below the fine-grained alluvial deposits (only four of 66 borings). The effectiveness of the alluvial layer in restricting vertical migration is further supported by groundwater data (as discussed below).
  - There are no indications of ongoing migration of NAPL/tar to surface water or sediments in the Hudson River or Wynantskill Creek. This is supported by NAPL gauging results in wells/piezometers adjacent to water bodies and sediment and surface water data. No NAPL has been observed in sediment samples/borings adjacent to the Site and MGP-related constituents were non-detected in surface water samples. Tar has been observed along a section of the concrete channel wall of Wynantskill Creek, however, observations indicate that the tar is in a hardened form and is not an active discharge to the creek.
- **Soil PAH Concentrations:** Total PAH concentrations above 500 mg/kg are generally associated with the presence of NAPL, but have also been observed to be associated with the presence of anthracite coal, or fragments of hardened (brittle) coal tar.
- **Groundwater Quality:** Groundwater quality data indicates that NAPL at the Site does not represent a source of considerable or extensive dissolved-phase impacts, as the elevated dissolved-phase concentrations are generally coincident with the areas where NAPL impacts are most extensive and

concentrations decrease to levels that are below or approaching groundwater quality criteria outside these NAPL-impacted areas and prior to groundwater discharging to surface water. In addition, at several well locations, where the screened interval was set adjacent to observed NAPL the dissolved-phase BTEX concentrations are below or approaching the groundwater quality criteria. The limited impact on groundwater quality is likely the result of natural attenuation and NAPL weathering, which has gradually reduced the concentration of constituents, particularly the more soluble constituents of the NAPL, including BTEX and naphthalene. There are two general areas of the Site where constituent concentrations in groundwater exceed Class GA Criteria:

- Plume A: Located in the southwestern portion of the Site, dissolved phase constituents in Plume A appear to be related to petroleum product storage and handling that post dated MGP operations at the Site.
- Plume B: Located in the northern portion of the Site, the source of dissolved-phase constituents in Plume B appears to be a combination of MGP residuals and petroleum releases after MGP operations ceased at the Site. In this area:
  - COC concentrations were detected above the Class GA criteria in the vicinity of the former Water Gas Building, and in the vicinity of the mouth of the buried former channel of Wynantskill Creek. Dissolved phase concentrations attenuate rapidly and are below or approaching groundwater quality criteria at the boundaries of the Site before migrating to surface water.
  - Dissolved-phase concentrations are substantially lower in the LSG unit than in the shallower hydrostratigraphic zones (i.e., fill and alluvial deposits), which supports that the alluvial deposits above the LSG unit are restricting the vertical movement of dissolved-phase constituents.

- **Natural Attenuation:** Based on historical data trends, bioparameter analyses, and fate and transport modeling, Site conditions are favorable for natural attenuation and natural attenuation is occurring:
  - Based on the estimated half-lives and travel times, substantial reduction of dissolved phase concentrations would be anticipated prior to the discharge of shallow groundwater laterally to the river. The anticipated significant decrease in concentrations is consistent with groundwater data which indicates that COC concentrations are approaching or are below groundwater quality criteria at the boundaries of the Site before migrating to surface water.
  - Based on the estimated half-lives and travel times, substantial reduction of dissolved phase concentrations would be anticipated prior to groundwater entering the LSG unit from overlying units, which is consistent with the low to non-detect dissolved concentrations observed in the LSG.
- **Mass Flux:** Conservative mass flux estimates support that discharge of Site groundwater to surface water is not impacting surface water quality, which is supported by surface water quality data from the Hudson River and Wynantskill Creek.

1.6 Remedial Goals

The remedial goals for the Site were established in the July 2003 ROD and are to eliminate or reduce to the extent practicable:

1. Exposures of persons at or around the site to contaminants in soil, waste material and groundwater;
2. Exposures of flora or fauna to contaminants in soil and waste material;
3. The release of contaminants from soil and waste material into groundwater that may create exceedances of groundwater quality standards; and
4. The release of contaminants from soil and waste material into surface water and sediment through storm water erosion, NAPL migration and groundwater discharge to the river.

The remaining two ROD-defined goals are to attain to the extent practicable:

5. NYSDEC groundwater quality standards; and
6. NYSDEC's recommended soil cleanup objectives as identified in TAGM 4046* for the contaminants of concern.

**Note that since issuance of the ROD, revisions to the New York State Part 375 Regulations ("Environmental Remedial Program" 6 NYCRR Part 375) have been promulgated, which include unrestricted- and restricted-use soil clean-up objectives, which may supersede those in the TAGM 4046.*

2. STANDARDS, CRITERIA, AND GUIDANCE

Standards, Criteria, and Guidance (SCGs) are promulgated requirements and non-promulgated guidance, which guide site activities during investigation and remediation. SCGs include chemical-specific, action-specific, and location-specific SCGs. SCGs that are considered potentially applicable to remediation activities at Area 2 of the Troy (Water St) Site are summarized below.

Chemical-Specific SCGs

Chemical-specific SCGs that are applicable to Area 2 of the Troy (Water St) Site include:

- NYS Water Quality Regulations for Surface Water and Groundwater (6 NYCRR Parts 700-706);
- Technical and Operational Guidance Series (TOGS) 1.1.1, "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" (NYSDEC, 1998);
- NYS Department of Health Drinking Water Supply Sanitary Code (10 NYCRR Part 5)
- NYS Soil Cleanup Objectives (6 NYCRR Part 375);
- Draft "Soil Cleanup Guidance" (NYSDEC, November 2009);
- NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels" (NYSDEC, 1994); and
- Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP) Limits (40 CFR 261 and 6 NYCRR Part 371).

The March 2002 FS and July 2003 ROD included a comparison of analytical data for various Site media (including soil, groundwater, and Wynantskill Creek sediment and surface water) to the applicable chemical-specific SCGs. In accordance with the July 2003 ROD, no MGP-related impacts require remediation of the Wynantskill Creek sediments or surface water. As indicated in Section 1.6, chemical-specific SCGs have been incorporated into the remedial goals for the Site which include attaining to the extent practicable NYSDEC groundwater quality standards, and NYSDEC's recommended soil cleanup objectives as identified in TAGM 4046 for the constituents of concern.

The FS and July 2003 ROD evaluated an alternative that would achieve soil SCGs (i.e., considered TAGM 4046 at the time of the ROD) and concluded that such an alternative was not cost effective for this Site. It was concluded in the ROD that the required cost to achieve soil SCGs was not proportional to the protectiveness of human health and the environment the alternative would provide. Based on the evaluations presented in the FS and ROD, achievement of soil SCGs at this Site was considered infeasible. Rather, for soil, the remedy selected in the July 2003 ROD focused on soil containing total PAH concentrations greater than 500 mg/kg, which corresponds to the TAGM 4046 cleanup objective for semi-volatile organic compounds and is consistent with the 500 mg/kg cleanup level for total PAHs identified in NYSDEC's Draft "Soil Cleanup Guidance" (NYSDEC, November 2009). As such, additional PAH concentration data for soil collected during post-ROD investigation activities have been evaluated against the 500 mg/kg criterion identified in the FS and ROD and the results are summarized in Appendix B.

The additional groundwater quality data collected during post-ROD investigation activities have been evaluated against the groundwater SCGs identified in the FS and ROD and the results are summarized in Appendix B.

Action-Specific SCGs

Action-specific SCGs that are considered potentially applicable to the proposed remedial actions at Area 2 of the Troy (Water St) Site include:

- General health and safety requirements, including Occupational Safety and Health Administration (OSHA) regulations;
- NYS Department of Health Generic Community Air Monitoring Plan (CAMP), which identifies air monitoring requirements for in work areas when certain activities are in progress at contaminated sites;
- RCRA Land Disposal Restrictions (LDRs), which govern the land disposal of hazardous wastes;
- RCRA and DOT regulations for the transportation and management of hazardous materials;
- NYSDEC Department of Environmental Remediation document entitled "Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment" (DER-4); and
- National Pollutant Discharge Elimination System (NPDES) program (administered in NYS under the State Pollutant Discharge Elimination System Program – SPDES), which governs discharge of wastewater and stormwater.

Location-Specific SCGs

Location-specific SCGs that are considered potentially applicable to the Troy (Water St) Site include:

- Water quality certifications required by Section 401 of the Federal Water Pollution Control Act, Title 33 United States Code 1341, which are required for activities that may result in any discharge into navigable waters;
- Regulations that govern the excavation and placement of fill in navigable waterways, including 6 NYCRR Part 608; and
- Local permits from the City of Troy.

3. DESCRIPTION OF THE PROPOSED AMENDED REMEDY

This section identifies the retained components of the ROD-Selected Remedy, summarizes remedial alternative evaluations that were performed to support amending the excavation and ISCO components, and identifies the Proposed Amended Remedy.

3.1 Retained Components of ROD-Selected Remedy

As discussed previously, based on information gathered during the post-ROD investigation activities, amendments to the excavation (Element 2) and ISCO (Element 3) elements of the ROD-Selected Remedy are required. The remaining elements of the ROD-Selected Remedy will be retained, some of which have been partially or completely addressed to date, as discussed below. The retained components of the ROD-Selected Remedy include the following, which are discussed in additional detail in Section 3.3:

- Element 1: Remedial Design Program
- Element 4: Removal of Structure Contents
- Element 5: Removal and Off-Site Disposal of Purifier Waste
- Element 6: Asphalt Cap or Permeable Soil Cover
- Element 7: Monitored Natural Attenuation (MNA)
- Element 8: Institutional Controls
- Element 9: Long Term Monitoring Program

3.2 Evaluation of Potential Alternate Remedy Components

Based on the meetings and correspondence between representatives of NYSDEC, National Grid, and BC, the following general technologies were evaluated as potentially feasible alternate remedy components:

- Excavation;
- NAPL Barrier Walls; and
- In Situ Stabilization/Solidification (ISS).

The evaluation of these potential alternate remedy components are summarized below:

3.2.1 Excavation

Excavation is a proven technology to remove impacted soil. Excavation scenarios that were evaluated were limited to addressing impacts in the unsaturated zone, since excavation to any substantial depth below the water table would require management of groundwater in close proximity to the Hudson River, which would substantially increase the complexity and cost of excavation. Rather, impacts in the saturated zone would be addressed more effectively and efficiently by other remedy components, as was concluded in the July 2003 ROD.

Several excavation scenarios have been evaluated ranging from targeted excavation scenarios to an excavation scenario that would remove all soil where visible NAPL and PAHs greater than 500 mg/kg have been identified (i.e., the July 2003 ROD criteria). The excavation scenario that would strictly meet the July 2003 ROD criteria would require the removal of a considerable volume of non-target soil to access impacts that are either isolated and/or observed to be hardened/brittle tar and do not warrant removal because other planned remedial components (i.e., Site Cover, Long-term Monitoring, and Institutional Controls) can effectively address these areas. Based on the alternatives evaluation and discussions with NYSDEC, it was concluded that that an excavation scenario that includes removal of shallow unsaturated zone soil (i.e., ranging in depths from approximately 8 to 18 feet bgs) from specific areas (i.e., in combination with an appropriate remedy for deeper soil) would allow for the achievement of remedial goals, satisfy the threshold criteria of protection of human health and the environment, and provide the most cost-effective approach to satisfying the threshold criteria of compliance with SCGs. Refer to Section 3.3.2 for a description of the selected excavation component and the criteria used to determine where excavation would be performed.

3.2.2 NAPL Barrier Walls

Subsurface barrier wall technologies were evaluated as a potentially feasible alternate remedy component for their ability to prevent potential migration of NAPL to surface water and sediments. Low permeability vertical barrier systems have been demonstrated to be an effective technology for addressing potential NAPL migration in situations where DNAPL has been found to be positioned above a low permeability material. Barriers may be constructed using interlocking steel sheetpile barrier with grouted joints (e.g., Waterloo® Barrier) or formed in situ using low-permeability slurry materials (e.g., cement and bentonite). As discussed in Appendix B, there are multiple lines of evidence that indicate that the alluvial layer is acting as a natural barrier restricting vertical migration of NAPL and groundwater. Based on those lines of evidence and that the alluvial layer is laterally continuous over the conceptual barrier area, the alluvial layer was considered a suitable key-in layer. As such, the assessment of a barrier wall system assumed that the barrier wall would be keyed into the fine-grained alluvial deposits. Two types of barrier configurations were evaluated:

- **Perimeter Barrier Configuration:** subsurface barriers surrounding the area of substantial NAPL occurrence in the northern area of the Site, including the area of the former Water Gas Building and most of the buried former Wynantskill Creek.
- **Targeted Barrier Configuration:** subsurface barriers positioned to block potential NAPL migration routes to surface water bodies, and to provide a physical barrier where NAPL is in closest proximity to water bodies including the Hudson River and Wynantskill Creek.

For both barrier configurations discussed above, NAPL monitoring and recovery (as necessary) would be conducted on the upgradient sides of the barriers.

Based on the evaluations and discussions with the NYSDEC, the potential use of barrier walls was considered an unnecessary component of the remedy. Barriers would restrict potential lateral migration of NAPL to surface water bodies, however, as stated in the Conceptual Site Model, NAPL at the Site has low mobility and is not impacting adjacent water bodies. In addition, groundwater modeling has indicated that placement of barrier walls would increase hydraulic heads upgradient of the barriers, which could increase potential for vertical migration of constituents through the alluvial deposits. Therefore, based on the evaluation and discussions with NYSDEC, barrier walls were eliminated from further consideration as a component of the Proposed Amended Remedy.

3.2.3 In-Situ Stabilization/Solidification (ISS)

ISS reduces the mobility of chemical constituents by mixing impacted soil with solidification/stabilization (S/S) agents (e.g., cement, bentonite, or cement/bentonite) using a variety of technologies (e.g., shallow soil mixing using large diameter augers or other methods, deep soil mixing using smaller diameter augers – potentially in concert; or jet grouting, where grout it injected into the formation from a dill stem under high pressures). Solidification of NAPL-impacted soils would reduce the mobility and leachability of NAPL associated with these soils. The reduction in NAPL leachability coupled with the decrease in hydraulic conductivity of the solidified mass would limit the interaction between COCs and Site groundwater and thus be expected to improve groundwater quality. ISS was identified as a potential technology to address deep zone impacts in both the unsaturated and saturated zones (depth ranging from approximately 8 to 36 feet bgs).

In addition to the stabilization/solidification of soil meeting the criteria for treatment, an ISS component of the remedy would also require pre-excavation to remove subsurface obstacles, potentially isolate or re-route utilities, and to accommodate the swelling of the ISS treatment zone, which is typically 20 to 40% for soil-mixing applications and up to 100% for jet grouting applications. For areas where ISS is co-applied with shallower zone excavation, this supplemental excavation volume may be minor. However, for areas where ISS is applied to address deep zone impacts and there is no shallow zone excavation, the supplemental excavation volume can be significant.

Several ISS scenarios were evaluated, ranging from a targeted ISS scenario, which would target NAPL-impacted soil that, based on groundwater quality data, represents the most significant source impacting groundwater (i.e., where BTEX concentrations exceed 1 mg/L), to an ISS scenario that would treat the soil wherever visible NAPL and PAHs > 500 mg/kg have been identified (i.e., the July 2003 ROD criteria for the ISCO component of the remedy).

Based on the alternatives evaluation and discussions with the NYSDEC, the ISS scenario that would strictly meet the July 2003 ROD criteria was eliminated from further consideration since this ISS scenario:

- Requires pre-excavation of an inordinately large volume of soil to access the ISS interval;
- Requires ISS of a substantially large volume of soil that does not meet the July 2003 ROD criteria in order to access a comparatively smaller volume of underlying soil meeting the criteria;
- Has an increased risk of degrading the LSG unit via potential dragdown of NAPL from shallower intervals to the LSG during implementation and/or potential migration resulting from disturbing the alluvial layer (i.e., some ISS columns would fully penetrate the alluvial deposits and the alluvial deposits present between the solidified zone and non-solidified zone may be disturbed thus potentially increasing vertical permeability);
- Destroys the layering of the alluvial deposits, a key property of these deposits that contributes to their function as a natural barrier that has demonstrated long-term effectiveness in controlling COC migration, and relies solely on ISS to control migration of COCs;

The ISS scenario that would only target areas where NAPL-impacted soil are present and BTEX concentrations exceed 1 mg/L (i.e., areas that appear to be the most significant source impacting groundwater based on groundwater data) was eliminated since it was concluded that such an alternative would not meet the remedial goals to the extent practicable, in particular the remedial goals of: 1) eliminating to the extent practicable the release of contaminants from soil and waste material into groundwater that may create exceedances of groundwater quality standards; and 2) attaining to the extent practicable the NYSDEC groundwater quality standards.

Based on the alternatives evaluation and discussions with the NYSDEC, it was concluded that an ISS scenario that includes treatment of deep zone impacts in the unsaturated and saturated zone in the northern portion of the Site where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where NAPL impacts are most extensive would allow for remedial goals to be achieved, satisfy the threshold criteria of protection of human health and the environment, and provide the most cost-effective approach to satisfying the threshold criteria of compliance with SCGs. Although this ISS scenario would include some ISS partially into the alluvial deposits in some local areas, it primarily addresses the fill zone where impacts are predominately located and would maintain a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone. Refer to Section 3.3.3 for a description of the selected ISS component and the criteria used to determine where ISS would be applied.

3.3 Proposed Amended Remedy

Based on the results of post-ROD investigation activities, remedial alternatives evaluations, and discussions with NYSDEC, the Proposed Amended Remedy has been identified and includes the elements listed below. Seven (7) of the elements are elements retained from the July 2003 ROD identified in Section 3.1 and the remaining two (Elements 2 and 3) represent the selected excavation and ISS components identified in Section 3.2. The Proposed Amended Remedy is depicted on Figure 3-1.

- Element 1: Remedial Design Program
- Element 2: Excavation
- Element 3: In-Situ Stabilization/Solidification (ISS)
- Element 4: Removal of Structure Contents
- Element 5: Removal and Off-Site Disposal of Purifier Waste
- Element 6: Asphalt Cap or Permeable Soil Cover
- Element 7: Monitored Natural Attenuation (MNA)
- Element 8: Institutional Controls
- Element 9: Long-Term Monitoring Program

Each element of the Proposed Amended Remedy is discussed in the following sections.

3.3.1 Element 1: Remedial Design Program

In accordance with the ROD, the Remedial Design Program will be performed to verify the components of the conceptual design, resolve uncertainties identified in the RI/FS, and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. In addition to post-ROD investigations completed to date, the Remedial Design Program is anticipated to include the following:

- Potential investigation activities to collect additional data which may be required for the design and construction of the Proposed Amended Remedy;
- Design of the construction elements of the Proposed Amended Remedy and development of plans for the operation, maintenance, and monitoring of the remedy; and
- An evaluation of the potential for exposure of building occupants to residual contamination, including indoor air contaminants of MGP origin, that will remain at the Site following the implementation of the remedy.

3.3.2 Element 2: Excavation

Description

As discussed in Section 3.2.1, based on remedial alternatives evaluations and discussions with the NYSDEC, an excavation scenario that includes removal of shallow unsaturated zone soil (i.e., ranging in depths from approximately 8 to 18 feet bgs) from specific areas (i.e., in combination with an appropriate remedy for deeper soil), would allow for the achievement of remedial goals, satisfy the threshold criteria of protection of human health and the environment, and provide the most cost-effective approach to satisfying the threshold criteria of compliance with SCGs. This excavation scenario would include removal of near-surface impacts in the Northern portion of the Site, at the mouth of the former Wynantskill Creek and along the Hudson River shoreline, and in the southern portion of the Site in the vicinity of the By-Products Building, where shallow-zone impacts are most extensive. This excavation component includes removal, to the extent practicable, of shallow unsaturated zone soil, which meets the following criteria:

- Visible tar or NAPL (including hardened tar deposits) is present in soil proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL; and/or
- Visible tar or NAPL is present, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging.

It is noteworthy that the excavation component and ISS component (described in Section 3.3.3) would remove or treat the vast majority of locations where total PAHs greater than 500 mg/kg have been identified, since total PAH concentrations above 500 mg/kg are generally co-located with NAPL meeting the criteria for excavation or ISS.

Locations where visible tar or NAPL and/or soil containing PAHs greater than 500 mg/kg are present, but do not meet the above criteria for removal, would remain at the Site. The potential risks to human health and the environment associated with impacts at these locations would be effectively managed by other planned remedial components (i.e., Site Cover, Long-term Monitoring, and Institutional Controls). Visible tar or NAPL and/or soil containing PAHs greater than 500 mg/kg that would not be subject to excavation include:

- Hardened/brittle tar not located proximal to a surface water body. This includes hardened tar in the area to the west of the former By-Products Building where tar was observed hard/brittle coal tar mixed with well-sorted aggregate and present in thin, widespread shallow layers. This type of tar is not mobile, does not represent a source impacting groundwater, and potential risks associated with future contact to this material can be effectively managed by the other planned remedial components.
- Visible tar or NAPL where the description of NAPL from the field observations and/or results from NAPL gauging indicate that NAPL is in the residual form (i.e., not potentially mobile) and nearby groundwater data supports that the residual NAPL is not impacting groundwater.

- Locations where total PAHs in soil are greater than 500 mg/kg, but are not co-located with visible tar or NAPL or are co-located with hardened/brittle tar or residual NAPL (see bullet above), and nearby groundwater data supports that the residual NAPL is not impacting groundwater.

The proposed conceptual excavation areas and depths are shown on Figure 3-1 and are considered approximate and may be refined during remedial design.

The soil volume to be excavated under this excavation component is estimated to be approximately 34,000 cy (total excavation) to access approximately 27,000 cy meeting the criteria for removal. The excavation depths typically vary from approximately one (1) to 11 feet bgs, however, along the Hudson River bank at the mouth of the former Wynantskill Creek, the excavation may extend as deep as approximately 18 feet bgs.

Implementation Considerations

Excavation would be combined with proper soil handling, waste characterization, transportation and off-site treatment/disposal. Visibly impacted soil would be segregated, characterized, and staged or direct-loaded for transportation to an off-site, permitted treatment or disposal facility. Visibly un-impacted excavated material would be segregated, staged, and characterized. Pending the results of the characterization, the visibly unimpacted material may be re-used as backfilled or transported to an off-site, permitted treatment or disposal facility. Waste materials would be dewatered/stabilized, as necessary, to remove free liquids prior to transportation. Clean fill would be imported for backfilling, as necessary, to replace the volume of material sent off site.

During excavation, former structures or foundations may be encountered which require removal in order to complete the excavation. The foundations and structures (following removal of the contents of structures, as necessary) would be demolished, as necessary, to facilitate removal. Based on visual observations and in consultation with the NYSDEC, concrete structures may be crushed for re-use as fill on-site underneath the Site Cover (refer to Section 3.3.6). Material not re-used on-site would be characterized and transported to an off-site, permitted disposal facility.

Excavation areas abutting buildings or other structures (e.g., concrete wall of Wynantskill Creek, railroad tracks) would require structural considerations. For instance, during the excavation of the area south of the channelized portion of Wynantskill Creek, conditions would be assessed to determine if an engineering evaluation is warranted to evaluate potential subsurface structural supports (e.g., tie-backs) associated with the wall and develop a shoring plan to protect (as necessary) the structures prior to completing excavation of the area.

Utilities, including electrical, telecommunication, water, sewer, and gas, are present on-site. These utilities would be identified and located prior to excavation. Coordination with the utility purveyor would be required to identify requirements and limitations associated with excavation in the vicinity of the utilities.

De-watering is not anticipated to be a significant component of any excavation scenario, since, as stated above, the excavation component would primarily address the unsaturated zone.

Monitoring and temporary controls would be included during implementation to manage stormwater, control erosion, and control the migration of odor, vapor, and dust from the excavation area.

The excavation areas and depths shown on Figure 3-1 are approximate and based on available data and field observations. The excavation depth or lateral limits may increase or decrease based on field observations. Within the excavation areas, the excavation would originate in locations and to depths where impacted soil has been confirmed to be present, based on available data. The actual extent of excavation would then be determined based on field observations and in consultation with the NYSDEC. The excavation limits would be based on satisfying the excavation criteria identified previously in this section. Applicable field observations that would provide a basis for laterally or vertically extending the excavation in MGP-impacted areas include the following:

- Soil partially to fully saturated with NAPL
- NAPL extensively (or continuously) coating soil materials
- NAPL flowing into excavations

Conversely, soils that would not be subject to excavation as a result of the following observations (in the absence of any of the observations listed above) include the following:

- Hardened or brittle tar
- Sporadic intervals of NAPL-coated soil grains
- Sporadic blebs, droplets, or small lenses of NAPL
- Stained soils
- Sheen on water in excavation

The applicable field observations that would determine the extent of excavation may be refined during the Remedial Design/Remedial Action (RD/RA).

3.3.3 Element 3: In-Situ Stabilization/Solidification (ISS)

ISS Background

ISS application can be performed using a variety of technologies. For shallow zone applications (e.g., from approximately 0 to 30 feet bgs), S/S agent injection and mixing is generally achieved using a method termed shallow-zone soil mixing (SSM), where large diameter augers (e.g., 6 to 12 foot diameter) are employed and S/S agents are injected through the auger shafts and mixed into the soil using the augers. Other soil mixing methods besides augers are sometimes used (e.g., mixing with excavator buckets or cutter-mixing technologies). To achieve continuous coverage, the columns would be overlapped. For deeper zone applications, S/S agents can be injected using smaller diameter augers (deep-zone soil mixing – DSM), or via jet grouting, where grout is injected into the subsurface by drilling or driving a drill stem and injecting grout under high pressures into the formation through jets.

ISS was evaluated as a component of one of the remedial alternatives (Alternative 4) in the FS (IT Group, March 2002) and in the July 2003 ROD. The ISS component was identified to address soil containing total PAHs > 500 ppm or visual tar/NAPL. ISS was not selected for several reasons, including, "the lack of published long-term groundwater data for in situ stabilization of MGP wastes and the potential for increased permeability of the stabilized mass over time calls into questions its long-term effectiveness" (excerpt from ROD) as well as implementability concerns associated with subsurface obstacles (i.e., debris, wires, former foundations, and variability in fill materials). However, in accordance with the NYSDEC letter dated August 20, 2008, several studies have been published that address the NYSDEC's earlier concerns for documenting the long-term effectiveness of ISS on MGP wastes.

Description

As discussed in Section 3.2.3, based on remedial alternatives evaluations and discussions with the NYSDEC, it was concluded that an ISS scenario that includes treatment of deep zone impacts in the unsaturated and saturated zone in the northern portion of the Site where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where NAPL impacts are most extensive would allow for remedial goals to be achieved, satisfy the threshold criteria of protection of human health and the environment, and provide the most cost-effective approach to satisfying the threshold criteria of compliance with SCGs. The ISS component would include stabilization/solidification of deep unsaturated zone soil and saturated zone soil, to the extent practicable, which meets the following criterion:

- Visible tar or NAPL is present in soil, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. Based on existing data, addressing these areas would also address the areas where groundwater quality data suggests the NAPL is acting as a source impacting groundwater.

As discussed in Section 3.3.2, it is noteworthy that the excavation and ISS components would remove or treat the vast majority of locations where total PAHs greater than 500 mg/kg have been identified, since total PAH concentrations above 500 mg/kg are generally co-located with NAPL meeting the criteria for excavation or ISS.

Locations where visible tar or NAPL and/or soil containing PAHs greater than 500 mg/kg are present, but do not meet the above criteria for ISS, would remain at the Site. The potential risks to human health and the environment associated with impacts at these locations would be effectively managed by other planned remedial components (i.e., Monitored Natural Attenuation, Long-term Monitoring, and Institutional Controls). The visible tar or NAPL and/or soil containing PAHs greater than 500 mg/kg that would not be subject to ISS include:

- Visible tar or NAPL where the description of NAPL from the field observations and/or results from NAPL gauging indicate that NAPL is in the residual form (i.e., not potentially mobile) and nearby groundwater data supports that the residual NAPL is not impacting groundwater.
- Locations where total PAHs in soil are greater than 500 mg/kg, but are not co-located with visible tar or NAPL or are co-located with hardened/brittle tar or residual NAPL (see bullet above), and nearby groundwater quality data supports that the residual NAPL is not impacting groundwater.

The proposed conceptual ISS treatment areas and depths are shown on Figure 3-1 and are considered approximate and may be refined during the RD/RA. As shown on the figure, three conceptual intervals have been selected for ISS to establish an ISS treatment zone that (a) treats the soil meeting the ISS criteria; and (b) maintains a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone to continue to serve as a natural barrier to COC migration. The conceptual intervals for ISS are: 1) approximately 8 to 24 feet bgs; 2) approximately 8 to 30 feet bgs; and 3) approximately 8 to 32 feet bgs. The depth transition boundaries identified on Figure 3-1 (i.e., as green dashed lines within the ISS limits) are based on existing investigation data and may be refined during the RD/RA.

The approximate ISS volume is 69,000 cy. In addition, approximately 29,000 cy of unsaturated zone soil within the ISS limits would require management via pre-excavation (refer to discussion below for the purpose of pre-excavation). This supplemental soil volume includes removal of multiple structures, including the former TLS, OWS, and Sump 4, and numerous foundations, including the former Water Gas Building foundation and gas holder foundations.

Implementation Considerations

Prior to implementation, pre-design activities would be conducted which would include bench-scale testing to identify an appropriate mix design and may include additional field investigation activities to supplement existing data (e.g., additional borings to identify the interface between the depth of fill/alluvial deposits).

Prior to applying ISS, The areas to be solidified would be pre-excavated to a depth of approximately eight (8) feet bgs to remove subsurface obstacles and to potentially isolate or re-route utilities. Utilities, including electrical, telecommunication, water, sewer, and gas, would be identified and located prior to application of ISS and coordination with the utility purveyor would be conducted to identify requirements and limitation associated with performing ISS in the vicinity of the utilities. In addition, the pre-excavation depth would accommodate swelling of the ISS treatment zone, which is typically 20 to 40% for SSM applications and up to 100% for jet grouting applications. The intent would be to accommodate swelling and maintain the solidified mass below the frost line to avoid potential detrimental effects of freeze-thaw action.

During pre-excavation, former structures or foundations may be encountered which require removal in order to complete the excavation. The foundations and structures (following removal of the contents of structures, as necessary) would be demolished, as necessary, to facilitate removal. Based on visual observations and in consultation with the NYSDEC, concrete structures may be crushed for re-use as fill on-site underneath the Site Cover (refer to Section 3.3.6). Material not re-used on-site would be characterized and transported to an off-site, permitted disposal facility.

Visibly un-impacted excavated material would be segregated, staged, and characterized. Pending the results of the characterization, the visibly un-impacted material may be re-used as backfilled or transported to an off-site, permitted treatment or disposal facility. Waste materials would be dewatered/stabilized, as necessary, to remove free liquids prior to transportation. Clean fill would be imported, as necessary, for backfilling to replace the volume of material sent off site.

Monitoring and temporary controls would be included during implementation to manage stormwater, control erosion, and control the migration of odor, vapor, and dust from the excavation/ISS areas.

ISS areas abutting buildings or other structures (e.g., E-Lot building) would require structural considerations. Prior to ISS activities an engineering evaluation of structures would be required to evaluate the impact the structures may have on ISS implementation and the baseline condition of the structures, and to develop a plan to protect the structures during the course of ISS and pre-excavation activities.

ISS over this large area would significantly alter groundwater flow. The result may be more rapid groundwater flow through zones not affected by ISS. Accordingly, the groundwater model discussed in Appendix C was used to evaluate the effect of the ISS element on groundwater flow. In the groundwater flow model the ISS areas were simulated, with a hydraulic conductivity of 1×10^{-6} cm/sec. Two scenarios were simulated to evaluate the effects of various cover materials. One scenario was performed assuming cover materials with a comparable composite permeability as the existing cover. For this scenario a recharge rate of 6 inches per year was used. A second additional simulation was performed that incorporated application of a larger percentage of lower-permeability cover materials (e.g., asphalt) over the ISS area. This simulation assumed a recharge rate of 2 inches per year. The results are summarized below:

- For the ISS with the 6-inch per year recharge scenario, modeling indicated that substantial hydraulic mounding (to an estimated maximum of approximately 11 feet above existing groundwater levels) would occur within the ISS area (refer to Figure C-2 in Appendix C). The mounding causes groundwater outside the treatment zone to flow around or underneath the solidified zone. The mounding caused by the reduced hydraulic conductivity of the ISS-treated zone increases the discharge of groundwater to the alluvial deposits and LSG units by approximately 47 and 35 percent, respectively (i.e., 62 cf/day compared to 117 cf/day for flow to the alluvial deposits and 72 cf/day compared to 111 cf/day for flow to the LSG). However, the increased flow to the LSG would not be expected to increase mass flux to the LSG, since this ISS scenario would treat the vast majority of impacts in the saturated zone thus limiting the contribution of COCs to the dissolved phase. In addition, dissolved-phased COCs that enter the alluvial deposits would be substantially reduced from natural attenuation prior to entering the LSG unit considering the long estimated travel times across the alluvial deposits. Compared to the base-case (i.e., existing conditions), the groundwater modeling indicated that this scenario would decrease the total amount of groundwater that flows through the fill in the ISS area by 76 percent (i.e., 137 cf/day compared to 564 cf/day). This supports that the ISS would reduce the interaction between groundwater and potential source material.

- For the ISS with the 2-inch per year recharge scenario, modeling indicated significantly less hydraulic mounding (to a maximum of 5 feet above existing groundwater levels (refer to Figure C-3 in Appendix C). Under these conditions, flow from the fill to the alluvial deposits would decrease by approximately 32 percent (i.e., 42 cf/day compared to 62 cf/day), whereas discharge of groundwater from the alluvial deposits to the LSG would decrease by approximately 31 percent (i.e., 50 cf/day compared to 72 cf/day). Compared to the base-case (i.e., existing conditions), the groundwater modeling indicated that this scenario would decrease the total amount of groundwater that flows through the fill in the ISS area by 91 percent (i.e., 48 cf/day compared to 564 cf/day), supporting that this scenario would further reduce the interaction between groundwater and potential source material compared to the 6-inch per year recharge scenario.

The ability to achieve the target depths may be impeded by obstacles located below the depth of the pre-excavated upper 8 feet of soil, which may potentially include former foundations, subsurface structures, piping, large debris in the fill material (e.g., slag or concrete), or zones with extensive amounts of smaller-sized debris. Reasonable efforts would be used to remove subsurface obstacles; however, in some instances removal may not be feasible or may require an inordinate level of effort. Material that is not treated via ISS would be addressed by other remedy components (i.e., NAPL monitoring/recovery, MNA, and Institutional Controls). The extent of ISS at a particular location would be determined in the field in consultation with the NYSDEC. Situations that may be encountered during ISS implementation which would limit the depth/area of ISS or require alternate ISS methods (e.g., localized jet grouting) include:

- Foundation component to a structure that is to remain (i.e., building, channelized portion of the Wynantskill, etc.).
- An active utility that is to remain that cannot be temporarily shutdown to accommodate ISS implementation and ISS could not be safely performed with the utility remaining active.
- A subsurface obstruction located at a substantial depth (e.g., below 18 ft bgs).
- Frequent auger refusal due to the nature of the fill material.

The field conditions that may limit the depth/area of ISS may be refined during the Remedial Design/Remedial Action (RD/RA).

3.3.4 Element 4: Removal of Structure Contents

In accordance with the ROD, this component includes removal of the structure contents followed by inspection of the interior surfaces. If the inspection concludes that no contaminants were released then the structure would be backfilled. The ROD specified that if the inspection indicates that contaminants may have been released or is inconclusive, then the structure itself would be removed. The volume of material to be addressed by this element was estimated in the ROD to be 1,500 cy of tar/soil/debris and 5,000 gallons of liquids. Depending on the manner in which each remedial alternative achieves the remedial goals, a potential modification to this ROD element is that structures may be left in place and backfilled following removal of the contents even if the inspection cannot confirm that the structure is intact or that no contaminants have been released. Under such a scenario, potential risks from impacted material remaining in the vicinity of cleaned-out structures would be addressed by a combination of engineering and institutional controls.

As indicated in Section 1.4, the contents of several of the structures identified in the ROD have already been removed, including the TLS, OWS, air plenum tunnels, and underground vault. To date, approximately 4,000 tons (approximately 2,500 cy) of impacted tar/soil/debris and approximately 73,000 gallons of liquids have been removed from structures and transported off-site for treatment/disposal. Following removal of the contents and inspection, the structures were backfilled with flowable fill.

In accordance with the July 2003 ROD, inspections of the structures were performed following structure contents removal in consultation with NYSDEC's on-site representative to determine whether or not the structures required removal. The results of the inspections are documented in the "Construction Completion Report, Purifier Waste Deposits, Tar Liquor Sump, and Oil/Water Separator, Troy (Water) Street Site – Area 2" (BC, May 2009) and "Construction Completion Report, Air Plenum and Underground Vault Remedial Action Troy (Water) Street Site - Area 2" (BC, April 2009). As discussed in Section 3.3.3, the TLS and OWS structures would be removed to facilitate ISS implementation. The results of the inspections of the Air Plenum and Underground Vault are summarized below:

- **Air Plenum:** The post-removal inspection of the Air Plenum revealed the structure to be intact and competent. One penetration was observed (6-inch diameter clay pipe sleeve), which was located through the top of the northern wall of the eastern tunnel. The penetration was located above the sludge elevation and no visible impacts were observed in soil outside of the plenum at this location. Slots (i.e., gaps in the tunnel sidewalls and floors, potentially associated with former baffle doors) were observed in the bottom and sidewalls at five (5) locations. Material was removed from the slots to the extent practical until a solid bottom or sidewall was encountered. Based on the post-removal inspections, the Air Plenum structure effectively contained the impacted material present within the structure, and there is no indication that the structure has released constituents to the subsurface. This is supported by observations and subsurface data from outside the Air Plenum, which was generated from the Site investigation activities. Therefore, following the removal of the Air Plenum contents and based on the results of the post-removal inspections, which was performed in consultation with NYSDEC's on-site representative, remedial actions at the Air Plenum are considered complete in accordance with the July 2003 ROD.
- **Underground Vault:** The inspection of the Underground Vault following the removal of its contents, which was performed in consultation with a representative from NYSDEC, revealed the structure to be intact and competent. No penetrations were observed in the structure bottom or sidewalls. Based on the post-removal inspections, the Underground Vault structure effectively contained the impacted material present within the structure, and there is no indication that the structure has released constituents to the subsurface. This is supported by observations and subsurface data from outside the Underground Vault, which was generated from the Site investigation activities. Therefore, following the removal of the Underground Vault contents and based on the results of the post-removal inspection, actions at the Underground Vault are considered complete in accordance with the July 2003 ROD.

Based on the discussion above, the remaining activities for this element include removal of the TLS structure itself and contents removal and post removal inspection of the structures identified as Sump 1 and Sump 4.

Remaining activities for this element also include investigation of the potential presence of MGP impacts within pipes traversing the Wynantskill Creek. Further efforts to review available records will be performed and utility companies contacted to attempt to identify pipes traversing the creek. Pipes which may potentially contain MGP impacts will be further investigated and mitigated, as necessary, during remedial action implementation when a remediation contractor is on-site prepared to properly open the pipes and potentially managed pipe contents.

3.3.5 Element 5: Removal and Off-Site Disposal of Purifier Waste

In accordance with the ROD, this component includes removal and off-site disposal of purifier waste deposits in two locations: 1) on the surface near the former 2,000,000-cf gas holder; and 2) on the surface directly north of the former Wynantskill Creek alignment along the Hudson Riverbank. The volume of material to be addressed by this element was estimated in the ROD to be 1,200 cy.

In August 2007, test pits were completed in the area to the south of the pad for the former 2,000,000-cf gas to evaluate if purifier waste deposits previously observed in this area are still present. No indications of purifier waste or other MGP-related waste were encountered in the test pit. The material encountered included top soil and fill, which locally contained various construction debris (e.g., pavement fragments, bricks, chain link fencing, etc.). Based on the results of the investigation, a request to remove this area from the planned remedial action activities was proposed to NYSDEC in an email dated August 9, 2007 (from Cathy Geraci [National Grid] to John Spellman [NYSDEC]). NYSDEC approval to remove this area from the planned remedial action activities was issued in an email dated August 23, 2007 (from John Spellman [NYSDEC] to Cathy Geraci [National Grid]).

Excavation of the purifier waste deposits on the surface along the Hudson Riverbank was completed in April 2008. The extent of the excavation was based on the limits identified on Figure 2-1 of the DEC-approved Purifier Waste Work Plan (Brown and Caldwell, June 2007) and field observations in consultation with NYSDEC's field representative. In total, approximately 400 cy of purifier waste/soil were removed and transported off-site for disposal. The excavation area was backfilled with an approximate 1'-2' layer of soil (medium-fine grained sand with minor amount of silt) placed at the bottom of the excavation and overlain with crushed stone (NYDOT 703-02, Size 3A) backfill to re-establish grades and match existing surrounding grades.

Following completion of this work, the remedial action component to address the purifier waste deposits is considered to be complete in accordance with the ROD.

3.3.6 Element 6: Asphalt Cap or Permeable Soil Cover

To control potential direct contact exposure, reduce erosion, and wind transport of constituents, an asphalt cap or permeable soil cover would be placed over the entire Site, excluding building footprints. As discussed in a meeting with representatives from the NYSDEC and National Grid on September 25, 2008, the permeable soil cover would be a minimum of one-foot thick and include a demarcation layer. The one-foot thick soil cover is less than the two-foot thickness identified in the July 2003 ROD, however, in combination with institutional controls (discussed in Section 3.3.8), it would provide an equivalent level of protection. Cover material may consist of stone rip-rap, in areas more susceptible to erosion (i.e., swales, potential drainage pipe inlets/outlets, steeper slopes). Site grading would be performed to facilitate drainage of stormwater and reduce infiltration.

In concert with institutional controls (discussed below), including implementation of a Site Management Plan, the site cover would be established to mitigate potential direct contact risks and facilitate re-development of the Site for industrial and commercial purposes, which is consistent with the Troy LDC's plans. The area to receive the site cover occupies approximately 14.5 to 16 acres depending on the footprint of buildings to remain.

3.3.7 Element 7: Monitored Natural Attenuation (MNA)

MNA consistent with the United States Environmental Protection Agency's April 21, 1999 Memorandum: Final OSWER Directive "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites", was selected in the ROD to address dissolved-phase constituents of concern. As discussed in Appendix B, the two areas to be addressed include Plume A, which is located in the southwestern portion of the Site, and Plume B, which is located in the northern portion of the Site. MNA may not be required for Plume B as this area is addressed by the proposed ISS component.

During the PDI a program was implemented at the Site to evaluate the potential for natural attenuation of site-related MGP hydrocarbons in groundwater and to establish baseline groundwater quality conditions. Based on the natural attenuation evaluation, which is summarized in Appendix B, it was concluded that conditions are favorable for natural attenuation of BTEX concentrations present at the Site and natural attenuation is occurring. Therefore, MNA will be retained as a component of the Proposed Amended Remedy to address dissolved phase constituents.

Performance of the natural attenuation processes will be evaluated by monitoring for BTEX and PAH compounds. Additional parameters (e.g., electron acceptor concentrations or metabolic byproducts) may be monitored, as necessary, to supplement the COC concentration data.

3.3.8 Element 8: Institutional Controls

In accordance with the ROD, institutional controls would be established to; (a) protect engineering controls which are part of the remedy; (b) restrict on-site groundwater use; (c) prohibit the site from being used for purposes other than appropriate recreational, industrial or commercial uses, as explained below, without the express written waiver of such prohibition by the NYSDEC and the NYSDOH; and (d) require an evaluation of potential soil vapor on indoor air quality in onsite buildings, should changes from the current use be proposed in the future. Appropriate industrial or commercial uses of the property would have to be consistent with any applicable zoning ordinances. An annual certification would be required to document the effectiveness of the institutional and engineering controls.

In addition to the above, a Site Management Plan (SMP) would also be implemented for the Site to specify the methods necessary ensure compliance with all engineering and institutional controls for constituents that remain at the Site. The institutional controls would place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all engineering and institutional controls.

3.3.9 Element 9: Long-Term Monitoring Program

Since the remedy would leave residual impacts at the Site (the degree of which depends on the selected alternative) a long-term monitoring program would be instituted. This program would include groundwater quality monitoring to evaluate the effectiveness of natural attenuation, and soil and/or asphalt cover monitoring and inspections to evaluate its integrity as a direct contact and surface migration barrier.

In addition, this element includes NAPL monitoring to evaluate potential migration of NAPL. Based on the results of the NAPL monitoring, NAPL recovery may be performed using passive NAPL recovery methods. Passive NAPL recovery would consist of periodically bailing or otherwise removing NAPL from wells (existing or possibly new installations) within areas containing NAPL-impacted soil. Recovered NAPL would be containerized, characterized, and transported off-site to a permitted treatment or disposal facility.

This program would be a component of the operation, maintenance, and monitoring (OM&M) for the Site.

3.3.10 Summary of the Proposed Amended Remedy

The Proposed Amended Remedy would remove and/or treat via ISS the vast majority of soil where visible tar or NAPL and/or soil containing total PAH concentrations greater than 500 mg/kg are present. Removal of structure contents and purifier waste deposits eliminates concentrated waste materials from the Site and the potential direct contact risks and sources of groundwater impacts associated with these areas. Excavation and ISS would remove or stabilize soil in areas where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where NAPL and groundwater impacts are most extensive. The excavation and ISS components address soil which meets the following criteria:

- In soil proximal to a surface water body, the presence of visible tar or NAPL (including hardened tar deposits), including locations where soil containing PAHs greater than 500 mg/kg is co-located with visible tar or NAPL; and/or
- Visible tar or NAPL is present in soil, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. Based on existing data, addressing these areas would also address the areas where groundwater quality data indicates the NAPL is acting as a source impacting groundwater.

In addition to the estimated soil volumes that meet the above criteria for removal or ISS (i.e., approximately 27,000 cy via excavation and 69,000 cy via ISS), an additional approximate 36,000 cy would require excavation to access this soil (i.e., approximately 6,000 cy for the excavation component and 29,000 cy for the ISS component).The excavation and ISS components would remove or treat the vast majority of locations where total PAHs greater than 500 mg/kg have been identified, since total PAH concentrations above 500 mg/kg are generally co-located with NAPL meeting the criteria for excavation or ISS.

Locations where visible tar or NAPL and/or soil containing PAHs greater than 500 mg/kg are present, but do not meet the above criteria for removal or ISS, would remain at the Site. This includes areas with hardened/brittle tar that are not located proximal to a surface water body and areas with visible tar or NAPL where the description of NAPL from the field observations and/or results from NAPL gauging indicate that NAPL is in the residual form (i.e., not potentially mobile) and nearby groundwater data supports that the NAPL is not significantly impacting groundwater. The potential risks associated with impacts at these locations could be effectively managed by other planned remedial components (i.e., Site Cover, MNA, Long-term Monitoring, and Institutional Controls). In addition, the ISS component of the Proposed Amended Remedy would be designed to maintain a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone, such that the alluvial layer, which has demonstrated its long-term effectiveness in controlling the vertical migration of constituents (including NAPL and dissolved-phase), can continue to provide a natural barrier to protect the underlying LSG unit.

4. EVALUATION OF THE PROPOSED AMENDED REMEDY

This section presents the results of the detailed analysis of the Proposed Amended Remedy identified in Section 3. The Proposed Amended Remedy was evaluated against the criteria identified in the NYSDEC guidance document entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites" (TAGM 4030) (NYSDEC, May 1990), which are consistent with the New York State Part 375 regulations (6 NYCRR Part 375).

4.1 Description of Evaluation Criteria

The detailed analysis presented in Section 4.2, consists of an evaluation of the Proposed Amended Remedy identified in Section 3 against the following seven (7) criteria, each of which are described in subsequent sections:

1. Overall Protection of Human Health and the Environment
2. Compliance with SCGs
3. Long-term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, or Volume
5. Short-Term Impacts and Effectiveness
6. Implementability
7. Cost

4.1.1 Overall Protection of Human Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. It evaluates the remedy's ability to achieve each of the remedial goals identified in Section 1.6. The overall assessment of protection overlaps with and is based on assessments performed under other evaluation criteria, particularly long-term effectiveness and performance, short-term effectiveness, and compliance with SCGs.

4.1.2 Compliance with SCGs

This criterion addresses whether or not a remedy will comply with applicable environmental laws, regulations, standards, and guidance. Refer to Section 2 for discussion of potentially applicable SCGs.

4.1.3 Long-Term Effectiveness and Permanence

This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

- The magnitude of the remaining risks;
- The adequacy of the engineering and institutional controls intended to limit the risk;

- The reliability of these controls; and
- The ability of the remedy to continue to meet RAOs in the future.

4.1.4 Reduction of Toxicity, Mobility, or Volume

This criterion addresses a remedy's ability to reduce the toxicity, mobility or volume of site contamination. The evaluation focuses on the following specific factors for a particular remedial alternative:

- The amount of hazardous materials that will be destroyed or treated;
- The degree of expected reduction in toxicity, mobility, or volume;
- The degree to which the treatment will be irreversible; and
- The type and quantity of treatment residuals that will remain following treatment.

4.1.5 Short-Term Impacts and Effectiveness

This criterion addresses potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation. It includes evaluation of how identified adverse impacts and health risks to the community or workers at the Site will be controlled, and the effectiveness of the controls. The engineering controls that will be used to mitigate short-term impacts are identified and evaluated. The length of time needed to achieve the remedial objectives is also estimated.

4.1.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing the remedy. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals and access for remedy implementation.

4.1.7 Cost

Under this criterion capital, operation, maintenance and monitoring costs for the remedy are estimated and presented on a present worth basis. The estimated costs are considered a Class 4 Cost Estimate with an expected accuracy of -30 to +50%, which is consistent with USEPA's RI/FS Guidance (USEPA, 1988). A contingency of 25% was applied to the Proposed Amended Remedy to address unforeseen costs and account for uncertainty in areas and volumes to be addressed. Present worth costs are estimated using a discount factor of 3%. Per the EPA Guidance, "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", July 2000 (EPA 540-R-00-002), for Federal facility sites being cleaned up using Superfund authority, it is generally appropriate to apply the real discount rates found in Appendix D of OMB Circular A-94. Per the Office of Management and Budget website (http://www.whitehouse.gov/omb/circulars/a094/ a094.html#8), the real discount rate as of January 2009 is 2.7% (i.e., approximately 3%).

4.2 Evaluation of the Proposed Amended Remedy

This section presents a detailed analysis of the Proposed Amended Remedy against the seven (7) evaluation criteria discussed above in Section 4.1. The analysis evaluates the relative performance of the Proposed Amended Remedy in relation to each specific evaluation criterion.

4.2.1 Overall Protection to Human Health and the Environment

The PDI and SI activities have provided additional information and increased the understanding of current Site conditions and the Conceptual Site Model. The Current Site Conceptual Model states that:

- The Site is currently used for commercial/industrial uses and there are no significant exposure pathways to MGP-related constituents under current Site use. Potential direct contact to MGP-related constituents is low under current conditions as the areas of the Site which are currently used either have not been found to contain surface impacts and/or are covered by either pavement or concrete.
- Data from the PDI activities indicates that potential vapor intrusion from the subsurface into on-site buildings also is not a significant exposure pathway. Soil gas sampling results indicated that MGP-related constituents were generally below conservative screening criteria and often within range of the concentrations that were found in ambient air at the Site.
- There is no exposure to groundwater as Site groundwater is not used and the depth to groundwater is typically 14 or more feet below grade.
- There are no indications of ongoing migration of NAPL/tar to surface water or sediments in the Hudson River or Wynantskill Creek. This conclusion is based on the observed low mobility of NAPL at the Site and is corroborated by sediment and surface water data in the Hudson River and Wynantskill Creek. No NAPL has been observed in sediment samples/borings adjacent to the Site and MGP-related constituents were not detected in surface water samples.
- Groundwater quality data indicate that dissolved-phase constituent concentrations attenuate rapidly and are approaching groundwater quality standards/guidance values before groundwater at the Site discharges to surface water. Where groundwater impacts are partially attributable to the presence of MGP constituents (i.e., in the northern portion of the Site), concentrations in the wells/piezometers adjacent to the Hudson River are non detect or meet New York State Class GA groundwater criteria (including both the fill and lower sand and gravel (LSG) units) adjacent to the Hudson River during the most recent sampling events. Furthermore, conservative mass flux estimates indicate that discharge of Site groundwater to surface water would not be anticipated to cause a significant impact to surface water quality.
- Transport of constituents via soil erosion is also not a significant pathway impacting adjacent water bodies, since impacted soil at the Site is primarily at depth and where surface impacts are present crushed stone or pavement is generally present, which limits erosion.

The Proposed Amended Remedy would provide ongoing protection of human health and the environment and would achieve remedial goals as follows:

- Protection of human health is achieved through the following:
    - Removal of near-surface impacts through the structure mitigation, purifier waste deposit excavation, and soil excavation components of the remedy;

- Implementation of a site cover to serve as a direct contact barrier; and
- Institutional controls to protect engineering controls; restrict future site uses for purposes other than appropriate recreational, industrial, or commercial uses; restrict use of site groundwater; require vapor intrusion evaluation and mitigation (if necessary); and require that future site work comply with a Site Management Plan.

- Protection of the environment is achieved through the following:
  - Excavation and ISS would address potential sources of COCs to surface water and sediment (i.e., removal of hardened tar along the shoreline and adjacent to the Wynantskill Creek), control the potential for future NAPL migration and eliminate or control potential sources impacting groundwater through removal or stabilization/solidification of visible tar or NAPL, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging;
  - Implementation of MNA, which is demonstrated to be effective in controlling dissolved phase COC migration.
  - NAPL monitoring to identify potential migration of NAPL and NAPL recovery (if necessary) to remove accumulated NAPL;
  - Installation of the site cover, which would provide a barrier to control contact by wildlife and would prevent erosion/migration of impacted soils to adjacent water bodies; and
  - Institutional controls to protect engineering controls and require that future site work comply with a Site Management Plan; and
  - Design of the ISS depths to maintain a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone, such that the alluvial layer, which has demonstrated its long-term effectiveness in controlling the vertical migration of constituents (including NAPL and dissolved-phase), can continue to provide a natural barrier to protect the underlying LSG unit.
- Potential short term risks during implementation would be managed through adherence to a site-specific HASP, restricted access to construction areas, adherence to a Community Air Monitoring Plan (CAMP), dust and vapor mitigation measures, and soil erosion and sediment migration control measures.

4.2.2 Compliance with SCGs

The analysis of compliance with SCGs is summarized below for each category of SCGs: chemical-specific, action-specific, and location-specific:

Chemical-Specific SCGs

The FS and July 2003 ROD evaluated an alternative that would achieve soil SCGs and concluded that such an alternative was not cost-effective for this Site, as the required cost to achieve soil SCGs was not proportional to the protectiveness of human health and the environment that such an alternative would provide. It was also concluded that such an alternative, despite the volume of soil that would be removed, would not be expected to immediately achieve groundwater SCGs. Based on the evaluations presented in the FS and ROD, achievement of soil and groundwater SCGs at this Site is considered infeasible and this conclusion has been further reinforced based on additional data collected during post-ROD investigation activities. Rather, the July 2003 ROD established excavation of soil containing total PAHs greater than 500 mg/kg as the practical extent of achieving soil SCGs, based on the information available at the time of the ROD, and the use of engineering and institutional controls to address residual concentrations above soil constituent-specific SCGs. To address groundwater SCGs the July 2003 ROD included removal or treatment of potential impacts which may be acting as a source to groundwater (i.e., soil containing visible tar or NAPL and/or PAHs greater than 500 mg/kg) followed by MNA until groundwater SCGs are met.

Post-ROD investigation activities, including the PDI and SI activities have generated new data/observations and information that substantially affect the scope, performance, and cost of components of the ROD-Selected Remedy. The post-ROD investigation activities have also increased the understanding of the site conceptual model, which has served as the basis for the proposed amendments to the remedy. Similar to the July 2003 ROD-Selected Remedy, the Proposed Amended Remedy would address soil SCGs through a combination of excavation, engineering controls, and institutional controls and groundwater SCGs through a combination of source removal/treatment and MNA. However, the Proposed Amended Remedy includes amended criteria for determining where the excavation and treatment components of the remedy would be applied.

The manner in which the Proposed Amended Remedy addresses soil and groundwater containing constituents that exceed applicable chemical-specific SCGs is discussed below.

- Removal of soil, to the extent practicable, with visible tar or NAPL (including hardened tar deposits) proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL, which would remove a potential source of COCs to surface water and sediment.
- Removal or stabilization/solidification of soil, to the extent practicable, which contains visible tar or NAPL, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. This includes the majority of locations where total PAHs greater than 500 mg/kg have been identified. However, locations where total PAHs in soil are greater than 500 mg/kg, but are not co-located with visible NAPL or are co-located with hardened/brittle tar or residual NAPL, and nearby groundwater data supports that the residual NAPL is not impacting groundwater, would not be subject to excavation or treatment. The excavation and ISS components would eliminate or control, to the extent practicable, the potential for NAPL to act as a source impacting groundwater.
- Soil with COC concentrations remaining above soil SCGs following removal/treatment would be addressed by a combination of engineering and institutional controls, including a site-wide cover and a long-term monitoring program.
- Groundwater with COC concentrations remaining above groundwater SCGs following removal/treatment would be addressed by a combination of engineering and institutional controls, including MNA and a long-term monitoring program.

As discussed in Section 2, surface water and sediment SCGs for Area 2 have already been met. The Hudson River is considered a separate operable unit. The potential impact of remaining COCs in soil and groundwater in Area 2 on surface water and sediment (including Wynantskill Creek and Hudson River) is discussed under the "Overall Protectiveness of Human Health and the Environment" and "Long-term Effectiveness and Permanence" criteria.

Action-Specific SCGs

The Proposed Amended Remedy would comply with Action-Specific SCGs through implementation of an NYSDEC-approved RD/RA Work Plan, site-specific HASP, and the NYSDOH CAMP and compliance with waste management regulations.

Location-Specific SCGs

The Proposed Amended Remedy would comply with Location-Specific SCGs through implementation of an NYSDEC-approved RD/RA Work Plan and obtaining applicable permits, which may include a water quality certifications required by Section 401 of the Federal Water Pollution Control Act, Title 33 United States Code 1341 and local permits from the City of Troy.

4.2.3 Long-Term Effectiveness and Permanence

The analysis of long-term effectiveness in relation to the Proposed Amended Remedy is as follows:

- Based on available data, under current conditions, the potential for direct contact to MGP-related constituents is low, potential vapor intrusion is not a significant exposure pathway, there is no exposure to groundwater, NAPL is not currently migrating to adjacent water bodies, groundwater is not impacting adjacent water bodies, and transport via erosion is not significant.
- The Proposed Amended Remedy would rely on engineering and institutional controls to address COCs in soil and groundwater which would remain on-site following excavation and treatment via ISS, to the extent practicable. As discussed, the excavation and ISS components address removal or treatment of soil (i.e., approximately 96,000 cy) meeting the following criteria:
  - Soil containing visible tar or NAPL (including hardened tar deposits) proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL, which would remove a potential source of COCs to surface water and sediment.
  - Soil containing visible tar or NAPL, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. This would eliminate or control the potential for future NAPL migration. Addressing these areas would also eliminate or control the potential for NAPL to act as a source impacting groundwater.
- The Proposed Amended Remedy would provide effective and reliable long-term control of potential remaining risks to human health (i.e., following the removal of impacted materials via the structure mitigation and soil excavation components) through implementation and maintenance of a site cover and institutional controls [including restriction of site uses, restriction of site groundwater use, vapor intrusion evaluation and mitigation (if necessary), and requirement that future site work comply with a Site Management Plan].
- The Proposed Amended Remedy would provide effective and reliable long-term control of potential remaining risks to the environment through implementation of ISS, which would limit future NAPL mobility and interaction of NAPL and groundwater, MNA, NAPL monitoring/recovery (if necessary), site cover, and a long-term monitoring program. The long-term effectiveness of these controls would be achieved through implementation of institutional controls to protect the engineering controls and require compliance with a Site Management Plan.

4.2.4 Reduction of Toxicity, Mobility, or Volume

The analysis of toxicity, mobility, or volume in relation to the Proposed Amended Remedy is as follows:

- Based on available data, under current conditions, NAPL is not migrating to adjacent water bodies, dissolved-phase COCs are not impacting adjacent water bodies, and significant transport of COCs via erosion is not occurring.

- The Proposed Amended Remedy would reduce the mobility of COCs via the site cover implementation, which would reduce infiltration through remaining impacted material via a combination of improved site drainage and asphalt paving.
- The Proposed Amended Remedy includes removal of approximately 2,500 to 3,000 cy of impacted material from structures. This would remove concentrated waste materials which are located near the surface and would eliminate the potential source that the contents of structures may represent to groundwater.
- The Proposed Amended Remedy includes excavation of approximately 27,000 cy of NAPL-impacted soil and soil containing total PAHs > 500 ppm from the unsaturated zone. Application of ISS, would further reduce the mobility of NAPL at the Site and would reduce the interaction between source material and groundwater. ISS would address deep zone impacts (approximately 69,000 cy) in the unsaturated and saturated zone in the northern portion of the Site where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where NAPL and groundwater impacts are most extensive.

4.2.5 Short-Term Impacts and Effectiveness

The analysis of short-term impacts in relation to the Proposed Amended Remedy is as follows:

- Through implementation of the Proposed Amended Remedy, potential risks to construction workers would be addressed by following a site-specific HASP, including air monitoring and use of proper personal protective equipment (PPE). Protection of the community would be provided through restricted access to construction areas and adherence to a Community Air Monitoring Plan (CAMP). Dust and vapor mitigation measures, would be employed, as necessary, to comply with dust and vapor concentration action levels established in the HASP and CAMP. Potential risks to the environment would be controlled by soil erosion and sediment migration control measures.
- Increased truck traffic due to off-site transportation and disposal of waste materials would occur as a result of the implementation of the Proposed Amended Remedy. The potential risks from increased truck traffic would be managed through adherence to a traffic management plan, decontamination plan, and dust controls.
- ISS would generate heat during the curing process which would increase COC volatilization. Monitoring would be required and engineering controls may be required to control vapors.
- Short-term risks would persist for the duration of remedy implementation. The estimated construction duration required for the Proposed Amended Remedy is 21 months.

4.2.6 Implementability

The analysis of technical feasibility of implementing the Proposed Amended Remedy is as follows:

- The Proposed Amended Remedy is considered technically feasible as the means and methods for implementation are available. In addition, the effectiveness of the Proposed Amended Remedy can be readily monitored under a long-term monitoring program including cover inspections, groundwater monitoring, and NAPL monitoring.
- The ability to achieve the target depths for ISS may be impeded by obstacles located below the depth of the pre-excavation (i.e., below 8 feet bgs), which may potentially include former foundations, subsurface structures, piping, large debris in the fill material (e.g., slag or concrete), or zones with extensive amounts of smaller-sized debris. In general, debris greater than 12 inches in size or zones with extensive amounts

of smaller diameter debris may present problems for the large diameter augers. As discussed in Section 3.3.3, reasonable efforts would be used to remove subsurface obstacles; however, in some instances removal may not be feasible or may require an inordinate level of effort. Material that is not treated via ISS would be addressed by other remedy components (i.e., NAPL monitoring/recovery, MNA, and Institutional Controls). The extent of ISS at a particular location would be determined in the field in consultation with the NYSDEC.

- Excavation and ISS near existing structures that are to remain may require temporary shoring or special provisions during implementation to protect those structures and to safely perform the work. This includes existing buildings, the channelized portion of the Wynantskill Creek (including the bridge crossing the creek), and the railroad. ISS has been successfully performed adjacent to buildings without the need for shoring as the ISS mix provided enough weight to keep the borehole open.
- Excavation and ISS near existing utilities that are to remain may require temporary shoring or special provisions during implementation to protect those utilities and to safely perform the work. These utilities would be identified and located prior to conducting work that may affect them. Coordination with the utility purveyor would be required to identify requirements and limitations associated with conducting work in the vicinity of the utilities.
- Aspects of the remedial action that affect potential future site development, including ISS mix design, site backfill specification, site cover materials and grades, and well locations, would require coordination with the development plans. As discussed below under administrative feasibility, implementation activities and schedule would require coordination with the property owner (i.e., Troy LDC).
- In addition to conventional equipment (e.g., excavators, loaders, dozers, dump trucks), barge-operated excavation equipment may be required to access shoreline tar deposits, however, this work may also be completed by land.

The analysis of administrative feasibility of implementing the Proposed Amended Remedy is as follows:

- Implementation activities and schedule would require coordination with the property owner (i.e., Troy LDC) and may include implementation using a phased-approach to accommodate potential development plans. In addition, Site access agreements would be required.
- The material and equipment for implementation are readily available.
- Permitted facilities are available for treatment/disposal of excavated materials.
- Implementation of the Proposed Amended Remedy would significantly disrupt current Site activities and may require temporary relocation of businesses currently operating on site.
- Excavation of shoreline hardened tar deposits may require permitting for work below the mean high water line.
- Application of ISS as a component of the Proposed Amended Remedy would require specialty contractors for design and installation support, however, such companies are available.

4.2.7 Cost

A summary of the estimated costs for the Proposed Amended Remedy along with detailed cost estimates and notes are presented in Appendix D. The estimated capital costs are \$35.1 Million (Note: this capital cost includes approximately \$5.4 Million, which has already been incurred, for completion of components of the remedy since issuance of the ROD, including post-ROD investigations and structure mitigation) and annual O&M costs are \$96,000. The estimated net present value of the alternative using a 3% discount rate and O&M period of 30 years is \$37.0 Million.

Note that the estimated costs do not include costs associated with previous interim remedial measures (IRMs) performed to address the former gasholder east of the former Water Gas Building or lime sump east of the former By-Products Building.

5. SUMMARY AND CONCLUSIONS

Since issuance of the July 2003 ROD, post-ROD investigation/evaluation activities have generated new data/observations and information that substantially affect the scope, performance, and cost of components of the ROD-Selected Remedy, in particular the excavation and in situ treatment (i.e., ISCO) components of the ROD-Selected Remedy, and require amendments to the site remedy. The post-ROD investigation/evaluation activities have also increased the understanding of the Conceptual Site Model and have provided the basis for the proposed amendments to the remedy.

Based on the current Conceptual Site Model, an alternative employing seven (7) of the nine (9) elements identified in the ROD-Selected Remedy would achieve the remedial goals outlined in the July 2003 ROD and provide long-term protection of human health and the environment through a combination of excavation and off-site treatment/disposal (i.e., structure contents and purifier waste deposits) and engineering and institutional controls. Protection of human health would be achieved through implementation of a site cover and institutional controls [including restriction of site uses, restriction of site groundwater use, vapor intrusion evaluation and mitigation (if necessary), and requirement that future site work comply with a Soil Management Plan]. Protection of the environment would be achieved through implementation of MNA, which has been demonstrated to be effective in controlling dissolved phase constituent migration, NAPL monitoring and recovery (if necessary), and the site cover, which would provide a barrier to control contact by wildlife and would prevent erosion/migration of impacted soils to adjacent water bodies.

Although implementation seven (7) of nine (9) elements identified in the ROD-Selected Remedy would achieve remedial goals, such a remedy would leave a substantial volume of impacted soil at the site and would not satisfy the threshold criteria of compliance with SCGs, to the extent practicable. Therefore, the Proposed Amended Remedy, which is depicted on Figure 3-1, would employ these seven (7) elements identified in the ROD-Selected Remedy along with excavation and in situ treatment via ISS. Similar to the July 2003 ROD-Selected Remedy, the Proposed Amended Remedy would achieve remedial goals and satisfy the threshold criteria of protection of human health and the environment and compliance with SCGs, to the extent practicable, through a combination of excavation, in situ treatment, engineering controls, and institutional controls. However, the Proposed Amended Remedy includes amended criteria for determining where the excavation and treatment components of the remedy would be applied. The potential risks to human health and the environment associated with residual COC concentrations remaining above SCGs following excavation and treatment would be effectively managed by other planned remedial components (i.e., Site Cover, Monitored Natural Attenuation, Long-term Monitoring, and Institutional Controls).

The Proposed Amended Remedy would remove and/or treat via ISS the vast majority of soil where visible tar or NAPL and/or soil containing total PAH concentrations greater than 500 mg/kg are present. Removal of structure contents and purifier waste deposits eliminates concentrated waste materials from the Site and the potential direct contact risks and potential sources of groundwater impacts associated with these areas. Excavation and ISS would remove or stabilize soil in areas where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where NAPL and groundwater impacts are most extensive. The excavation and ISS component address soil which meets the following criteria:

- Visible tar or NAPL (including hardened tar deposits) is present in soil proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL; and/or

- Visible tar or NAPL is present in soil, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. Based on existing data, addressing these areas would also address the areas where groundwater data suggests the NAPL is acting as a source impacting groundwater.

In addition to the estimated soil volumes that meet the above criteria for removal or ISS (i.e., approximately 27,000 cy via excavation and 69,000 cy via ISS), an additional approximate 36,000 cy would require excavation to access this soil (i.e., approximately 6,000 cy for the excavation component and 29,000 cy for the ISS component).

The potential risks associated with residual impacts would be effectively managed by other planned remedial components (i.e., Site Cover, MNA, Long-term Monitoring, and Institutional Controls). In addition, the depth of the ISS component of the Proposed Amended Remedy would be designed to maintain a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone, such that the alluvial layer, which has demonstrated its long-term effectiveness in controlling the vertical migration of constituents (including NAPL and dissolved-phase), can continue to provide a natural barrier to protect the underlying LSG unit.

The following represents a summary of the elements of the Proposed Amended Remedy:

- **Element 1: Remedial Design Program** - The Remedial Design Program would be performed to verify the components of the conceptual design, resolve uncertainties identified in the RI/FS, and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Some components of Element 1 have been completed since issuance of the ROD, including the investigation activities (i.e., PDI and SI) and ISCO pilot testing. Additional activities may include:
  - Potential investigation activities to collect additional data which may be required for the design and construction of the Proposed Amended Remedy; and
  - Design of the construction elements of the Proposed Amended Remedy and development of plans for the operation, maintenance, and monitoring of the remedy.
- **Element 2: Excavation** – The excavation component removes of near-surface impacts in the northern portion of the Site, at the mouth of the former Wynantskill Creek and along the Hudson River shoreline, and in the southern portion of the Site in the vicinity of the By-Products Building, where shallow-zone impacts are most extensive. The excavation component would include removal of shallow unsaturated zone soil, to the extent practicable, which meets the following criteria (estimated to be approximately 27,000 cy):
  - Visible tar or NAPL (including hardened tar deposits) is present in soil proximal to a surface water body, including locations where soil containing PAHs greater than 500 mg/kg are co-located with visible tar or NAPL; and/or
  - Visible tar or NAPL is present, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging.
- **Element 3: In-Situ Stabilization/Solidification (ISS)** - The ISS component addresses deep zone impacts in the unsaturated and saturated zone in the northern portion of the Site where the bulk of the former MGP operations were conducted, the filled-in former Wynantskill Creek is located, and where deep-zone NAPL impacts are most extensive. The ISS component would include stabilization/solidification of deep unsaturated zone soil and saturated zone soil, to the extent practicable, which meets the following criterion:

- Visible tar or NAPL is present in soil, which is potentially mobile based on the description of NAPL from the field observations and/or results from NAPL gauging. Addressing these areas would also address the areas where groundwater data indicate the NAPL is acting as a source impacting groundwater.

- **Element 4: Removal of Structure Contents** - This component includes removal of the structure contents followed by inspection of the interior surfaces. The structures of interest identified in the ROD include: A) Sump 1; B) Underground Air Plenum (completed in 2009); C) Underground Vault (completed in 2009); D) Sump 4; E) Tar-Liquor Sump (contents removal completed in 2008, structure to be removed under future remedial action); and F) Aboveground Oil/Water Separator (completed in 2008). This element also includes investigation of the potential presence of MGP impacts within pipes traversing the Wynantskill Creek. With the exception of removal of the TLS, removal of structure contents from Sumps 1 and 4, and the investigation of the pipes traversing the Wynantskill Creek, previously conducted remedial action activities have addressed the other items in Element 4.
- **Element 5: Removal and Off-Site Disposal of Purifier Waste** - In accordance with the ROD, this component includes removal and off-site disposal of purifier waste deposits in two locations: 1) on the surface near the former 2,000,000-cf gas holder; and 2) on the surface in the former Wynantskill Creek alignment along the Hudson Riverbank. Based on the findings from test pitting activities performed during the SI in August 2007, no indications of purifier waste were identified in the area near the former 2,000,000-cf gas holder and thus, this component has since been removed from the requirements for Element 5, as approved by the NYSDEC in an e-mail dated August 9, 2007. Excavation of the purifier waste deposits on the surface along the Hudson Riverbank was completed in April 2008.
- **Element 6: Asphalt Cap or Permeable Soil Cover** - To control potential direct contact exposure, reduce erosion, and wind transport of constituents, an asphalt cap or permeable soil cover would be placed over the entire Site, excluding building footprints. The site cover would also facilitate re-development of the Site for industrial and commercial purposes. As discussed in a meeting with representatives from the NYSDEC and National Grid on September 25, 2008, the permeable soil cover would be a minimum of one-foot thick and include a demarcation layer. This represents a modification of the minimum two foot thickness identified in the July 2003 ROD.
- **Element 7: Monitored Natural Attenuation (MNA)** – MNA was selected in the ROD to address dissolved-phase constituents of concern associated with Plume A, located in the southwestern portion of the Site, and Plume B, which is located in the northern portion of the Site. MNA may not be required for Plume B as this area is addressed by the proposed ISS component.
- **Element 8: Institutional Controls** – Institutional controls including groundwater usage and zoning restrictions would be established as part of the remedy. In addition, protection of engineering controls associated with the remedy would be established. In the event that changes from the current use of on-site buildings occur in the future, an evaluation of potential soil vapor on indoor air quality would be conducted.
- **Element 9: Long-Term Monitoring Program** – Institution of a long-term monitoring program would be established to: 1) evaluate the effectiveness of ISS (Element 3) and MNA (Element 7) through groundwater quality monitoring; 2) evaluate the soil and/or asphalt cover (Element 6) through routine inspections; and 3) assess potential migration of NAPL through NAPL gauging efforts.

The Proposed Amended Remedy is estimated to require a construction period of approximately two years to complete the remaining structure mitigation, perform the excavation/restoration and ISS, and install the surface cover. This timeframe does not include the timeframe for potential additional pre-design investigation/treatability testing activities, remedial design, or permitting, which would be required prior to the start of construction. The remaining components of the remedy would be implemented as part of the long-term OM&M program. The construction activities and schedule would be coordinated with the property owner (i.e., the Troy Local Development Corporation) and may include implementation using a phased approach to accommodate potential development plans.

The estimated capital cost for implementation of the Proposed Amended Remedy is $35 Million (Note: this capital cost includes approximately $5.4 Million, which has already been incurred, for completion of components of the remedy since issuance of the ROD, including post-ROD investigations and structure mitigation). The estimated O&M cost is $96,000 per year. The estimated net present worth is $37 Million.

6. REFERENCES

Blasland Bouck & Lee, March 2003. “Phase II Hudson River Sediment Investigation Report”.

Brown and Caldwell Associates, February 2004. “Pre-Design Investigation Report, Troy (Water Street) Site, Troy, New York”.

Brown and Caldwell Associates, June 2004. “In-Situ Chemical Oxidation Pre-Design Pilot Test Work Plan, Troy (Water Street) Site-Area 2, Troy New York”.

Brown and Caldwell Associates, May 2006. “In-Situ Chemical Oxidation Post-Pilot Test Report, Troy (Water Street) Site-Area 2, Troy New York”.

Brown and Caldwell Associates, May 2006. “Supplemental Pre-Design Investigation Report, Troy (Water Street) Site—Area 2, Rensselaer County, New York”.

Brown and Caldwell Associates, January 2006. “In-Situ Chemical Oxidation Pilot Test Report, Troy (Water Street) Site, Troy, New York”.

Brown and Caldwell Associates, September 2006. “Supplemental Investigation Work Plan, Troy (Water Street) Site—Area 2, Troy, New York”.

Brown and Caldwell Associates, June 2007. “Interim Remedial Measures Work Plan for Purifier Waste Deposits, Troy (Water Street) Site—Area 2, Rensselaer County, New York”;

Brown and Caldwell Associates, February 2008. “Supplemental Investigation Report, Troy (Water Street) Site—Area 2, Troy, New York”.

Brown and Caldwell Associates, February 2008. “DRAFT Groundwater Model Report, Troy (Water Street) Site—Area 2, Troy, New York”.

Fetter, C.W. 1993. “Contaminant Hydrogeology”

Fluor Daniel GTI, Inc. October 1998. “Remedial Investigation Report for Troy (Water Street) Site, Area 2”.

Fluor Daniel GTI, Inc. 1998. “Remedial Investigation Report for Troy (Water Street), New York, Area 4”.

Foster Wheeler, November, 2002. “Generic Field Sampling Plan for Site Investigations at Non-Owned Former MGP Sites”.

Foster Wheeler, November 2002. “Generic Quality Assurance Project Plan for Site Investigations at Non-Owned Former MGP Sites”.

Groundwater Technology, Inc. October 1995. “Final Preliminary Site Assessment/Interim Remedial Measures Study for Troy (Water Street) New York (Area 2)”.

IT Engineering of New York, P.C., March 2002. “Final Feasibility Study Report, Troy Water Street Area 2”.

IT Corporation, March 2002. “Supplemental Phase II Data Report, Troy Water Street Area 2”.

IT Corporation, September 2000. “Troy Water Street Area 2, Supplemental Data Report”.

Letter Re: “Data Gaps” from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) dated July 7, 2006.

Letter Re: “Action Items from June 4, 2008 Meeting” from National Grid (Ms. Cathy Geraci) to NYSDEC (Mr. John Spellman) dated June 20, 2008.

Letter Re: “2008 Submittal Review” from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) dated August 2008;

Letter Re: “Identification of Proposed Remedial Alternatives” from National Grid (Ms. Cathy Geraci) to NYSDEC (Mr. John Spellman) dated October 21, 2008.

Letter Re: “Identification of Proposed Alternatives” from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) dated October 30, 2008.

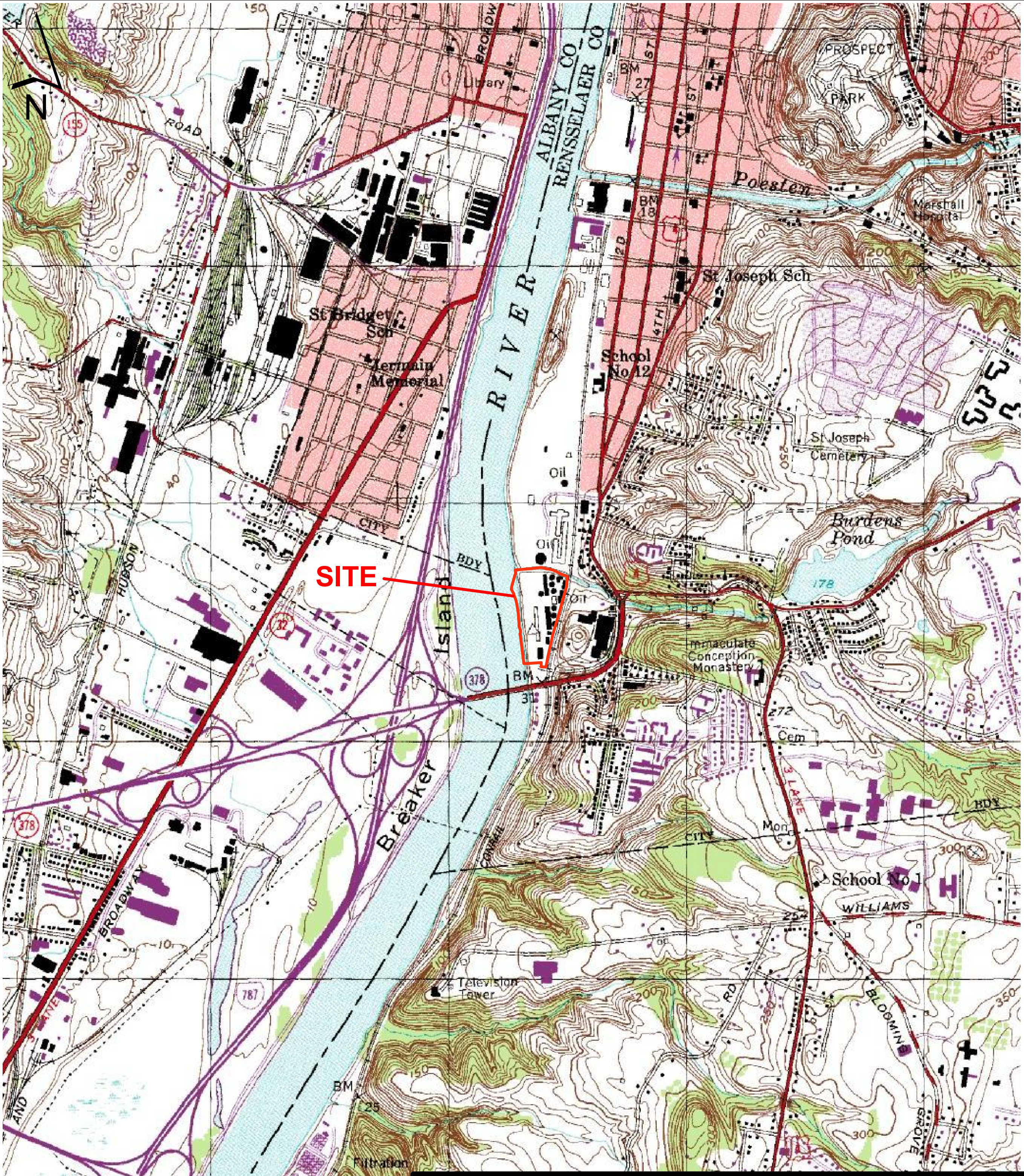
Memorandum Re: “Soil Volume Estimates” from BC (Mr. Adam Sherman) to NYSDEC (Mr. John Spellman) dated April 28, 2008.

NYSDEC, February 2003. “Proposed Remedial Action Plan, NIMO Troy-Water Street MGP, Operable Unit No. 1, Area 2-Former Plant Site”.

NYSDEC, July 2003. “Record of Decision, NIMO-Troy-Water Street MGP Site, Operable Unit No.1, Area 2-Former Plant Site”.

NYSDEC, November 2009. “Draft Soil Cleanup Guidance”.

FIGURES



Base Map Source:
USGS 7.5 Minute Quadrangle
Troy South, New York, 1995

FIGURE 1

SITE LOCATION

Troy (Water Street) Site - Area 2
Troy, New York

DATE	PROJECT NUMBER
1/2009	132071.007

BROWN AND CALDWELL
ASSOCIATES

P:/GIS/National_Grid/Troy/Troy_Site_Location.mxd

LEGEND:

BELOW-GRADE STRUCTURE/PAD

FORMER ABOVE-GRADE BUILDING

EXSITING ABOVE-GRADE STRUCTURE/BUILDING

PROPERTY LINE

PZ-3 PIEZOMETER LOCATION

MW-23 MONITORING WELL LOCATION

MAP SOURCE DATA:

1. BASE MAP INFORMATION OBTAINED FROM DRAWING PREPARED BY NIAGARA MOHAWK ENTITLED "TROY, WATER STREET - TOPOGRAPHIC MAP", DRAWING D-31454-E, DATED 10/3/94.
2. PROPERTY LINE BASED ON DRAWING PREPARED BY VAN DUSEN & STEVES LAND SURVEYORS, DATED DECEMBER 1, 2004.
3. AIR PLENUM AND UNDERGROUND VAULT LOCATIONS BASED ON SURVEY COMPLETED BY CLARK ENGINEERING AND SURVEYING, P.C. (CES) ON 2/3/09. SURVEY DEPICTED ON CES DRAWING ENTITLED "TUNNEL LOCATION SURVEY", DATED 3/4/09.
4. LIMITS OF PURIFIER WASTE DEPOSIT EXCAVATION, TAR LIQUOR SUMP (TLS), AND OIL/WATER SEPARATOR (OWS) OBTAINED FROM SURVEY DRAWING BY VAN DUSEN AND STEVES LAND SURVEYORS, DATED MAY 1, 2008. EXCAVATION OF PURIFIER WASTE AND CONTENTS OF TLS AND OWS WAS COMPLETED IN APRIL TO MAY 2008.
5. LOCATION OF REMAINING UNDERGROUND STRUCTURES SHALL BE CONSIDERED APPROXIMATE.

P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\502(PMSR)\~FFS\FIGURE_1-2 _SITE_PLAN.DWG 03/18/2010 10:31:37AM By:jjames XREFS: Layout: Site Plan

FIGURE 1-2
SITE PLAN

NATIONAL GRID
TROY (WATER STREET) SITE-AREA 2
TROY, NEW YORK

DATE	PROJECT NUMBER
3/10	132071

BROWN AND CALDWELL
ALLENDALE, NEW JERSEY

FIGURE 1-3

SAMPLE LOCATION PLAN

Troy (Water Street) Site - Area 2
Troy, New York

DATE 03/16/10

PROJECT NUMBER 132071.502

BROWN AND CALDWELL ASSOCIATES

P:/GIS/National_Grid/Troy_Sample_Loc_Map.mxd

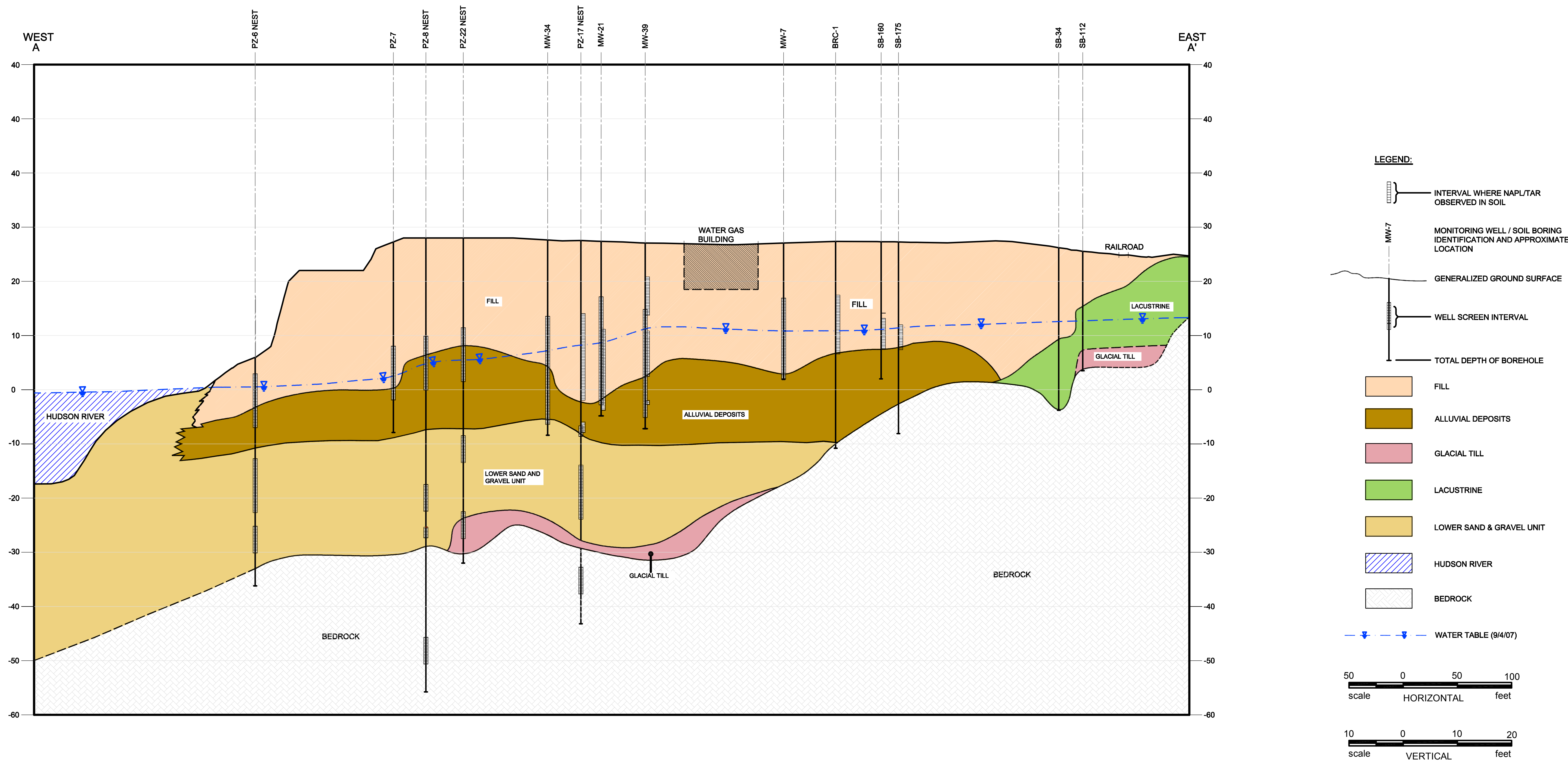


FIGURE 1-4a
GENERALIZED GEOLOGIC
CROSS-SECTION A-A

NATIONAL GRID
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

DATE	PROJECT NUMBER
1/09	132071

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\FIGURE-1-4A CROSS-SECTIONS A-A.DWG 03/23/2010 10:16:09AM By:rjames XREFS: Layout: Layout1

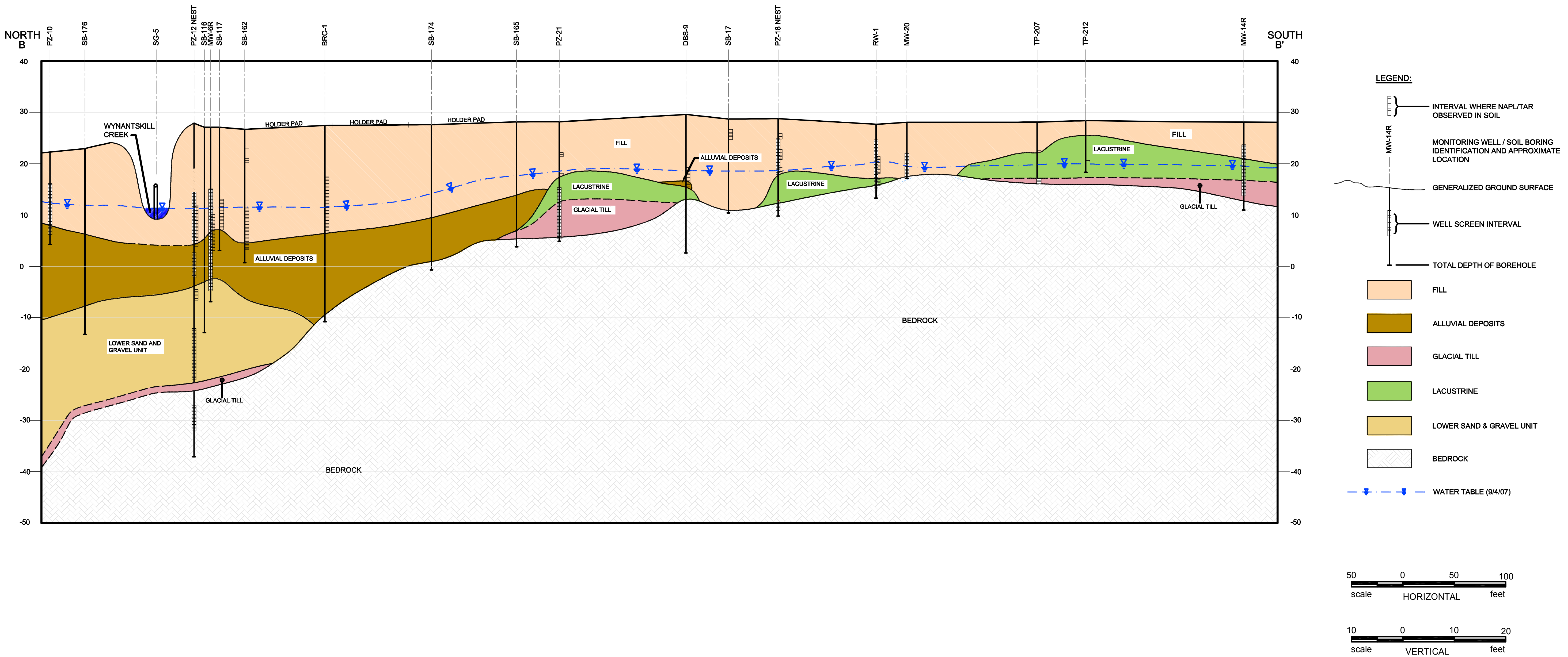


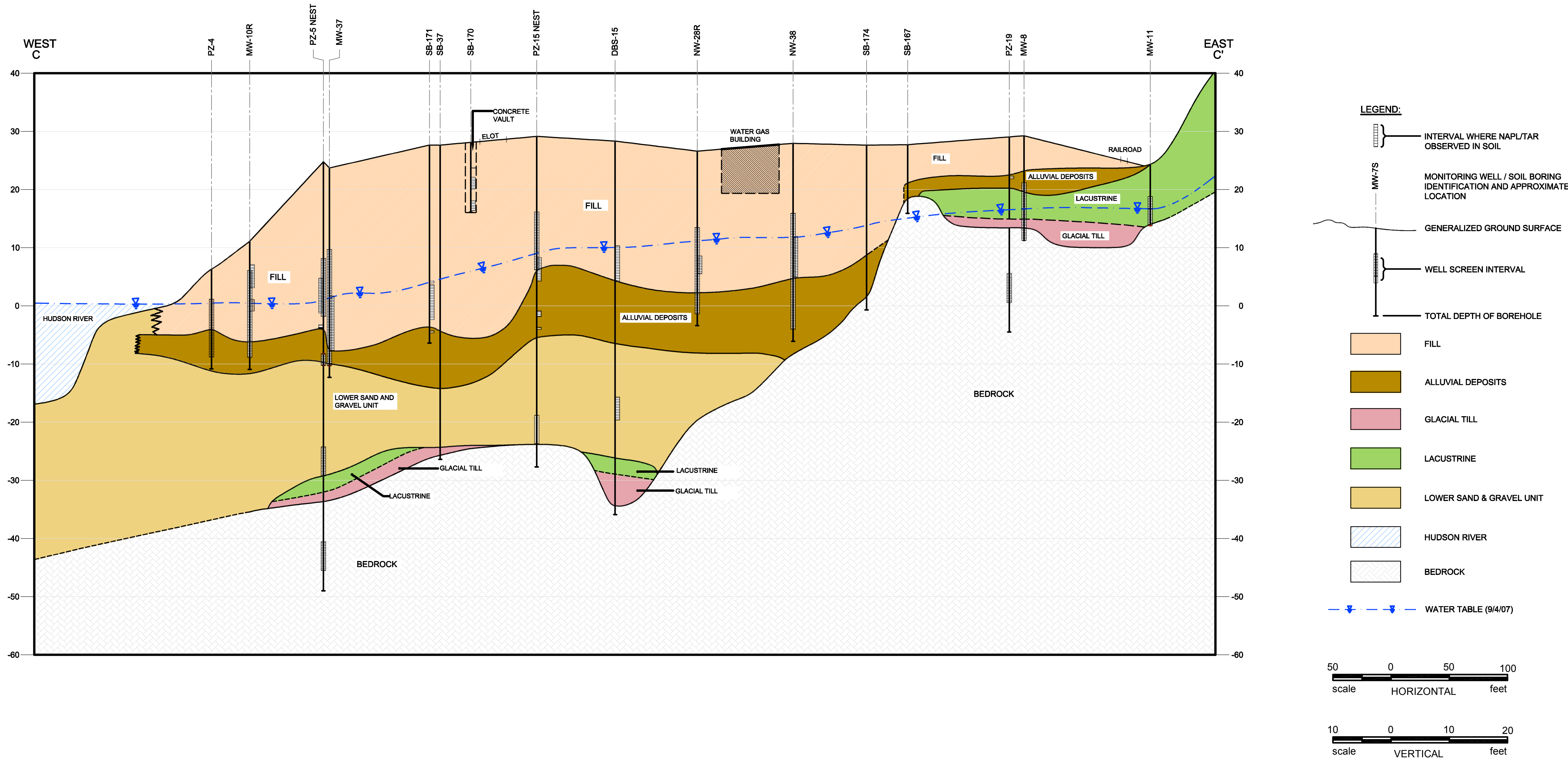
FIGURE 1-4b
GENERALIZED GEOLOGIC
CROSS-SECTION B-B

NATIONAL GRID
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

DATE	PROJECT NUMBER
1/09	132071

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\FIGURE-1-4B CROSS-SECTIONS B-B.DWG 03/23/2010 10:17:23AM By:jrames XREFS: Layout: Layout1



P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\FIGURE-1-4C CROSS-SECTIONS C-C.DWG 03/23/2010 10:18:28AM By:rjames XREFS: Layout: Layout1

FIGURE 1-4c
GENERALIZED GEOLOGIC
CROSS-SECTION C-C

NATIONAL GRID
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

DATE	PROJECT NUMBER
1/09	132071

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

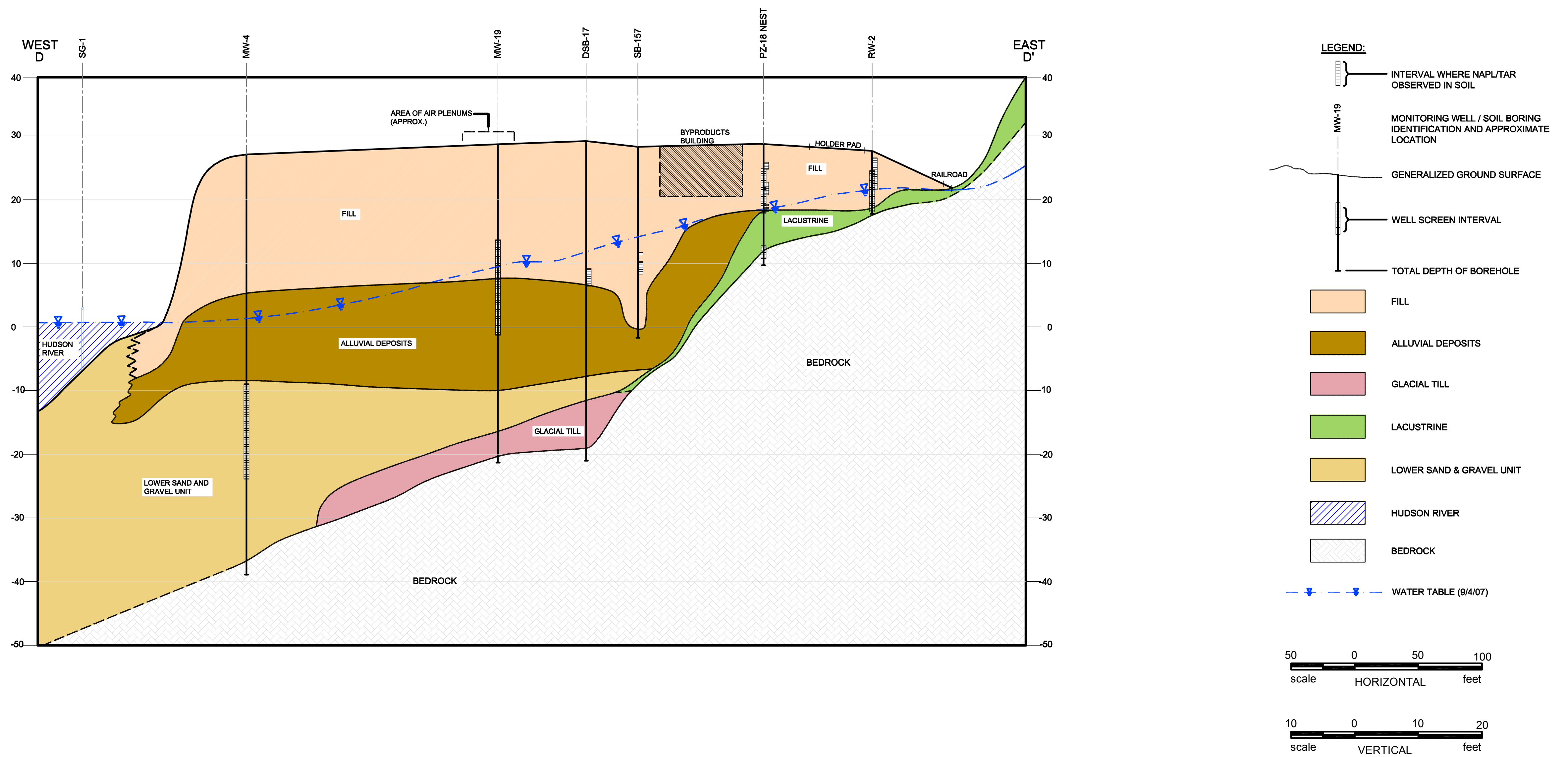


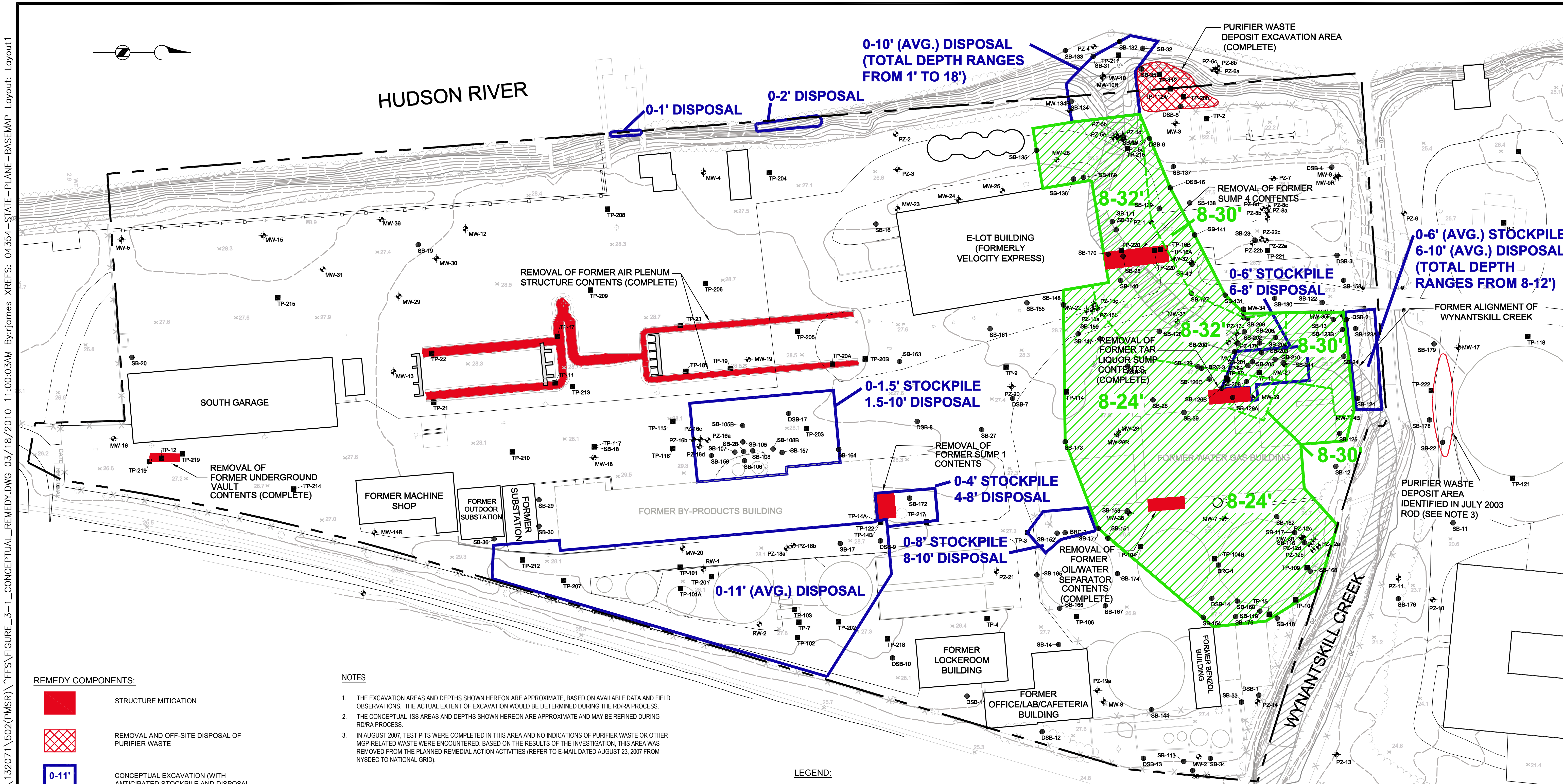
FIGURE 1-4d
GENERALIZED GEOLOGIC
CROSS-SECTION D-D

NATIONAL GRID
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

DATE	PROJECT NUMBER
1/09	132071

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\FIGURE-1-4D CROSS-SECTIONS D-D.DWG 03/23/2010 10:20:02AM By:rjames XREFS: Layout: Layout1



REMEDY COMPONENTS:

- STRUCTURE MITIGATION
- REMOVAL AND OFF-SITE DISPOSAL OF PURIFIER WASTE
- 0-11' CONCEPTUAL EXCAVATION (WITH ANTICIPATED STOCKPILE AND DISPOSAL INTERVALS)
- 8-30' CONCEPTUAL IN SITU SOLIDIFICATION/ STABILIZATION (ISS) (WITH TARGET INTERVALS); 0-8' INTERVAL TO BE EXCAVATED PRIOR TO ISS

REMEDY COMPONENTS:

- SITE-WIDE SOIL OR ASPHALT COVER
- MONITORED NATURAL ATTENUATION (MNA) OF GROUNDWATER
- NAPL MONITORING AND RECOVERY (AS NECESSARY)
- INSTITUTIONAL CONTROLS TO: (A) PROTECT ENGINEERING CONTROLS; (B) RESTRICT ON-SITE GROUNDWATER USE; (C) PROHIBIT SITE USE FOR RESIDENTIAL PURPOSE; (D) REQUIRE VAPOR INTRUSION EVALUATION FOR ON-SITE BUILDINGS IF BUILDING USE CHANGES FROM CURRENT USE.
- LONG-TERM MONITORING PROGRAM

NOTES

1. THE EXCAVATION AREAS AND DEPTHS SHOWN HEREON ARE APPROXIMATE, BASED ON AVAILABLE DATA AND FIELD OBSERVATIONS. THE ACTUAL EXTENT OF EXCAVATION WOULD BE DETERMINED DURING THE RD/RA PROCESS.
2. THE CONCEPTUAL ISS AREAS AND DEPTHS SHOWN HEREON ARE APPROXIMATE AND MAY BE REFINED DURING RD/RA PROCESS.
3. IN AUGUST 2007, TEST PITS WERE COMPLETED IN THIS AREA AND NO INDICATIONS OF PURIFIER WASTE OR OTHER MGP-RELATED WASTE WERE ENCOUNTERED. BASED ON THE RESULTS OF THE INVESTIGATION, THIS AREA WAS REMOVED FROM THE PLANNED REMEDIAL ACTION ACTIVITIES (REFER TO E-MAIL DATED AUGUST 23, 2007 FROM NYSDEC TO NATIONAL GRID).

LEGEND:

- BELOW-GRADE STRUCTURE/PAD
- FORMER ABOVE-GRADE BUILDING
- EXSITING ABOVE-GRADE STRUCTURE/BUILDING
- PROPERTY LINE
- PZ-3 PIEZOMETER LOCATION
- MW-23 MONITORING WELL LOCATION
- TP-3 TEST PIT LOCATION
- SB-65 SOIL BORING LOCATION

0 50 100
SCALE IN FEET

MAP SOURCE DATA:
REFER TO FIGURE 1-2 "SITE PLAN"

DRAFT

FIGURE 3-1
CONCEPTUAL SITE PLAN - PROPOSED AMENDED REMEDY
EXCAVATION, ISS, SITE COVER, CLOSURE OF STRUCTURES, REMOVAL OF PURIFIER WASTE, MNA, INSTITUTIONAL CONTROLS, AND LONG-TERM MONITORING

NATIONAL GRID
TROY (WATER STREET) SITE-AREA 2
TROY, NEW YORK

DATE	PROJECT NUMBER
03/10	132071

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

APPENDIX A

Documentation of Post-ROD Activities

DOCUMENTATION OF POST-ROD ACTIVITIES

Since issuance of the ROD in July 2003, Site investigation, remedy evaluation, and other remedial activities for the Site have been discussed in the following documents:

- Pre-Design Investigation Report, Troy (Water Street) Site, Troy, New York (BC, February 2004);
- In-Situ Chemical Oxidation Pre-Design Pilot Test Work Plan, Troy (Water Street) Site-Area 2, Troy New York (BC, June 2004);
- In-Situ Chemical Oxidation Pilot Test Report, Troy (Water Street) Site, Troy, New York (BC, January 2006);
- In-Situ Chemical Oxidation Post-Pilot Test Report, Troy (Water Street) Site-Area 2, Troy New York (BC, May 2006);
- Supplemental Pre-Design Investigation Report, Troy (Water Street) Site—Area 2, Rensselaer County, New York (BC, May 2006);
- Letter Re: "Data Gaps" from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) dated July 7, 2006;
- Interim Remedial Measures Work Plan for the Tar Liquor Sump and Oil/Water Separator, Troy (Water Street) Site—Area 2, Rensselaer County, New York (BC, November 2006);
- Clarifications to Interim Remedial Measures Work Plan for the Tar Liquor Sump and Oil/Water Separator, Troy (Water Street) Site—Area 2, Rensselaer County, New York (BC, June 2007);
- Interim Remedial Measures Work Plan for Purifier Waste Deposits, Troy (Water Street) Site—Area 2, Rensselaer County, New York (BC, June 2007);
- Supplemental Investigation Report; Troy (Water Street) Site – Area 2; Troy, New York (BC, February 2008);
- Memorandum Re: "Soil Volume Estimates" from BC (Mr. Adam Sherman) to NYSDEC (Mr. John Spellman) dated April 28, 2008;
- Memorandum Re: "Preliminary Feasibility Assessment of Subsurface Barrier Walls as a Component of Remedy" from BC (Mr. Robert O'Neill and Mr. Adam Sherman) to NYSDEC (Mr. John Spellman) dated May 2, 2008;
- Remedial Action Work Plan for the Air Plenum Troy (Water Street) Site—Area 2, Rensselaer County, New York (BC, May 2008);
- Letter Re: "Action Items from June 4, 2008 Meeting" from National Grid (Ms. Cathy Geraci) to NYSDEC (Mr. John Spellman) dated June 20, 2008;
- Letter Re: "2008 Submittal Review" from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) dated August 2008;
- Letter Re: "Identification of Proposed Remedial Alternatives" from National Grid (Ms. Cathy Geraci) to NYSDEC (Mr. John Spellman) dated October 21, 2008;
- Letter Re: "Identification of Proposed Alternatives" from NYSDEC (Mr. John Spellman) to National Grid (Ms. Cathy Geraci) dated October 30, 2008;
- Draft Proposal to Modify the Site Remedy, Troy (Water Street) Site, Troy, New York (BC, January 2009);

- Construction Completion Report, Air Plenum and Underground Vault Remedial Action, Troy (Water Street) Site, Troy, Rensselaer County, New York (BC, April 2009);
- Construction Completion Report, Purifier Waste Deposits, Tar Liquor Sump, and Oil/Water Separator, Troy (Water Street) Site, Troy, New York (BC, May 2009);
- Letter Re: "Repair of Makeshift Access Ramp" from National Grid (Ms. Cathy Geraci) to NYSDEC (Mr. John Spellman) dated May 14, 2009; and
- Letter Re: Management of Waste from Demolition of Former Cooling Towers" from National Grid (Ms. Cathy Geraci) to NYSDEC (Mr. John Spellman) dated August 5, 2009.

APPENDIX B

Site Characterization Summary

SITE CHARACTERIZATION SUMMARY

B.1 Site Stratigraphy

The SI Report (BC, February 2008) provides a detailed description of the Site geologic setting. As discussed in the SI Report, unconsolidated overburden deposits that are variable in nature overlie bedrock at the site. The overburden is generally thinnest in the eastern part of the Site, and becomes progressively thicker toward the Hudson River to the west. Figure 1-3 of the FFS depicts orientations for the geologic cross-sections that illustrate the Site stratigraphy, which are presented in Figures 1-4a through 1-4d of the FFS.

Provided below is a summary of the findings based on the results and the SI and previous investigation activities at the Site:

- Bedrock beneath the Site is composed of black shale with pervasive, closely-spaced, scaly and planar cleavage surfaces. The cleavage surfaces, and the quartz veins that cut though the shale, dip moderately to steeply to the east. The top of bedrock surface is weathered to varying degrees. The surface of the bedrock slopes to the west and north with local irregularities.
- Glacial deposits are present above the bedrock and are locally discontinuous. These deposits include glacial till and lacustrine deposits; where they occur at the same location, the lacustrine deposits are above the till. The glacial till consists of poorly sorted mixtures of sand and gravel with varying amounts of silt and clay, and is typically dense and cohesive, but can be loose. The lacustrine deposits are typically fine-grained, ranging from silty clays to clayey silts, often with trace amounts of fine sand. They are usually very thinly-bedded (varved), and are typically cohesive.
- The lower sand and gravel (LSG) unit is positioned above the glacial deposits and bedrock in the western portion of site. The unit becomes thinner and ends toward the east. This unit is predominantly composed of coarse grained sand and gravel with some cobbles. Locally, it contains finer sands, silt and clay. The upper contact of the LSG unit appears to be gradational with the overlying, fine grained alluvial deposits.
- Finer-grained alluvial deposits overlie the LSG unit in the western part of the site, and overlie the glacial deposits or bedrock in the eastern part of the site. They are absent on the easternmost side of the site. These deposits consist of layered organics, peat, silt, clay and fine sand and contain discontinuous lenses of coarser sand and gravel. Laboratory grain size analysis samples collected during the SI demonstrate that the composition of the material is predominantly fine-grained. Adjacent to the Hudson River, the average grain size coarsens.
- Fill overlies the other deposits described above. The fill is generally thinner in the east and thicker toward the west (refer to "Isopach Map of Alluvial Deposits" and "Base of Fill Surface Contour Map" in Appendix E, which were presented in the SI Report). The fill is generally coarse grained and is composed of various materials including sand, gravel, slag, cinders, and demolition debris. Finer-grained material (silt and clay) is locally present in the fill, but is typically not the predominant component.

- The buried former channel of Wynantskill Creek is bedded in the fine-grained alluvial deposits in the northern part of the Site (refer to cross-section in Figure 1-4a of the FFS and "Base of Fill Surface Contour Map" in Appendix E). The course of this former channel is positioned under, and parallel to, the eastern, unlined section of the existing creek. Where the existing creek enters the concrete channel, the buried former channel turns south and then west toward the Hudson River. The fill is relatively thicker where it occupies the former channel.

B.2 Hydrostratigraphy and Groundwater Flow

The SI Report (BC, February 2008) provides a detailed description of the hydrostratigraphy and groundwater flow at the Site. Provided below is a summary of the findings based on the results and the SI and previous investigation activities at the Site:

- The fill and the LSG are the most permeable units, with a geometric mean horizontal hydraulic conductivity estimates (K_h) from slug tests of 3.9 x 10^{-3} cm/sec and 2.1 x 10^{-3} cm/sec, respectively.
- The fine grained alluvial deposits form a lower permeability layer beneath the fill. The geometric mean K_h estimate of the alluvial deposits from slug tests, 3.7 x 10^{-4} cm/sec, is approximately an order of magnitude less than that of the fill and LSG unit. On a larger scale, the K_h of the alluvial deposits is likely even less due to the discontinuous nature of the thin layers in these types of deposits. As discussed in Section 1.5.1, the alluvial deposits are variable in composition, containing layered organics/peat, silt, clay, and fine sand. Discontinuous lenses of coarser materials, including coarse-grained sands and gravel are locally present but are overlain and/or underlain with the finer grained materials or are intermixed with fine-grained materials, as a result of sifting of the finer-grained materials downward into these pore spaces. The result is an alluvial layer with a vertical hydraulic conductivity that is controlled by the fine-grained materials and the vertical hydraulic conductivity (K_v) is expected to be several orders of magnitude lower than the K_h.
- The glacial deposits (till and lacustrine) are also generally lower in permeability, with a geometric mean K_h of 4.8 x 10^{-4} cm/sec estimated from slug tests, and a laboratory-measured K_v (on a sample of lacustrine deposits) of 2.0 x 10^{-6} cm/sec. As with the alluvial deposits, the K_h estimates from the slug tests likely overestimate the K_h of these deposits on a larger scale.
- Water-bearing zones were encountered in upper 10 to 20 feet of bedrock; these zones are comprised by open fractures in low permeability shale.
- The water table is positioned in the fill or upper portions of alluvial deposits or glacial deposits just beneath the fill (refer to cross-sections in Figures 1-4a through 1-4b of the FFS).
- Net groundwater flow is from the east central portion of the site westward toward the Hudson River, with a northwestward component of flow toward the unlined, eastern part of Wynantskill Creek (refer to Figure B-1: "Water Table Contours (February 19, 2008)". Groundwater flows under the concrete-lined part of the creek. Lateral groundwater flow within the overburden deposits occurs primarily in the fill and the LSG unit. Lateral groundwater flow in the fill discharges to the Hudson River, and to a lesser degree the eastern, the unlined segment of Wynantskill Creek. Groundwater within the LSG unit discharges to the Hudson River.
- Vertical hydraulic gradients are downward from the water table across the layer of alluvial deposits to the LSG unit. The large vertical gradient across this layer is a further indication of the low K_v of the alluvial deposits. The hydraulic head in the bedrock is similar to that in the LSG unit and thus the vertical hydraulic gradient between these units is low.

The Hudson River adjacent to the Site is a tidal water body that ranges in elevation from a mean high water (MHW) of approximately Elevation 4.9 ft (NGVD 1929) to a mean low water (MLW) of approximately Elevation -0.6 ft. (NGVD 1929), based on the USGS tidal monitoring data for the Hudson River at Albany Station for the period January 1, 2009 through January 1, 2010. The tidal fluctuations in the Hudson River result in a high degree of groundwater level (head) fluctuation in LSG and bedrock piezometers. The water table near the river also fluctuates, but generally to a lesser extent. With distance inland, the amplitude of water table fluctuation typically dampens relative to the river level, and there is a time lag between the peak water level in the river and the peak water level in the piezometer. Hydrographs prepared using the continuous water level monitoring data were presented in the SI Report. The occurrence of substantial groundwater head fluctuations due to tides in the units below the fine grained alluvial deposits (i.e., the LSG unit and bedrock) at locations hundreds of feet from the river, and the dissipation of tidal influence on the water table above and within the alluvial deposits within a relatively short distance of the river, substantiate the low K_v of the alluvial deposits.

Data obtained from the Site investigations were used to develop a three dimensional numerical groundwater flow model, using USGS MODFLOW finite difference source code, to simulate groundwater flow conditions at the Site. The model was developed to estimate and predict the behavior of groundwater under potential remediation scenarios, including the Proposed Amended Remedy. The model was developed and calibrated against water elevations measured in the field. Sensitivity analyses were conducted to assess uncertainty in the model. A Groundwater Model Report (BC, February 2008) was provided to NYSDEC in February 2008, which included a discussion of the groundwater model's construction (e.g., model domain, boundary conditions, estimated aquifer properties, etc.), calibration, and sensitivity analyses. Additional groundwater modeling sensitivity analyses were performed and provided to NYSDEC at a September 25, 2008 meeting and in an October 23, 2008 letter to NYSDEC from National Grid. Based on the additional sensitivity analyses, calibrated model presented in the Groundwater Model Report continues to remain the "best fit" when compared to observed groundwater elevation data. The results from groundwater modeling of the Proposed Amended Remedy is discussed in Section 3.3 and presented in Appendix C.

B.3 Nature and Extent of Impacts

The following sections summarize the nature and extent of impacts at the Site, including NAPL, PAH concentrations in soil, and groundwater quality. Figures B-2a and B-2b illustrate the location and depths where NAPL/tar was encountered at soil borings and test pit locations from the investigation activities. Figures B-3a and B-3b present the locations and depths where total PAH concentrations in soil are above 500 ppm.

Ten cross sections are included in Appendix F which depict NAPL observations and PAH concentrations in the lateral and vertical dimensions. Figures B-4a and B-4b depict the most recent groundwater quality data for Site monitoring wells and piezometers.

B.3.1 Non-Aqueous Phase Liquid (NAPL)

Figure B-2a shows the NAPL observations for the depth interval from 0 to 18 feet bgs, and Figure B-2b shows these observations from the interval below 18 feet bgs. These intervals correspond to the depth designations in the July 2003 ROD. As shown on Figure B-2a, several of the NAPL observations made in the 0 to 18 foot bgs interval are contained within subsurface structures. Figure B-2a, also identifies the observations where the noted impacts are in the form of hardened, brittle tar. As illustrated on the Figures B-2a and b, NAPL observations are predominately in three general areas: (1) the northern area of the Site (i.e., in the vicinity of the former Water Gas Building and former alignment of the Wynantskill Creek); (2) west of the former By-Products Building; and (3) east of the former By-Products Building.

Most NAPL/tar at the Site occurs within the fill above either the fine grained alluvial deposits or glacial deposits or, to a lesser extent, within the fine-grained alluvial deposits. In the borings that penetrated into or through the fine-grained alluvial deposits, observations at approximately 84% (i.e., 124 of 148 total) indicate that NAPL has not entered the unit. Where NAPL has entered the alluvial deposits it is typically contained within this unit. In addition to visual observations, the limited vertical penetration of constituents into the alluvial deposits is supported by soil PAH data, which indicates total PAH concentrations are non-detect or less than 10 mg/kg within or immediately below the NAPL observations in the alluvial deposits, with one exception being SB 161. At SB-161, total PAHs were 599 mg/kg in the interval approximately two feet below the observed NAPL, however, no NAPL was observed in the approximate 10-foot interval between the visible NAPL and the base of the boring.

In only four of the 66 borings that were drilled into the LSG unit (44 of which penetrated the full thickness of the unit) was NAPL observed (or suspected based on noted field observations) below the alluvial deposits, in the LSG unit. These locations are identified on Figure B-2b and include: MW-26, DSB-15, PZ-12, and SB-39.

The soils with the greatest thicknesses of observed NAPL and greatest frequency and area of NAPL observations are in the area west of the former Water Gas Building, and to the west within the fill material that was placed in the former channel of Wynantskill Creek. As illustrated on Figures B-2a and B-2b and cross-sections in Appendix F, there is a correspondence between NAPL occurrence and the former channel; these figures illustrate that no NAPL has been observed west and north of the former channel (Note: PZ-11, which is located on the north side of the current Wynantskill Creek, is within the alignment of the buried former creek channel). As described earlier, this former channel is bedded in the fine-grained alluvial deposits (i.e., the bottom and banks are formed by this relatively fine-grained material). The finding that no NAPL has been observed west and north of the former channel and the general lack of NAPL observations below this unit (except for the few instances described above), indicates that the alluvial deposits have effectively restricted the migration of the NAPL present in this area.

The results of NAPL gauging indicate that NAPL at the Site typically does not enter the wells and piezometers (see Appendix G for NAPL gauging results). Exceptions to this are MW 21 (LNAPL and DNAPL), MW-33 (DNAPL), and MW-39 (DNAPL), which have screened intervals in the fill contained in the buried channel of Wynantskill Creek, and adjacent to the former tar liquor sump (TLS) west of the former Water Gas Building. At these wells, the surrounding deposits adjacent to the screen have a high degree of NAPL saturation. DNAPL and LNAPL have also been observed in MW 6R, located northeast of the former Water Gas Building, and south of Wynantskill Creek. The soil boring at this location, and others nearby (e.g., PZ-12, SB-168), indicate the presence of several feet of NAPL in the base of the fill above the alluvial deposits, locally extending partly into the alluvial deposits. The screen for MW-6R is positioned within the former Wynantskill Channel, near its southern bank (note that the current channel overlies the former channel in this area). A thin layer (0.17 ft) of LNAPL and silt was observed on the water column in PZ-2 during the September 2007 gauging event, and brown NAPL blebs were present along a portion of tubing following removal of purging equipment from PZ-2 during the January 2010 sampling event. In the southern part of the Site, a thin layer of LNAPL was encountered in well MW-29. The LNAPL observed in MW-29, and historically in other wells in this area (e.g., MW-30, MW-31, and MW-36), is attributed to a petroleum release from former underground storage tanks (USTs) that were operated by King Fuels (refer to Section 1.3). The general low mobility of NAPL at the Site is further supported by the results of baildown testing conducted during the PDI (see Appendix G for baildown test data).

NAPL has been observed in soil borings in the saturated zone within the former alignment of the Wynantskill Creek. However, NAPL gauging indicates that NAPL in this area is not migrating. As discussed above, the results of NAPL gauging indicate that the NAPL typically does not enter the wells and piezometers with the exceptions of MW-21 and MW-39, which are screened in the vicinity of the former TLS and adjacent to soil having a high degree of NAPL saturation. Monitoring well MW-33, screened within the former alignment of the Wynantskill Creek and located approximately 70 feet downgradient of the area west of the former TLS, indicated little to no measurable NAPL [during two events a small amount of NAPL was observed (i.e., approximately an inch or less)]. Moving further down the alignment of the former creek (i.e., downgradient), NAPL has not been observed in monitoring wells (including MW-37, PZ-5, and MW-10). Therefore, although NAPL has been observed in soil borings at these locations, the NAPL gauging indicates that NAPL is not migrating. The NAPL present at these locations may be the result of past migration along the former creek alignment (i.e., before the creek was filled, NAPL had reached residual saturation, or weathering had reduced the mobility of the NAPL), or as a result of filling the creek with impacted materials. River sediment data adjacent to the mouth of the former Wynantskill Creek (sediment samples DD-1, -2, -3, and -E) also supports that NAPL is not migrating, as no NAPL has been observed at these locations (Blasland Bouck & Lee, March 2003).

Hardened tar has been observed in several areas of the Site, predominately in the area to the west of the former By-Products Building. The tar in this area was hard/brittle coal tar mixed with well-sorted aggregate and present in thin, widespread shallow layers.

As shown on Figure B-2a, tar has been observed along a section of the concrete channel wall of Wynantskill Creek. The tar has been observed over the top of the wall in one area, and along a horizontal joint in the concrete wall in another area. Observations indicate that the tar is in a hardened form and is not an active discharge to the creek.

Three hardened tar deposits were observed during the Hudson River Sediment Investigation (Blasland Bouck & Lee, March 2003) along the Hudson River shoreline on the western boundary of Area 2. The shoreline tar deposits (AA, BB, and DD), which are depicted on Figure B-2a, are considered potential sources of particulate tar materials in sediment via erosion (i.e., tidal, ice, wave) of the shoreline tar deposits.

B.3.2 PAHs in Soil

The total PAH concentration data for soil samples (soil borings, test pits, and surficial soils) are presented in Figures B-3a (0-18 feet bgs) and B-3b (greater than 18 feet bgs). As shown on Figure B-3a, the soils with total PAH concentrations greater than 500 mg/kg in the shallow interval primarily occurred in the following areas:

- The general area of the buried, former Wynantskill channel;
- Along the northern perimeter of the 300,000 cu. ft former gas holder;
- West of the former By-Products Building, in the vicinity of the former cooler towers; and
- East of the former By-Products Building.

As shown on Figure B-3b, exceedances of 500 mg/kg total PAHs in soil below 18 feet bgs primarily occurred in the general area of the buried, former Wynantskill channel.

The region with total PAHs above 500 mg/kg is primarily north and northeast of the warehouse building (currently occupied by E-Lot) and west of the former Water Gas Building, and corresponds to the filled-in, former alignment of the Wynantskill Creek. The occurrence of total PAHs above 500 mg/kg is generally coincident with the presence of NAPL. Based on observations from soil borings and test pit logs, some of the elevated PAH concentrations reflect the presence of anthracite coal, or fragments of hardened (brittle) coal tar.

With one exception, none of the surficial soil samples collected along the Hudson River bank exceeded 500 mg/kg total PAHs. The exception, SS-14 at 1.0-1.5 feet, was located in the lower bank area to the southwest of the warehouse building. The location of SS-14 is approximately 50 feet north of the shoreline hardened tar deposit BB.

B.3.3 Groundwater

B.3.3.1 Groundwater Quality

The most recent groundwater quality data for Site monitoring wells and piezometers are presented on Figures B-4a and B-4b. The results are also presented in the tables provided in Appendix H.

Constituent concentrations in shallow groundwater within the fill and fine-grained alluvial deposits are above the New York State Class GA groundwater quality criteria (i.e., standards from the 6 NYCRR Part 703 Standards and guidance values from the Division of Water Technical and Operational Guidance Series [TOGS] 1.1.1) in several areas of the Site. In the northern part of the Site, concentrations above the Class GA criteria were detected in the vicinity of the former Water Gas Building, and in the vicinity of the mouth of the buried former channel of Wynantskill Creek, near the PZ-5 piezometer nest. Concentrations in the wells/piezometers adjacent to the Hudson River in the northern part of the Site are non-detect (with detection limits below the Class GA criteria). In the southern part of the Site, concentrations above the Class GA criteria were detected at several wells; these wells are downgradient of former USTs that were operated by King Fuels, and the constituents detected in groundwater in this area are believed to be related to petroleum product storage and handling that post-dated MGP operations at the site. The areal concentration distribution of BTEX compounds and naphthalene in the shallow groundwater are generally consistent with those indicated by data from groundwater sampling events in 2004, although concentrations are generally lower than in 2004 [refer to PDI Report (BC, February 2004) and SPDI Report (BC, May 2006)].

The analytical data for the shallow groundwater support that NAPL at the Site does not represent a source of considerable or extensive dissolved-phase impacts. Elevated dissolved-phase concentrations are generally coincident with the areas where NAPL impacts are most extensive and the concentrations decrease to levels that are below or approaching groundwater quality criteria outside these NAPL-impacted areas and prior to groundwater discharging to surface water. At several well locations, where the screened interval was set adjacent to observed NAPL, the dissolved-phase BTEX concentrations are below or approaching the groundwater quality criteria (e.g., PZ-2, PZ-3, PZ-15a, MW-26).

Concentrations of constituents are substantially lower in the LSG unit than in the shallower hydrostratigraphic zones (i.e., fill and alluvial deposits). Based on the results from the 2008 groundwater sampling data, at most of the piezometers screened in the LSG unit the concentrations were below the Class GA groundwater quality criteria, and locally were not detected. Note, the elevated constituent concentrations detected in February/March 2008 at PZ-5c, screened in the LSG, do not appear to be representative of dissolved-phase concentrations and may have been the result of disturbance during well installation or high turbidity levels. The concentrations measured at PZ-5c decreased substantially after two rounds of re-development (BTEX from 51 to 7 μg/L and naphthalene from 750 to <1 μg/L).

The precipitous reduction in dissolved-phase concentrations moving from groundwater in the fill zone to groundwater in the LSG unit is evident even in areas of the Site where NAPL impacts are most prevalent (i.e., west of the Former Water Gas Building, within the buried former channel of Wynantskill Creek) and where the fine-grained alluvial deposits layer is relatively thin (ranges in thickness from 4.5 to 5.3 feet). Since there is a downward component to groundwater flow this area would be expected to have elevated dissolved-phase concentrations in the LSG if the alluvial deposits were not restricting vertical migration of constituents. The following tables provide vertical profiles of groundwater constituent concentrations from the area west of the Former Water Gas Building and at the mouth of the former Wynantskill Creek:

Vertical Profile of Groundwater West of Former Water Gas Building

Constituent	Concentration (μg/L)		
	MW-21[2] (Fill)	PZ-17a[1] (Alluvial Deposits)	PZ-17b[1] (LSG)
Benzene	**510**	**24**	1 J
Toluene	**19 J**	**3J**	0.7 U
Ethylbenzene	**1400**	**21**	0.8 U
Xylenes	**460**	**17**	0.8 U
Naphthalene	**7000 D**	8	1U

Vertical Profile of Groundwater at Mouth of Former Wynantskill Creek

Constituent	Concentration (μg/L)		
	PZ-5a[1] (Fill)	PZ-5b[1] (Alluvial)	PZ-5c[1] (LSG)
Benzene	**170**	**12**	1 J
Toluene	**12 J**	1 J	0.7 U
Ethylbenzene	**74**	2 J	4 J
Xylenes	**48**	0.8 U	2 J
Naphthalene	**1700**	6	1 U

Notes:

1. *Groundwater quality data from September 2008.*
2. *Groundwater quality data from August 2005. MW-21 was not included in 2008 groundwater monitoring program due to presence of NAPL in the well.*

***Bold** value indicates concentration above NYS Class GA Groundwater Standard or Guidance Values.*

U: The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.

J: Estimated concentrations. The result is below the quantitation limit but above the method detection limit.

These data, which show dissolved-phase concentrations decreasing substantially with depth, support that the alluvial deposits layer above the LSG unit is restricting the vertical movement of dissolved-phase constituents even in areas where NAPL impacts have been observed and alluvial layer is less extensive.

The substantial decrease in dissolved-phase concentrations moving from the fill unit to the LSG unit is consistent with information generated from the groundwater modeling and natural attenuation modeling (discussed below). As discussed in Appendix C, under current conditions groundwater originating near the base of the fill is estimated to require 2 to 10 years to pass through the alluvial layer to the underlying LSG unit. Due to sorption processes involving chemical constituents and soil particles, chemical constituents will move more slowly than groundwater; the effect is termed retardation and is given by the following series of equations (Fetter, 1993):

$$\mathbf{V_c = V_s/R}$$

$$\mathbf{R = 1 + (\rho_b/\sigma)\ K_d}$$

$$\mathbf{K_d = K_{oc}\ f_{oc}}$$

Where: $\mathbf{V_c}$: velocity of chemical constituent
$\mathbf{V_s}$: groundwater seepage velocity
R: retardation factor
$\boldsymbol{\rho_b}$: bulk density (kg/L) ~ 1.9 kg/L (approximately 120 lbs/cf)
$\boldsymbol{\sigma}$: porosity ~ 0.3
$\mathbf{K_d}$: sorption coefficient (L/kg)
$\mathbf{K_{oc}}$: organic carbon partitioning coefficient (L/kg)
$\mathbf{f_{oc}}$: organic carbon fraction ~ 0.1 (based on organic carbon data collected during ISCO pilot testing)

For two of the primary constituents of concern, benzene and naphthalene, retardation factors of 1.9 and 3.0 were estimated using the above equations and K_{oc} values of 1.4 L/kg (benzene) and 3.2 L/kg (naphthalene), which were obtained from the technical literature (Fetter, 1993). Based on these retardation factors, the travel time for benzene and naphthalene through the alluvial deposits would be anticipated to be approximately two to three times longer than a particle of groundwater (i.e., 4 to 20 years for benzene and 6 to 30 years for naphthalene).

As discussed below, natural attenuation is occurring at the Site and natural attenuation modeling indicated degradation rates for BTEX corresponding to half-lives ranging from 0.5 to 1.9 years. Based on the estimated half-lives and long travel times for chemical constituents to travel through the alluvial deposits, substantial reduction of dissolved-phase concentrations would be anticipated as constituents travel from the fill to the LSG unit. The low to non-detect dissolved concentrations observed in the LSG are consistent with these anticipated conditions.

As discussed previously, the LSG is a highly transmissive unit which is in direct hydraulic communication with the river, and, as a result there is a high degree of tidal fluctuations in the LSG unit. The net flow from the LSG unit is toward the river, however, at high tide the gradient direction reverses and the hydraulic head in the river is higher than that in the LSG unit which causes groundwater flow to reverse. Using September 2007 water level data, groundwater seepage velocity was estimated at high tide between the river and piezometer PZ-5c, which is screened in the LSG unit. The estimated seepage velocity is approximately 0.25 feet per day. This seepage velocity was estimated at the peak of high tide and would diminish as the tide level decreases and the gradient direction reverses back toward the river. Based on this low seepage velocity, river water would not be expected to flow a significant distance into the Site during high tide and flow of river water into the LSG is limited to the extreme western edge of the Site. Therefore, it is concluded that the significantly lower concentrations in the LSG unit are not attributable to flushing of the LSG unit from the adjacent Hudson River.

B.3.3.2 Monitored Natural Attenuation Evaluation

As indicated in Section 1.1.2 of this document, the remedy selected in the July 2003 ROD includes monitored natural attenuation (MNA) of groundwater. The ROD identified MNA to address dissolved-phase constituents at three (3) impacted areas identified in Figure 5 of the ROD. Based on groundwater monitoring conducted in 2004 and 2008, the two (2) northern areas identified in the ROD appear to be connected as one northern area and therefore, hereafter, the two (2) areas of dissolved-phase impacts will be referred to, as follows:

- **Plume A:** located in the southwestern portion of the Site; and
- **Plume B:** located in the northern portion of the Site.

A program was implemented at the Site to evaluate the potential for natural attenuation of Site-related MGP hydrocarbons in groundwater and to establish baseline groundwater quality conditions. The program was conducted as part of the Pre-Design Investigation (PDI) at the request of the NYSDEC in a letter dated September 29, 2003. The results of the natural attenuation evaluation were presented in the SPDI Report (BC, May 2006).

The potential use of MNA for the MGP- and petroleum-derived hydrocarbons in groundwater was evaluated based on historical groundwater quality trends, a qualitative interpretation of bioparameter/geochemical data, and fate and transport modeling using the USEPA sponsored model, BIOSCREEN®.

The natural attenuation evaluation concluded that conditions are favorable for natural attenuation of BTEX concentrations present at the Site and natural attenuation is occurring.

As discussed above, under current conditions groundwater originating near the base of the fill is estimated to require 2 to 10 years to pass through the layer of alluvial deposits to the underlying LSG unit. Accounting for chemical retardation, it is estimated that benzene and naphthalene would require approximately two to three times longer to migrate through the alluvium compared to a particle of groundwater (i.e., 4 to 20 years for benzene and 6 to 30 years for naphthalene). Based on the estimated half-lives and travel times, substantial reduction of dissolved phase concentrations would be anticipated prior to groundwater entering the LSG unit from overlying units, which is consistent with the low to non-detect dissolved-phase concentrations observed in the LSG.

Similarly, under current conditions groundwater originating near the water table in the fill and west of the former Water Gas Building is estimated to require approximately one (1) year to migrate laterally through the fill to the Hudson River. Accounting for chemical retardation, it is estimated that benzene and naphthalene would require approximately two to three times longer to travel to the river compared to a particle of groundwater (i.e., approximately 2 years for benzene and 3 years for naphthalene). Based on the estimated half-lives and travel times, substantial reduction of dissolved phase concentrations would be anticipated prior to groundwater discharging to the river, which is consistent with groundwater quality data from the shallow groundwater that indicate concentrations are approaching or are below the groundwater quality criteria at the boundaries of the Site before migrating to surface water.

B.3.3.3 Groundwater Mass Flux Estimates

Mass flux estimates have been performed to evaluate the potential impact that discharge of Site groundwater may have on surface water, including both the Hudson River and Wynantskill Creek. Mass flux estimates were performed for benzene and naphthalene, as these constituents have most frequently been detected above Class GA criteria and are most commonly associated with MGP Sites. The following information was used to perform the mass flux estimates:

- Benzene and naphthalene concentrations from the February/March 2008 groundwater monitoring event;
- Groundwater volumetric discharge rate estimated using the groundwater flow model developed for the Site;
- River flow data obtained from USGS for station USGS 01358000 Hudson River at Green Island, NY; and
- Estimated flow rates for the Wynantskill Creek.

For Site groundwater to impact surface water quality in the Hudson River the river flow would have to decrease to 0.2 cfs for benzene and 0.1 cfs for naphthalene to approach their respective surface water quality criterion. These flow rates are several orders of magnitude lower than the lowest monthly mean flow measured at the river monitoring station since 1946. The negligible impact of Site groundwater to surface water quality in the Hudson River is supported by the surface water quality data generated during the RI completed for Area 4 (Fluor Daniel GTI, 1998), where surface water samples were collected adjacent to and upstream of Area 2.

For Site groundwater to impact surface water quality in the Wynantskill Creek flow would have to decrease to 0.3 cfs for benzene and 0.003 cfs for naphthalene to approach their respective surface water quality criterion. The negligible impact of Site groundwater to surface water quality in the Wynantskill is supported by the surface water quality data from the RI, which indicated non-detect for VOCs and PAHs.

The conservative mass flux estimates indicate that discharge of Site groundwater to surface water is not impacting surface water quality. Additional discussion of the mass flux estimates and a breakdown of the calculations are provided in Appendix I.

B.3.4 Sediment and Surface Water

Sediment and surface water associated with Area 2 is limited to sediment within the Wynantskill Creek. As discussed in Section 1.4 of this document, the Hudson River is considered a separate operable unit, however, sediment and surface water quality in the Hudson River adjacent to Area 2 is discussed herein since the river is a potential receptor of COCs migrating from Area 2 (via potential NAPL or dissolved-phase migration).

B.3.4.1 Wynantskill Creek

Wynantskill Creek sediments adjacent to the Site contained total PAHs at concentrations ranging from 3.9 mg/kg to 9 mg/kg, although one sample collected from the channeled section, near the confluence with the Hudson River, was found to contain 392 mg/kg. Upstream of the site, total PAHs ranged from 6 to 32 mg/kg except for one sample collected adjacent to a railroad bridge which contained 1,716 mg/kg. PAH concentrations in sediment both upstream and adjacent to the Site were comparable and are considered to represent background conditions in this historically industrial area through which this reach of stream flows.

No BTEX was detected in Wynantskill sediments above sediment screening levels included in NYSDEC's "Technical Guidance for Screening Contaminated Sediments" (NYSDEC 1999) and cyanide was also not detected in Wynantskill sediments.

No constituents of concern were detected above surface water quality criteria in surface water samples from the Wynantskill Creek.

In accordance with the ROD, no MGP impacts require remediation of the Wynantskill Creek sediments or surface water.

B.3.4.2 Hudson River

During Phase I and Phase II of the Hudson River Sediment Investigations, 60 sediment borings (15 in the Phase I and 45 in the Phase II) were drilled and sampled adjacent to Areas 2, 3, and 4 of the Troy (Water Street) Site. Sixteen (16) of these borings were drilled adjacent to Area 2, and of those, three were drilled to bedrock. There were not indications of NAPL in the sediment borings adjacent to Area 2, or the sediment borings adjacent to Areas 3 and 4 (Blasland Bouck & Lee, March 2003).

Surface water samples were collected adjacent to and upstream of Area 2 during the RI for Area 4. The results were reported in the "Remedial Investigation Report for Troy (Water Street), New York, Area 4" (Fluor Daniel GTI, 1998). No potential MGP-related constituents (i.e., PAHs, BTEX, or cyanide) were detected in the Hudson River surface water samples.

FIGURES

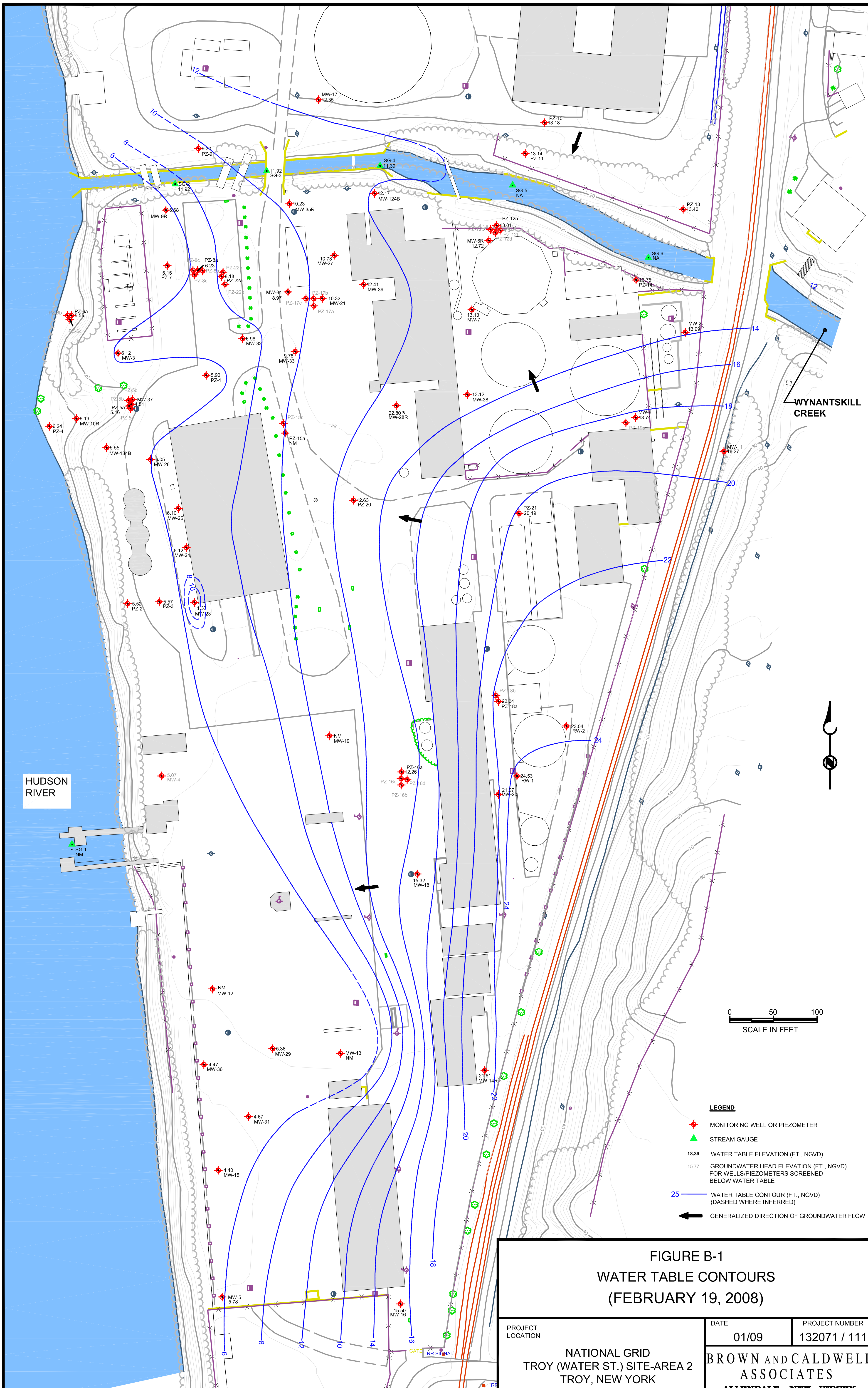


FIGURE B-1
WATER TABLE CONTOURS
(FEBRUARY 19, 2008)

PROJECT LOCATION	DATE	PROJECT NUMBER
NATIONAL GRID TROY (WATER ST.) SITE-AREA 2 TROY, NEW YORK	01/09	132071 / 111

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

Jan 26, 2009 - 9:38am rjames
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\111\WATER TABLE CONTOUR MAP (FEBRUARY 19, 2008).dwg

FIGURE B-2a

LOCATIONS OF OBSERVED NAPL / COAL TAR
0 TO 18 FEET BELOW GROUND SURFACE

Troy (Water Street) Site - Area 2
Troy, New York

DATE 1/2009

PROJECT NUMBER 132071.502

BROWN AND CALDWELL ASSOCIATES

FIGURE B-2b

LOCATIONS OF OBSERVED NAPL / COAL TAR GREATER THAN 18 FEET BELOW GROUND SURFACE

Troy (Water Street) Site - Area 2
Troy, New York

DATE 1/2009

PROJECT NUMBER 132071.502

BROWN AND CALDWELL ASSOCIATES

FIGURE B-3a

TOTAL PAH CONCENTRATIONS
IN SUBSURFACE SOILS
0 TO 18 FEET BELOW GROUND SURFACE

Troy (Water Street) Site - Area 2
Troy, New York

DATE	PROJECT NUMBER
1/2009	132071.502

BROWN AND CALDWELL
ASSOCIATES

FIGURE B-3b

TOTAL PAH CONCENTRATIONS
IN SUBSURFACE SOILS
>18 FEET BELOW GROUND SURFACE

Troy (Water Street) Site - Area 2
Troy, New York

DATE	PROJECT NUMBER
12/08/08	132071.502

BROWN AND CALDWELL
ASSOCIATES

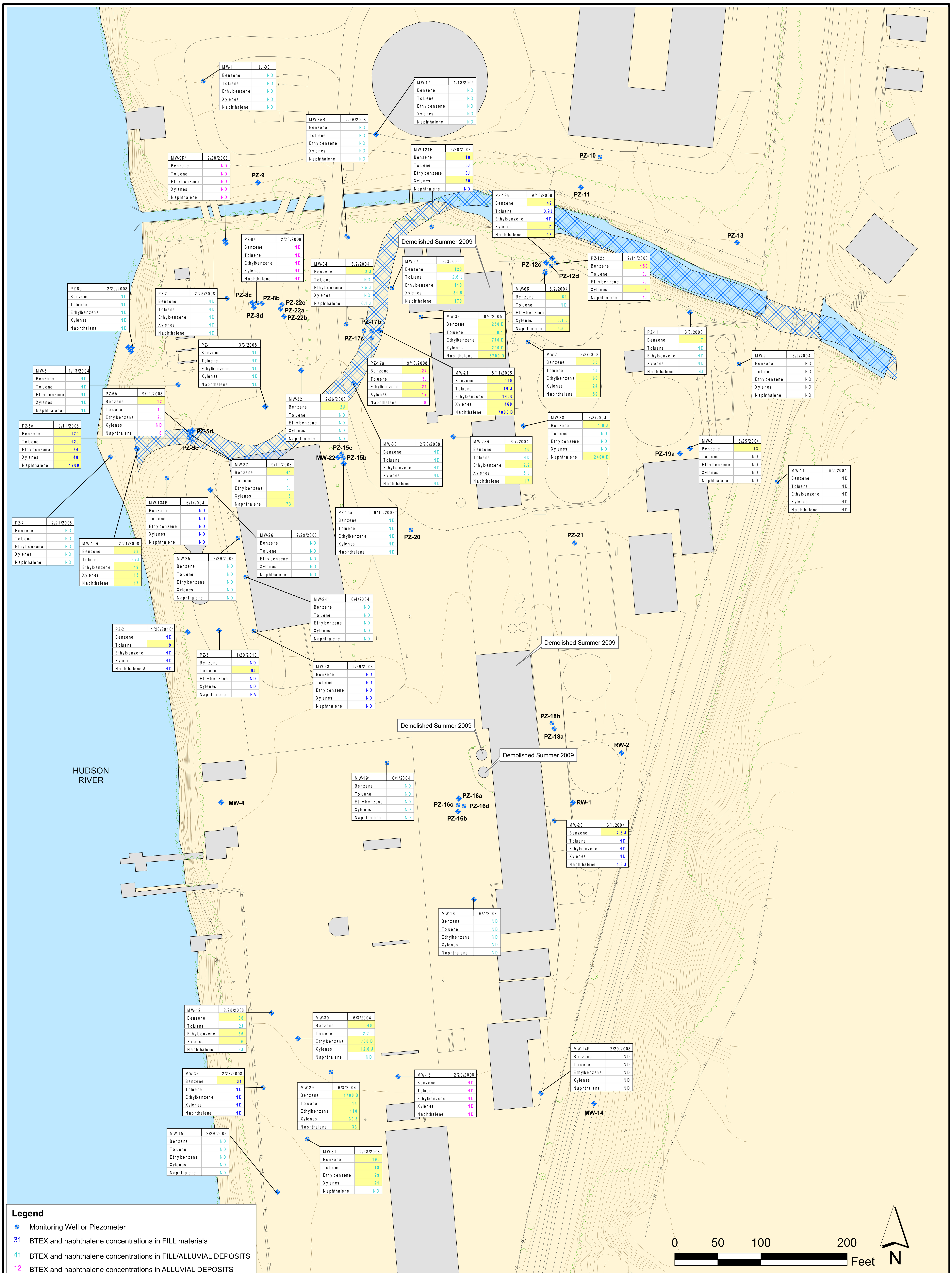


FIGURE B-4a

BTEX AND NAPHTHALENE IN SHALLOW GROUNDWATER

Troy (Water Street) Site - Area 2
Troy, New York

DATE 3/17/10

PROJECT NUMBER 132071.502

BROWN AND CALDWELL ASSOCIATES

P:/GIS/National_Grid/Troy_GWQ_Data_BTEX&Naphth(shallow).mxd

PZ-6b	2/20/2008
Benzene	ND
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	ND

PZ-6c*	2/20/2008
Benzene	ND
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	ND

PZ-8c	2/26/2008
Benzene	ND
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	ND

PZ-8b	2/26/2008
Benzene	ND
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	ND

PZ-17b	9/9/2008
Benzene	1J
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	ND

PZ-12c	9/10/2008
Benzene	2J
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	1J

PZ-15c	9/10/2008
Benzene	16
Toluene	ND
Ethylbenzene	ND
Xylenes	12
Naphthalene	6

PZ-5c	9/11/2008
Benzene	1J
Toluene	ND
Ethylbenzene	4J
Xylenes	2J
Naphthalene	ND

MW-4	5/25/2004
Benzene	ND
Toluene	ND
Ethylbenzene	ND
Xylenes	ND
Naphthalene	ND

Legend

Monitoring Well or Piezometer

31 BTEX and naphthalene concentrations in LOWER SAND & GRAVEL UNIT

Site Structures

Historic Wynantskill Creek Channel

ABBREVIATIONS:

BTEX - Benzene, toluene, ethlybenzene, and xylene isomers

ND - Not Detected

J - Estimated concentration

NOTES:

Results reported in micrograms per liter (ug/L).

Cells highlighted in yellow indicate concentration above Class GA Criteria

* - Table lists the highest concentration from original and duplicate sample.

FIGURE B-4b

BTEX AND NAPHTHALENE IN LOWER SAND & GRAVEL UNIT

Troy (Water Street) Site - Area 2
Troy, New York

DATE 3/17/10

PROJECT NUMBER 132071.502

BROWN AND CALDWELL ASSOCIATES

P:/GIS/National_Grid/Troy_GWQ_Data_BTEX&Naphth(LSG).mxd

APPENDIX C

Groundwater Model Simulation for the Proposed Amended Remedy

GROUNDWATER MODEL SIMULATION FOR THE PROPOSED AMENDED REMEDY TROY (WATER STREET) SITE – AREA 2 TROY, NEW YORK

Introduction

A groundwater flow scenario under conditions of the Proposed Amended Remedy was simulated by using the calibrated groundwater flow model described in the February 2008 Brown and Caldwell document entitled "Groundwater Model Report, Troy (Water Street) Site – Area 2, Troy, New York". As discussed in that report, the Modular Three-Dimensional Finite Difference Groundwater Flow Model (MODFLOW) code developed by the United States Geological Survey (USGS) was used to develop the model. The specific version used was MODFLOW 2000, and the graphical interface used was Visual MODFLOW Pro Version 4.1 from Waterloo Hydrologic, Inc.

The simulation described herein was developed in order to evaluate the impact that the Proposed Amended Remedy could have on groundwater flow at the Site. As discussed in Section 3.3 of the Focused Feasibility Study (FFS) Report, in situ solidification/stabilization (ISS) is proposed as an element of the Proposed Amended Remedy.

The area of proposed ISS treatment was simulated by changing the hydraulic conductivity of the fill layer in the proposed treatment area to a value of 1E-6 cm/sec both in a horizontal and vertical direction. This change was intended to account for the reduction of the hydraulic conductivity of the soil after the soil had been treated by the ISS process.

For the calculation of the estimated vertical discharge rates through the alluvial layer, a water budget zone was established. That zone covers, in plan view, the ISS treatment zone depicted on Figure 3-1 of the FFS. The water budget was calculated using the Zone Budget module of Visual MODFLOW.

Figure C-1 depicts the model simulation for current site conditions and is used as a point of comparison for the simulation completed for the Proposed Amended Remedy.

Two scenarios were simulated to evaluate the effect of various cover materials, in combination with ISS, on groundwater flow. One scenario was performed assuming cover materials with a comparable composite permeability as the existing cover. For this scenario a recharge rate of 6 inches per year was used. A second additional simulation was performed that incorporated application of a larger percentage of lower-permeability cover materials (e.g., asphalt) over the ISS area. This simulation assumed a recharge rate of 2 inches per year.

The model simulations are described further below.

Calibrated Base Model ("Base Case")

Description: The construction of the calibrated base model is described in the Groundwater Model Report (Brown and Caldwell, February 2008). The calibrated base model is also referred to herein as the "base case" in subsequent discussions regarding model runs in which the impact of applying ISS treatment was simulated.

Flow Paths: The particle flow paths derived from the calibrated model are shown in Figure C-1. Particles originating proximal to the Water Gas Building near the water table progress west through the fill without entering the deeper units. These particle paths are influenced by the buried former channel of Wynantskill Creek, where the fill is thicker and the lower conductivity alluvial deposits are deeper. Particles originating near the base of the fill near the Water Gas building move westward and downwards along the fill unit until they encounter the alluvial deposits layer. At this point the particles descend slowly through the low conductivity alluvial layer over the course of several years, eventually reaching the relatively high conductivity lower sand and gravel (LSG) unit which conveys the particles west toward the Hudson River. Particle movement through the alluvial deposit layer is most prevalent where this layer is thinnest, principally in the area near the centerline of the buried former Wynantskill Creek alignment.

Velocity/Travel Times: In the base model, a particle of groundwater that originates in the fill near the former Water Gas Building and eventually discharges directly to the Hudson River from the fill is estimated to require approximately 1 year to migrate to the Hudson River. Groundwater that originates near the base of the fill and eventually flows into the alluvial layer before migrating to the river is estimated to require 2 to 10 years to pass through the alluvial layer to the underlying LSG unit. Once in the LSG, groundwater will move more rapidly to the Hudson River.

Flow Rates: It is estimated from the model that the discharge of groundwater laterally from the fill within the water budget zone (i.e., the zone where ISS will be simulated, as described above) to the laterally adjacent fill downgradient of the water budget zone is approximately 502 ft^3/day for the base case. The net discharge of groundwater vertically from the fill within the water budget zone into the alluvial layer is approximately 62 ft^3/day, while the discharge rate of groundwater vertically from the alluvial layer to the LSG is approximately 72 ft^3/day (note that approximately 10 ft^3/day [$\pm$0.05 gpm] of lateral flow into the water budget zone from the alluvial deposits contributes to the 72 ft^3/day).

Proposed Amended Remedy

ISS Component of the Proposed Amended Remedy (to base of Fill Layer)

Description: This proposed remedial scenario was constructed to simulate the ISS component of the Proposed Amended Remedy, which is depicted on Figure 3-1 of the FFS Report. Although the proposed ISS extends partly into the alluvial deposits at some locations, the ISS scenario would primarily focus on the fill zone where impacts are predominantly located and would maintain a continuous, undisturbed layer of alluvial deposits beneath the ISS treatment zone. Maintaining this undisturbed layer of alluvial deposits is anticipated to have a similar effect on groundwater flow as would the case of ISS being only applied to the fill due to the low permeability of the alluvial deposits relative to the fill. Therefore, for modeling purposes, it was assumed that ISS would be applied to the entire fill Layer in these areas and the alluvial deposits were left unchanged from the base case.

As mentioned above, two cover scenarios were simulated to evaluate the effect of various cover materials, in combination with ISS, on groundwater flow. One scenario was performed assuming cover materials with a comparable composite permeability as the existing cover. For this scenario a recharge rate of 6 inches per year was used. A second additional simulation was performed that incorporated application of a larger percentage of lower-permeability cover materials (e.g., asphalt) over the ISS area. This simulation assumed a recharge rate of 2 inches per year. These values are based on land use and soil-based recharge values derived by the New Jersey Geological Survey (NJGS) for industrial and commercial properties, respectively, as discussed in the Groundwater Model Report (BC, February 2008).

Flow Paths: For the ISS with the 6 inch per year recharge scenario, the simulation indicates that the ISS causes substantial mounding of the water table over the entire area to which it is applied (Figure C-2) to a maximum of 11 ft[1] above the base case in the southern portion of the ISS treated area near MW-28R.

The mounding produces an increased downward gradient in the ISS zone relative to the base case which causes groundwater within the ISS zone to move vertically downward through the stabilized fill and the alluvial layer to the LSG unit. Upon entering the LSG unit, groundwater flows west to discharge to the Hudson River.

A second simulation performed a 2-inch recharge rate (refer to Figure C-3) resulted in substantially less hydraulic mounding, on the order of a maximum of 5 feet above the base case.

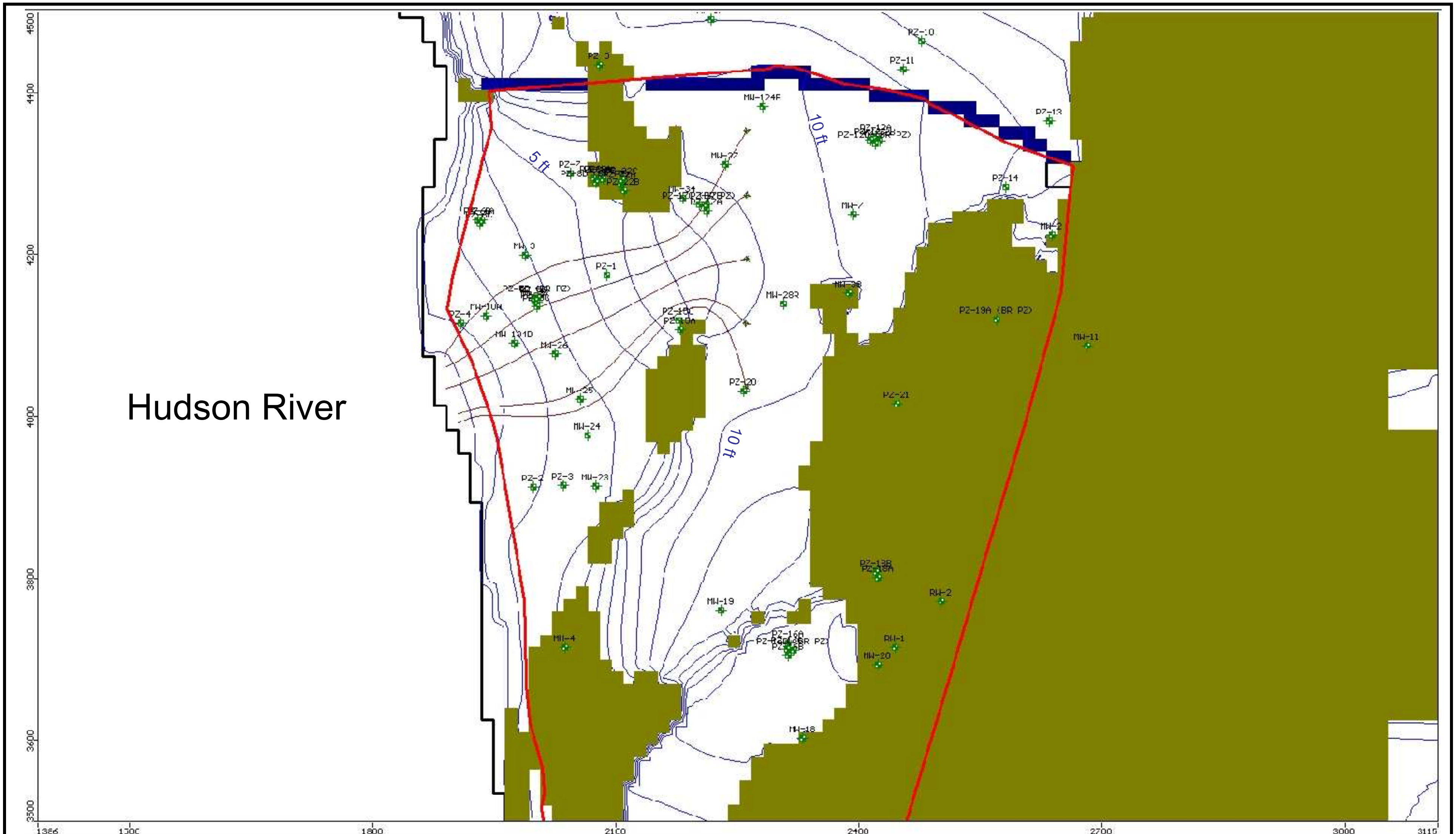
Velocity/Travel Times: The 6-inch per year recharge simulation indicates that groundwater requires between 7 and 10 years to move vertically through the solidified zone and alluvial layer at a rate of approximately 3 ft/yr.

Using a recharge rate of 2-inches per year indicates that groundwater requires between 11 and 12 years to move vertically through the solidified zone and alluvial layer at a rate of approximately 1.3 to 1.5 ft/yr.

Flow Rates: The 6-inch per year recharge simulation reveals that the mounding caused by the reduced conductivity of the ISS-treated fill increases the discharge from the fill to the alluvial layer from 62 ft^3/day (in the base-case) to 117 ft^3/day. Flow from the alluvial layer to the LSG unit is also increased from 72 ft^3/day (in the base-case) to 111 ft^3/day. However, the simulation also indicates that the lateral groundwater flow from the fill within the ISS treatment zone would be substantially decreased from 502 ft^3/day (in the base-case) to 20 ft^3/day. This simulation indicates that this scenario would decrease the total groundwater flow through the fill in the ISS area by 76 percent (i.e., 137 ft^3/day compared to 564 ft^3/day). This supports that the ISS would reduce the interaction between groundwater and potential source material.

The simulation that incorporates the lower-permeability cover (recharge of 2-inches per year) over the ISS treatment zone indicates a decrease in the discharge from the fill to the alluvial layer from 62 ft^3/day (in the base-case to 42 ft^3/day). Flow from the alluvial layer to the LSG unit is also decreased from 72 ft^3/day (in the base-case) to 50 ft^3/day. Similar to the 6-inches per year recharge simulation, incorporation of a lower-permeability cover would decrease the lateral flow rate from the fill within the ISS treatment zone to the adjacent downgradient fill from 502 ft^3/day in the base-case to 5.9 ft^3/day. This simulation indicates that this scenario would decrease the total groundwater flow through the fill in the ISS area by 91 percent (i.e., 48 ft^3/day compared to 564 ft^3/day). This supports that this scenario would further reduce the interaction between groundwater and potential source material compared to the 6-inch per year recharge scenario.

[1] The model likely overestimates the height of mounding in this area due to the "dry cells" that are present in the base case (i.e., the calibrated model without ISS simulation) adjacent to this area. The model cannot re-saturate these dry cells as the heads build up-in adjacent cells as a result of the simulated ISS. As such, the dry cells behave essentially as impermeable zones and contribute to the calculated head increase in the ISS simulation. If the cells could re-saturate, some of the volume of groundwater that is calculated to cause the head increase would be permitted to spread laterally, thus reducing the height of the mounding. Although MODFLOW has an option to re-saturate, or "re-wet" cells that are dry, doing so often causes instability in the model; such was the case when use of re-wetting was attempted during the original calibration of this model.



Dry Cells

Pathline

Site Boundary

River Boundary

Head Equipotenial Lines
(1 ft Contour Interval)

Figure C-1

CALIBRATED BASE SCENARIO

Troy (Water Street) Site – Area 2

Troy, New York

Date

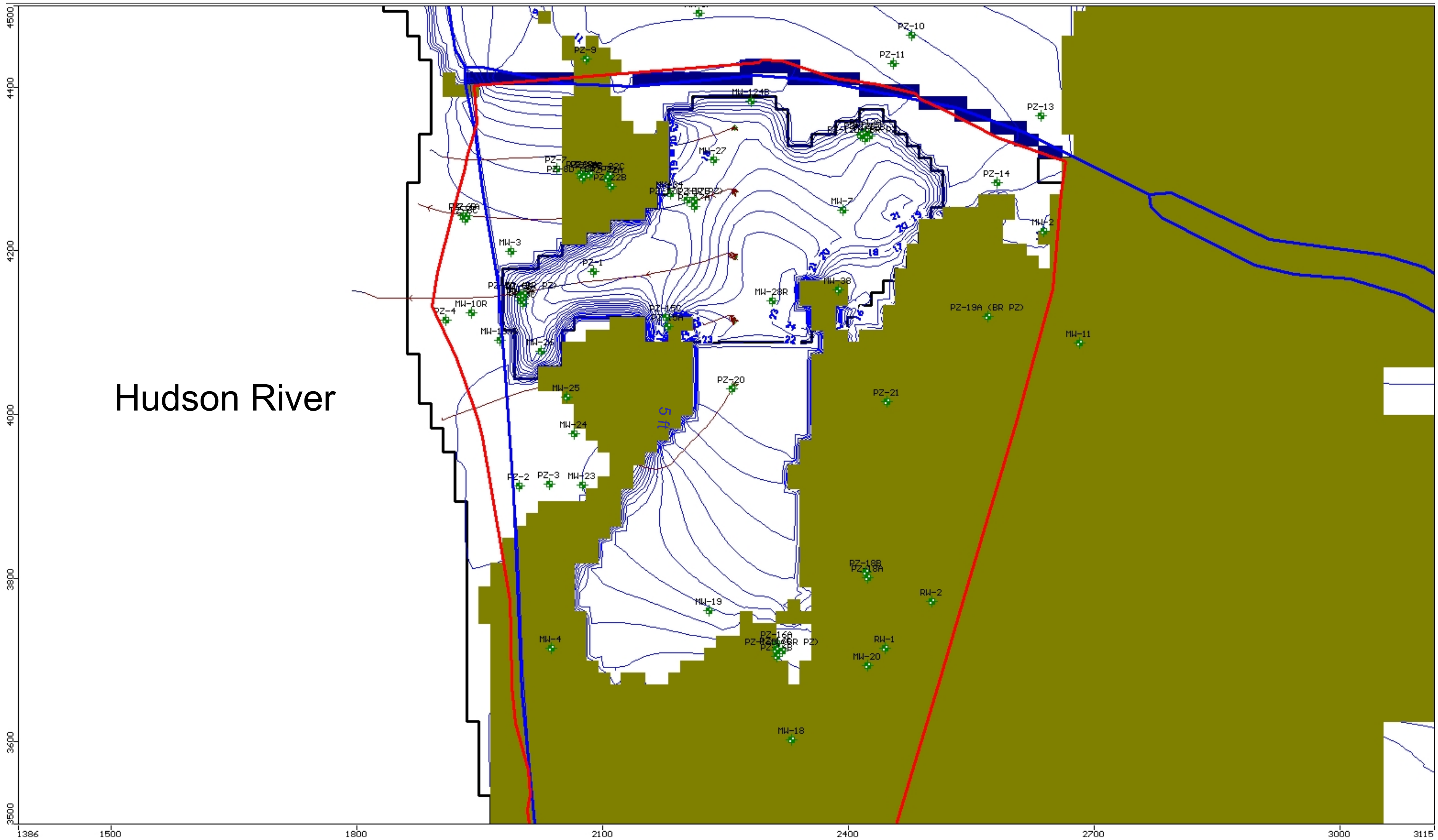
January, 2009

Project Number

132071

BROWN AND CALDWELL ASSOCIATES

Allendale, New Jersey



Dry Cells

Pathline

Site Boundary

ISS Treated Areas

Head Equipotenial Lines
(1 ft Contour Interval)

River Boundary

Figure C-2

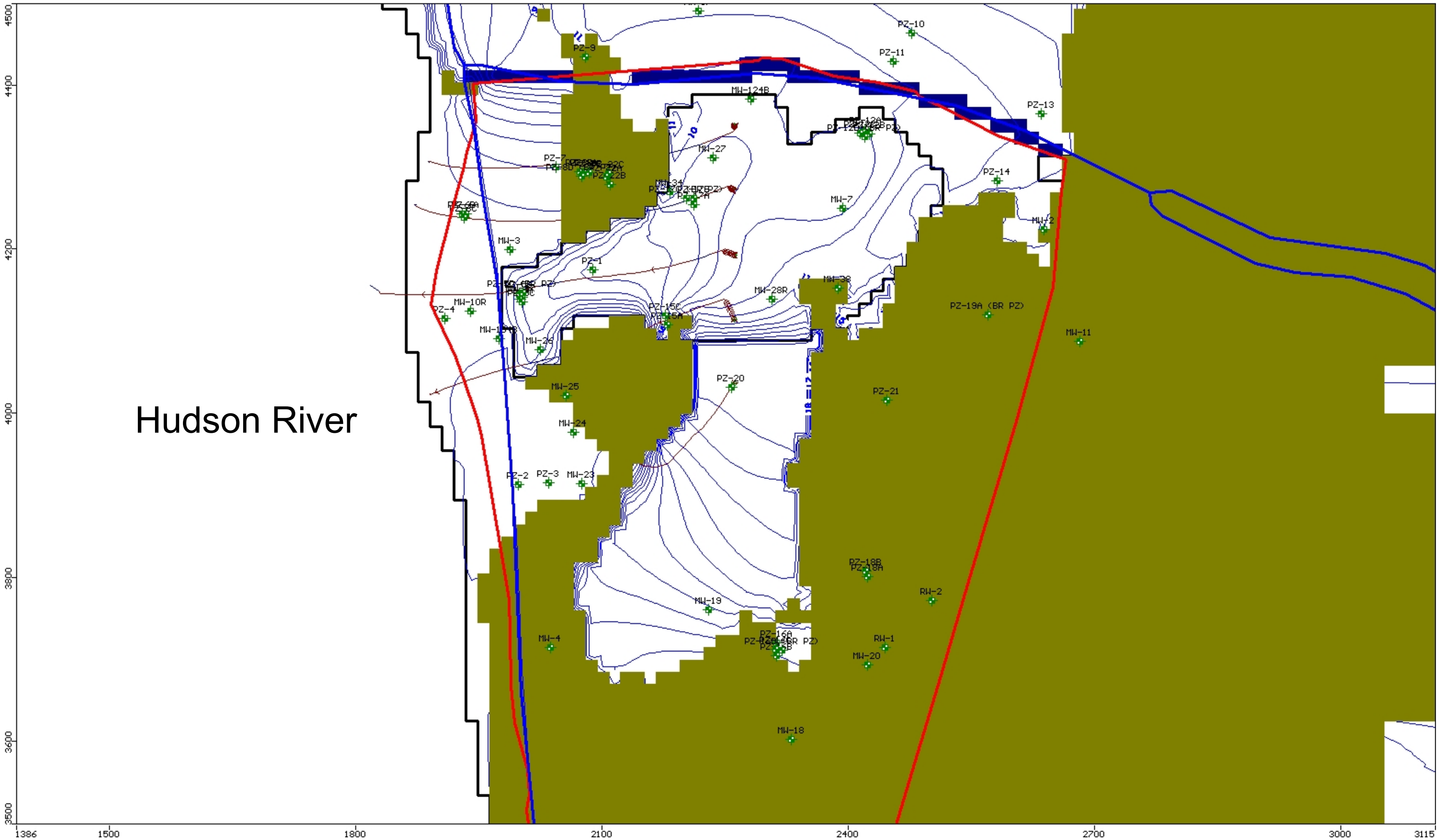
ISS COMPONENT OF PROPOSED AMENDED REMEDY. 6 INCH RECHARGE

Troy (Water Street) Site – Area 2

Troy, New York

Date	Project Number
March, 2010	132071

BROWN AND CALDWELL ASSOCIATES
Allendale, New Jersey



Dry Cells	Pathline
Site Boundary	ISS Treated Areas
Head Equipotenial Lines (1 ft Contour Interval)	River Boundary

Figure C-3

ISS COMPONENT OF PROPOSED AMENDED REMEDY, 2 INCH RECHARGE

Troy (Water Street) Site – Area 2

Troy, New York

Date: **March, 2010**

Project Number: **132071**

BROWN AND CALDWELL ASSOCIATES

Allendale, New Jersey

APPENDIX D

Cost Estimate for the Proposed Amended Remedy

COST ESTIMATE
PROPOSED AMENDED REMEDY
Troy (Water Street) Site - Area 2
Troy, New York

Remedy Components:

ROD-Remedy Components Completed to Date, Excavation, ISS., Site Cover, Closure of Structures, MNA, Institutional Controls, and Long-term Monitoring)

Capital Cost

ITEM		UNIT	QUANTITY	UNIT PRICE	AMOUNT	NOTES
1.	ROD-Remedy Components Completed to Date					1
	a. Pre-Design Investigations	LS	1	$ 910,000	$ 910,000	
	b. In Situ Chemical Oxidation Pilot Test	LS	1	$ 770,000	$ 770,000	
	c. Supplemental Investigation	LS	1	$ 730,000	$ 730,000	
	d. Removal of Purifier Waste and Contents of TLS and OWS	LS	1	$ 390,000	$ 390,000	
	e. Removal of Contents of Air Plenum and Underground Vault	LS	1	$ 1,950,000	$ 1,950,000	
	f. Engineering Evaluations, Remedy Modifications	LS	1	$ 650,000	$ 650,000	
	Subtotal (Item 1)				$ 5,400,000	
2.	Mobilization & Demobilization	LS	1	$ 860,000	$ 860,000	2
3.	Closure of Structures					3
	a. Structure Access	LS	1	$ 10,000	$ 10,000	
	b. Cover Soil Excavation	CY	150	$ 25	$ 4,000	
	c. Structure Contents Excavation	CY	540	$ 40	$ 22,000	
	d. Waste Characterization	SAMPLE	9	$ 1,000	$ 9,000	
	e. T&D of Non-haz. Soil to Landfill	TON	240	$ 80	$ 19,000	
	f. Waste Conditioning	TON	220	$ 65	$ 14,000	
	g. T&D of Coal Tar Sludge	TON	1090	$ 235	$ 256,000	
	h. Dewatering	LS	1	$ 20,000	$ 20,000	
	i Char, T&D of Water	GAL	22000	$ 0.95	$ 21,000	
	j Structure Backfilling	CY	690	$ 65	$ 45,000	
	k Temporary Controls	WK	4	$ 10,000	$ 40,000	
	Subtotal (Item 3)				$ 460,000	
4.	Removal and T&D of Misc. Piping and Tanks	LS	1	$ 110,000	$ 110,000	4
5.	Excavation					5
	a Demolition of Concrete Foundations	LS	1	$ 181,000	$ 181,000	
	b Excavation Shoring Allowance	LS	1	$ 100,000	$ 100,000	
	c Excavation	CY	34000	$ 25	$ 850,000	
	d Waste Characterization (Sludge)	SAMPLE	10	$ 1,000	$ 10,000	
	e Waste Characterization (Soil)	SAMPLE	46	$ 1,500	$ 69,000	
	f Waste Conditioning of Tar Sludge	TON	2700	$ 65	$ 176,000	
	g T&D of Coal Tar Sludge (25%)	TON	13500	$ 235	$ 3,173,000	
	h T&D of Coal Tar Soil (75%)	TON	32400	$ 82	$ 2,657,000	
	i Backfill (Re-use of Excavated Soil)	CY	7000	$ 10	$ 70,000	
	j Backfill (Imported Soil)	CY	27000	$ 40	$ 1,080,000	
	k Temporary Controls	WEEK	22.7	$ 12,000	$ 272,000	
	Subtotal (Item 5)				$ 8,638,000	
6.	ISS (>8 ft bgs) and Pre-Excavation (0-8 ft bgs)					6
	a. Bench-Scale Testing	LS	1	$ 100,000	$ 100,000	
	b. Demolition of Concrete Foundations	LS	1	$ 384,000	$ 384,000	
	c. Shoring Allowance	LS	1	$ 100,000	$ 100,000	
	d. Pre-Excavation (0-8 ft)	CY	29000	$ 25	$ 725,000	
	e. Char, T&D of Coal Tar Soil (10% Supp. Excav.)	TON	4700	$ 95	$ 447,000	
	f. ISS (> 8 ft bgs)	CY	69000	$ 90	$ 6,210,000	
	g. Backfill (Re-use of Excavated Material)	CY	8300	$ 10	$ 83,000	
	h. Confirmation Soil Sampling	SAMPLE	69	$ 400	$ 28,000	
	i. Temporary Controls	WEEK	35	$ 12,000	$ 420,000	
	Subtotal (Item 6)				$ 8,497,000	

Capital Cost (continued)

ITEM		UNIT	QUANTITY	UNIT PRICE	AMOUNT	NOTES
7.	Site Cover					7
	a. Site Grading and Drainage Controls	ACRE	15	$ 41,000	$ 615,000	
	b. 1' Soil/Stone Cover (50% of Area)	ACRE	7.5	$ 83,000	$ 623,000	
	c. 4" Asphalt Cover (50% of Area)	ACRE	7.5	$ 200,000	$ 1,500,000	
	d. Erosion and Sediment Controls	LS	1	$ 36,000	$ 36,000	
	Subtotal (Item 7)				$ 2,774,000	
8.	Monitored Natural Attenuation (First Year)	LS	1	$ 40,000	$ 40,000	8
9.	Institutional Controls	LS	1	$ 50,000	$ 50,000	9
10.	Additional Investigation	LS	1	$ 50,000	$ 50,000	10
	SUBTOTAL				**$ 26,879,000**	
11.	Engineering & Construction Support	%	15		$ 2,281,000	11
	SUBTOTAL				**$ 29,160,000**	
12.	Contingency	%	25		$ 5,940,000	12
	TOTAL CAPITAL COST				**$ 35,100,000**	

O&M Cost

ITEM		UNIT	ANNUAL QUANTITY	UNIT PRICE	AMOUNT	NOTES
13.	Monitored Natural Attenuation	LS	1	$ 40,000	$ 40,000	8
14.	Long-term Monitoring and O&M					
	a. Cap/Cover Inspection	LS	1	$ 6,000	$ 6,000	13
	b. NAPL Recovery and Disposal Allowance	LS	1	$ 10,000	$ 10,000	
	c. Reporting	LS	1	$ 30,000	$ 30,000	
	d. Miscellaneous Maintenance	LS	1	$ 10,000	$ 10,000	
	TOTAL ANNUAL O&M COST				**$ 96,000**	
	O&M N.P.V. (30 yrs @3% discount rate)				**$1,890,000**	
	TOTAL NET PRESENT VALUE				**$ 36,990,000**	

DRAFT
COST ESTIMATE NOTES

TROY (WATER STREET) SITE – AREA 2
TROY, NY

Conceptual Remedial Action Cost Estimate Notes and Assumptions

1) ROD Remedy Components costs based on actual costs from completed projects.

2) Cost for mobilization of labor, equipment, and materials is estimated at 10% of the total cost of the construction-related items.

3) Closure of Structures cost includes excavation, dewatering, transportation, disposal, backfill, and temporary controls for removal of the contents of Sump 1 and Sump 4. The temporary controls cost includes access control; fencing, air monitoring; health and safety measures; dust, vapor, and odor control; and soil erosion and sediment control. Assumed two feet of cover soil to be excavated for all structures and disposed off-site at a non-hazardous landfill. Structure contents assumed to be non-hazardous coal tar soil/sludge material, which could be managed off-site at an incineration facility (e.g., Covanta Niagara). Assumed a Sump 4 depth of 10.6 ft based on boring/test pit observations. Sump 1 depth assumed to be 10 ft. Waste characterization cost assumes 1 sludge sample, 1 soil sample, and 1 water sample per structure analyzed for TCLP, ignitability, reactivity, corrosivity (water only), PCBs, and BTU and sulfur (sludge and soil only). Dewatering assumes pumping and storage at onsite storage tank. Dewatering volume assumed to be 20% of structure volume.

4) Includes decommissioning, characterization, transportation and disposal of contents of pipes traversing the Wynantskill Creek, tanks and pipes in former Benzol building. Assumed pipes traversing Wynantskill are 60 feet in length and would be cut, drained, and plugged at each side of the creek. Quantities for pipes traversing the Wynantskill Creek and tanks and pipes in former Benzol building are based on field reconnaissance. Pipes/tanks assumed to be ½ full of non-hazardous coal tar sludge/soil material, which could be managed off-site at an incineration facility (e.g., Covanta Niagara).

5) Excavation includes demolition of concrete structures within the excavation area, temporary shoring ($100,000 allowance), soil excavation, waste characterization, transportation, disposal, and backfilling. Demolition of concrete foundations cost includes structures East of Former By-Products Building and an allowance of $50,000 for miscellaneous demolition. Concrete tank pads are assumed to be two feet thick and heavily reinforced. Steel sheet piling assumes temporary use and salvaging of sheet piles after use. Assumed 25% of excavated material would be managed as non-hazardous coal tar sludge at an off-site incineration facility (e.g., Covanta Niagara). Assumed 75% of excavated material would be managed as non-hazardous coal tar soil at an off-site thermal desorption facility (e.g., ESMI). Waste characterization of coal tar sludge assumes collection of 10 samples to be analyzed for TCLP, ignitability, reactivity, PCBs, BTU, and sulfur. Waste characterization of soil assumes 4 samples for first 1500 tons of coal tar soil and 1 sample per 750 tons thereafter analyzed for TCLP, ignitability, reactivity, TPH, VOCs, SVOCs, RCRA metals, Total CN, % sulfur, BTU, and total PCBs. Waste conditioning assumes conditioning of coal tar sludge using a 25:100 mixing ratio (by weight) of lime kiln dust/sand mix to sludge (assuming 10% LKD, 15% sand for waste conditioning). Temporary controls includes access control, fencing, air monitoring (including community air monitoring), health and safety measures, dust, vapor, and odor control (assumed use of spray-applied foams – does not include use of a temporary enclosure and air handling/treatment) and soil erosion and sediment control and is based on the excavation duration calculated using an assumed excavation rate of 1,500 cy per week. Cost assumes excavation would not be conducted under temporary enclosures.

   Excavation of shoreline hardened tar deposits is assumed to be accessible from the bank with some clearing and grubbing (i.e., use of barge-operated excavation equipment has not been included).

6) ISS costs include bench-scale testing, pre-excavation excavation, temporary shoring ($100,000 allowance), implementation of ISS, confirmation soil sampling, backfill for ISS area, soil disposal, temporary controls for access control, dust/vapor/odor control (assumed use of spray-applied foams and does not include use of a temporary enclosures or air handling/treatment systems), soil erosion and sediment migration control, and H&S measures. Temporary controls cost is based on a duration calculated using a rate of 2,000 CY/week for implementation of ISS. Assumed ISS mix includes 5-10% Portland cement, 0.5% Bentonite, and 10-15% water. Assumed 1 sample/ 1000 CY taken to test for unconfined compressive strength, Hydraulic Conductivity, and SPLP VOCs. Structure demolition includes demolition of former Tar Liquor Sump, structures east of former Water

Gas Building, and former Water Gas Building foundation. For Tar Liquor Sump, assumed 1 foot thick reinforced concrete walls, 10 foot deep sump, and 1 foot of cover soil. Assumed 2 foot thick concrete pads for structures east of former Water Gas Building, and 18 inch thick concrete pads for former Water Gas Building, former Boiler House, and former Reactor House. Supplemental excavation assumed to extend to 8 feet below ground surface. The excavation backfill volume reduction assumes 30% swelling in ISS area as a result of ISS. Extra backfill may be used for backfilling excavation areas or for grading prior to cap construction.

7) Assumed 15 acres to be covered (excludes footprint of South Garage, Machine Shop, E-Lot Building, and Gas Regulator Station). Assumed that 50% of area will be covered with one-foot soil or stone cover and 50% covered with a 4-inch asphalt cover. Assumed an additional average of one foot of soil required to achieve suitable subgrades to promote drainage. Asphalt cover assumes 4-inch dense graded aggregate, 2-inch asphalt subbase, 2-inch asphalt surface course, and demarcation layer. Assumed silt fencing and hay bales would be installed around the perimeter of the Site.

8) Costs associated with MNA assumes sampling of 20 to 25 wells once per year and analysis of samples for PAHs and BTEX compounds. Labor cost assumes 3 hours labor from Supervising Hyrdrogeologist, 15 hours from Senior Hydrogeologists, 72 hours from Hydrogeologist I, and 80 hours from Field Technician III. Equipment rental assumes rental of 2 QED bladder pump for 1.5 weeks, 2 QED control box for 1.5 weeks, 2 QED Compressor for 1.5 weeks, QED accessories (bladder, check balls, gaskets, etc.) for each well, 2 Horiba U-22 for 1.5 weeks, 2000 feet of tubing, and 2 oil/water interface probes for 1.5 weeks. Includes costs for preparation of Data Usability Summary Report (DUSR) and evaluation of data.

9) Assumes preparation of deed restriction documents and site management plan (SMP).

10) Includes an allowance of $50,000 for potential additional pre-design investigation activities.

11) Engineering and Construction support estimated at 15% of capital costs (excluding waste transportation and disposal). Includes engineering design, bid document preparation, review of construction submittals, construction observation, and documentation.

12) A contingency of 25% has been applied to the capital costs (excluding Item 1: ROD-Remedy Components Completed to Date) to account for unforeseen conditions and general project complexity.

13) Long Term Monitoring and O&M assumes semiannual cap/cover inspection/documentation, a $10,000 allowance for NAPL recovery and disposal, a $10,000 allowance for miscellaneous O&M repairs, preparation of Monitoring and O&M reports, and Institutional and Engineering annual certifications.

APPENDIX E

"Isopach Map of Alluvial Deposits" and "Base of Fill Surface Map"

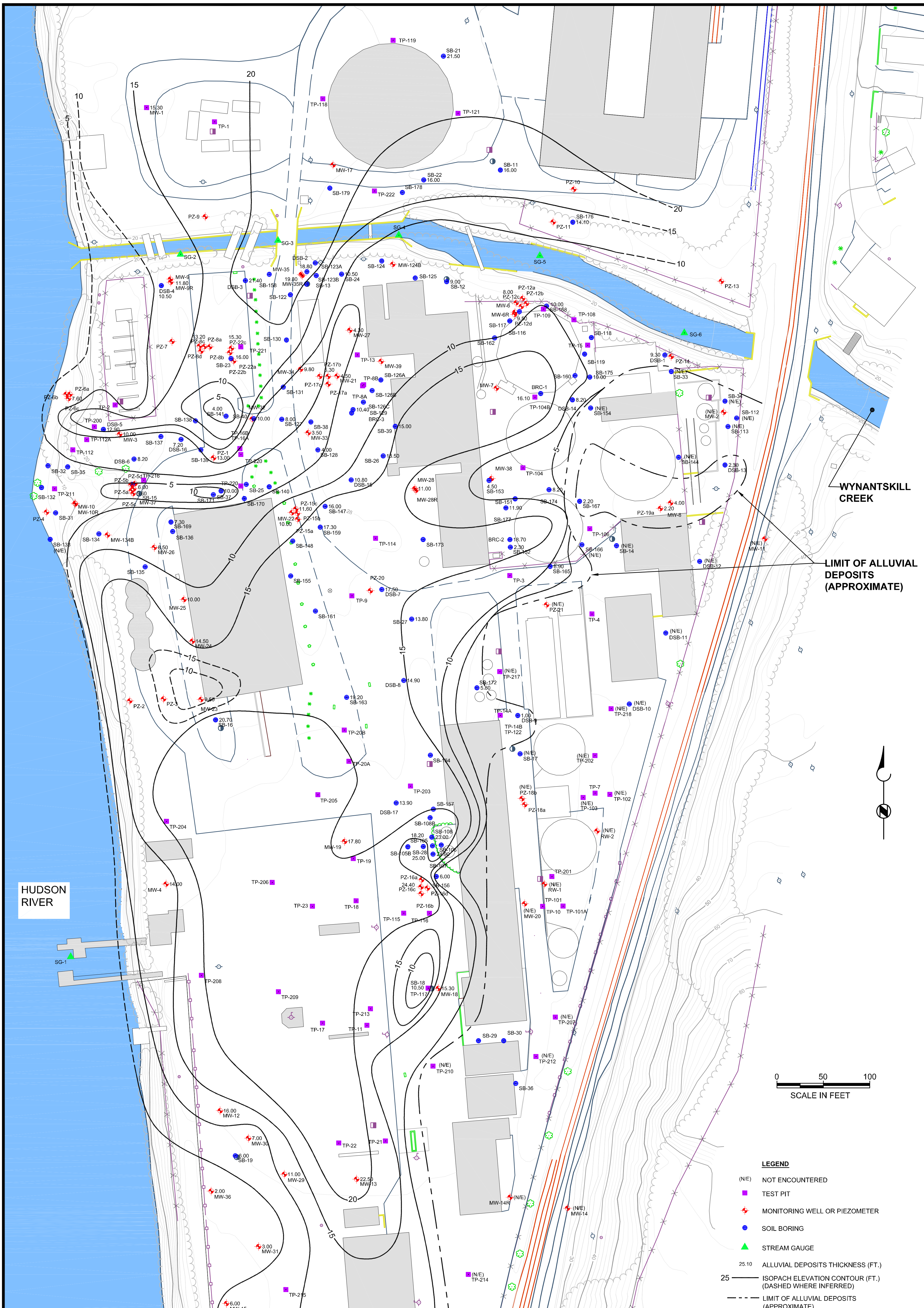


FIGURE E-1

ISOPACH MAP OF ALLUVIAL DEPOSITS

PROJECT LOCATION	DATE	PROJECT NUMBER
NATIONAL GRID TROY (WATER ST.) SITE-AREA 2 TROY, NEW YORK	FEB., 2008	132071 / 107

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

Feb 26, 2008 - 2:02pm rjames
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\ISOPACH MAP OF ALLUVIAL.dwg

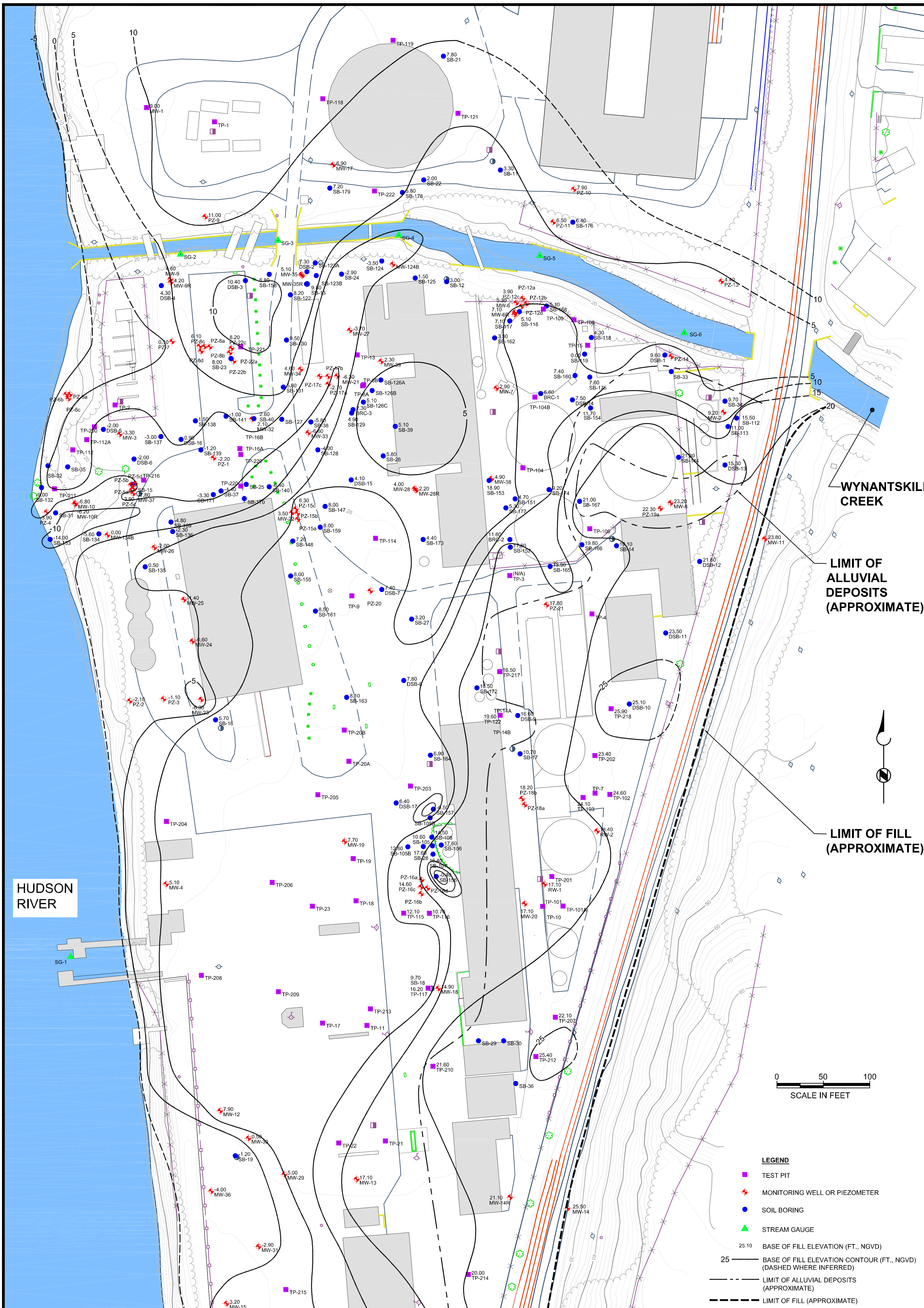


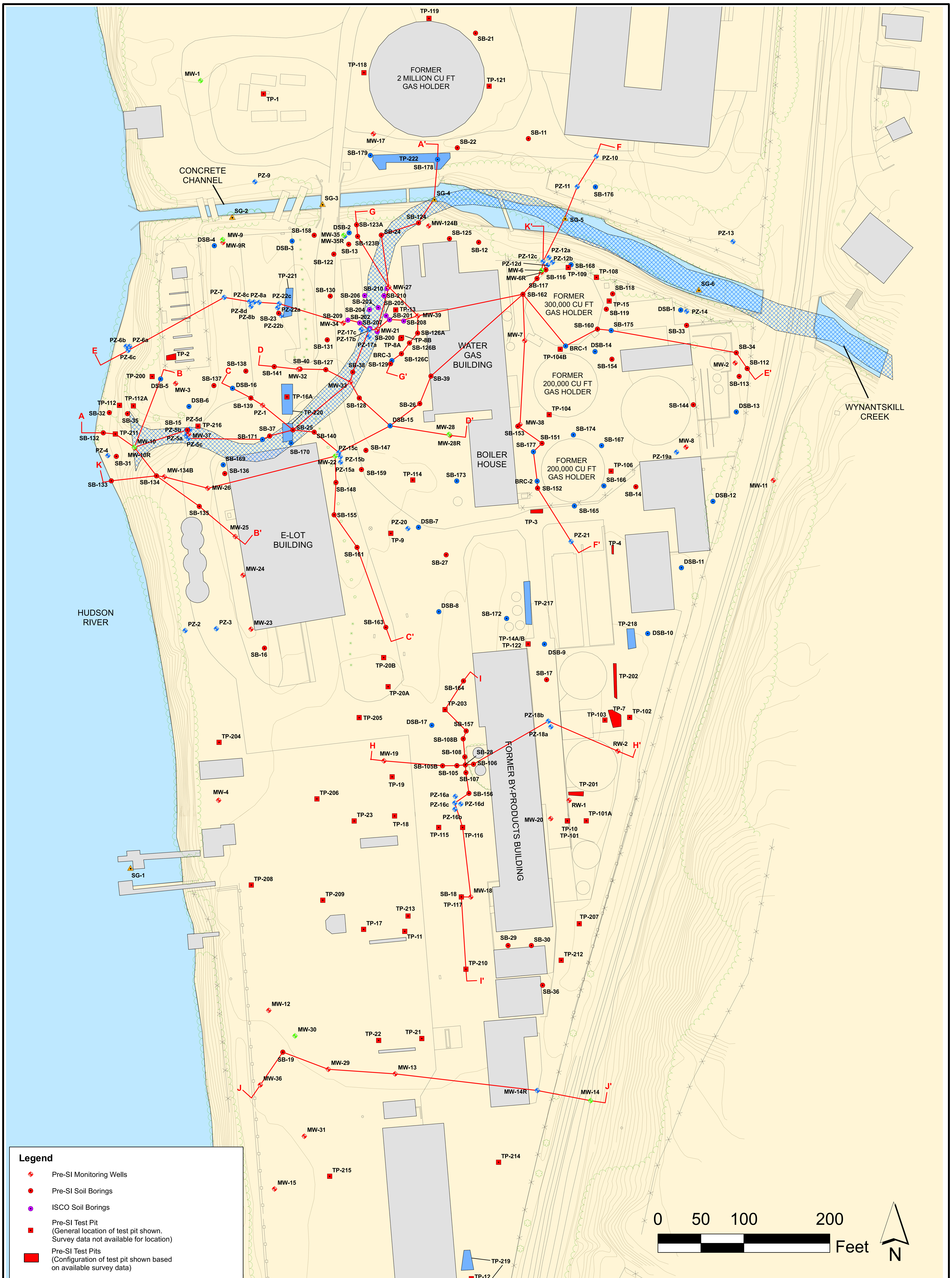
FIGURE E-2
BASE OF FILL SURFACE
CONTOUR MAP

PROJECT LOCATION	DATE	PROJECT NUMBER
NATIONAL GRID TROY (WATER ST.) SITE-AREA 2 TROY, NEW YORK	FEB., 2008	132071 / 107
	BROWN AND CALDWELL ASSOCIATES ALLENDALE, NEW JERSEY	

Feb 26, 2008 - 2:00pm rjames
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\BASE OF FILL SURFACE.dwg

APPENDIX F

Cross-Sections Depicting NAPL and PAH Data



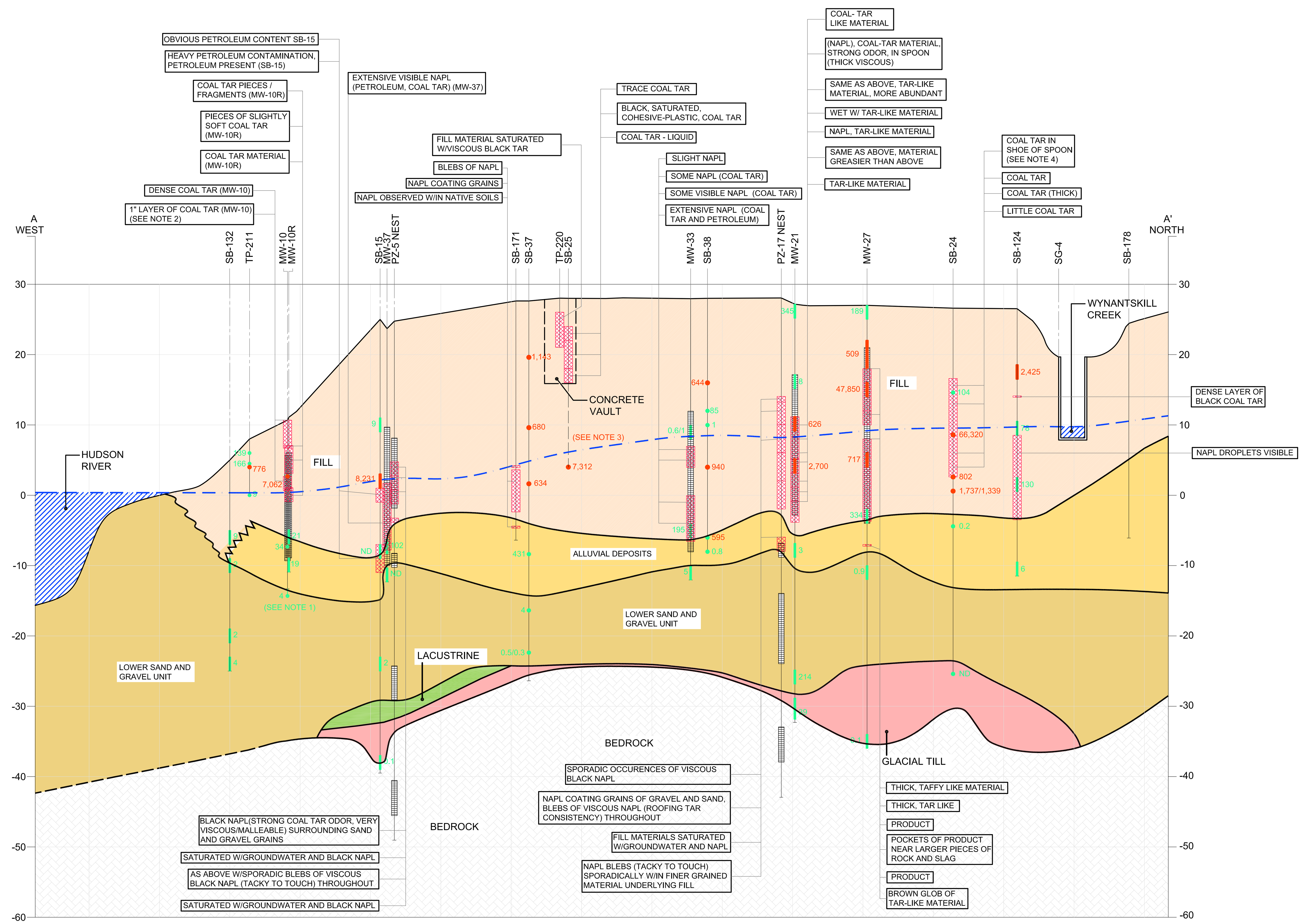
CROSS-SECTION LOCATIONS

Troy (Water Street) Site - Area 2
Troy, New York

DATE	PROJECT NUMBER
03/25/08	132071.201

BROWN AND CALDWELL
ASSOCIATES

P:/GIS/National_Grid/Troy_XSect_loc_map_rev.mxd



LEGEND:

MW-7 — MONITORING WELL / SOIL BORING IDENTIFICATION AND APPROXIMATE LOCATION

GENERALIZED GROUND SURFACE

138 — PAHS < 500 mg/kg, WITHIN SAMPLE INTERVAL

4 — PAHS < 500 mg/kg, AT SPECIFIC DEPTH

1,017 — PAHS > 500 mg/kg, WITHIN SAMPLE INTERVAL

1,017 — PAHS > 500 mg/kg, AT SPECIFIC DEPTH

WELL SCREEN INTERVAL

INTERVAL WHERE NAPL/TAR OBSERVED IN SOIL

TOTAL DEPTH OF BOREHOLE

FEW NAPL DROPLETS — DESCRIPTION OF NAPL/TAR IN SOIL. AT EACH LOCATION DESCRIPTIONS ARE ARRANGED FROM SHALLOWEST TO DEEPEST.

ABBREVIATIONS:

PAHS - POLYCYCLIC AROMATIC HYDROCARBONS

NAPL - NON AQUEOUS PHASE LIQUID

FILL

ALLUVIAL DEPOSITS

GLACIAL TILL

LACUSTRINE

LOWER SAND & GRAVEL UNIT

BEDROCK

WATER TABLE (9/4/07)

NOTE:

1. THE BORING LOG FOR MW-10 (PREPARED BY FLUOR DANIEL GTI, INC.) INDICATES THE BORING TERMINATES AT 24.0 FT. BGS. THE PAH SAMPLE WAS REPORTED AT 25.0 FT. BGS.
2. THE BORING LOG FOR MW-10 (PREPARED BY FLUOR DANIEL GTI, INC.) INDICATES A 1" LAYER OF DENSE COAL TAR IN THE 8 FT.-10 FT. BGS INTERVAL. SINCE NO INFORMATION IS PROVIDED REGARDING ACTUAL DEPTH OF COAL TAR LAYER, THE ENTIRE INTERVAL IS SHOWN TO CONTAIN NAPL.
3. THE BORING LOG FOR SB-25 (PREPARED BY FLUOR DANIEL GTI, INC.) INDICATES THE BORING TERMINATES AT 12 FT. BGS. THE PAH SAMPLE DEPTH FOR THE BORING WAS REPORTED AT 24.5 FT. BGS.
4. THE BORING LOG FOR SB-24 (FLUOR DANIEL GTI , INC.) INDICATES COAL TAR IN SHOE OF SPOON FOR THIS INTERVAL. THERE IS NO INFORMATION AVAILABLE TO DETERMINE ACTUAL DEPTH. BC ASSUMED COAL TAR PRESENT FOR ENTIRE INTERVAL.

50 0 50 100 scale HORIZONTAL feet

10 0 10 20 scale VERTICAL feet

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER — DATE: 02/5/08
APPROVED: BROWN AND CALDWELL — DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:	JLM
DRAWN:	RMJ
CHECKED:	JLM
CHECKED:	RLO
APPROVED:	

EXTERNAL REFERENCES

REVISIONS

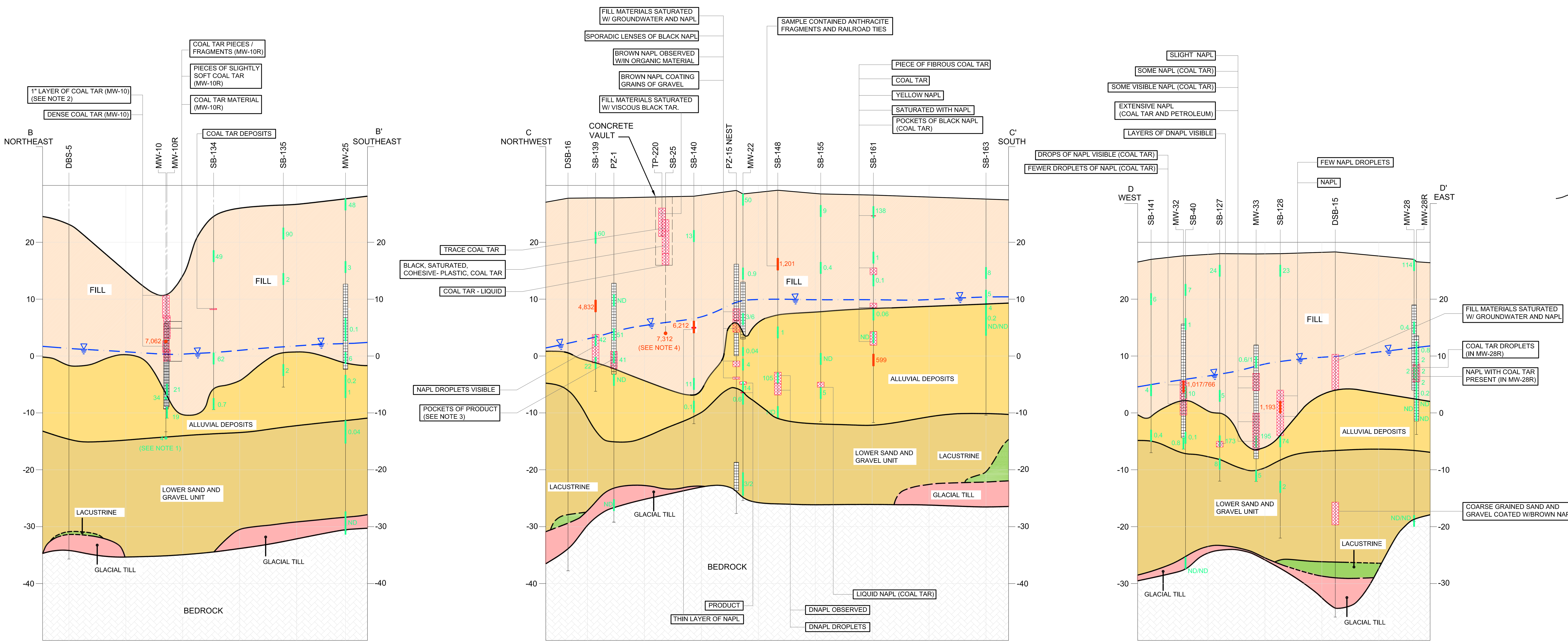
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

GENERALIZED GEOLOGIC CROSS-SECTION A-A

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

FILENAME -
BC PROJECT NUMBER 132071.201
CLIENT PROJECT NUMBER
DRAWING NUMBER -
SHEET NUMBER

Aug 28, 2008 - 4:18pm
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\201\FIGURE- CROSS-SECTIONS A-A.dwg
asherman



CROSS-SECTION B-B'

CROSS-SECTION C-C'

CROSS-SECTION D-D'

LEGEND:

MONITORING WELL / SOIL BORING IDENTIFICATION AND APPROXIMATE LOCATION

GENERALIZED GROUND SURFACE

PAHS < 500 mg/kg, WITHIN SAMPLE INTERVAL

PAHS < 500 mg/kg, AT SPECIFIC DEPTH

PAHS > 500 mg/kg, WITHIN SAMPLE INTERVAL

PAHS > 500 mg/kg, AT SPECIFIC DEPTH

WELL SCREEN INTERVAL

INTERVAL WHERE NAPL/TAR OBSERVED IN SOIL

TOTAL DEPTH OF BOREHOLE

FEW NAPL DROPLETS — DESCRIPTION OF NAPL/TAR IN SOIL. AT EACH LOCATION DESCRIPTIONS ARE ARRANGED FROM SHALLOWEST TO DEEPEST.

ABBREVIATIONS:

PAHS - POLYCYCLIC AROMATIC HYDROCARBONS

NAPL - NON AQUEOUS PHASE LIQUID

FILL

ALLUVIAL DEPOSITS

GLACIAL TILL

LACUSTRINE

LOWER SAND & GRAVEL UNIT

BEDROCK

WATER TABLE (9/4/07)

HORIZONTAL scale 50 0 50 100 feet

VERTICAL scale 10 0 10 20 feet

NOTES:

1. THE BORING LOG FOR MW-10 (PREPARED BY FLUOR DANIEL GTI, INC.) INDICATES THE BORING TERMINATES AT 24 FT. BGS. THE PAH SAMPLE DEPTH FOR THIS BORING WAS REPORTED AT 25 FT. BGS.
2. THE BORING LOG FOR MW-10 (PREPARED BY FLUOR DANIEL GTI, INC.) INDICATES A 1" LAYER OF DENSE COAL TAR IN THE 8 FT.-10FT. BGS INTERVAL. SINCE NO INFORMATION IS PROVIDED REGARDING ACTUAL DEPTH OF COAL TAR LAYER, THE ENTIRE INTERVAL IS SHOWN TO CONTAIN NAPL.
3. BORING LOG PZ-1 (PREPARED BY IT CORP.) INCLUDES A DESCRIPTION OF VISCOUS MATERIAL AT 21-23 FT. THIS WAS NOT DEPICTED AS NAPL DUE TO INADEQUATE DESCRIPTION AND INFORMATION.
4. THE BORING LOG FOR SB-25 (PREPARED BY FLUOR DANIEL GTI, INC.) INDICATES THE BORING TERMINATES AT 12 FT. BGS. THE PAH SAMPLE DEPTH FOR THIS BORING WAS REPORTED AT 24.5 FT. BGS.

asherman
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\201\FIGURE- CROSS-SECTIONS B-B, C-C & D-D.dwg
Aug 28, 2008 - 4:19pm

BROWN AND CALDWELL ASSOCIATES

ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER — DATE: 04/08

APPROVED: BROWN AND CALDWELL — DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: JLM
DRAWN: RMJ
CHECKED: JLM
CHECKED: RLO
APPROVED:

EXTERNAL REFERENCES

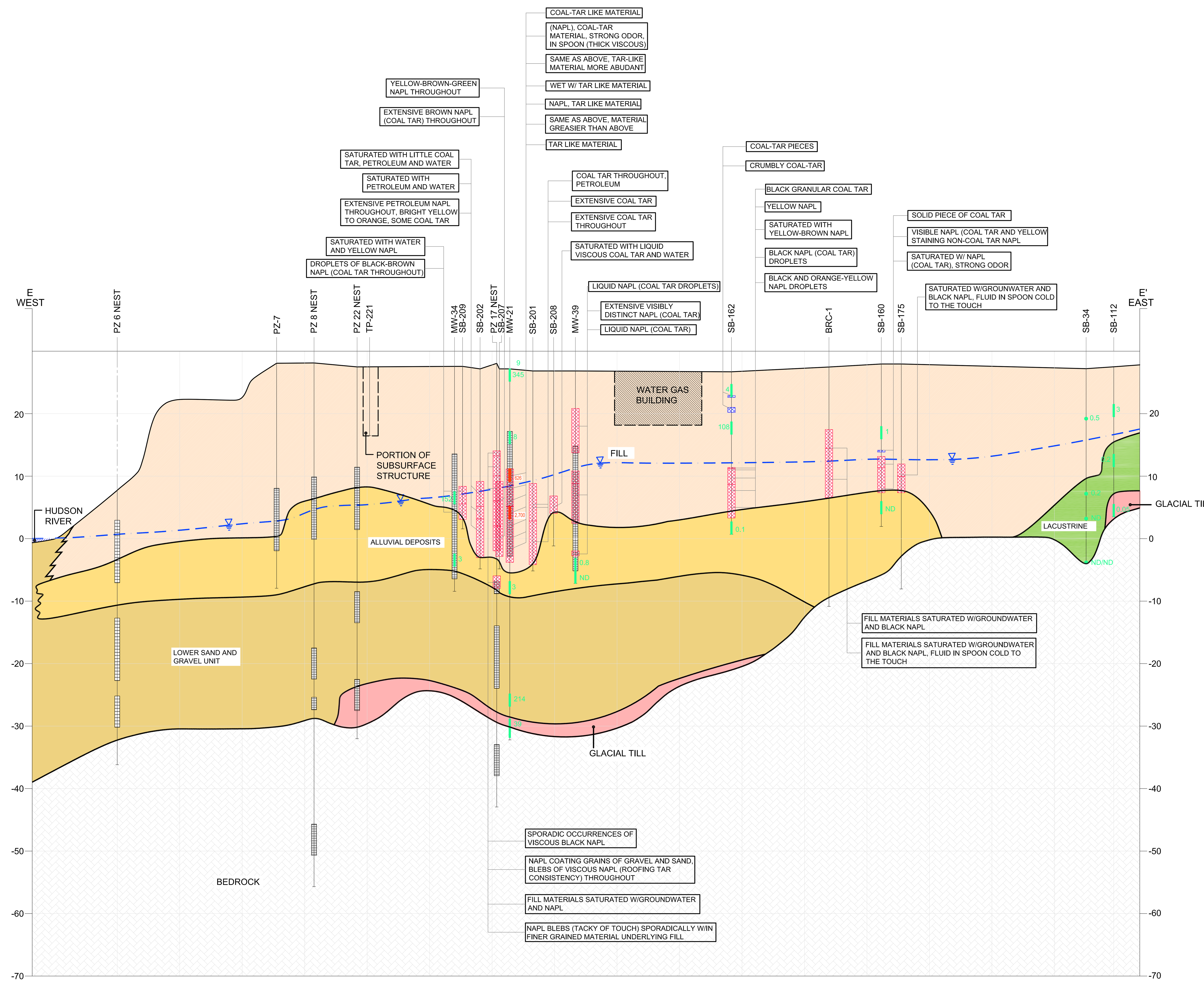
REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

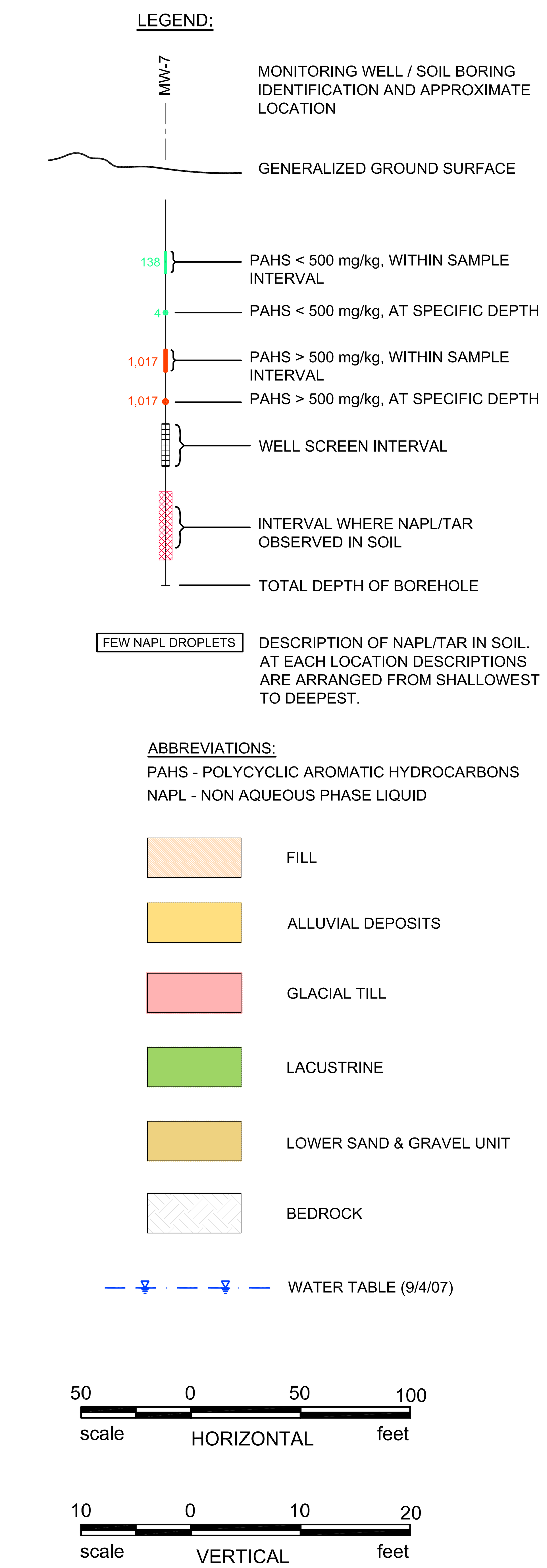
GENERALIZED GEOLOGIC CROSS-SECTION B-B', C-C' & D-D'

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

FILENAME
-
BC PROJECT NUMBER
132071.201
CLIENT PROJECT NUMBER
DRAWING NUMBER
-
SHEET NUMBER



CROSS-SECTION E-E'



Aug 28, 2008 - 4:20pm P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\201\FIGURE- CROSS-SECTIONS E-E.dwg asherman

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER — DATE: 02/5/08
APPROVED: BROWN AND CALDWELL — DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:	JLM
DRAWN:	RMJ
CHECKED:	JLM
CHECKED:	RLO
APPROVED:	

EXTERNAL REFERENCES

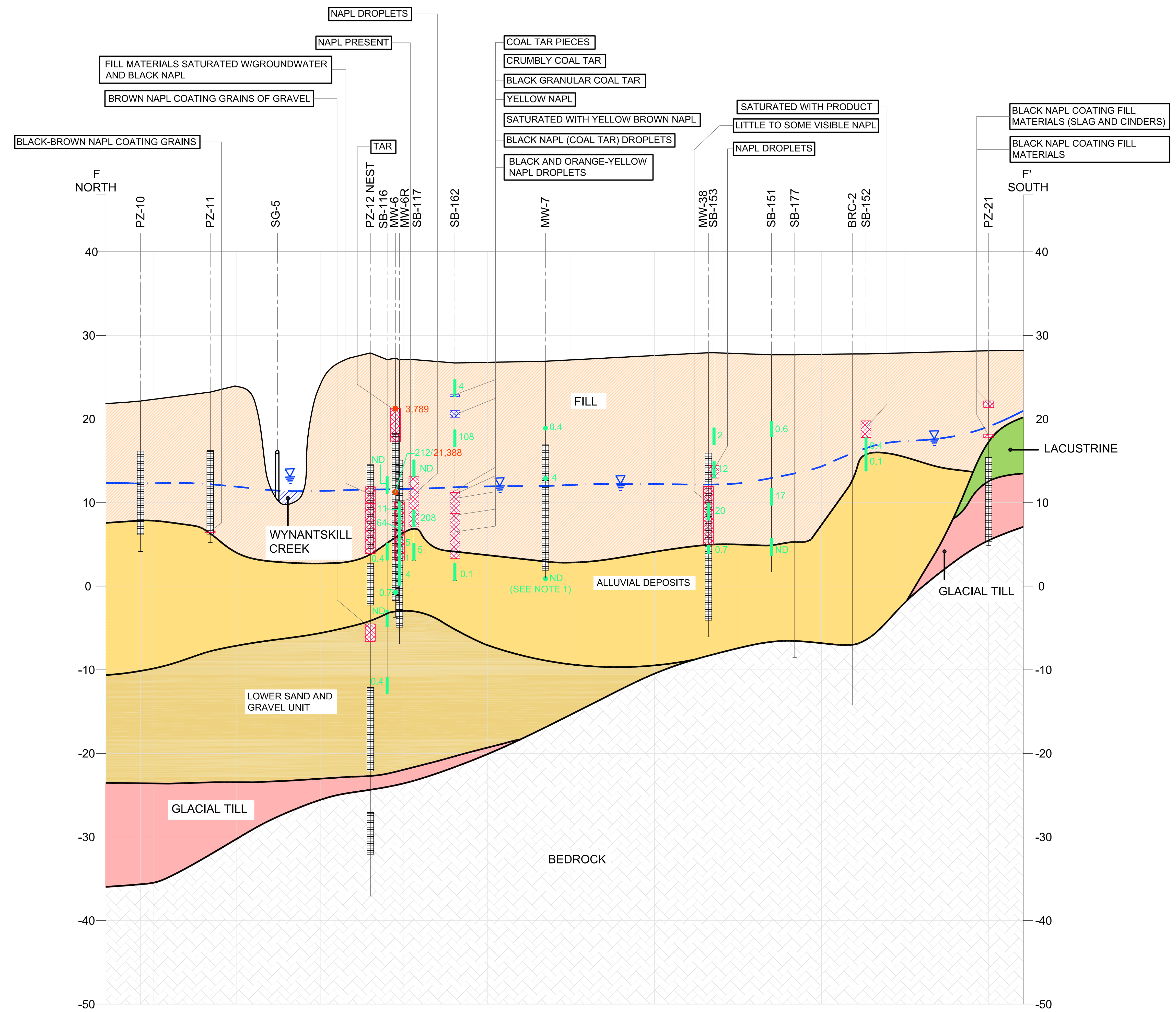
REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

GENERALIZED GEOLOGIC CROSS-SECTION E-E'

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

FILENAME
-
BC PROJECT NUMBER
132071.201
CLIENT PROJECT NUMBER
DRAWING NUMBER
-
SHEET NUMBER



CROSS-SECTION F-F'

LEGEND:

- MW-7 — MONITORING WELL / SOIL BORING IDENTIFICATION AND APPROXIMATE LOCATION
- GENERALIZED GROUND SURFACE
- 138 — PAHS < 500 mg/kg, WITHIN SAMPLE INTERVAL
- 4 — PAHS < 500 mg/kg, AT SPECIFIC DEPTH
- 1,017 — PAHS > 500 mg/kg, WITHIN SAMPLE INTERVAL
- 1,017 — PAHS > 500 mg/kg, AT SPECIFIC DEPTH
- WELL SCREEN INTERVAL
- TAR IN INTERVAL IS BRITTLE/HARD
- INTERVAL WHERE NAPL/TAR OBSERVED IN SOIL
- TOTAL DEPTH OF BOREHOLE
- FEW NAPL DROPLETS — DESCRIPTION OF NAPL/TAR IN SOIL. AT EACH LOCATION DESCRIPTIONS ARE ARRANGED FROM SHALLOWEST TO DEEPEST.

ABBREVIATIONS:

PAHS - POLYCYCLIC AROMATIC HYDROCARBONS

NAPL - NON AQUEOUS PHASE LIQUID

- FILL
- ALLUVIAL DEPOSITS
- GLACIAL TILL
- LACUSTRINE
- LOWER SAND & GRAVEL UNIT
- BEDROCK
- WATER TABLE (9/4/07)

50 0 50 100
scale HORIZONTAL feet

10 0 10 20
scale VERTICAL feet

NOTES:

1. THE BORING LOG FOR MW-7 (PREPARED BY FLUOR DANIEL GT1, INC.) INDICATES THE BORING TERMINATES AT 25 FT. BGS. THE PAH SAMPLE DEPTH FOR THE BORING WAS REPORTED AT 26 FT. BGS.

asherman
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\201\FIGURE- CROSS-SECTIONS F-F.dwg
Aug 28, 2008 - 4:20pm

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER DATE: 02/5/08
APPROVED: BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: JLM
DRAWN: RMJ
CHECKED: JLM
CHECKED: RLO
APPROVED:

EXTERNAL REFERENCES

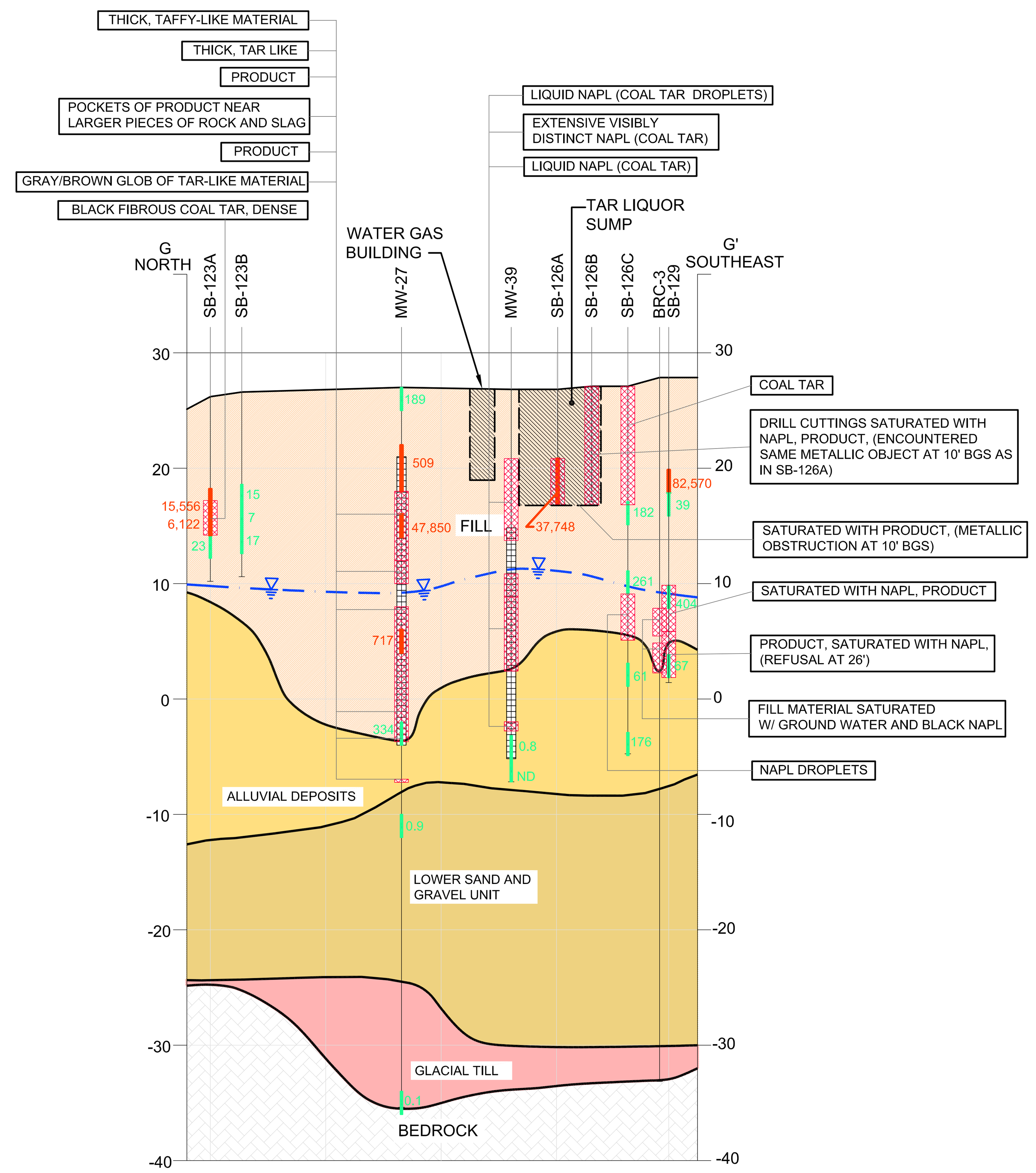
REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

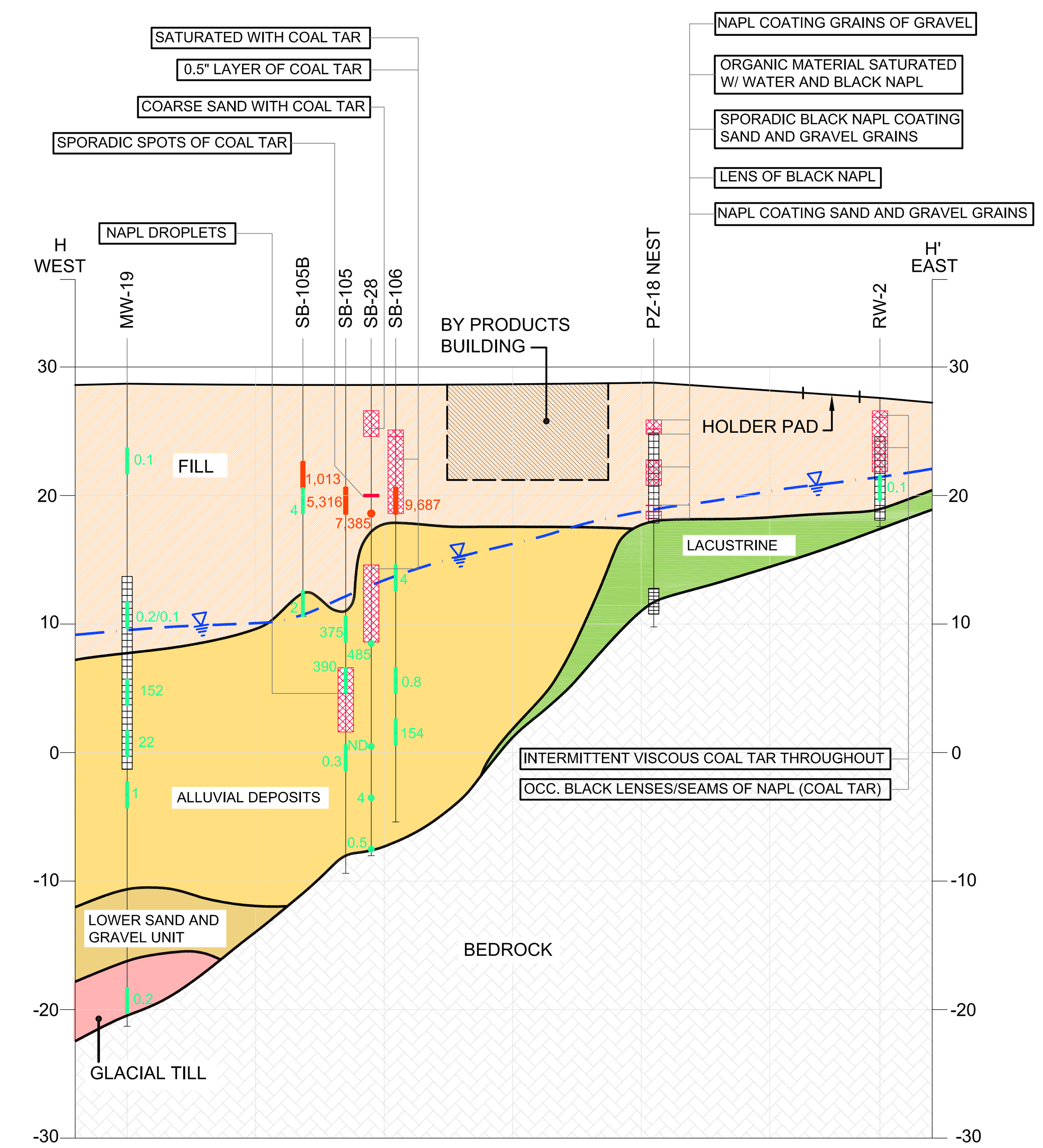
GENERALIZED GEOLOGIC CROSS-SECTION F-F'

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

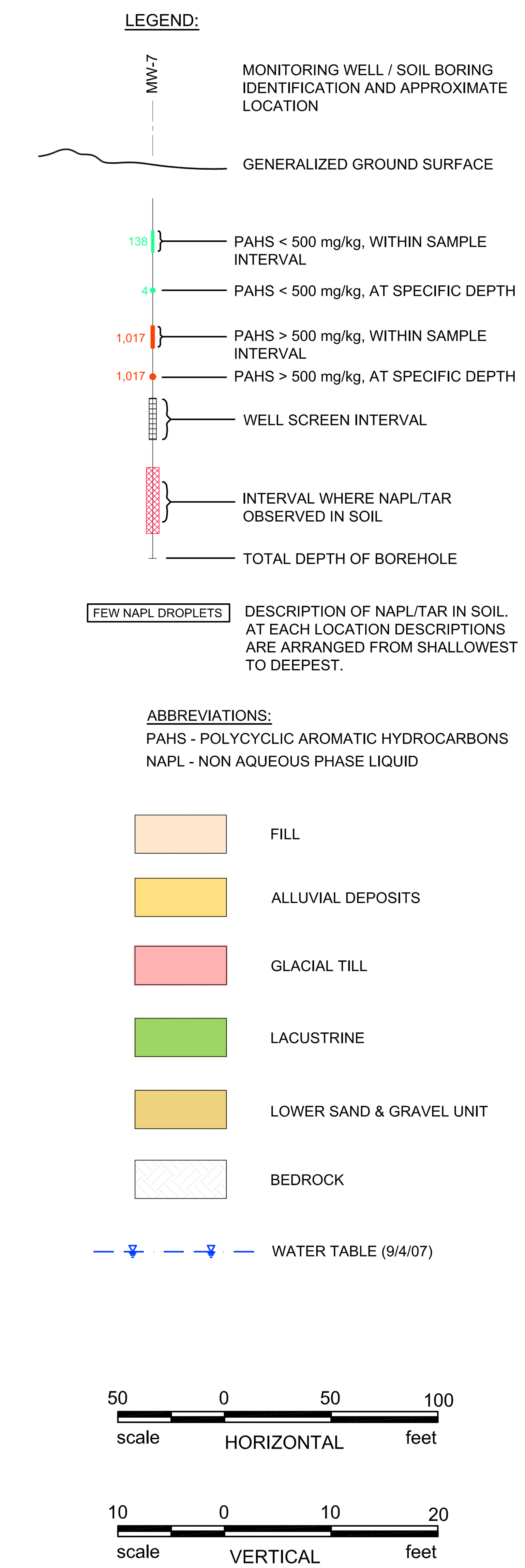
FILENAME
-
BC PROJECT NUMBER
132071.201
CLIENT PROJECT NUMBER
DRAWING NUMBER
-
SHEET NUMBER



CROSS-SECTION G-G'



CROSS-SECTION H-H'



asherman
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\201\FIGURE- CROSS-SECTIONS G-G, H-H.dwg
Aug 28, 2008 - 4:24pm

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER — DATE: 02/5/08
APPROVED: BROWN AND CALDWELL — DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: JLM
DRAWN: RMJ
CHECKED: JLM
CHECKED: RLO
APPROVED:

EXTERNAL REFERENCES

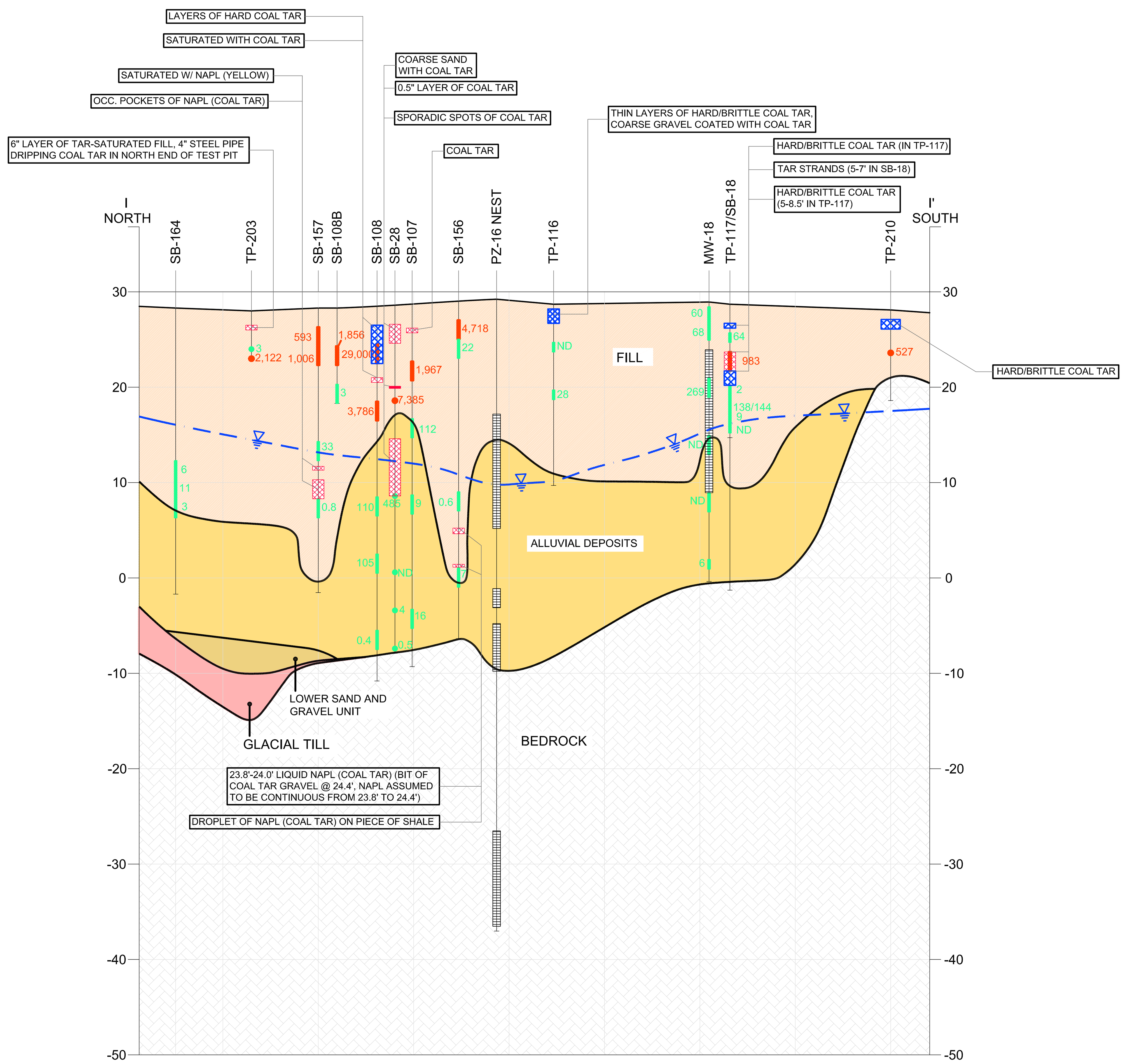
REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

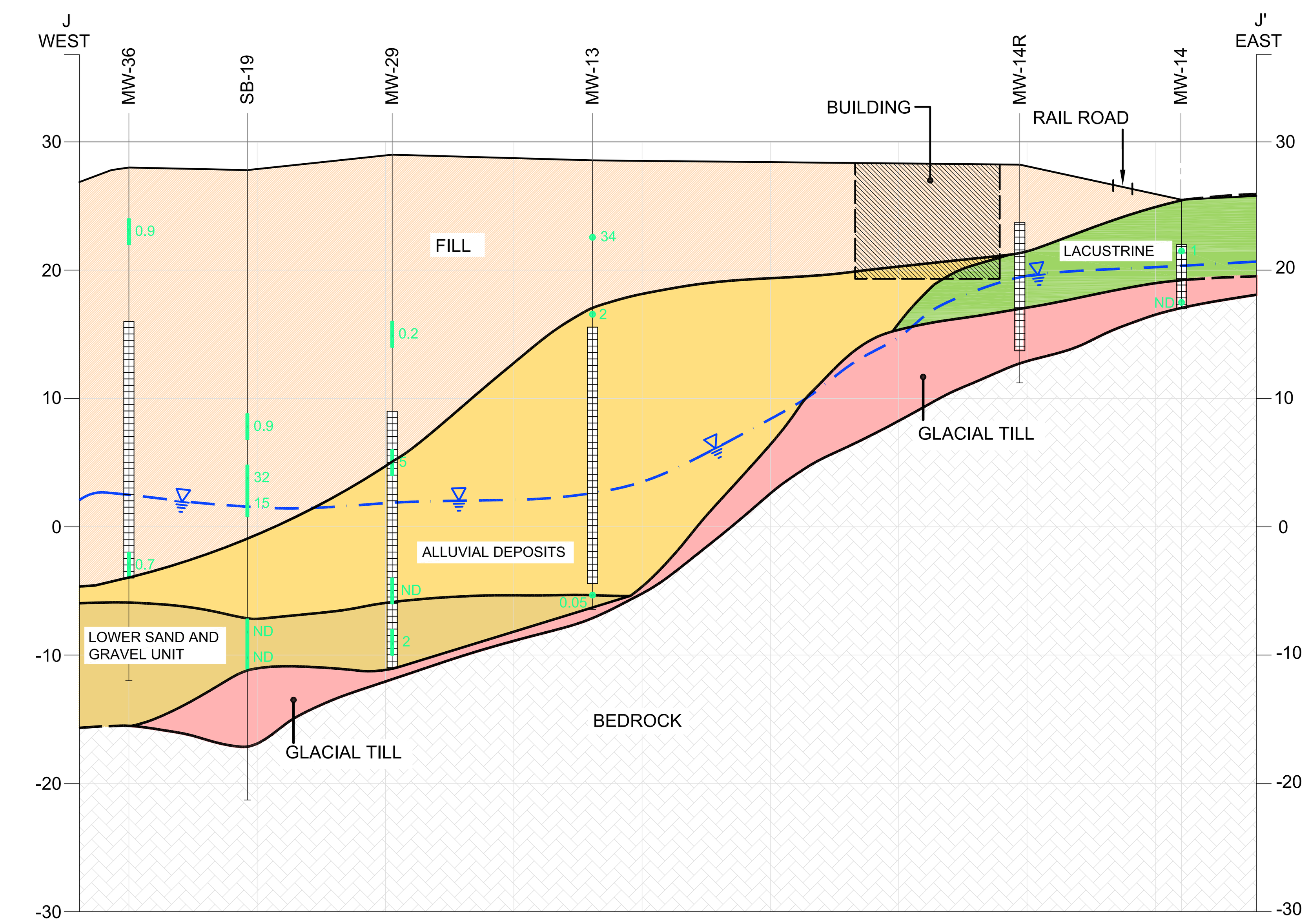
GENERALIZED GEOLOGIC CROSS-SECTION G-G' & H-H'

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

FILENAME: -
BC PROJECT NUMBER: 132071.201
CLIENT PROJECT NUMBER
DRAWING NUMBER: -
SHEET NUMBER



CROSS-SECTION I-I'



CROSS-SECTION J-J'

LEGEND:

- MW-7 — MONITORING WELL / SOIL BORING IDENTIFICATION AND APPROXIMATE LOCATION
- GENERALIZED GROUND SURFACE
- 138 — PAHS < 500 mg/kg, WITHIN SAMPLE INTERVAL
- 4 — PAHS < 500 mg/kg, AT SPECIFIC DEPTH
- 1,017 — PAHS > 500 mg/kg, WITHIN SAMPLE INTERVAL
- 1,017 — PAHS > 500 mg/kg, AT SPeCIFIC DEPTH
- WELL SCREEN INTERVAL
- TAR IN INTERVAL IS BRITTLE/HARD
- INTERVAL WHERE NAPL/TAR OBSERVED IN SOIL
- TOTAL DEPTH OF BOREHOLE
- FEW NAPL DROPLETS — DESCRIPTION OF NAPL/TAR IN SOIL. AT EACH LOCATION DESCRIPTIONS ARE ARRANGED FROM SHALLOWEST TO DEEPEST.

ABBREVIATIONS:

PAHS - POLYCYCLIC AROMATIC HYDROCARBONS
NAPL - NON AQUEOUS PHASE LIQUID

- FILL
- ALLUVIAL DEPOSITS
- GLACIAL TILL
- LACUSTRINE
- LOWER SAND & GRAVEL UNIT
- BEDROCK
- WATER TABLE (9/4/07)

50 0 50 100
scale HORIZONTAL feet

10 0 10 20
scale VERTICAL feet

asherman
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\201\FIGURE- CROSS-SECTIONS I-I & J-J.dwg
Aug 28, 2008 - 4:36pm

BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER DATE: 02/5/08
APPROVED: BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: JLM
DRAWN: RMJ
CHECKED: JLM
CHECKED: RLO
APPROVED:

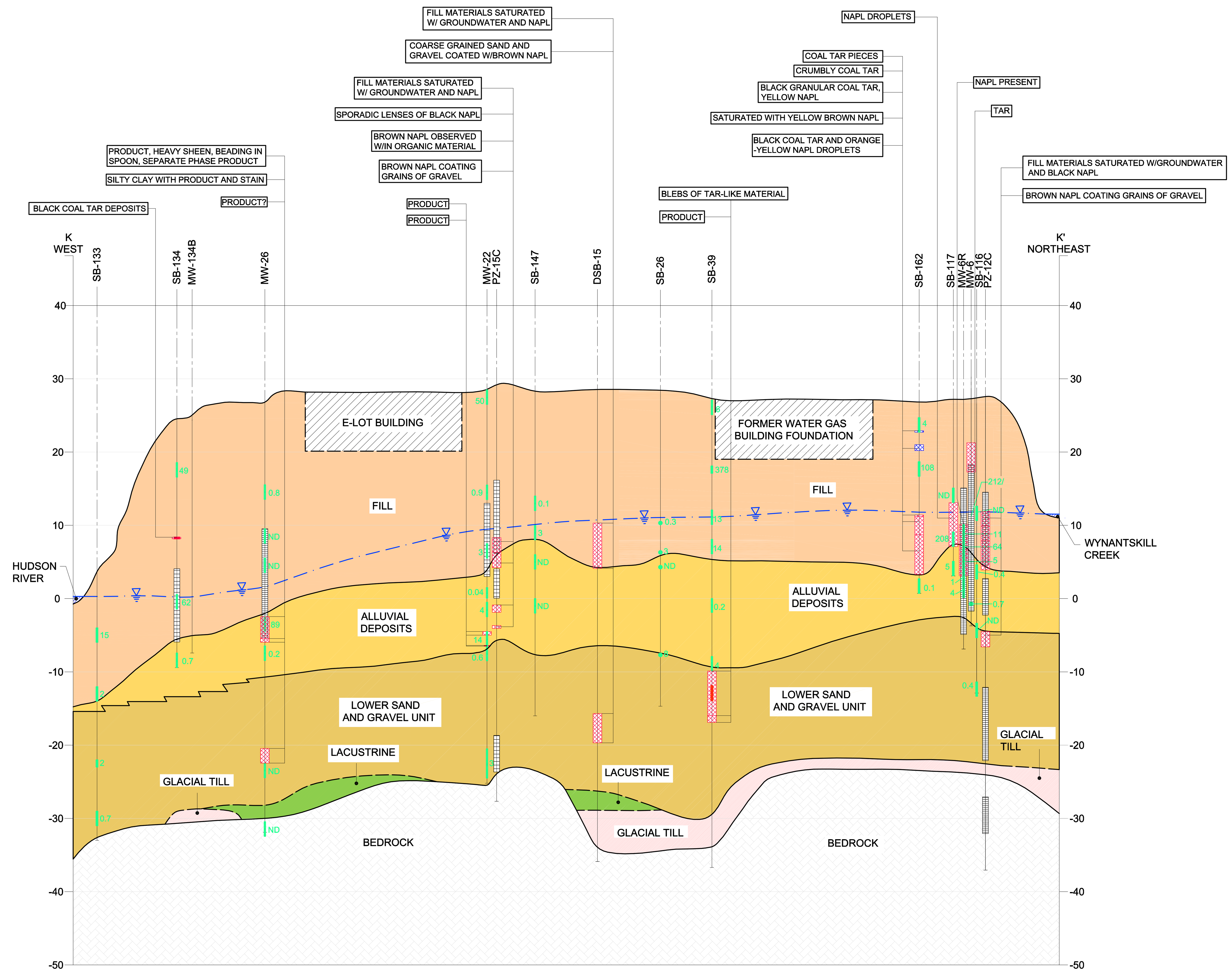
EXTERNAL REFERENCES

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

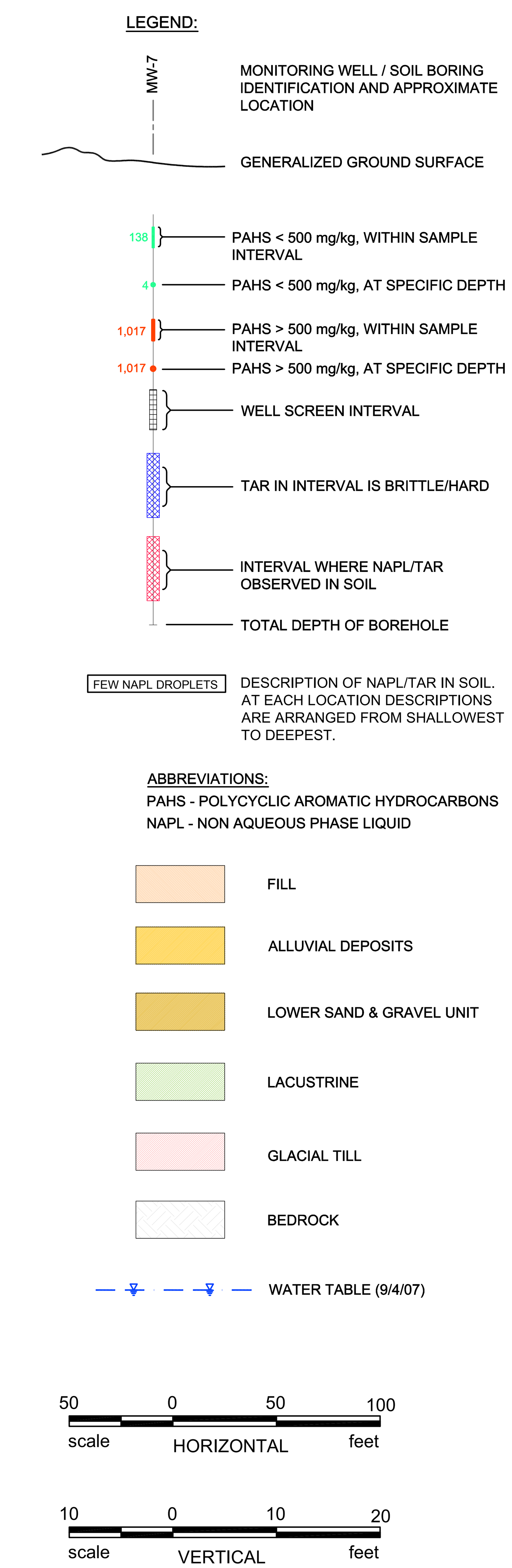
GENERALIZED GEOLOGIC CROSS-SECTION I-I' & J-J'

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

FILENAME
-
BC PROJECT NUMBER
132071.201
CLIENT PROJECT NUMBER
DRAWING NUMBER
-
SHEET NUMBER



CROSS-SECTION K-K'



BROWN AND CALDWELL ASSOCIATES
ALLENDALE, NEW JERSEY

SUBMITTED: BOB O'NEILL, PROJECT MANAGER DATE: 02/5/08
APPROVED: BROWN AND CALDWELL DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:	JLM
DRAWN:	RMJ
CHECKED:	JLM
CHECKED:	RLO
APPROVED:	

EXTERNAL REFERENCES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

GENERALIZED GEOLOGIC CROSS-SECTION K-K'

NATIONAL GRID
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

FILENAME
-
BC PROJECT NUMBER 132071.502
CLIENT PROJECT NUMBER
DRAWING NUMBER
-
SHEET NUMBER

Dec 09, 2009 - 1:23pm
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\502(PMSR)\Figure K-K.dwg
rjames

APPENDIX G

NAPL Gauging and Baildown Testing Results

NAPL GAUGING SUMMARY

G-1 and G-2 summarize the NAPL gauging results. Table 1 in G-1, presents a summary of the historic NAPL observations at monitoring wells and piezometers and dates of well development activities. Table 2 in G-1 summarizes the results from NAPL baildown testing performed at the Site during the Supplemental Pre-Design Investigation (SPDI) activities. For reference and additional information regarding NAPL observations and the results of NAPL gauging efforts, refer to G-2. This attachment includes tables that document NAPL observations in wells and piezometers from investigative efforts spanning from 2004 to 2010 including the SPDI and Supplemental Investigation (SI).

A summary of the available information pertaining to historic NAPL observations in monitoring wells and piezometers was presented in Section 3.3.1 of the Supplemental Investigation Report (Brown and Caldwell Associates, February 2008).

APPENDIX G-1

TABLE 1
HISTORIC NAPL OBSERVATIONS IN MONITORING WELLS AND PIEZOMETERS
TROY (WATER ST.) SITE -AREA 2
TROY, NEW YORK

Well ID	Date Installed	Development Date	Re-Development Date(s)	NAPL Observed (Y/N)	NAPL Observation Date (s)
MW-2	9/6/1994	NA	1/22/2004	N	--
MW-3	8/23/1994	NA	8/16/2007, 1/22/2004	N	--
MW-4	8/23/1994	NA	8/21/2007, 1/21/2004	N	--
MW-5	8/19/1994	NA	--	N	--
MW-6R	5/4/2004	5/11/2004	--	Y(b)	May-04, Mar-06, Jun-06, Jul-07, Sep-07, Nov-07, Feb-08
MW-7	5/21/1997	NA	5/6/2004	N	--
MW-8	5/20/1997	NA	1/22/2004	N	--
MW-9R	5/5/2004	5/7/2004	8/16/2007	N	--
MW-10R	5/10/2004	5/14/2004	5/21/2004	N	--
MW-11	5/1/1997	NA		N	--
MW-12	5/8/1997	NA	4/7/2004	N	--
MW-13	5/5/1997	NA	4/7/2004, 8/21/2007	N	--
MW-14R	8/8/2007	8/13/2007	--	N	--
MW-15	5/6/1997	NA	--	N	--
MW-16	5/9/1997	NA	1/22/2004, 8/13/2007	N	--
MW-17	4/28/1997	NA	1/22/2004	N	--
MW-18	5/15/2000	NA	4/7/2004	N	--
MW-19	5/25/2000	NA	1/21/2004	N	--
MW-20	5/15/2000	NA	4/7/2004	N	--
MW-21	5/25/2000	NA	8/20/2007	Y(a,b)	Nov-04, May-06, Jun-06, Aug-07, Sep-07, Nov-07
MW-22	5/16/2000	NA	1/22/2004	N	--
MW-23	5/17/2000	NA	4/7/2004	N	--
MW-24	5/23/2000	NA	1/21/2004	N	--
MW-25	5/19/2000	NA	1/16/2004	N	--
MW-26	5/18/2000	NA	1/21/2004	N	--
MW-27	6/7/2000	NA	4/6/2004, 8/17/2007	Y(b)	Apr-04, Feb-04
MW-28R	5/7/2004	5/13/2004	--	N	--
MW-29	2/2/2001	NA	4/8/2004, 8/13/2007	Y(b)	May-04, Jun-06, Sep-07, Nov-07, Feb-08
MW-30	2/5/2001	NA	4/8/2004	Y(b)	Nov-04
MW-31	2/5/2001	NA	8/13/2007	Y(b)	Nov-04, Jun-06
MW-32	5/12/2004	5/14/2004	8/21/2007	N	--
MW-33	5/19/2004	5/20/2004	8/21/2007	Y(b)	May-04, Sep-07
MW-34	5/14/2004	5/18/2004	--	N	--
MW-35R	8/1/2007	8/8/2007	--	N	--
MW-36	5/20/2004	5/21/2004	--	Y(b)	Jun-04
MW-37	5/21/2004	5/24/2004	4/30/2008	Y(b)	May-04

TABLE 1
HISTORIC NAPL OBSERVATIONS IN MONITORING WELLS AND PIEZOMETERS
TROY (WATER ST.) SITE -AREA 2
TROY, NEW YORK

Well ID	Date Installed	Development Date	Re-Development Date(s)	NAPL Observed (Y/N)	NAPL Observation Date (s)
MW-38	5/25/2004	NA		Y(b)	May-04
MW-39	8/10/2004	NA	--	Y(b)	Nov-04, Mar-06, May-06, Jun-06, Sep-07, Nov-07, Feb-08
MW-124B	1/27/2004	NA		N	--
MW-134B	1/28/2004	NA	8/20/2007	N	--
PZ-1	1/30/2001	NA	8/20/2007	Y(b)	May-04, Jun-06
RMW-8D	10/6/2005	NA	--	Y(b)	Mar-06, May-06, Jun-06
RW-1	8/6/2004	NA	--	Y(b)	Nov-04, Mar-06, Nov-07
RW-2	8/9/2004	NA	--	N	--
PZ-2	5/3/2007	7/27/2007	--	Y(b)	Sep-07, Jan-10
PZ-3	5/3/2007	7/13/2007	--	Y(b)	Jul-07
PZ-4	7/27/2007	8/15/2007	--	N	--
PZ-5a	7/11/2007	7/31/2007	--	N	--
PZ-5b	7/12/2007	8/14/2007	4/29/2008	N	--
PZ-5c	7/11/2007	8/17/2007	4/29/2008	N	--
PZ-5d (BR PZ)	7/17/2007	7/26/2007	--	N	--
PZ-6a	7/25/2007	8/15/2007	--	N	--
PZ-6b	7/26/2007	8/15/2007	--	N	--
PZ-6c	7/25/2007	8/15/2007	--	N	--
PZ-7	6/5/2007	8/16/2007	--	N	--
PZ-8a	6/6/2007	7/11/2007	--	N	--
PZ-8b	6/7/2007	7/11/2007	--	N	--
PZ-8c	6/6/2007	7/12/2007	--	N	--
PZ-8d (BR PZ)	6/18/2007	7/26/2007	--	N	--
PZ-9	7/24/2007	8/15/2007	--	N	--
PZ-10	7/3/2007	8/14/2007	--	N	--
PZ-11	7/24/2007	8/14/2007	--	N	--
PZ-12a	6/19/2007	7/30/2007	--	N	--
PZ-12b	6/19/2007	8/15/2007	--	N	--
PZ-12c	6/19/2007	8/17/2007	--	N	--
PZ-12d (BR PZ)	6/27/2007	7/26/2007	--	N	--
PZ-13	7/30/2007	8/15/2007	--	N	--
PZ-14	7/18/2007	8/15/2007	--	N	--
PZ-15a	5/25/2007	7/30/2007	--	N	--
PZ-15b	5/23/2007	7/31/2007	4/30/2008	N	--
PZ-15c	5/23/2007	7/31/2007	--	N	--
PZ-16a	5/8/2007	8/16/2007	--	N	--
PZ-16b	5/8/2007	8/16/2007	--	N	--
PZ-16c	5/4/2007	8/16/2007	--	N	--
PZ-16d (BR PZ)	5/29/2007	7/27/2007	--	N	--
PZ-17a	5/16/2007	8/3/2007	--	Y(a)	Aug-07
PZ-17b	5/11/2007	8/8/2007	--	N	--
PZ-17c (BR PZ)	5/22/2007	7/26/2007	--	N	--

TABLE 1
HISTORIC NAPL OBSERVATIONS IN MONITORING WELLS AND PIEZOMETERS
TROY (WATER ST.) SITE -AREA 2
TROY, NEW YORK

Well ID	Date Installed	Development Date	Re-Development Date(s)	NAPL Observed (Y/N)	NAPL Observation Date (s)
PZ-18a	5/10/2007	8/15/2007	--	N	--
PZ-18b	5/10/2007	8/15/2007	--	Y(a,b)	Jul-07, Aug-07
PZ-19a (BR PZ)	5/17/2007	7/26/2007	--	N	--
PZ-22a	6/13/2007	8/8/2007	--	N	--
PZ-22b	6/13/2007	8/8/2007	--	N	--
PZ-22c	6/12/2007	8/8/2007	--	N	--
PZ-20	4/30/2007	8/15/2007	--	N	--
PZ-21	6/15/2007	8/15/2007	--	N	--

Notes:
NA - Not Available
(a) - NAPL was observed during well development.
(b) - NAPL was observed during gauging events.

TABLE 2
NAPL BAILDOWN TESTING SUMMARY
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

	NAPL Baildown Testing Period						
Well ID	Start Date	Finish Date	Maximum Thickness (ft)	Minimum Thickness (ft)	Average Thickness (ft)	Volume Removed (gallons)	Comments
MW-21	11/4/2004	11/10/2004	0.50	0.00	0.47	5.3	Removed approximately 5.3 gallons of water and DNAPL. Product coating probe.
MW-30	11/2/2004	11/10/2004	0.13	0.00	0.06	2.4	Removed approximately 2.4 gallons of water and NAPL. NAPL is yellow, not viscous with strong odor.
MW-31	11/4/2004	11/10/2004	0.20	0.00	0.13	0.8	Removed approximately 0.8 gallons of water and NAPL.
MW-6R	3/1/2006	3/3/2006	0.06	0.00	0.05	3	Removed approximately 3 gallons of water and NAPL with bailer.
RMW-8D	3/1/2006	3/3/2006	1.35	0.00	0.53	2	Removed approximately 2 gallons of water and LNAPL with bailer.
MP-12S	3/1/2006	3/3/2006	0.06	0.00	0.06	1.5	Removed approximately 1.5 gallons of water and NAPL with bailer.
RW-1	3/1/2006	3/3/2006	0.03	0.00	0.03	2	Removed approximately 2 gallons of water and NAPL with bailer.

APPENDIX G-2

TABLE 3-9
NAPL BAILDOWN TESTS - NOVEMBER 2004
Troy (Water Street) MGP - Area 2

MW-21

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
11/4/2004 11:40	19.55	29.00	0.45	29.45	
11/8/2004 9:45	19.64	29.00	0.45		Purged well, collected groundwater sample.
11/9/2004 13:50	19.75	29.00	0.50	29.50	
11/9/2004 14:10	20.25	ND	0.00	-	Removed 20 Liters of water and DNAPL.
11/9/2004 14:20	20.05	ND	0.00	-	
11/9/2004 14:30	19.80	ND	0.00	-	
11/9/2004 14:40	19.75	ND	0.00	-	
11/10/2004 10:50	19.73	ND	0.00		Product coating probe.
11/10/2004 12:35	19.63	ND	0.00		
11/10/2004 14:15	18.53	ND	0.00		

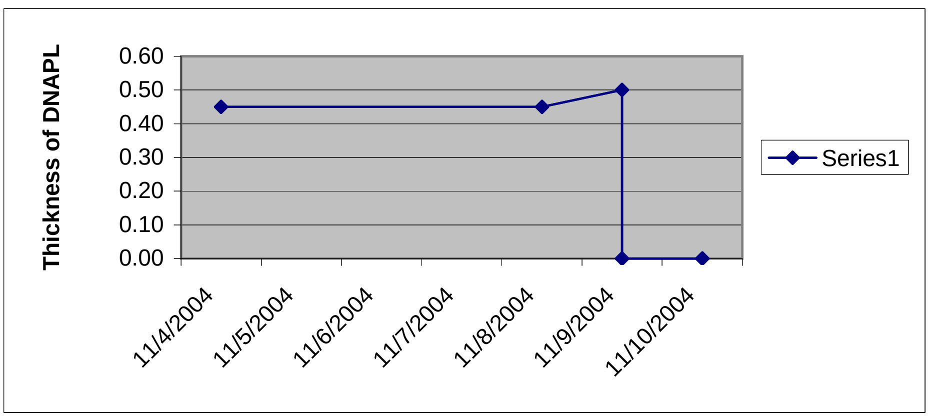


TABLE 3-9
NAPL BAILDOWN TESTS - NOVEMBER 2004
Troy (Water Street) MGP - Area 2

MW-30

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
11/2/2004 13:05	25.58	25.45	0.13	36.8	NAPL is yellow, not viscous, strong odor.
11/2/2004 14:35	25.50	ND	0.00		Removed 9 Liters of water and NAPL.Some NAPL on probe.
11/3/2004 10:00	25.11	25.10	0.01		
11/4/2004 7:47	25.72	25.68	0.04		
11/4/2004 14:38	25.78	25.72	0.06		
11/5/2004 10:32	25.36	25.31	0.05		
11/8/2004 9:30	26.11	26.10	0.01		
11/10/2004 11:05	26.22	26.10	0.12		

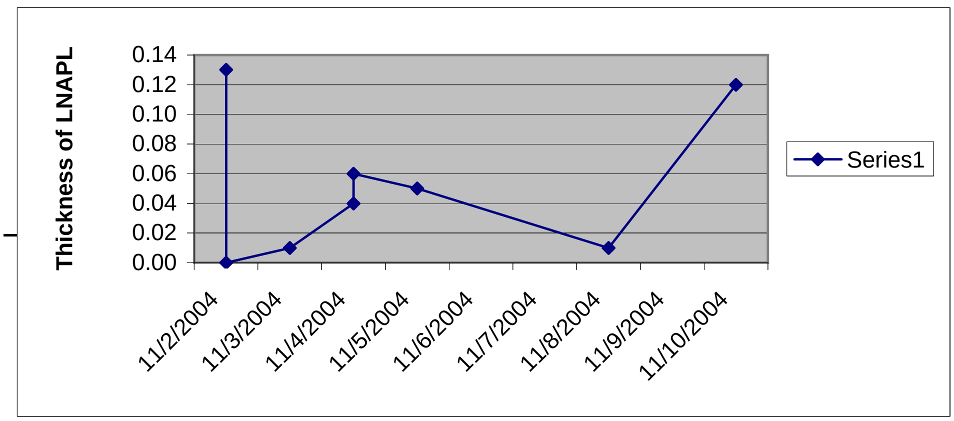


TABLE 3-9
NAPL BAILDOWN TESTS - NOVEMBER 2004
Troy (Water Street) MGP - Area 2

MW-31

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
11/4/2004 12:20	25.42	ND	0.00	33.59	
11/4/2004 14:10	25.54	25.52	0.02		Removed 3 Liters of water/NAPL.
11/4/2004 14:30	26.11	ND	0.00		
11/8/2004 9:20	25.89	25.69	0.20		
11/10/2004 11:20	26.26	26.10	0.16		

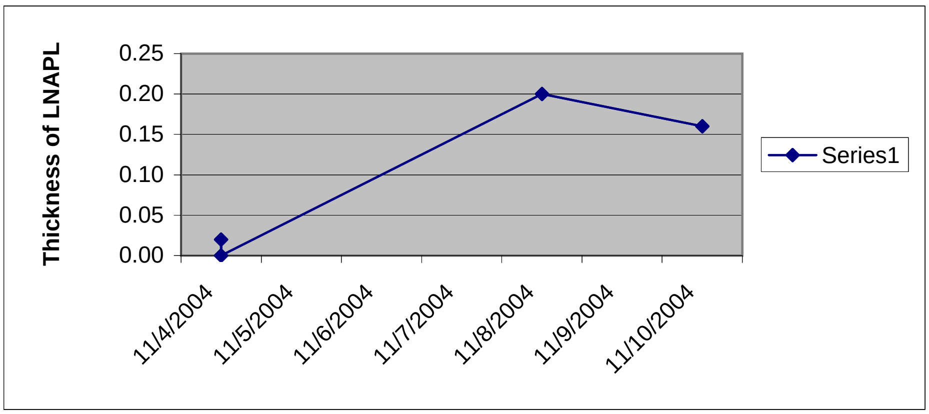


TABLE 3-10
NAPL BAILDOWN TESTS - DECEMBER 2006
Troy (Water Street) MGP - Area 2

MW-6R

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
3/1/06 2:42 PM	19.07	19.01	0.06		
3/2/06 10:45 AM	19.07	19.01	0.06		
3/2/06 10:55	19.13	NR	0.00		Removed NAPL with bailer.
3/2/06 12:11 PM	19.08	NR	0.00		
3/2/06 1:18 PM	19.07	NR	0.00		
3/3/06 8:19 AM	19.12	19.10	0.02		

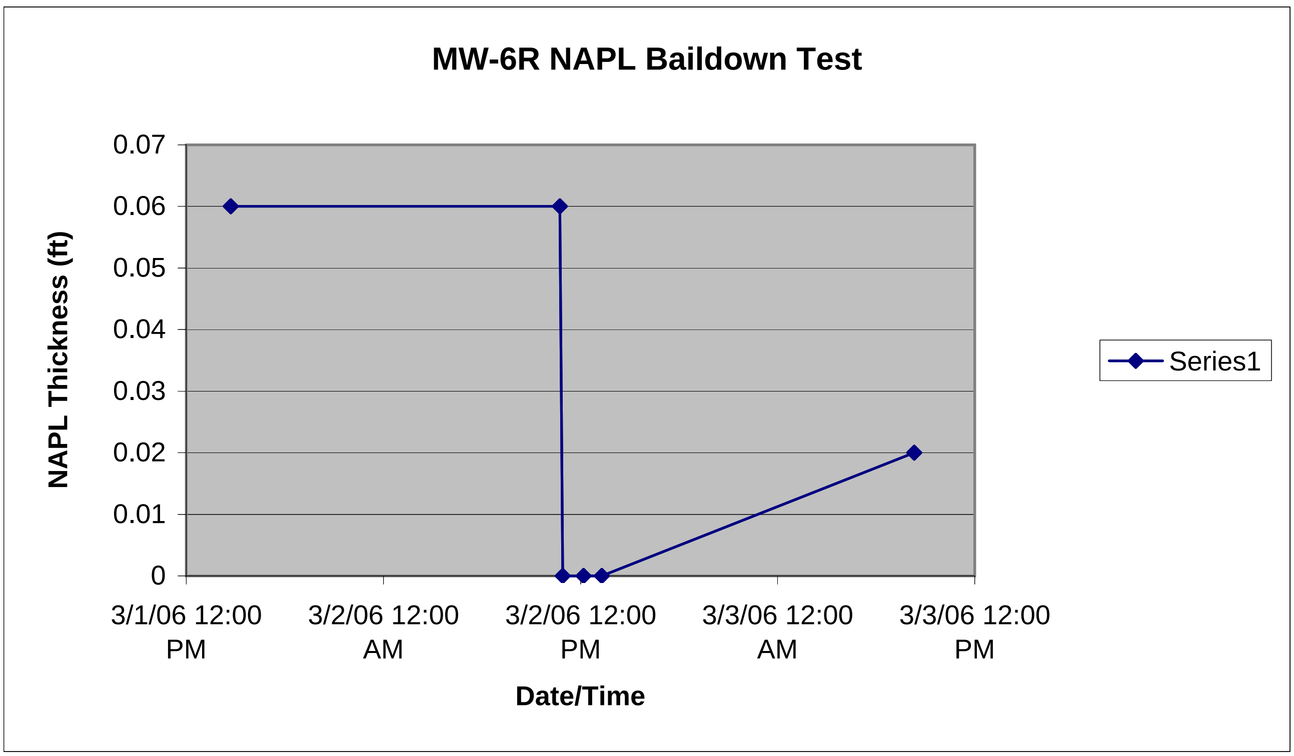


TABLE 3-10
NAPL BAILDOWN TESTS - MARCH 2006
Troy (Water Street) MGP - Area 2

RMW-8D

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
3/1/06 10:27	18.12	18.03	0.09		
3/2/06 9:30	18.17	18.03	0.14		
3/2/06 10:00	18.25	NR	0.00		Removed NAPL with bailer.
3/2/06 12:03	18.21	NR	0.00		
3/2/06 13:06	18.22	NR	0.00		
3/3/06 8:11	19.35	18.00	1.35		

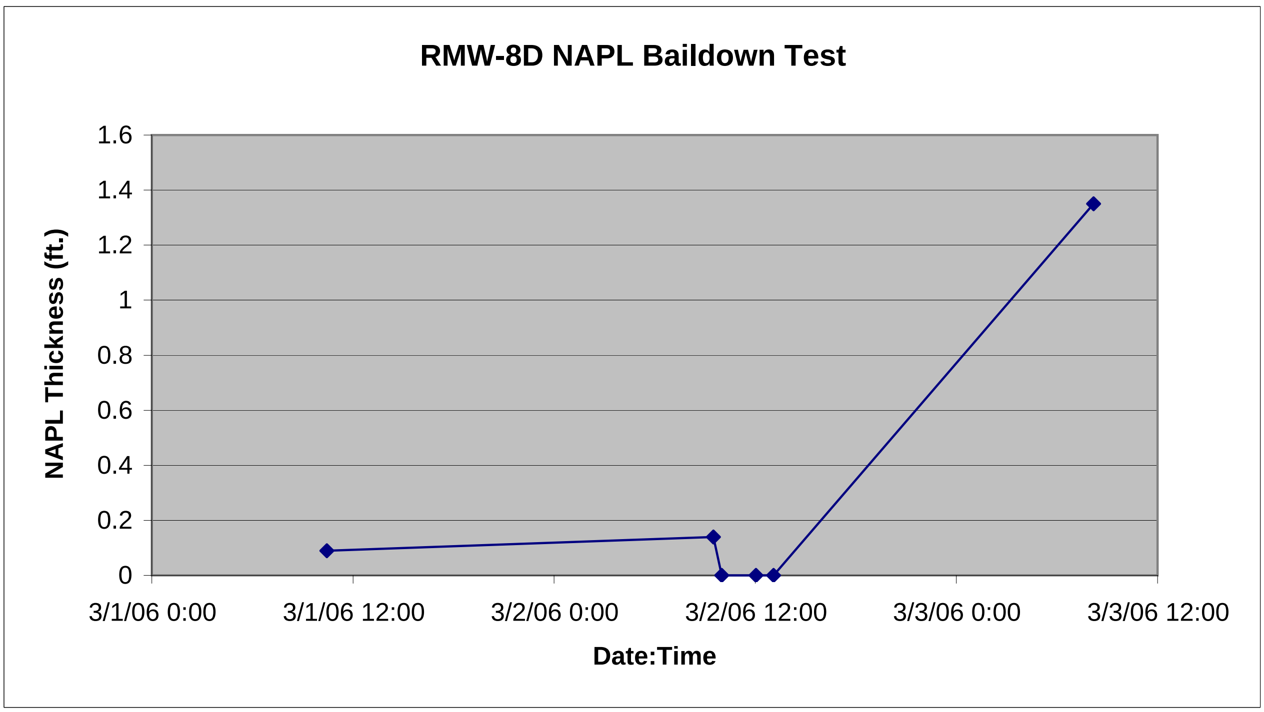


TABLE 3-10
NAPL BAILDOWN TESTS - DECEMBER 2006
Troy (Water Street) MGP - Area 2

MP-12S

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
3/1/06 12:11	18.24	18.18	0.06		
3/2/06 10:10	18.24	18.18	0.06		
3/2/06 10:00	18.25	NR	0.00		Removed NAPL with bailer.
3/2/06 12:00	18.20	NR	0.00		
3/2/06 13:06	18.22	NR	0.00		
3/2/06 14:00	18.21	NR	0.00		
3/3/06 8:13	18.23	NR	0.00		

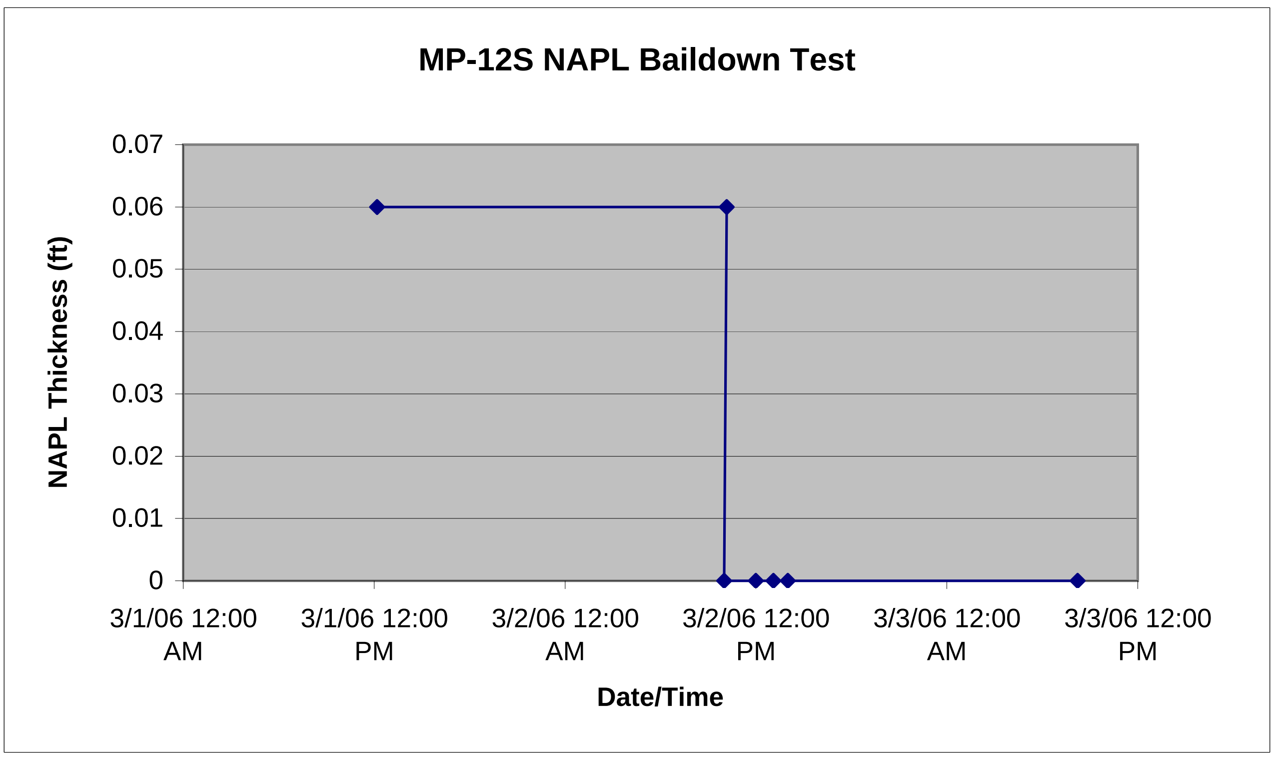
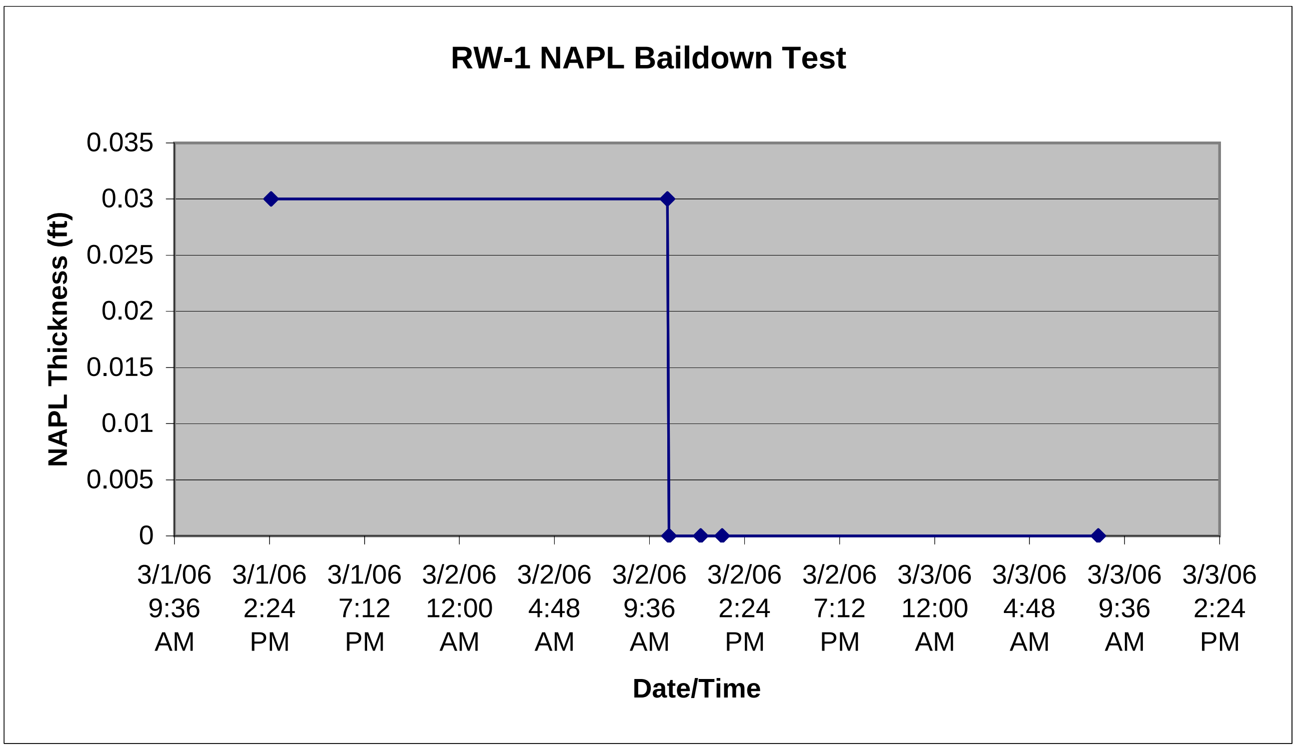


TABLE 3-10
NAPL BAILDOWN TESTS - DECEMBER 2006
Troy (Water Street) MGP - Area 2

RW-1

Date, Time	Depth to Water	Depth to NAPL	Thickness of NAPL	Total Depth	Comments
3/1/06 14:29	10.64	10.61	0.03		
3/2/06 10:30	10.64	10.61	0.03		
3/2/06 10:35	11.36	NR	0.00		Removed NAPL with bailer.
3/2/06 12:11	10.19	NR	0.00		
3/2/06 13:16	18.22	NR	0.00		
3/3/06 8:16	18.23	NR	0.00		



DRAFT
NAPL OBSERVATIONS
Troy (Water Street) MGP - Area 2

Well ID	NAPL Gauging Observations (Thickness) Apr-Nov 2004	ISCO Pilot Test Observations: ISCO Pilot Test Injections	ISCO Pilot Test Observations: Post-Treatment Weeks 1 & 3	ISCO Pilot Test Observations: Post-Treatment Weeks 6 & 12	NAPL Gauging Observations (Thickness) March 2006	NAPL Gauging Observations (Thickness) May 2006		NAPL Gauging Observations (Thickness) June 2006 (c)
IP-1	NA	√	√	√	NA	-		-
IP-2	NA	○	○	○	NA	-		-
MP-1D	NA	√	○	√	NA	NA		-
MP-1S	NA	√	○	√	NA	-		-
MP-2D	NA	○	○	○	NA	NA		NA
MP-4D	NA	√	√	○	NA	(1-2 ft) *		
MP-4S	NA	√	√	√	*	(1-5 ft) *		
MP-6	NA	○	√	○	NA	-		-
MP-7D	NA	○	○	○	NA	(1-2 ft) *	a	NG
MP-7S	NA	√	√	√	NA	(0.80 ft)		(0.19 ft)
MP-8D	NA	√	√	○	NA	(0.01 ft)		-
MP-8S	NA	√	○	○	NA	NA		-
MP-9D	NA	○	○	○	NA	NA		-
MP-9S	NA	√	√	√	NA	s		
MP-10S	NA	○	○	√	NA	NA		
MP-11D	NA	√	√	○	NA	-		
MP-11S	NA	√	○	√	NA	(0.25 ft)		-
MP-12D	NA	(2-6 inches)	○	√	-	-		-
MP-12S	NA	(3-4 ft)	○	√	(0.06 ft)	s		(0.05 ft)
MP-13D	NA	○	○	○	NA	-		-
MP-13S	NA	√	○	√	-	(1-2 ft) *	a	
MP-21D	NA	√	○	√	NA	(1-2 ft) *	a	-
MP-27D	NA	○	○	○	NA	(1-2 ft) *		
MW-2	NG	NG	NG	NG	NG	NG		-
MW-3	NG	NG	NG	NG	NG	NG		-
MW-4	NG	NG	NG	NG	NG	NG		-
MW-5	NG	NG	NG	NG	NG	NG		NA
MW-6R	(<0.01ft)	NG	NG	NG	(0.06 ft)	NG		(0.02 ft)
MW-7	NG	NG	NG	NG	NG	NG		-
MW-8	NG	NG	NG	NG	NG	NG		-
MW-9R	NG	NG	NG	NG	NG	NG		-
MW-10R	NG	NG	NG	NG	NG	NG		-
MW-11	NG	NG	NG	NG	NG	NG		-
MW-12	NG	NG	NG	NG	NG	NG		-
MW-13	NG	NG	NG	NG	NG	NG		NA
MW-14	NG	NG	NG	NG	NG	NG		-
MW-15	NG	NG	NG	NG	NG	NG		NA
MW-16	NG	NG	NG	NG	NG	NG		-
MW-17	NG	NG	NG	NG	NG	NG		-
MW-18	NG	NG	NG	NG	NG	NG		-
MW-19	NG	NG	NG	NG	NG	NG		-
MW-20	NG	NG	NG	NG	NG	NG		-
MW-21	(0.50 ft)	√	√	√	NA	(1-2 ft) *	a	

DRAFT
NAPL OBSERVATIONS
Troy (Water Street) MGP - Area 2

Well ID	NAPL Gauging Observations (Thickness) Apr-Nov 2004	ISCO Pilot Test Observations: ISCO Pilot Test Injections	ISCO Pilot Test Observations: Post-Treatment Weeks 1 & 3	ISCO Pilot Test Observations: Post-Treatment Weeks 6 & 12	NAPL Gauging Observations (Thickness) March 2006	NAPL Gauging Observations (Thickness) May 2006	NAPL Gauging Observations (Thickness) June 2006 (c)
MW-22	NG	NG	NG	NG	NG	NG	-
MW-23	NG	NG	NG	NG	NG	NG	-
MW-24	NG	NG	NG	NG	NG	NG	-
MW-25	NG	NG	NG	NG	NG	NG	-
MW-26	NG	NG	NG	NG	NG	NG	-
MW-27	*	○	○	○	-	-	-
MW-28R	NG	NG	NG	NG	NG	NG	-
MW-29	(<0.01ft)	NG	NG	NG	-	NG	(0.20 ft)
MW-30	(0.13 ft)	NG	NG	NG	-	NG	NA
MW-31	(0.02 ft)	NG	NG	NG	-	NG	(0.07 ft)
MW-32	NG	NG	NG	NG	NG	NG	-
MW-33	(<0.01 ft)	NG	NG	NG	-	NA	-
MW-34	NA	NG	NG	NG	NA	-	-
MW-35	NG	NG	NG	NG	NG	NG	NA
MW-36	(<0.01ft)	NG	NG	NG	-	NG	-
MW-37	(<0.01ft)	NG	NG	NG	-	NG	-
MW-38	(<0.01ft)	NG	NG	NG	-	NG	-
MW-39	*	√	√	√	(0.04 ft) *	(1-2 ft) *	
MW-124B	NG	NG	NG	NG	NG	NG	-
MW-134B	NG	NG	NG	NG	NG	NG	-
PZ-1	(<0.01ft)	NG	NG	NG	-	NG	
RW-1	(<0.01ft)	NG	NG	NG	(0.03 ft)	NG	-
RW-2	NG	NG	NG	NG	NG	NG	-
RMW-8D	NA	○	○	○	(0.09-1.35 ft) b	(2.13 ft) (0.1ft) *	(1.21 ft)

Notes:

(yellow)	Field observations and/or NAPL gauging indicate LNAPL present.
(orange)	Field observations and/or NAPL gauging indicate DNAPL present.
(green)	NAPL present, but not positively identified as Light or Dense.
○	Under "ISCO Pilot Test Observations" columns, indicates that no NAPL was noted in groundwater samples.
√	Under "ISCO Pilot Test Observations" columns, indicates NAPL noted in groundwater sample either as non-coalesced globules and/or as discrete layer.
NG	Not gauged.
NA	Not available because well was not yet installed, could not be located, or was damaged.
-	No evidence of NAPL.
<0.01	NAPL visible on equipment but distinct NAPL layer not detected by interface probe.
s	Sheen noted on probe.
*	Probe fouled by viscous NAPL. Readings unreliable.
a	Semi-solid or solid material in bottom of monitoring point/well presumed to be DNAPL.
b	NAPL thickness increased to 1.35 feet after initial baildown.
c	For the June 2006 NAPL gauging, in addition to using an oil/water interface probe, a weighted tape measure was used to sound each well, and a threaded rod was lowered to the bottom in an attempt to penetrate accumulated material, assess its thickness, and retrieve some of the material for description.

NAPL GAUGING - SEPTEMBER 5-6, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
<u>Transects</u>														
Transect 1														
PZ-2	18.5-28.5	28.30	26.64	30.5	-3.86	31.97	-3.67	0.19	26.23	26.4	0.17	NA	NA	Black-yellow silt/ NAPL on top of water. Strong petroleum odor.
PZ-3	19-29	27.24	27.75	31	-3.25	30.43	-3.19	0.06	NA	24.75	NA	NA	NA	Weak petroleum odor.
MW-23	12.5-28	27.99	27.73	29	-1.27	28.29	-0.30	0.97	NA	25.61	NA	NA	NA	Hard bottom.
Transect 2														
PZ-4	5-15	8.55	6.14	17	-10.86	19.25	-10.70	0.16	NA	6.85	NA	NA	NA	
PZ-5a	16-26	23.59	24.14	28	-3.86	27.51	-3.92	-0.06	NA	20.95	NA	NA	NA	The black silty water from the bailer had a sheen on the surface. Weak coal tar/ petroleum odor.
PZ-5b	32-34	23.36	23.75	34	-10.25	33.66	-10.30	-0.05	NA	21.05	NA	NA	NA	Hard bottom. Pressure was built up in well.
PZ-5c	49-54	24.21	24.75	56	-31.25	55.58	-31.37	-0.12	NA	23.57	NA	52.68*	NA	Grey silt with moderate coal tar odor from 52.68' to 55.58'. *Threaded rod did not confirm presence of D-NAPL.
PZ-5d	65.5-70.5	24.35	24.96	70.5	-45.54	70.46	-46.11	-0.57	NA	21.69	NA	NA	NA	Hard bottom.
MW-37	14-34	24.23	23.69	36	-12.31	35.2	-10.97	1.34	NA	20.92	NA	NA	NA	
Transect 3														
PZ-6a	5-15	10.24	7.94	15	-7.06	16.8	-6.56	0.50	NA	8.1	NA	NA	NA	
PZ-6b	20-30	8.90	7.28	30	-22.72	31.46	-22.56	0.16	NA	6.75	NA	NA	NA	
PZ-6c	33-38	9.68	7.82	38	-30.18	39.65	-29.97	0.21	NA	7.49	NA	NA	NA	
PZ-7	20-30	30.15	28.06	32	-3.94	33.42	-3.27	0.67	NA	28.56	NA	NA	NA	
PZ-8a	18-28	27.53	27.88	30	-2.12	29.51	-1.98	0.14	NA	22.96	NA	NA	NA	Hard bottom.
PZ-8b	45-50	27.00	27.52	51	-23.48	50.21	-23.21	0.27	NA	25.46	NA	NA	NA	Hard bottom.
PZ-8c	53.5-55.5	27.65	28.11	56.5	-28.39	55.88	-28.23	0.16	NA	26.11	NA	NA	NA	
PZ-8d (BR PZ)	73.4-78.4	28.10	27.72	78.4	-50.68	77.18	-49.08	1.60	NA	26.29	NA	NA	NA	

NAPL GAUGING - SEPTEMBER 5-6, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Transect 4														
PZ-9	10-20	26.66	24.04	20	4.04	21.92	4.74	0.70	NA	17.86	NA	NA	NA	
MW-9R	14-34	29.76	26.43	36	-9.57	38.91	-9.15	0.42	NA	26.4	NA	NA	NA	
Transect 5														
PZ-10	6-16	21.83	22.15	18	4.15	15.61	6.22	2.07	NA	9.75	NA	NA	NA	Hard bottom.
PZ-11	7-17	24.92	23.22	18	5.22	19.85	5.07	-0.15	NA	12.86	NA	NA	NA	
PZ-12a	13-23	29.63	27.53	25	2.53	26.95	2.68	0.15	NA	18.26	NA	NA	NA	
PZ-12b	25-30	29.87	27.74	32	-4.26	34.07	-4.20	0.06	NA	24.23	NA	NA	NA	
PZ-12c	40-50	29.72	27.90	51	-23.10	52.97	-23.25	-0.15	NA	27.86	NA	NA	NA	
PZ-12d (BR PZ)	55-60	29.81	27.93	60	-32.07	62	-32.19	-0.12	NA	27.86	NA	NA	NA	
MW-6R	12-32	30.33	27.10	34	-6.90	36.5	-6.17	0.73	19.25	19.83	0.58	NA	NA	Brown-yellow NAPL on probe from surface of water. Brown-Yellow NAPL also present on bailer collected from the bottom of the well. Slightly greasy to the touch. Strong petroleum odor (smelled old like used car oil).
Transect 6														
PZ-13	7-17	24.30	22.42	17	5.42	19.16	5.14	-0.28	NA	12.06	NA	NA	NA	
PZ-14	10-20	30.54	28.27	22	6.27	24.1	6.44	0.17	NA	18.51	NA	NA	NA	

NAPL GAUGING - SEPTEMBER 5-6, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval	Reference Elevation	Ground Surface Elevation - at installation	Constructed PZ/MW[b] Bottom	Constructed PZ/MW[b] Bottom	Measured PZ/MW Bottom	Measured PZ/MW Bottom	Difference: Measured Resistance - Constructed PZ/MW Bottom	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to DNAPL	DNAPL Thickness	Remarks
	(ft., BGS)[a]	(ft., NGVD)	(ft., NGVD)	(ft., BGS)	(ft., NGVD)	(ft., below reference elevation)	(ft., NGVD)	(ft.)	(ft., below reference elevation)	(ft., BGS)	(ft.)	(ft., below reference elevation)	(ft.)	
Other Nests														
PZ-15a	13-23	28.73	29.15	25	4.15	24.53	4.20	0.05	NA	19.15	NA	NA	NA	
PZ-15c	47.8-52.8	28.54	29.12	52.8	-23.68	51.2	-22.66	1.02	NA	25.99	NA	NA	NA	Soft bottom (approx 2' of grey silt). No odor.
PZ-16a	12-24	28.87	29.18	24	5.18	23.2	5.67	0.49	NA	19.28	NA	NA	NA	
PZ-16b	30.5-32.5	29.01	29.33	32.5	-3.17	31.97	-2.96	0.21	NA	25.85	NA	NA	NA	
PZ-16c	34-39	28.73	29.22	39	-9.78	38.55	-9.82	-0.04	NA	26.23	NA	NA	NA	
PZ-16d (BR PZ)	56-66	28.93	29.48	66.5	-37.02	66	-37.07	-0.05	NA	27.02	NA	NA	NA	Moderate surface odor (rotten egg smell).
MW-21	10-30	27.44	27.16	32	-4.84	30.63	-3.19	1.65	NA	19.09	NA	NA	NA	Hard bottom. Yellow-brown NAPL on probe from surface of water. Strong coal tar/ petroleum odor.
PZ-17a	34.8-36.8	27.13	27.98	38.8	-10.82	38.29	-11.16	-0.34	NA	24.82	NA	NA	NA	Hard bottom.
PZ-17b	42-52	27.68	28.05	54	-25.95	53.79	-26.11	-0.16	NA	24.57	NA	NA	NA	Hard bottom.
PZ-17c (BR PZ)	61-66	27.66	28.06	66	-37.94	65.71	-38.05	-0.11	NA	24.53	NA	NA	NA	Hard bottom.
PZ-18a	4-11	28.54	28.87	12	16.87	11.56	16.98	0.11	NA	10.11	NA	NA	NA	Weak petroleum odor. Fe stained silt on probe.
PZ-18b	16-18	28.40	28.78	19	9.78	18.57	9.83	0.05	NA	12.7	NA	NA	NA	Hard bottom. Weak/moderate petroleum odor.
MW-8	8-18	28.93	29.23	18	11.23	16.75	12.18	0.95	NA	11.97	NA	NA	NA	
PZ-19a (BR PZ)	23.5-28.5	28.49	29.03	28.5	0.53	27.38	1.11	0.58	NA	11.06	NA	NA	NA	
PZ-22a	16-26	27.05	27.44	28	-0.56	27.5	-0.45	0.11	NA	22.06	NA	NA	NA	Hard bottom.
PZ-22b	36-41	26.91	27.53	43	-15.47	41.65	-14.74	0.73	NA	25.91	NA	NA	NA	Soft bottom.
PZ-22c	50-55	26.85	27.48	56	-28.52	53.92	-27.07	1.45	NA	25.94	NA	NA	NA	Soft bottom.
												NA	NA	
Other												NA	NA	
PZ-20	12-22	28.01	28.36	24	4.36	24.04	3.97	-0.39	NA	16.58	NA	NA	NA	Hard bottom.
PZ-21	12.8-22.8	27.77	28.17	22.8	5.37	22.76	5.01	-0.36	NA	9.13	NA	NA	NA	

NAPL GAUGING - SEPTEMBER 5-6, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
<u>Well Replacements</u>														
MW-14	4.5-14.5	27.93	28.22	14.5	13.72	14.34	13.59	-0.13	NA	8.58	NA	NA	NA	Hard bottom.
MW-35	13-23	27.23	27.53	25	2.53	24.48	2.75	0.22	NA	17.55	NA	NA	NA	Hard botom.
<u>Pre-SI Wells</u>														
MW-2	9-24	30.80	27.20	26	1.20	29.1	1.70	0.50	NA	18.07	NA	NA	NA	
MW-3	17.3-37.3	26.28	22.70	39.3	-16.60	42.02	-15.74	0.86	NA	23.53	NA	NA	NA	Hard bottom.
MW-4	36-51	30.45	27.10	53	-25.90	54.38	-23.93	1.97	NA	28.51	NA	NA	NA	Hard bottom.
MW-5	17.5-32.5	28.79	28.70	34.5	-5.80	NA	NA	NA	NA	NA	NA	NA	NA	Well not located (buried).
MW-7	10-25	27.24	26.91	25	1.91	NA	NA	NA	NA	NA	NA	NA	NA	Well not located (buried).
MW-10R	5-20	14.27	11.08	22	-10.92	24.38	-10.11	0.81	NA	12.43	NA	NA	NA	Slight coal tar odor.
MW-11	5-10	27.28	23.79	10	13.79	12.98	14.30	0.51	NA	10.87	NA	NA	NA	
MW-12	18-38	28.41	27.88	40	-12.12	37.67	-9.26	2.86	NA	26.59	NA	NA	NA	Hard bottom. Dead larvae on surface of water (large quantity of larvae removed with bailer).
MW-13	13-33	29.06	28.56	35	-6.44	34.64	-5.58	0.86	NA	27.04	NA	NA	NA	
MW-15	15-35	29.79	29.22	37	-7.78	35.92	-6.13	1.65	NA	27.65	NA	NA	NA	Rusty-brown silt on probe.
MW-16	12-32	27.88	27.75	34	-6.25	32.93	-5.05	1.20	NA	14.61	NA	NA	NA	
MW-17	7-27	28.39	25.94	29	-3.06	33.4	-5.01	-1.95	NA	17.08	NA	NA	NA	
MW-18	5-20	29.04	28.93	29.3	-0.37	29.41	-0.37	0.00	NA	15.64	NA	NA	NA	
MW-19	15-30	28.68	28.70	32	-3.30	32.25	-3.57	-0.27	NA	19.11	NA	NA	NA	
MW-20	6-11	27.92	28.07	11	17.07	10.54	17.38	0.31	NA	8.09	NA	NA	NA	Hard bottom.
MW-24	17-32	28.29	27.89	34	-6.11	34	-5.71	0.40	NA	25.09	NA	NA	NA	Hard bottom.
MW-25	15-30	28.05	27.65	32	-4.35	32.96	-4.91	-0.56	NA	25.43	NA	NA	NA	Rust-orange sediment at bottom.
MW-26	17-32	26.86	26.54	34	-7.46	33.81	-6.95	0.51	NA	24.23	NA	NA	NA	Rust-orange sediment (approx 2" @ bottom).
MW-27	6-31	27.39	27.00	33	-6.00	30.2	-2.81	3.19	NA	18.45	NA	NA	NA	Hard bottom.

NAPL GAUGING - SEPTEMBER 5-6, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
MW-28R	13-28	29.89	26.58	30	-3.42	32.12	-2.23	1.19	NA	18.33	NA	NA	NA	Hard bottom.
MW-29	20-40	28.71	29.00	40	-11.00	39	-10.29	0.71	26.975	26.98	0.005	NA	NA	Yellow NAPL coated probe when lowered to water surface. Rainbow sheen on surface of water removed with the bailer. Moderate petroleum smell (slight "sweet" odor).
MW-30						NA	NA	NA	NA	NA	NA	NA	NA	Well not located (buried).
MW-31	15-35	29.20	29.14	35	-5.86	33.86	-4.66	1.20	NA	26.94	NA	NA	NA	Moderate petroleum/ paint thinner odor.
MW-32	12-32	27.89	27.63	34	-6.37	33.61	-5.72	0.65	NA	22.11	NA	NA	NA	Hard bottom.
MW-33	16-36	28.34	27.95	38	-10.05	38.16	-9.82	0.23	NA	20.03	NA	NA	NA	Brown-black NAPL at the bottom of well (approx 0.1' on threaded rod). Moderate coal tar odor.
MW-34	14-34	27.74	27.56	36	-8.44	NA	NA	NA	NA	NA	NA	NA	NA	Well not located (buried).
MW-36	12-32	31.92	28.00	40	-12.00	42.64	-10.72	1.28	NA	29.82	NA	NA	NA	Relatively hard bottom.
MW-38	12-32	30.32	27.93	34	-6.07	NA	NA	NA	NA	18.47	NA	NA	NA	
MW-39	12-32	29.99	26.83	34	-7.17	21.3	8.69	15.86	NA	18.98	NA	19.06	2.24	Entire probe and end of tape were covered with very black viscous DNAPL Strong coal tar/ petroleum odor. Sample could not be obtained with bailer. True depth of DNAPL is hard to identify.
MW-124B	15-25	29.61	26.52	26.5	0.02	27.44	2.17	2.15	NA	18.75	NA	NA	NA	
MW-134B	20.5-30.5	28.52	24.57	32	-7.43	31.25	-2.73	4.70	NA	26.73	NA	NA	NA	
PZ-1	15-31	27.41	27.80	31	-3.20	29.44	-2.03	1.17	NA	23.41	NA	NA	NA	Hard bottom.
RW-1	3-13	30.93	27.69	14	13.69	16.17	14.76	1.08	NA	10.77	NA	NA	NA	Yellow-brown coating from water surface on probe. Strong petroleum odor. Water removed with bailer had a rainbow sheen on the surface and a moderate sulfur smell.
RW-2	3-9.5	30.60	27.59	10	17.59	11.89	18.71	1.13	NA	9.06	NA	NA	NA	Hard bottom.

Notes:
NA - Not applicable
(a) - BGS - below ground surface
(b) - MW - monitoring well. PZ - piezometer

PRELIMINARY NAPL GAUGING - NOVEMBER 27-28, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Transects														
Transect 1														
PZ-2	18.5-28.5	28.30	26.64	30.5	-3.86	31.96	-3.66	0.20	NA	24.73	NA	NA	NA	Hard bottom, moderate petroleum odor. Bailed water contained black particals (organics?)
PZ-3	19-29	27.24	27.75	31	-3.25	30.42	-3.18	0.07	NA	23.13	NA	NA	NA	Hard bottom, strong odor.
MW-23	12.5-28	27.99	27.73	29	-1.27	28.31	-0.32	0.95	NA	24.43	NA	NA	NA	Hard bottom.
Transect 2														
PZ-4	5-15	8.55	6.14	17	-10.86	19.35	-10.80	0.06	NA	8.83	NA	NA	NA	Soft bottom.
PZ-5a	16-26	23.59	24.14	28	-3.86	27.53	-3.94	-0.08	NA	22.91	NA	NA	NA	Hard bottom, strong odor. Grey-black water in bailer.
PZ-5b	32-34	23.36	23.75	34	-10.25	33.35	-9.99	0.26	NA	24.3	NA	NA	NA	Hard bottom, slight coal tar odor. Brown-orange water in bailer.
PZ-5c	49-54	24.21	24.75	56	-31.25	52.84	-28.63	2.62	NA	25.04	NA	NA	NA	Hard bottom, strong coal tar odor. Grey-black silt on probe. Grey-black water in bailer.
PZ-5d	65.5-70.5	24.35	24.96	70.5	-45.54	70.47	-46.12	-0.58	Probe indicated trace on surface*****	25.21	NA	NA	NA	Soft bottom. Bailed surface water was clean. *****Trace LNAPL indication from probe not confirmed.
MW-37	14-34	24.23	23.69	36	-12.31	30.58	-6.35	5.96	NA	20.62	NA	NA	NA	Soft bottom, slight coal tar odor.
Transect 3														
PZ-6a	5-15	10.24	7.94	15	-7.06	16.77	-6.53	0.53	NA	10.57	NA	NA	NA	Moderate soft bottom, slight odor.
PZ-6b	20-30	8.90	7.28	30	-22.72	31.47	-22.57	0.15	NA	9.89	NA	NA	NA	Hard bottom.
PZ-6c	33-38	9.68	7.82	38	-30.18	39.65	-29.97	0.21	NA	10.67	NA	NA	NA	Hard bottom.
PZ-7	20-30	30.15	28.06	32	-3.94	33.82	-3.67	0.27	NA	27.71	NA	NA	NA	Hard bottom, slight odor.
PZ-8a	18-28	27.53	27.88	30	-2.12	29.54	-2.01	0.11	NA	27.1	NA	NA	NA	Hard bottom, slight odor.
PZ-8b	45-50	27.00	27.52	51	-23.48	50.25	-23.25	0.23	NA	27.4	NA	NA	NA	Hard bottom.
PZ-8c	53.5-55.5	27.65	28.11	56.5	-28.39	55.92	-28.27	0.12	NA	26.65	NA	NA	NA	Hard bottom.
PZ-8d (BR PZ)	73.4-78.4	28.10	27.72	78.4	-50.68	77.23	-49.13	1.55	NA	28.15	NA	NA	NA	Hard bottom.

PRELIMINARY NAPL GAUGING - NOVEMBER 27-28, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Transect 4														
PZ-9	10-20	26.66	24.04	20	4.04	21.61	5.05	1.01	NA	17.61	NA	NA	NA	Hard bottom.
MW-9R	14-34	29.76	26.43	36	-9.57	38.92	-9.16	0.41	NA	25.75	NA	NA	NA	Hard bottom, strong odor.
Transect 5														
PZ-10	6-16	21.83	22.15	18	4.15	15.69	6.14	1.99	NA	9.19	NA	NA	NA	Soft bottom.
PZ-11	7-17	24.92	23.22	18	5.22	19.86	5.06	-0.16	NA	12.25	NA	NA	NA	Hard bottom.
PZ-12a	13-23	29.63	27.53	25	2.53	26.94	2.69	0.16	NA	17.51	NA	NA	NA	Hard bottom, slight odor.
PZ-12b	25-30	29.87	27.74	32	-4.26	34.2	-4.33	-0.07	Probe indicated trace on surface*	23.99	NA	NA	NA	Soft bottom, strong fuel odor. *Trace LNAPL indication from probe not confirmed.
PZ-12c	40-50	29.72	27.90	51	-23.10	52.98	-23.26	-0.16	NA	27.57	NA	NA	NA	Hard bottom, slight odor.
PZ-12d (BR PZ)	55-60	29.81	27.93	60	-32.07	62.22	-32.41	-0.34	NA	27.59	NA	NA	NA	Soft bottom.
MW-6R	12-32	30.33	27.10	34	-6.90	36.44	-6.11	0.79	Probe indicated trace on surface	18.48	NA	NA	NA	Soft bottom. Golden-yellow sheen seen on probe. Sheen floating on surface of water of bailer taken at top of water column. Bailer from deeper interval has more sheen.
Transect 6														
PZ-13	7-17	24.30	22.42	17	5.42	18.82	5.48	0.06	NA	11.41	NA	NA	NA	Hard bottom.
PZ-14	10-20	30.54	28.27	22	6.27	24.09	6.45	0.18	NA	17.82	NA	NA	NA	Hard bottom, trace odor.

PRELIMINARY NAPL GAUGING - NOVEMBER 27-28, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Other Nests														.
PZ-15a	13-23	28.73	29.15	25	4.15	24.54	4.19	0.04	NA	18.81	NA	NA	NA	Hard bottom.
PZ-15c	47.8-52.8	28.54	29.12	52.8	-23.68	51.27	-22.73	0.95	NA	28.68	NA	NA	NA	Soft bottom, slight odor. Grey-black silt on probe.
PZ-16a	12-24	28.87	29.18	24	5.18	23.34	5.53	0.35	NA	16.43	NA	NA	NA	Moderately soft bottom.
PZ-16b	30.5-32.5	29.01	29.33	32.5	-3.17	31.98	-2.97	0.20	NA	25.05	NA	NA	NA	Moderately soft bottom, slight petroleum odor.
PZ-16c	34-39	28.73	29.22	39	-9.78	38.71	-9.98	-0.20	NA	24.1	NA	NA	NA	Moderately soft bottom.
PZ-16d (BR PZ)	56-66	28.93	29.48	66.5	-37.02	65.99	-37.06	-0.04	NA	16.7	NA	NA	NA	Hard bottom, slight odor.
MW-21	10-30	27.44	27.16	32	-4.84	30.64	-3.20	1.64	NA	NA	NA	NA	NA	Well was submerged under water the day water levels were taken. Hard bottom, coal tar odor. Probe was covered in DNAPL after a total depth measurement of the well. Bailer was stained with NAPL following use, contents LNAPL, trace amount of DNAPL, and a rainbow sheen.
PZ-17a	34.8-36.8	27.13	27.98	38.8	-10.82	38.47	-11.34	-0.52	NA	25.52	NA	NA	NA	Soft bottom, moderate petroluem odor.
PZ-17b	42-52	27.68	28.05	54	-25.95	53.94	-26.26	-0.31	NA	26.89	NA	NA	NA	Soft bottom, trace odor.
PZ-17c (BR PZ)	61-66	27.66	28.06	66	-37.94	65.77	-38.11	-0.17	NA	26.46	NA	NA	NA	Soft bottom, moderate odor.
PZ-18a	4-11	28.54	28.87	12	16.87	11.56	16.98	0.11	Probe indicated trace on surface*	9.69	NA	NA	NA	Hard bottom, strong petroleum odor. *Trace LNAPL indication from probe not confirmed.
PZ-18b	16-18	28.40	28.78	19	9.78	18.53	9.87	0.09	NA	12.09	NA	NA	NA	Hard bottom, moderate odor (petroleum?).
MW-8	8-18	28.93	29.23	18	11.23	16.81	12.12	0.89	NA	10.79	NA	NA	NA	Moderately hard bottom, slight odor.
PZ-19a (BR PZ)	23.5-28.5	28.49	29.03	28.5	0.53	27.41	1.08	0.55	NA	9.83	NA	NA	NA	Moderately hard bottom, slight odor.
PZ-22a	16-26	27.05	27.44	28	-0.56	27.49	-0.44	0.12	Probe indicated trace on surface*	19.26	NA	NA	NA	Hard bottom, strong odor. *Trace LNAPL indication from probe not confirmed.
PZ-22b	36-41	26.91	27.53	43	-15.47	41.8	-14.89	0.58	NA	27.36	NA	NA	NA	Hard bottom.
PZ-22c	50-55	26.85	27.48	56	-28.52	54	-27.15	1.37	NA	27.46	NA	NA	NA	Soft bottom.

PRELIMINARY NAPL GAUGING - NOVEMBER 27-28, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Other														
PZ-20	12-22	28.01	28.36	24	4.36	24.16	3.85	-0.51	NA	16.06	NA	NA	NA	Moderately soft bottom.
PZ-21	12.8-22.8	27.77	28.17	22.8	5.37	22.85	4.92	-0.45	NA	8.08	NA	NA	NA	Soft bottom, slight odor.
Well Replacements														
MW-14R	4.5-14.5	27.93	28.22	14.5	13.72	14.34	13.59	-0.13	NA	7.45	NA	NA	NA	Hard bottom, slight odor.
MW-35R	13-23	27.23	27.53	25	2.53	24.48	2.75	0.22	NA	11.23	NA	NA	NA	Hard bottom, slight fuel odor.
Pre-SI Wells														
MW-2	9-24	30.80	27.20	26	1.20	29.23	1.57	0.37	NA	17.17	NA	NA	NA	Soft bottom, trace odor.
MW-3	17.3-37.3	26.28	22.70	39.3	-16.60	42.04	-15.76	0.84	NA	25.07	NA	NA	NA	Hard bottom, strong odor.
MW-4	36-51	30.45	27.10	53	-25.90	54.4	-23.95	1.95	NA	30.61	NA	NA	NA	Hard bottom, slight petroleum odor.
MW-5	17.5-32.5	28.79	28.70	34.5	-5.80	33.56	-4.77	1.03	NA	24.47	NA	NA	NA	Hard bottom, slight odor.
MW-7	10-25	27.24	26.91	25	1.91	24.24	3.00	1.09	NA	14.85	NA	NA	NA	Moderately soft bottom, slight odor.
MW-10R	5-20	14.27	11.08	22	-10.92	24.48	-10.21	0.71	NA	14.87	NA	NA	NA	Soft bottom, slight coal tar odor.
MW-11	5-10	27.28	23.79	10	13.79	12.94	14.34	0.55	NA	9.86	NA	NA	NA	Hard bottom, trace odor.
MW-12	18-38	28.41	27.88	40	-12.12	NA	NA	NA	NA	NA	NA	NA	NA	Could not be located.
MW-13	13-33	29.06	28.56	35	-6.44	34.78	-5.72	0.72	NA	26.11	NA	NA	NA	Soft bottom.
MW-15	15-35	29.79	29.22	37	-7.78	NA	NA	NA	NA	NA	NA	NA	NA	Could not be located.
MW-16	12-32	27.88	27.75	34	-6.25	32.93	-5.05	1.20	NA	13.6	NA	NA	NA	Hard bottom, slight odor.
MW-17	7-27	28.39	25.94	29	-3.06	30.75	-2.36	0.70	NA	16.59	NA	NA	NA	Soft bottom.
MW-18	5-20	29.04	28.93	29.3	-0.37	29.41	-0.37	0.00	NA	14.89	NA	NA	NA	Hard bottom, moderate to strong odor.
MW-19	15-30	28.68	28.70	32	-3.30	32.26	-3.58	-0.28	NA	18.9	NA	NA	NA	Hard bottom.
MW-20	6-11	27.92	28.07	11	17.07	10.5	17.42	0.35	NA	7.33	NA	NA	NA	Hard bottom, strong odor (fuel?).
MW-24	17-32	28.29	27.89	34	-6.11	34	-5.71	0.40	Probe indicated trace on surface*	23.38	NA	NA	NA	Hard bottom, slight odor. Orange water from bailer. *Trace LNAPL indication from probe not confirmed.
MW-25	15-30	28.05	27.65	32	-4.35	32.98	-4.93	-0.58	NA	24.16	NA	NA	NA	Hard bottom, rust colored sediment on probe.
MW-26	17-32	26.86	26.54	34	-7.46	33.59	-6.73	0.73	NA	23.86	NA	NA	NA	Hard bottom, rust colored sediment on probe.
MW-27	6-31	27.39	27.00	33	-6.00	29.61	-2.22	3.78	NA	17.23	NA	NA	NA	Soft bottom, moderate odor.

PRELIMINARY NAPL GAUGING - NOVEMBER 27-28, 2007
SUPPLEMENTAL INVESTIGATION
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
MW-28R	13-28	29.89	26.58	30	-3.42	32.25	-2.36	1.06	Probe indicated trace on surface*	17.74	NA	NA	NA	Moderately soft bottom. *Trace LNAPL indication from probe not confirmed.
MW-29	20-40	28.71	29.00	40	-11.00	38.96	-10.25	0.75	Probe indicated trace on surface*	26.08	NA	NA	NA	Soft bottom, strong petroleum odor. *Trace LNAPL indication from probe not confirmed.
MW-30							NA	NA	NA	NA	NA	NA	NA	Well not located (buried).
MW-31	15-35	29.20	29.14	35	-5.86	33.91	-4.71	1.15	NA	25.97	NA	NA	NA	Hard bottom, strong fuel odor.
MW-32	12-32	27.89	27.63	34	-6.37	33.62	-5.73	0.64	NA	12.21	NA	NA	NA	Hard bottom.
MW-33	16-36	28.34	27.95	38	-10.05	NA	NA	NA	NA	NA	NA	NA	NA	Could not be located.
MW-34	14-34	27.74	27.56	36	-8.44	35.33	-7.59	0.85	NA	19.48	NA	NA	NA	Soft bottom, moderate odor.
MW-36	12-32	31.92	28.00	40	-12.00	42.68	-10.76	1.24	NA	27.86	NA	NA	NA	Soft bottom, slight fuel odor.
MW-38	12-32	30.32	27.93	34	-6.07	35.87	-5.55	0.52	NA	17.88	NA	NA	NA	Moderately soft bottom, slight fuel odor.
MW-39	12-32	29.99	26.83	34	-7.17	NA	NA	NA	NA	13.27	NA	NA	NA	Soft bottom, strong coal tar odor. Bailer was blocked from decending, possibly hardened tar. Threaded rod came back coated in DNAPL. Blockage prevented a proper total depth measurement.
MW-124B	15-25	29.61	26.52	26.5	0.02	27.54	2.07	2.05	NA	18.12	NA	NA	NA	Moderately soft bottom, slight old petroleum odor.
MW-134B	20.5-30.5	28.52	24.57	32	-7.43	31.25	-2.73	4.70	NA	27.67	NA	NA	NA	Modertaely hard bottom. Rust colored sediment on probe.
PZ-1	15-31	27.41	27.80	31	-3.20	29.41	-2.00	1.20	NA	22.16	NA	NA	NA	Moderately soft bottom, slight odor.
RW-1	3-13	30.93	27.69	14	13.69	16.17	14.76	1.08	Probe indicated trace on surface*	8.73	NA	NA	NA	Hard bottom, strong odor. Bailer was clean. *Trace LNAPL indication from probe not confirmed.
RW-2	3-9.5	30.60	27.59	10	17.59	11.86	18.74	1.16	NA	7.8	NA	NA	NA	Hard bottom.

Notes:
NA - Not applicable
(a) - BGS - below ground surface
(b) - MW - monitoring well. PZ - piezometer

TABLE 2
NAPL GAUGING - FEBRUARY 2008
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Transects														
Transect 1														
PZ-2	18.5-28.5	28.30	26.64	30.5	-3.86	31.91	-3.61	0.25	ND	22.78	ND	ND	ND	Firm Bottom, Moderate Odor
PZ-3	19-29	27.24	27.75	31	-3.25	30.42	-3.18	0.07	ND	21.67	ND	ND	ND	Strong Odor, Hard Bottom
MW-23	12.5-28	27.99	27.73	29	-1.27	28.28	-0.29	0.98	ND	10.62	ND	ND	ND	Soft Bottom, Very Slight Odor
Transect 2														
PZ-4	5-15	8.55	6.14	17	-10.86	16.9	-8.35	2.51	ND	2.31	ND	ND	ND	Moderate Odor, Soft Bottom
PZ-5a	16-26	23.59	24.14	28	-3.86	27.58	-3.99	-0.13	ND	18.43	ND	ND	ND	Moderate Odor, Soft Bottom
PZ-5b	32-34	23.36	23.75	34	-10.25	33.74	-10.38	-0.13	ND	16.96	ND	ND	ND	Firm Bottom, Slight Odor
PZ-5c	49-54	24.21	24.75	56	-31.25	52.45	-28.24	3.01	ND	17.77	ND	ND	ND	Slight to Moderate Odor, Soft Bottom
PZ-5d	65.5-70.5	24.35	24.96	70.5	-45.54	70.48	-46.13	-0.59	ND	17.94	ND	ND	ND	Slight Odor, Hard Bottom
MW-37	14-34	24.23	23.69	36	-12.31	30.57	-6.34	5.97	ND	19.72	ND	ND	ND	Soft Bottom, Moderate Odor
Transect 3														
PZ-6a	5-15	10.24	7.94	15	-7.06	16.54	-6.30	0.76	ND	4.69	ND	ND	ND	Slight odor, Rust on Probe, Hard Bottom
PZ-6b	20-30	8.90	7.28	30	-22.72	31.28	-22.38	0.34	ND	2.59	ND	ND	ND	Slight odor, Rust on Probe, Hard Bottom
PZ-6c	33-38	9.68	7.82	38	-30.18	39.64	-29.96	0.22	ND	3.3	ND	ND	ND	Hard Bottom
PZ-7	20-30	30.15	28.06	32	-3.94	33.85	-3.70	0.24	ND	25	ND	ND	ND	Firm Bottom, Slight Odor
PZ-8a	18-28	27.53	27.88	30	-2.12	29.56	-2.03	0.09	ND	21.3	ND	ND	ND	Soft Bottom, Slight Odor
PZ-8b	45-50	27.00	27.52	51	-23.48	50.35	-23.35	0.13	ND	20.81	ND	ND	ND	Soft Bottom, Moderate Odor
PZ-8c	53.5-55.5	27.65	28.11	56.5	-28.39	55.96	-28.31	0.08	ND	21.53	ND	ND	ND	Soft Bottom, Slight Odor
PZ-8d (BR PZ)	73.4-78.4	28.10	27.72	78.4	-50.68	77.11	-49.01	1.67	ND	21.72	ND	ND	ND	Very Soft Bottom, Silty
Transect 4														
PZ-9	10-20	26.66	24.04	20	4.04	21.95	4.71	0.67	ND	17.36	ND	ND	ND	Firm Bottom
MW-9R	14-34	29.76	26.43	36	-9.57	38.98	-9.22	0.35	ND	24.08	ND	ND	ND	Firm Bottom, Slight Odor
Transect 5														
PZ-10	6-16	21.83	22.15	18	4.15	15.69	6.14	1.99	ND	8.05	ND	ND	ND	Hard Bottom
PZ-11	7-17	24.92	23.22	18	5.22	19.82	5.10	-0.12	ND	11.78	ND	ND	ND	Hard Bottom, Slight Odor
PZ-12a	13-23	29.63	27.53	25	2.53	26.94	2.69	0.16	ND	16.62	ND	ND	ND	Hard Bottom, Moderate Tar Odor
PZ-12b	25-30	29.87	27.74	32	-4.26	34.07	-4.20	0.06	ND	25.53	ND	ND	ND	Hard Bottom, Slight Tar Odor
PZ-12c	40-50	29.72	27.90	51	-23.10	52.94	-23.22	-0.12	ND	25.7	ND	ND	ND	Hard Bottom With Suspended Silt, Moderate Tar Odor
PZ-12d (BR PZ)	55-60	29.81	27.93	60	-32.07	62.08	-32.27	-0.20	ND	25.73	ND	ND	ND	Soft Bottom, Very Slight Odor
MW-6R	12-32	30.33	27.10	34	-6.90	36.49	-6.16	0.74	ND*	17.61	ND	ND	ND	*Thick coating of NAPL on Tape, Begins at 19.23 ft

TABLE 2
NAPL GAUGING - FEBRUARY 2008
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Transect 6														
PZ-13	7-17	24.30	22.42	17	5.42	18.87	5.43	0.01	ND	10.9	ND	ND	ND	Hard Bottom
PZ-14	10-20	30.54	28.27	22	6.27	24.09	6.45	0.18	ND	16.79	ND	ND	ND	Hard Bottom, Moderate Odor
Other Nests														
PZ-15a	13-23	28.73	29.15	25	4.15	24.54	4.19	0.04	ND	--	ND	ND	ND	Hard Bottom
PZ-15c	47.8-52.8	28.54	29.12	52.8	-23.68	50.79	-22.25	1.43	ND	22.48	ND	ND	ND	Soft Bottom, Silty, Slight Tar Odor
PZ-16a	12-24	28.87	29.18	24	5.18	23.24	5.63	0.45	ND	16.61	ND	ND	ND	Slight Odor, Very Soft Bottom
PZ-16b	30.5-32.5	29.01	29.33	32.5	-3.17	32.06	-3.05	0.12	ND	23.28	ND	ND	ND	Firm Bottom, Moderate Odor
PZ-16c	34-39	28.73	29.22	39	-9.78	38.66	-9.93	-0.15	ND	22.93	ND	ND	ND	Firm Bottom, Moderate Odor
PZ-16d (BR PZ)	56-66	28.93	29.48	66.5	-37.02	66.7	-37.77	-0.75	ND	24.01	ND	ND	ND	Soft Bottom, Slight Odor
MW-21	10-30	27.44	27.16	32	-4.84	30.66	-3.22	1.62	ND	17.12	ND	ND	ND	Slight Aromatic Odor
PZ-17a	34.8-36.8	27.13	27.98	38.8	-10.82	38.3	-11.17	-0.35	ND	24.07	ND	ND	ND	Firm Bottom
PZ-17b	42-52	27.68	28.05	54	-25.95	53.69	-26.01	-0.06	ND	24.5	ND	ND	ND	Strong Tar Odor
PZ-17c (BR PZ)	61-66	27.66	28.06	66	-37.94	65.84	-38.18	-0.24	ND	24.26	ND	ND	ND	Soft Bottom
PZ-18a	4-11	28.54	28.87	12	16.87	9.61	18.93	2.06	ND	6.5	ND	ND	ND	Very Soft Bottom, Red Mud on Probe
PZ-18b	16-18	28.40	28.78	19	9.78	18.57	9.83	0.05	ND	11.1	ND	ND	ND	Hard Bottom, Moderate Odor
MW-8	8-18	28.93	29.23	18	11.23	16.78	12.15	0.92	ND	10.19	ND	ND	ND	Firm Bottom
PZ-19a (BR PZ)	23.5-28.5	28.49	29.03	28.5	0.53	27.26	1.23	0.70	ND	9.09	ND	ND	ND	Hard Bottom
PZ-22a	16-26	27.05	27.44	28	-0.56	27.52	-0.47	0.09	ND	18.87	ND	ND	ND	Silty Bottom
PZ-22b	36-41	26.91	27.53	43	-15.47	41.74	-14.83	0.64	ND	20.67	ND	ND	ND	Silty Bottom
PZ-22c	50-55	26.85	27.48	56	-28.52	53.83	-26.98	1.54	ND	20.51	ND	ND	ND	Silty Bottom
Other														
PZ-20	12-22	28.01	28.36	24	4.36	24.47	3.54	-0.82	ND	15.38	ND	ND	ND	Moderately Soft Bottom
PZ-21	12.8-22.8	27.77	28.17	22.8	5.37	21.81	5.96	0.59	ND	7.58	ND	ND	ND	Hard Bottom
Well Replacements														
MW-14	4.5-14.5	27.93	28.22	14.5	13.72	14.05	13.88	0.16	ND	6.32	ND	ND	ND	Hard Bottom, Moderate Odor
MW-35	13-23	27.23	27.53	25	2.53	24.47	2.76	0.23	ND	17	ND	ND	ND	Hard Bottom

TABLE 2
NAPL GAUGING - FEBRUARY 2008
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval	Reference Elevation	Ground Surface Elevation - at installation	Constructed PZ/MW[b] Bottom	Constructed PZ/MW[b] Bottom	Measured PZ/MW Bottom	Measured PZ/MW Bottom	Difference: Measured Resistance - Constructed PZ/MW Bottom	Depth to LNAPL	Depth to Water	LNAPL Thickness	Depth to DNAPL	DNAPL Thickness	Remarks
	(ft., BGS)[a]	(ft., NGVD)	(ft., NGVD)	(ft., BGS)	(ft., NGVD)	(ft., below reference elevation)	(ft., NGVD)	(ft.)	(ft., below reference elevation)	(ft., BGS)	(ft.)	(ft., below reference elevation)	(ft.)	
Pre-SI Wells														
MW-2	9-24	30.80	27.20	26	1.20	29.07	1.73	0.53	ND	16.81	ND	ND	ND	Hard Bottom
MW-3	17.3-37.3	26.28	22.70	39.3	-16.60	42.07	-15.79	0.81	ND	20.16	ND	ND	ND	
MW-4	36-51	30.45	27.10	53	-25.90	--	NA	NA	ND	25.38	ND	ND	ND	
MW-5	17.5-32.5	28.79	28.70	34.5	-5.80	33.62	-4.83	0.97	ND	23.01	ND	ND	ND	Firm Bottom, Moderate Odor
MW-7	10-25	27.24	26.91	25	1.91	24.15	3.09	1.18	ND	14.11	ND	ND	ND	Hard Bottom, Moderate Tar Odor
MW-10R	5-20	14.27	11.08	22	-10.92	24.38	-10.11	0.81	ND	8.08	ND	ND	ND	Moderate Odor, Soft Bottom
MW-11	5-10	27.28	23.79	10	13.79	12.95	14.33	0.54	ND	9.01	ND	ND	ND	Soft Bottom
MW-12	18-38	28.41	27.88	40	-12.12	37.85	-9.44	2.68	NM	NM	NM	NM	NM	Ground surface flooded at time of water level/NAPL gauging, Soft Bottom
MW-13	13-33	29.06	28.56	35	-6.44	34.78	-5.72	0.72	ND	25.36	ND	ND	ND	Soft Bottom
MW-15	15-35	29.79	29.22	37	-7.78	35.93	-6.14	1.64	ND	25.39	ND	ND	ND	Soft Bottom, Moderate tar odor
MW-16	12-32	27.88	27.75	34	-6.25	33.01	-5.13	1.12	ND	12.38	ND	ND	ND	Soft Bottom
MW-17	7-27	28.39	25.94	29	-3.06	30.32	-1.93	1.13	ND	16.04	ND	ND	ND	Soft Bottom
MW-18	5-20	29.04	28.93	29.3	-0.37	29.46	-0.42	-0.05	ND	13.72	ND	ND	ND	Firm Bottom
MW-19	15-30	28.68	28.70	32	-3.30	--	NA	NA	NM	NM	NM	NM	NM	Ground surface frozen over at time of water level/NAPL gauging
MW-20	6-11	27.92	28.07	11	17.07	10.55	17.37	0.30	ND	5.95	ND	ND	ND	Stong Odor, Hard Bottom
MW-24	17-32	28.29	27.89	34	-6.11	33.97	-5.68	0.43	ND	22.17	ND	ND	ND	Soft Bottom
MW-25	15-30	28.05	27.65	32	-4.35	30.7	-2.65	1.70	ND	21.95	ND	ND	ND	Very Soft Bottom, Slight Odor
MW-26	17-32	26.86	26.54	34	-7.46	31.61	-4.75	2.71	ND	20.81	ND	ND	ND	Soft Bottom
MW-27	6-31	27.39	27.00	33	-6.00	28.85	-1.46	4.54	ND*	16.61	ND	ND	ND	*NAPL on water surface. Very soft bottom
MW-28R	13-28	29.89	26.58	30	-3.42	32.16	-2.27	1.15	ND	7.09	ND	ND	ND	Firm Bottom, Slight Odor
MW-29	20-40	28.71	29.00	40	-11.00	38.97	-10.26	0.74	25.01	25.04	0.03	ND	ND	Amber colored NAPL coating tape and probe, StrongAromatic/Sweet Odor

TABLE 2
NAPL GAUGING - FEBRUARY 2008
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
MW-30	NA	NA	NA	NA	NA	NM	NA	NA	NM	NM	NM	NM	NM	Well Not Located
MW-31	15-35	29.20	29.14	35	-5.86	33.83	-4.63	1.23	ND	24.53	ND	ND	ND	Missing J-plug, Firm Bottom, Strong Aromatic Odor
MW-32	12-32	27.89	27.63	34	-6.37	31.1	-3.21	3.16	ND	20.91	ND	ND	ND	Soft Bottom, Moderate Odor
MW-33	16-36	28.34	27.95	38	-10.05	35.07	-6.73	3.32	ND	18.56	ND	ND	ND	Very Soft Bottom, Ferrous Material
MW-34	14-34	27.74	27.56	36	-8.44	35.27	-7.53	0.91	ND	18.77	ND	ND	ND	Mod Tar Odor
MW-36	12-32	31.92	28.00	40	-12.00	42.64	-10.72	1.28	ND	27.45	ND	ND	ND	Firm Bottom, Slight Odor
MW-38	12-32	30.32	27.93	34	-6.07	35.88	-5.56	0.51	ND	17.2	ND	ND	ND	Soft Bottom
MW-39	12-32	29.99	26.83	34	-7.17	36.68	-6.69	0.48	ND	17.58	ND	34.98	1.7	Probe and Tape Covered in Tar, Very Strong Odor
MW-124B	15-25	29.61	26.52	26.5	0.02	27.43	2.18	2.16	ND	17.44	ND	ND	ND	Moderate to Strong Tar Odor, Firm Bottom
MW-134B	20.5-30.5	28.52	24.57	32	-7.43	31.27	-2.75	4.68	ND	22.97	ND	ND	ND	Rust on Probe
PZ-1	15-31	27.41	27.80	31	-3.20	NA	NA	NA	ND	21.51	ND	ND	ND	
RW-1	3-13	30.93	27.69	14	13.69	16.34	14.59	0.91	ND	6.4	ND	ND	ND	Firm Bottom, Sheen Visible in well (6" casing), Strong Odor
RW-2	3-9.5	30.60	27.59	10	17.59	11.9	18.70	1.12	ND	7.56	ND	ND	ND	Soft Bottom

Notes:
NA - Not applicable
NM - Not measured
ND - NAPL not detected during gauging event
(a) - BGS - below ground surface
(b) - MW - monitoring well. PZ - piezometer

TABLE 3
NAPL GAUGING - SEPTEMBER 9, 2008
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[a]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[b] Bottom (ft., BGS)	Constructed PZ/MW[b] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., BGS)	LNAPL Thickness (ft.)	Depth to DNAPL (ft., below reference elevation)	DNAPL Thickness (ft.)	Remarks
Transects														
Transect 1														
PZ-2	18.5-28.5	28.30	26.64	30.5	-3.86	31.99	-3.69	0.17	ND	25.42	ND	ND	ND	Soft bottom, strong odor, black sediment on probe.
PZ-3	19-29	27.24	27.75	31	-3.25	30.41	-3.17	0.08	see remarks	23.74	ND	ND	ND	Strong odor, minor NAPL observed on probe and tape.
Transect 2														
PZ-5a	16-26	23.59	24.14	28	-3.86	27.55	-3.96	-0.10	ND	20.3	ND	ND	ND	Soft bottom, slight odor.
PZ-5b	32-34	23.36	23.75	34	-10.25	34	-10.64	-0.39	ND	20.74	ND	ND	ND	Tar odor.
PZ-5c	49-54	24.21	24.75	56	-31.25	55.99	-31.78	-0.53	ND	21.34	ND	ND	ND	Soft bottom, slight odor.
MW-37	14-34	24.23	23.69	36	-12.31	35.31	-11.08	1.23	ND	20.41	ND	ND	ND	Soft bottom.
Transect 5														
PZ-12a	13-23	29.63	27.53	25	2.53	26.98	2.65	0.12	ND	17.62	ND	ND	ND	Hard bottom, strong odor.
PZ-12b	25-30	29.87	27.74	32	-4.26	34.09	-4.22	0.04	ND	24.06	ND	ND	ND	Hard bottom, faint odor.
PZ-12c	40-50	29.72	27.90	51	-23.10	52.99	-23.27	-0.17	ND	27.05	ND	ND	ND	Sediment at base of well.
Other Nests														
PZ-15a	13-23	28.73	29.15	25	4.15	24.55	4.18	0.03	ND	19	ND	ND	ND	Soft bottom.
PZ-15c	47.8-52.8	28.54	29.12	52.8	-23.68	53.38	-24.84	-1.16	ND	25.58	ND	ND	ND	Soft bottom.
MW-21	10-30	27.44	27.16	32	-4.84	30.6	-3.16	1.68	ND	17.76	ND	see remarks	ND	Soft bottom, slight tar odor. Bailer contents: slight sheen observed on surface of water, viscous tar at base of bailer.
PZ-17a	34.8-36.8	27.13	27.98	38.8	-10.82	38.6	-11.47	-0.65	ND	25.07	ND	ND	ND	Soft bottom, faint tar odor.
PZ-17b	42-52	27.68	28.05	54	-25.95	54.5	-26.82	-0.87	ND	25.48	ND	ND	ND	Soft bottom, slight tar odor.
PZ-18b	16-18	28.40	28.78	19	9.78	18.57	9.83	0.05	ND	12.35	ND	ND	ND	Hard bottom, strong petroleum odor
Pre-SI Wells														
MW-27	6-31	27.39	27.00	33	-6.00	28	-0.61	5.39	ND	17.45	ND	ND	ND	Soft bottom, plant life on probe, faint odor.
MW-33	16-36	28.34	27.95	38	-10.05	33.5	NA	NA	ND	19.88	ND	ND	ND	Soft bottom.
MW-38	12-32	30.32	27.93	34	-6.07	34	-3.68	2.39	ND	17.6	ND	ND	ND	Soft bottom.
RW-1	3-13	30.93	27.69	14	13.69	16.2	14.73	1.05	see remarks	8.44	ND	ND	ND	hard bottom, sheen/film on surface of water, residual NAPL on probe (petroleum odor)

Notes:
ND - NAPL not detected during gauging event
(a) - BGS - below ground surface
(b) - MW - monitoring well. PZ - piezometer

BROWN AND CALDWELL

TABLE 1
NAPL GAUGING RESULTS - JANUARY 2010
TROY (WATER ST.) SITE-AREA 2
TROY, NEW YORK

Location ID	Screened Interval (ft., BGS)[1]	Reference Elevation (ft., NGVD)	Ground Surface Elevation - at installation (ft., NGVD)	Constructed PZ/MW[2] Bottom (ft., BGS)	Constructed PZ/MW[2] Bottom (ft., NGVD)	Measured PZ/MW Bottom (ft., below reference elevation)	Measured PZ/MW Bottom (ft., NGVD)	Difference: Measured Resistance - Constructed PZ/MW Bottom (ft.)	Well Construction Notes	Depth to LNAPL (ft., below reference elevation)	Depth to Water (ft., below reference elevation)	Depth to DNAPL (ft., below reference elevation)	Comments
PZ-2	18.5-28.5	28.30	26.64	30.5	-3.86	31.95	-3.65	0.21	2-foot sump	ND[3]	24.96	ND	moderate petroleum odor on probe from surface of water; black staining on tip of bailer (produced sheen when rinsed with water); NAPL blebs on sample tubing following removal of pump (strong fuel odor)
PZ-3	19-29	27.24	27.75	31	-3.25	30.47	-3.23	0.02	2-foot sump	ND	23.90	ND	slight petroleum odor from purge water
MW-23	12.5-28	27.99	27.73	29	-1.27	28.28	-0.29	0.98	1-foot sump	ND	23.65	ND	slight odor on probe from surface of water
MW-24	17-32	28.29	27.89	34	-6.11	31.88	-3.59	2.52	2-foot sump	ND	25.02	ND	
MW-25	15-30	28.05	27.65	32	-4.35	32.98	-4.93	-0.58	2-foot sump	ND	24.68	ND	

Notes:

ND - Not detected with oil/water interface probe

(1) - BGS - below ground surface

(2) - MW - monitoring well. PZ - piezometer

(3) - LNAPL was not detected with oil/water interface probe, however, upon reomoval of pump following sampling, brown NAPL blebs were observed along approximately six-inches of tubing approximately 2.5 feet above pump intake.

APPENDIX H

Groundwater Analytical Results

Table
Groundwater
Volatiles (mg/l)

Analyte	Analytical Method	NYSDEC Std./Guidance Value (1)	Sample Location MW-01 Dec 1994	MW-01 Jan 1995	MW-01 June 1997	MW-01 July 1997	MW-01 July 2000	MW-02 Dec 1994	MW-02 Jan 1995	MW-02 June 1997	MW-02 July 1997	MW-02 July 2000	MW-03 Dec 1994	MW-03 Jan 1995	MW-03 June 1997	MW-03 July 1997	MW-03 July 2000
1,1-Dichloroethane	NYSDEC 91-1	0.005	BDL	0.003J	0.01U	0.01U	NT	BDL	0.003J	0.005J	0.005J	NT	BDL	BDL	0.01U	0.01U	NT
1,1-Dichloroethene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
1,1,1-Trichloroethane	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
1,2-Dichloroethene (Total)	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
2-Butanone	NYSDEC 91-1	0.05 (GV)	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01UJ	0.01U	NT	BDL	BDL	0.01UJ	0.01U	NT
Acetone	NYSDEC 91-1	0.05 (GV)	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	0.01U	0.01UJ	NT
Benzene	NYSDEC 91-1	0.007	BDL	BDL	**0.02**	0.01U	0.005 U	BDL	BDL	**0.02**	0.005	0.005 U	BDL	BDL	0.001J	0.01U	0.005 U
Bromoform	NYSDEC 91-1	0.05 (GV)	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01UJ	0.01U	NT	BDL	BDL	0.01UJ	0.01U	NT
Carbon Disulfide	NYSDEC 91-1	NA	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Chloroform	NYSDEC 91-1	0.007	**0.022**	BDL	0.01U	**0.016**	NT	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	0.01U	0.01UJ	NT
Chlorobenzene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Chloromethane	NYSDEC 91-1	NA	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	0.01U	0.01UJ	NT
Ethylbenzene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U
Methylene Chloride	NYSDEC 91-1	0.005	BDL JB	BDL JB	0.01U	0.01U	NT	BDL JB	BDL JB	0.01U	0.01U	NT	BDL	BDL JB	0.01U	0.01U	NT
Styrene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Toluene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U
Trichloroethene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Vinyl Chloride	NYSDEC 91-1	0.002	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Xylene (Total)	NYSDEC 91-1	0.005	BDL	BDL	**0.014**	0.01U	0.005 U	BDL	BDL	**0.014**	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U
Total BTEX	-	NA	BDL	BDL	0.034	BDL	BDL	BDL	BDL	0.034	0.005	BDL	BDL	BDL	0.001	BDL	BDL
Total Volatiles (2)	-	NA	0.022	0.003	0.034	0.016	NT	BDL	0.003	0.039	0.01	NT	BDL	BDL	0.001	BDL	NT

Analyte	Analytical Method	NYSDEC Std./Guidance Value (1)	Sample Location MW-04 Dec 1994	MW-04 Jan 1995	MW-04 June 1997	MW-04 July 1997	MW-04 July 2000	MW-05 Dec 1994	MW-05 Jan 1995	MW-05 June 1997	MW-05 July 1997	MW-05 July 2000	MW-50 [1] Dec 1994	MW-50 [1] Jan1995	MW-06 June1997	MW-06 July 1997	MW-06 July 2000
1,1-Dichloroethane	NYSDEC 91-1	0.005	0.003J	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
1,1-Dichloroethene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
1,1,1-Trichloroethane	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
1,2-Dichloroethene (Total)	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
2-Butanone	NYSDEC 91-1	0.05 (GV)	BDL	BDL	0.01UJ	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01UJ	0.01U	NT
Acetone	NYSDEC 91-1	0.05 (GV)	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	**0.013**	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Benzene	NYSDEC 91-1	0.007	**0.06**	**0.049**	0.01U	0.01U	0.005 U	BDL	BDL	0.002J	**0.01**	0.005 U	BDL	BDL	0.002J	**0.12**	**0.024**
Bromoform	NYSDEC 91-1	0.05 (GV)	BDL	BDL	0.01UJ	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01UJ	0.01U	NT
Carbon Disulfide	NYSDEC 91-1	NA	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Chloroform	NYSDEC 91-1	0.007	BDL	BDL	0.01U	0.01U	NT	**0.038**	**0.033**	0.01U	0.01U	NT	**0.036**	**0.036**	0.01U	0.01U	NT
Chlorobenzene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Chloromethane	NYSDEC 91-1	NA	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Ethylbenzene	NYSDEC 91-1	0.005	0.003 J	**0.007 J**	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	**0.01**	**0.017**	**0.006 J**
Methylene Chloride	NYSDEC 91-1	0.005	BDL JB	BDL JB	0.01U	0.01U	NT	BDL JB	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Styrene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Toluene	NYSDEC 91-1	0.005	**0.01 J**	0.002J	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	0.01U	0.005J	0.002 U
Trichloroethene	NYSDEC 91-1	0.005	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Vinyl Chloride	NYSDEC 91-1	0.002	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT
Xylene (Total)	NYSDEC 91-1	0.005	0.001J	**0.006 J**	0.01U	0.01U	0.001 J	BDL	BDL	0.01U	0.01U	0.005 U	BDL	BDL	**0.03**	**0.034**	**0.020**
Total BTEX	-	NA	0.074	0.064	BDL	BDL	0.001 J	BDL	BDL	0.002	0.01	BDL	BDL	BDL	0.042	0.176	0.051
Total Volatiles (2)	-	NA	0.077	0.064	BDL	BDL	NT	0.038	0.033	0.015	0.01	NT	0.036	0.036	0.042	0.176	NT

(1) NYSDEC Division of Water TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total volatiles do not include TICs.

GV - Guidance Value

[1]Duplicate of MW-05

NOTE: Only the detected analytes are reported in the tables

Table 4
Groundwater
Volatiles (mg/l)

Analyte	Analytical Method	NYSDEC Std./Guidance Value (1)	Sample Location: MW-07 June 1997	MW-07 July 1997	MW-07 July 2000	MW-08 June 1997	MW-08 July 1997	MW-08 July 2000	MW-09 June 1997	MW-09 July 1997	MW-09 July 2000	MW-10 June 1997	MW-10 July 1997	MW-11 June 1997	MW-11 July 1997	MW-11 July 2000
1,1-Dichloroethane	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.004J	NT
1,1-Dichloroethene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.003J	NT
1,1,1-Trichloroethane	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	**0.026**	**0.13**	NT
1,2-Dichloroethene (Total)	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.002J	NT
2-Butanone	NYSDEC 91-1	0.05 (GV)	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01UJ	0.01U	NT	0.01U	0.01U	0.01UJ	0.01U	NT
Acetone	NYSDEC 91-1	0.05 (GV)	0.01U	0.01U	NT	0.01U	0.01UJ	NT	0.01U	0.01UJ	NT	0.01U	0.01UJ	0.01U	0.01UJ	NT
Benzene	NYSDEC 91-1	0.007	**0.043**	**0.043**	**0.023**	**0.15D**	**0.36 D**	0.005 U	0.01U	0.01U	0.005 U	0.01U	**0.028**	0.01U	0.01U	0.005 U
Bromoform	NYSDEC 91-1	0.05 (GV)	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01UJ	0.01U	NT	0.01U	0.01U	0.01UJ	0.01U	NT
Carbon Disulfide	NYSDEC 91-1	NA	0.01U	0.001J	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT
Chloroform	NYSDEC 91-1	0.007	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	**0.031**	0.01U	0.01U	0.01U	NT
Chlorobenzene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.001J	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT
Chloromethane	NYSDEC 91-1	NA	0.01U	0.01U	NT	0.01U	0.01UJ	NT	0.01U	0.01UJ	NT	0.01U	0.01UJ	0.01U	0.01UJ	NT
Ethylbenzene	NYSDEC 91-1	0.005	**0.006 J**	**0.009 J**	**0.006**	**0.028**	**0.033**	0.003 J	0.01U	0.01U	0.005 U	0.01U	0.001J	0.01U	0.01U	0.005 U
Methylene Chloride	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT
Styrene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.002 J	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT
Toluene	NYSDEC 91-1	0.005	0.01U	0.001J	0.001 J	**0.034**	**0.04**	0.005 J	0.01U	0.01U	0.005 U	0.01U	0.01U	0.01U	0.01U	0.005 U
Trichloroethene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT
Vinyl Chloride	NYSDEC 91-1	0.002	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT
Xylene (Total)	NYSDEC 91-1	0.005	**0.01**	**0.012**	**0.013**	**0.1**	**0.053**	0.004 J	0.01U	0.01U	0.005 U	0.01U	**0.008 J**	0.01U	0.01U	0.005 U
Total BTEX	-	NA	0.059	0.065	0.043	0.312	0.486	0.007 J	BDL	BDL	BDL	BDL	0.037	BDL	BDL	BDL
Total Volatiles (2)	-	NA	0.059	0.065	NT	0.312	0.489	NT	BDL	BDL	NT	0.031	0.037	0.026	0.139	NT

Analyte	Analytical Method	NYSDEC Std./Guidance Value (1)	Sample Location: MW-12 June 1997	MW-12 July 1997	MW-12 June 2000	MW-13 June 1997	MW-13 July 1997	MW-13 July 2000	MW-14 June 1997	MW-14 July 1997	MW-15 June 1997	MW-15 July 1997	MW-15 July 2000	MW-16 June 1997	MW-16 July 1997	MW-16 June 2000
1,1-Dichloroethane	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.001J	0.005 J	**0.012**	NT	0.01U	0.01U	NT
1,1-Dichloroethene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
1,1,1-Trichloroethane	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	**0.042**	**0.042**	0.01U	0.01U	NT	0.01U	0.01U	NT
1,2-Dichloroethene (Total)	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	**0.026**	**0.044**	NT	0.01U	0.01U	NT
2-Butanone	NYSDEC 91-1	0.05 (GV)	0.01UJ	0.01U	NT	0.01U	0.01U	NT	0.01UJ	0.01U	0.01UJ	0.01U	NT	0.01UJ	0.01U	NT
Acetone	NYSDEC 91-1	0.05 (GV)	0.096U	0.092U	NT	0.036U	0.01U	NT	0.01U	0.01UJ	0.078U	0.046U	NT	0.01U	0.01U	NT
Benzene	NYSDEC 91-1	0.007	**0.12**	**0.16**	**0.72**	0.01U	0.01U	0.005 U	0.01U	0.01U	**0.9 D**	**0.24 D**	0.002 J	0.01U	0.01U	0.005 U
Bromoform	NYSDEC 91-1	0.05 (GV)	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01UJ	0.01U	0.01UJ	0.01U	NT	0.01UJ	0.01U	NT
Carbon Disulfide	NYSDEC 91-1	NA	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
Chloroform	NYSDEC 91-1	0.007	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.003 J	NT	0.01U	0.01U	NT
Chlorobenzene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
Chloromethane	NYSDEC 91-1	NA	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01UJ	0.01U	0.01U	NT	0.01U	0.01U	NT
Ethylbenzene	NYSDEC 91-1	0.005	**0.019**	**0.15**	**0.15**	0.01U	0.01U	0.005 U	0.01U	0.01U	0.003J	**0.006 J**	0.005 U	0.01U	0.01U	0.005 U
Methylene Chloride	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01UJ	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
Styrene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
Toluene	NYSDEC 91-1	0.005	**0.029**	**0.045**	**0.048 J**	0.01U	0.01U	0.005 U	0.01U	0.01U	**0.016**	**0.032**	0.005 U	0.01U	0.01U	0.005 U
Trichloroethene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	**0.013**	NT	0.01U	0.01U	NT
Vinyl Chloride	NYSDEC 91-1	0.002	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	0.01U	**0.017**	NT	0.01U	0.01U	NT
Xylene (Total)	NYSDEC 91-1	0.005	**0.3**	**0.8 D**	**1.7**	0.01U	0.01U	0.005 U	0.01U	0.01U	**0.14**	**0.25**	0.005 U	0.01U	0.01U	0.005 U
Total BTEX	-	NA	0.468	1.155	2.618 J	BDL	BDL	BDL	BDL	BDL	1.059	0.528	0.002 J	BDL	BDL	BDL
Total Volatiles (2)	-	NA	0.468	1.155	NT	BDL	BDL	NT	0.042	0.043	1.09	0.6	NT	BDL	BDL	NT

(1) NYSDEC Division of Water TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total volatiles do not include TICs.

GV - Guidance Value

NOTE: Only the detected analytes are reported in the tables

T[illegible] 3-4
Groundwater
Volatiles (mg/l)

Analyte	Analytical Method	NYSDEC Std./Guidance Value (1)	Sample Location												
			MW-17			MW-18	MW-19	MW-20	MW-21	MW-22		MW-23	MW-24	MW-25	MW-26
			June 1997	July 1997	July 2000	June 2000	July 2000	June 2000	July 2000	July 2000	DUP 7/00	July 2000	July 2000	July 2000	July 2000
1,1-Dichloroethane	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1,1-Dichloroethene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1,1,1-Trichloroethane	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1,2-Dichloroethene (Total)	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2-Butanone	NYSDEC 91-1	0.05 (GV)	0.01UJ	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Acetone	NYSDEC 91-1	0.05 (GV)	0.01U	0.01UJ	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzene	NYSDEC 91-1	0.007	0.01U	0.01U	0.005 U	0.005 U	0.005 U	0.005 U	**0.91**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Bromoform	NYSDEC 91-1	0.05 (GV)	0.01UJ	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Carbon Disulfide	NYSDEC 91-1	NA	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chloroform	NYSDEC 91-1	0.007	0.009J	**0.023**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chlorobenzene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chloromethane	NYSDEC 91-1	NA	0.01U	0.01UJ	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Ethylbenzene	NYSDEC 91-1	0.005	0.01U	0.01U	0.005 U	0.005 U	0.005 U	0.005 U	0.025 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005
Methylene Chloride	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Styrene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Toluene	NYSDEC 91-1	0.005	0.01U	0.01U	0.005 U	0.005 U	0.005 U	0.005 U	**0.051**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Trichloroethene	NYSDEC 91-1	0.005	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Vinyl Chloride	NYSDEC 91-1	0.002	0.01U	0.01U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Xylene (Total)	NYSDEC 91-1	0.005	0.01U	0.01U	0.005 U	0.005 U	0.005 U	0.005 U	**0.94**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005
Total BTEX	-	NA	BDL	BDL	BDL	BDL	BDL	BDL	1.901	BDL	BDL	BDL	BDL	BDL	0.01
Total Volatiles (2)	-	NA	0.009	0.023	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Analyte	Analytical Method	NYSDEC Std./Guidance Value (1)	Sample Location				
			MW-27	MW-28	MW-33 [2]	MW-55 [3]	MW-9 DUP
			July 2000	July 2000	June 1997	July 1997	July 2000
1,1-Dichloroethane	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
1,1-Dichloroethene	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
1,1,1-Trichloroethane	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
1,2-Dichloroethene (Total)	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
2-Butanone	NYSDEC 91-1	0.05 (GV)	NT	NT	0.01UJ	0.01U	NT
Acetone	NYSDEC 91-1	0.05 (GV)	NT	NT	0.01U	0.01U	NT
Benzene	NYSDEC 91-1	0.007	0.005 U	0.005 U	0.001J	**0.13**	0.005 U
Bromoform	NYSDEC 91-1	0.05 (GV)	NT	NT	0.01UJ	0.01U	NT
Carbon Disulfide	NYSDEC 91-1	NA	NT	NT	0.01U	0.01U	NT
Chloroform	NYSDEC 91-1	0.007	NT	NT	0.01U	0.01U	NT
Chlorobenzene	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
Chloromethane	NYSDEC 91-1	NA	NT	NT	0.01U	0.01U	NT
Ethylbenzene	NYSDEC 91-1	0.005	0.005 U	0.005 U	0.01U	**0.017**	0.005 U
Methylene Chloride	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
Styrene	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
Toluene	NYSDEC 91-1	0.005	0.005 U	0.005 U	0.01U	**0.006 J**	0.005 U
Trichloroethene	NYSDEC 91-1	0.005	NT	NT	0.01U	0.01U	NT
Vinyl Chloride	NYSDEC 91-1	0.002	NT	NT	0.01U	0.01U	NT
Xylene (Total)	NYSDEC 91-1	0.005	0.004 J	0.005 U	0.01U	**0.036**	0.005 U
Total BTEX	-	NA	0.004 J	BDL	0.001	0.189	BDL
Total Volatiles (2)	-	NA	NT	NT	0.001	0.189	NT

(1) NYSDEC Division of Water TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total volatiles do not include TICs.

GV - Guidance Value

[2] Duplicate of MW-03

[3] Duplicate of MW-06

Table 3-5
Groundwater
Semivolatiles (mg/l)
NMPC Troy - Area 2

Analyte	Analytical Method	NYSDEC Grdwtr. Std./Guidance Value (1)	Sample Location												
			MW-1					MW-2					MW-3		
			Dec 1994	Jan 1995	June 1997	July 1997	July 2000	Dec 1994	Jan 1995	June 1997	July 1997	July 2000	Dec 1994	Jan 1995	June 1997
2-Methylnaphthalene	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
2-Methylphenol	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
2,4-Dimethylphenol	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
2,4-Dinitrophenol	NYSDEC 91-2	NA	BDL	BDL	0.025UJ	0.032UJ	NT	BDL	BDL	0.025U	0.025UJ	NT	BDL	BDL	0.025U
3,3'-Dichlorobenzidine	NYSDEC 91-2	0.005	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	0.01U
4-Methylphenol	NYSDEC 91-2	NA	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
4-Nitrophenol	NYSDEC 91-2	NA	BDL	BDL	0.025UJ	0.032U	NT	BDL	BDL	0.025U	0.025U	NT	BDL	BDL	0.025U
Acenaphthene	NYSDEC 91-2	0.02 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	0.002 J	0.01U
Acenaphthylene	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Anthracene	NYSDEC 91-2	0.05 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Benzo (a) anthracene	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Benzo (a) pyrene	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Benzo (b) fluoranthene	NYSDEC 91-2	0.000002 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Benzo (g,h,i) perylene	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Benzo (k) fluoranthene	NYSDEC 91-2	0.000002 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
bis (2-Ethylhexyl) phthalate	NYSDEC 91-2	0.05	BDL	BDL	0.012U	0.013U	NT	0.002J	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
Carbazole	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
Chrysene	NYSDEC 91-2	0.000002 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Dibenzo(a,h)anthracene	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Dibenzofuran	NYSDEC 91-2	ND	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
Fluoranthene	NYSDEC 91-2	0.05 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Fluorene	NYSDEC 91-2	0.05 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Hexachlorocyclopentadiene	NYSDEC 91-2	0.005	BDL	BDL	0.01UJ	0.013UJ	NT	BDL	BDL	0.01UJ	0.01UJ	NT	BDL	BDL	0.01UJ
Indeno(1,2,3-cd)pyrene	NYSDEC 91-2	0.000002	BDL	BDL	0.01UJ	0.013UJ	0.01 U	BDL	BDL	0.01UJ	0.01UJ	0.011 U	BDL	BDL	0.01UJ
Naphthalene	NYSDEC 91-2	0.01 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Penta chlorophenol	NYSDEC 91-2	0.001	BDL	BDL	0.025UJ	0.032U	NT	BDL	BDL	0.025U	0.025U	NT	BDL	BDL	0.025U
Phenanthrene	NYSDEC 91-2	0.05 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Phenol	NYSDEC 91-2	0.001	BDL	BDL	0.01U	0.013U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	0.01U
Pyrene	NYSDEC 91-2	0.05 (GV)	BDL	BDL	0.01U	0.013U	0.01 U	BDL	BDL	0.01U	0.01U	0.011 U	BDL	BDL	0.01U
Total PAHs	NYSDEC 91-2	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.002	BDL
Total Semivolatiles (2)	NYSDEC 91-2	-	BDL	BDL	BDL	BDL	NT	0.002	BDL	BDL	BDL	NT	BDL	0.002	BDL

(1) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), "Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total semivolatiles do not include TICs.

GV - Guidance Value

BDL - Below Detection Limits

* Indicates the values used when a reanalysis of the sample was run by laboratory

NOTE: Only the detected analytes are reported in the tables

Table 3-5
Groundwater
Semivolatiles (mg/l)

NMPC Troy - Area 2

Analyte	Analytical Method	NYSDEC Grdwtr. Std./Guidance Value (1)	Sample Location												
			MW-33 [2]	MW-3		MW-4						MW-50 [1]	MW-5	MW-50 [1]	
			June 1997	July 1997	July 2000	Dec 1994	Jan 1995	June 1997	July 1997	July 2000	Dec 1994	Dec 1994	Jan1995	Jan1995	June 1997
2-Methylnaphthalene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
2-Methylphenol	NYSDEC 91-2	ND	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	BDL	BDL	0.01U
2,4-Dimethylphenol	NYSDEC 91-2	ND	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	BDL	BDL	0.01U
2,4-Dinitrophenol	NYSDEC 91-2	NA	0.025U	0.025UJ	NT	BDL	BDL	0.025U	0.025U	NT	BDL	BDL	BDL	BDL	0.025UJ
3,3'-Dichlorobenzidine	NYSDEC 91-2	0.005	0.01U	0.01UJ	NT	BDL	BDL	0.01U	0.01UJ	NT	BDL	BDL	BDL	BDL	0.01U
4-Methylphenol	NYSDEC 91-2	NA	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	BDL	BDL	0.01U
4-Nitrophenol	NYSDEC 91-2	NA	0.025U	0.025U	NT	BDL	BDL	0.025U	0.025U	NT	BDL	BDL	BDL	BDL	0.025UJ
Acenaphthene	NYSDEC 91-2	0.02 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Acenaphthylene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Anthracene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Benzo (a) anthracene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Benzo (a) pyrene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Benzo (b) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Benzo (g,h,i) perylene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Benzo (k) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
bis (2-Ethylhexyl) phthalate	NYSDEC 91-2	0.05	0.01U	0.01U	NT	BDL	0.002J	0.01U	0.018U	NT	BDL	0.001	BDL	BDL	0.011U
Carbazole	NYSDEC 91-2	ND	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	BDL	BDL	0.01U
Chrysene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Dibenzo(a,h)anthracene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Dibenzofuran	NYSDEC 91-2	ND	0.01U	0.01U	NT	BDL	BDL	0.01U	0.01U	NT	BDL	BDL	BDL	BDL	0.01U
Fluoranthene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Fluorene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Hexachlorocyclopentadiene	NYSDEC 91-2	0.005	0.01UJ	0.01UJ	NT	BDL	BDL	0.01UJ	0.01UJ	NT	BDL	BDL	BDL	BDL	0.01UJ
Indeno(1,2,3-cd)pyrene	NYSDEC 91-2	0.000002	0.01UJ	0.01UJ	0.01 U	BDL	BDL	0.01UJ	0.01UJ	0.01 U	BDL	BDL	BDL	BDL	0.01UJ
Naphthalene	NYSDEC 91-2	0.01 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Penta chlorophenol	NYSDEC 91-2	0.001	0.025U	0.025U	NT	BDL	BDL	0.025U	0.025U	NT	BDL	BDL	BDL	BDL	0.01U
Phenanthrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.025UJ
Phenol	NYSDEC 91-2	0.001	0.01U	0.01U	NT	**0.002J**	**0.023**	0.01U	0.01U	NT	BDL	BDL	BDL	BDL	0.01U
Pyrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	BDL	BDL	0.01U	0.01U	0.01 U	BDL	BDL	BDL	BDL	0.01U
Total PAHs	NYSDEC 91-2	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001J
Total Semivolatiles (2)	NYSDEC 91-2	-	BDL	BDL	NT	0.002	0.025	BDL	BDL	NT	BDL	0.001	BDL	BDL	0.001

(1) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1),
"Ambient Water Quality Standards and Guidance Values", October 22, 1993
(2) Total semivolatiles do not include TICs.
GV - Guidance Value
BDL - Below Detection Limits
* Indicates the values used when a reanalysis of the sample was run by laboratory

[1] - Duplicate of MW-05
[2] - Duplicate of MW-03

NOTE: Only the detected analytes are reported in the tables

Table 3-5
Groundwater
Semivolatiles (mg/l)

NMPC Troy - Area 2

Analyte	Analytical Method	NYSDEC Grdwtr. Std./Guidance Value (1)	Sample Location											
			MW-5		MW-6		MW-55 [3]		MW-7			MW-8		
			July 1997	July 00	June 1997	July 1997	July 1997	July 00	June 1997	July 1997	July 00	June 1997	July 1997	July 00
2-Methylnaphthalene	NYSDEC 91-2	ND	0.01U	0.011 U	**0.007 J**	**0.04**	**0.04**	**0.01 J**	**0.009 J**	**0.006 J**	**0.006 J**	0.01U	0.01U	0.01 U
2-Methylphenol	NYSDEC 91-2	ND	0.01U	NT	0.01U	**0.008 J**	**0.004 J**	NT	0.01U	0.01U	NT	0.01U	0.01U	NT
2,4-Dimethylphenol	NYSDEC 91-2	ND	0.01U	NT	**0.01 J**	**0.004 J**	**0.004 J**	NT	0.01U	0.01U	NT	0.01U	0.01U	NT
2,4-Dinitrophenol	NYSDEC 91-2	NA	0.025U	NT	0.026U	0.025UJ	0.025UJ	NT	0.025UJ	0.025UJ	NT	0.025UJ	0.025UJ	NT
3,3'-Dichlorobenzidine	NYSDEC 91-2	0.005	0.01UJ	NT	0.01U	0.01UJ	0.01UJ	NT	0.01U	0.01UJ	NT	0.01U	0.01UJ	NT
4-Methylphenol	NYSDEC 91-2	NA	0.01U	NT	0.002J	0.004J	0.006J	NT	0.01U	0.01U	NT	0.01U	0.01U	NT
4-Nitrophenol	NYSDEC 91-2	NA	0.025U	NT	0.026U	0.025U	0.025U	NT	0.025UJ	0.025U	NT	0.025UJ	0.025U	NT
Acenaphthene	NYSDEC 91-2	0.02 (GV)	0.01U	0.01 U	0.017	0.012	0.013	**0.028**	**0.027**	0.016	**0.033**	0.01U	0.01U	0.01 U
Acenaphthylene	NYSDEC 91-2	ND	0.01U	0.011 U	**0.008 J**	**0.003 J**	**0.003 J**	0.021 U	**0.002 J**	**0.002 J**	**0.002 J**	0.01U	0.01U	0.01 U
Anthracene	NYSDEC 91-2	0.05 (GV)	0.01U	0.011 U	0.006J	0.0025	0.002J	0.01 U	0.002J	0.001J	0.002 J	0.01U	0.01U	0.01 U
Benzo (a) anthracene	NYSDEC 91-2	ND	0.01U	0.011 U	**0.003 J**	0.01U	0.01U	0.021 U	**0.001 J**	**0.001J**	0.01 U	0.01U	0.01U	0.01 U
Benzo (a) pyrene	NYSDEC 91-2	ND	0.01U	0.011 U	**0.002 J**	0.01U	0.01U	0.021 U	**0.002 J**	**0.002 J**	0.011 U	0.01U	0.01U	0.01 U
Benzo (b) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.011 U	**0.001 J**	0.01U	0.01U	0.021 U	0.01U	0.01U	0.011 U	0.01U	0.01U	0.01 UJ
Benzo (g,h,i) perylene	NYSDEC 91-2	ND	0.01U	0.011 U	0.01U	0.01U	0.01U	0.021 U	0.01U	**0.001J**	0.011 U	0.01U	0.01U	0.01 UJ
Benzo (k) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.011 U	**0.001J**	0.01U	0.01U	0.021 U	**0.001J**	0.01U	0.011 U	0.01U	0.01U	0.01 UJ
bis (2-Ethylhexyl) phthalate	NYSDEC 91-2	0.05	0.01U	NT	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT	0.01U	0.01U	NT
Carbazole	NYSDEC 91-2	ND	0.01U	NT	0.012	0.004J	0.003J	NT	0.01U	0.01U	NT	0.01U	0.01U	NT
Chrysene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.011 U	**0.002J**	0.01U	0.01U	0.021 U	**0.001J**	**0.001J**	0.01 U	0.01U	0.01U	0.01 U
Dibenzo(a,h)anthracene	NYSDEC 91-2	ND	0.01U	0.011 U	**0.002J**	0.01U	0.01U	0.021 U	**0.001J**	**0.001J**	0.011 U	0.01U	0.01U	0.01 UJ
Dibenzofuran	NYSDEC 91-2	ND	0.01U	NT	**0.012**	**0.004J**	**0.004J**	NT	**0.003J**	**0.002J**	NT	0.01U	0.01U	NT
Fluoranthene	NYSDEC 91-2	0.05 (GV)	0.001J	0.01 U	0.008J	0.002J	0.002J	0.01 U	0.002J	0.001J	0.01 U	0.01U	0.01U	0.01 U
Fluorene	NYSDEC 91-2	0.05 (GV)	0.01U	NT	0.022	0.008J	0.008J	0.014 J	0.010	0.006J	0.014	0.01U	0.01U	0.01 U
Hexachlorocyclopentadiene	NYSDEC 91-2	0.005	0.01UJ	NT	0.01UJ	0.01UJ	0.01UJ	NT	0.01UJ	0.01UJ	NT	0.01UJ	0.01UJ	NT
Indeno(1,2,3-cd)pyrene	NYSDEC 91-2	0.000002	0.01UJ	0.011 U	0.01UJ	0.01UJ	0.01UJ	0.021 U	0.01UJ	0.01UJ	0.011 U	0.01UJ	0.01UJ	0.01 UJ
Naphthalene	NYSDEC 91-2	0.01 (GV)	0.001J	0.011 U	0.008J	**0.066**	**0.064**	**0.095**	**0.059**	**0.039**	**0.068**	**0.033**	**0.02**	0.01 U
Penta chlorophenol	NYSDEC 91-2	0.001	0.025U	NT	0.026U	0.025U	0.025U	NT	0.025UJ	0.025U	NT	0.025UJ	0.025U	NT
Phenanthrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.011 U	0.029	0.01	0.01	0.012 J	0.007J	0.004J	0.003 J	0.01U	0.01U	0.01 U
Phenol	NYSDEC 91-2	0.001	0.01U	NT	**0.002J**	**0.002J**	0.01U	NT	0.01U	0.01U	NT	**0.004J**	**0.006J**	NT
Pyrene	NYSDEC 91-2	0.05 (GV)	0.001J	0.01 U	0.005J	0.002J	0.002J	0.01 U	0.003J	0.002J	0.002 J	0.01U	0.01U	0.01 U
Total PAHs	NYSDEC 91-2	-	0.003	BDL	0.157	0.105	0.104	0.159 J	0.128	0.076	0.13 J	0.037	0.02	BDL
Total Semivolatiles (2)	NYSDEC 91-2	-	0.003	NT	0.202	0.17	0.061	NT	0.14	0.084	NT	0.041	0.026	NT

(1) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), "Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total semivolatiles do not include TICs.

GV - Guidance Value

BDL - Below Detection Limits

* Indicates the values used when a reanalysis of the sample was run by laboratory

[3] - Duplicate of MW-06

NOTE: Only the detected analytes are reported in the tables

Table 3-5
Groundwater
Semivolatiles (mg/l)

NMPC Troy - Area 2

Analyte	Analytical Method	NYSDEC Grdwtr. Std./Guidance Value (1)	Sample Location											
			MW-9			DUP #2	MW-10		MW-11			MW-12		
			June 1997	July 1997	July 2000	July 2000	June 1997	July 1997	June 1997	July 1997	June 2000	June 1997	July 1997	June 2000
2-Methylnaphthalene	NYSDEC 91-2	ND	0.01U	0.012U	0.01 U	0.01 U	0.01U	**0.011**	0.01U	0.01U	0.01 U	**0.008 J**	**0.01**	**0.039**
2-Methylphenol	NYSDEC 91-2	ND	0.01U	0.012U	NT	NT	0.01U	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
2,4-Dimethylphenol	NYSDEC 91-2	ND	0.01U	0.012U	NT	NT	0.01U	0.01U	0.01U	0.01U	NT	**0.005 J**	**0.004 J**	NT
2,4-Dinitrophenol	NYSDEC 91-2	NA	0.025UJ	0.029UJ	NT	NT	0.026UJ	0.029UJ	0.026U	0.025UJ	NT	0.025U	0.025U	NT
3,3'-Dichlorobenzidine	NYSDEC 91-2	0.005	0.01U	0.012UJ	NT	NT	0.01U	0.01UJ	0.01UJ	0.01UJ	NT	0.01U	0.01UJ	NT
4-Methylphenol	NYSDEC 91-2	NA	0.01U	0.012U	NT	NT	0.01U	0.01U	0.01U	0.01U	NT	0.001J	0.002J	NT
4-Nitrophenol	NYSDEC 91-2	NA	0.01U	0.029U	NT	NT	0.026UJ	0.025U	0.026U	0.025U	NT	0.025U	0.025U	NT
Acenaphthene	NYSDEC 91-2	0.02 (GV)	0.01U	0.012U	0.01 U	0.01 U	**0.040**	**0.034**	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01 U
Acenaphthylene	NYSDEC 91-2	ND	0.01U	0.012U	0.01 U	0.01 U	**0.004 J**	**0.002 J**	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Anthracene	NYSDEC 91-2	0.05 (GV)	0.01U	0.012U	0.01 U	0.01 U	0.002J	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01 U
Benzo (a) anthracene	NYSDEC 91-2	ND	0.01U	0.012U	0.01 U	0.01 U	**0.002J**	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Benzo (a) pyrene	NYSDEC 91-2	ND	0.01U	0.012U	0.01 U	0.01 U	**0.002 J**	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Benzo (b) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.012U	0.01 U	0.01 U	**0.001 J**	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Benzo (g,h,i) perylene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Benzo (k) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.012U	0.01 U	0.01 U	**0.002J**	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
bis (2-Ethylhexyl) phthalate	NYSDEC 91-2	0.05	0.01U	0.012U	NT	NT	0.01U	0.01U	0.01U	0.01U	NT	0.01U	0.01U	NT
Carbazole	NYSDEC 91-2	ND	0.01U	0.012U	NT	NT	0.003J	0.002J	0.01U	0.01U	NT	0.01U	0.01U	NT
Chrysene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.012U	0.01 U	0.01 U	**0.002J**	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Dibenzo(a,h)anthracene	NYSDEC 91-2	ND	0.01U	0.012U	0.01 U	0.01 U	**0.002J**	0.01U	0.01U	0.01U	0.01 U	0.01U	0.01U	0.02 U
Dibenzofuran	NYSDEC 91-2	ND	0.01U	0.012U	NT	NT	**0.004J**	**0.003J**	0.01U	0.01U	NT	0.01U	0.01U	NT
Fluoranthene	NYSDEC 91-2	0.05 (GV)	0.01U	0.012U	0.01 U	0.01 U	0.005J	0.0025	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01 U
Fluorene	NYSDEC 91-2	0.05 (GV)	0.01U	0.012U	0.01 U	0.01 U	0.01J	0.008J	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01 U
Hexachlorocyclopentadiene	NYSDEC 91-2	0.005	0.01UJ	0.012UJ	NT	NT	0.01UJ	0.01UJ	0.01UJ	0.01UJ	NT	0.01UJ	0.01UJ	NT
Indeno(1,2,3-cd)pyrene	NYSDEC 91-2	0.000002	0.01UJ	0.012UJ	0.01 U	0.01 U	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.01 U	0.01UJ	0.01UJ	0.02 U
Naphthalene	NYSDEC 91-2	0.01 (GV)	0.01U	0.012U	0.01 U	0.01 U	0.007J	**0.052**	0.01U	0.01U	0.01 U	**0.025**	**0.034**	**0.12**
Penta chlorophenol	NYSDEC 91-2	0.001	0.025U	0.029U	NT	NT	0.026UJ	0.025UJ	0.026U	0.025U	NT	0.025U	0.025U	NT
Phenanthrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.012U	0.01 U	0.01 U	0.002J	0.002J	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01 U
Phenol	NYSDEC 91-2	0.001	0.01U	0.012U	NT	NT	**0.002J**	0.01U	0.01U	0.01U	NT	**0.012**	0.01U	NT
Pyrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.012U	0.01 U	0.01 U	0.004J	0.002J	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01 U
Total PAHs	NYSDEC 91-2	-	BDL	BDL	BDL	BDL	0.092	0.102	BDL	BDL	BDL	0.051	0.034	0.159
Total Semivolatiles (2)	NYSDEC 91-2	-	BDL	BDL	NT	NT	0.101	0.118	BDL	BDL	NT	0.026	0.05	NT

(1) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), "Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total semivolatiles do not include TICs.

GV - Guidance Value

BDL - Below Detection Limits

* Indicates the values used when a reanalysis of the sample was run by laboratory

DUP #2: Duplicate of MW-9

NOTE: Only the detected analytes are reported in the tables

Table 3-5
Groundwater
Semivolatiles (mg/l)
NMPC Troy - Area 2

Analyte	Analytical Method	NYSDEC Grdwtr. Std./Guidance Value (1)	MW-13 June199	MW-13 July1997	MW-13 June 00	MW-14 June1997	MW-14 July 1997	MW-15 June1997	MW-15 July 1997	MW-15 June 00*	MW-15 June 00 RE	MW-16 June1997	MW-16 July 1997	MW-16 June 00	MW-17 June199	MW-17 July 1997	MW-17 July 2000
2-Methylnaphthalene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	**0.008 J**	0.01 U
2-Methylphenol	NYSDEC 91-2	ND	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	NT	0.011U	0.01U	NT	0.01U	0.013U	NT
2,4-Dimethylphenol	NYSDEC 91-2	ND	0.01U	0.01U	NT	0.01U	0.01U	0.01U	**0.002 J**	NT	NT	0.011U	0.01U	NT	0.01U	0.013U	NT
2,4-Dinitrophenol	NYSDEC 91-2	NA	0.025UJ	0.025U	NT	0.025U	0.025UJ	0.025U	0.025U	NT	NT	0.026U	0.025U	NT	0.025U	0.032UJ	NT
3,3'-Dichlorobenzidine	NYSDEC 91-2	0.005	0.01U	0.01U	NT	0.01U	0.01UJ	0.01U	0.01U	NT	NT	0.011UJ	0.01U	NT	0.01U	0.013UJ	NT
4-Methylphenol	NYSDEC 91-2	NA	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	NT	0.011U	0.01U	NT	0.01U	0.002J	NT
4-Nitrophenol	NYSDEC 91-2	NA	0.025UJ	0.025U	NT	0.025U	0.025U	0.025U	0.025U	NT	NT	0.026U	0.025U	NT	0.025U	0.032U	NT
Acenaphthene	NYSDEC 91-2	0.02 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.003J	0.01 U
Acenaphthylene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Anthracene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Benzo (a) anthracene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Benzo (a) pyrene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Benzo (b) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 UJ	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Benzo (g,h,i) perylene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 UJ	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Benzo (k) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 UJ	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
bis (2-Ethylhexyl) phthalate	NYSDEC 91-2	0.05	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	NT	0.011U	0.01U	NT	0.01U	0.013U	NT
Carbazole	NYSDEC 91-2	ND	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	NT	0.011U	0.01U	NT	0.01U	0.013U	NT
Chrysene	NYSDEC 91-2	0.000002 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Dibenzo(a,h)anthracene	NYSDEC 91-2	ND	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 UJ	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Dibenzofuran	NYSDEC 91-2	ND	0.01U	0.01U	NT	0.01U	0.01U	0.01U	0.01U	NT	NT	0.011U	0.01U	NT	0.01U	0.013U	NT
Fluoranthene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Fluorene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.002J	0.01 U
Hexachlorocyclopentadiene	NYSDEC 91-2	0.005	0.01UJ	0.01UJ	NT	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.01 U	NT	0.011UJ	0.01UJ	NT	0.01UJ	0.013UJ	NT
Indeno(1,2,3-cd)pyrene	NYSDEC 91-2	0.000002	0.01UJ	0.01UJ	0.01 U	0.01UJ	0.01UJ	0.01UJ	0.01UJ	0.01 UJ	0.01 U	0.011UJ	0.01UJ	0.01 U	0.01UJ	0.013UJ	0.01 U
Naphthalene	NYSDEC 91-2	0.01 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.002J	0.003J	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	**0.014**	0.01 U
Penta chlorophenol	NYSDEC 91-2	0.001	0.025UJ	0.025U	NT	0.025U	0.025U	0.025U	0.025U	NT	NT	0.026U	0.025U	NT	0.025U	0.032U	NT
Phenanthrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.002J	0.01 U
Phenol	NYSDEC 91-2	0.001	0.01U	0.01U	NT	0.01U	0.01U	**0.021**	0.01U	NT	NT	0.011U	0.01U	NT	0.01U	0.013U	NT
Pyrene	NYSDEC 91-2	0.05 (GV)	0.01U	0.01U	0.01 U	0.01U	0.01U	0.01U	0.01U	0.01 U	0.01 U	0.011U	0.01U	0.01 U	0.01U	0.013U	0.01 U
Total PAHs	NYSDEC 91-2	-	BDL	BDL	BDL	BDL	BDL	0.023	0.003	BDL	BDL	BDL	BDL	BDL	BDL	0.021	BDL
Total Semivolatiles (2)	NYSDEC 91-2	-	BDL	BDL	NT	BDL	BDL	0.044	0.005	NT	NT	BDL	BDL	NT	BDL	0.031	NT

(1) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), "Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total semivolatiles do not include TICs.

GV - Guidance Value

BDL - Below Detection Limits

* Indicates the values used when a reanalysis of the sample was run by laboratory

NOTE: Only the detected analytes are reported in the tables

Table 3-5
Groundwater
Semivolatiles (mg/l)

NMPC Troy - Area 2

Analyte	Analytical Method	NYSDEC Grdwtr. Std./Guidance Value (1)	Sample Location MW-18 July 2000	MW-19 July 2000	MW-20 July 2000	MW-21 July 2000	MW-22 July 2000	DUP #1 July 2000	MW-23 July 2000	MW-24 July 2000	MW-25 July 2000	Sample Location MW-26 July 2000	MW-27* July 2000	MW-27 RE July 2000	MW-28 July 2000
2-Methylnaphthalene	NYSDEC 91-2	ND	0.01 U	0.01 U	0.01 U	**1.2 B**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
2-Methylphenol	NYSDEC 91-2	ND	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4-Dimethylphenol	NYSDEC 91-2	ND	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4-Dinitrophenol	NYSDEC 91-2	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3,3'-Dichlorobenzidine	NYSDEC 91-2	0.005	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4-Methylphenol	NYSDEC 91-2	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4-Nitrophenol	NYSDEC 91-2	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Acenaphthene	NYSDEC 91-2	0.02 (GV)	0.01 U	0.004 J	0.006 J	**0.32 J**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.029**	**0.057 J**	**0.055**	0.01 U
Acenaphthylene	NYSDEC 91-2	ND	0.01 U	0.01 U	**0.002 J**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.002 J**	**0.013 J**	**0.012**	0.01 U
Anthracene	NYSDEC 91-2	0.05 (GV)	0.01 U	0.002 J	0.002 J	**0.11 J**	0.01 U	0.01 U	0.002 J	0.01 U	0.01 U	0.004 J	0.027 J	0.028	0.01 U
Benzo (a) anthracene	NYSDEC 91-2	ND	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.006 J**	**0.018 J**	**0.018**	0.01 U
Benzo (a) pyrene	NYSDEC 91-2	ND	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.004 J**	**0.014 J**	**0.014**	0.01 U
Benzo (b) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.002 J**	0.01 U	**0.006 J**	0.01 U
Benzo (g,h,i) perylene	NYSDEC 91-2	ND	0.01 U	0.01 U	0.01 U	1.0 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.002 J**	0.01 U	**0.01**	0.01 U
Benzo (k) fluoranthene	NYSDEC 91-2	0.000002 (GV)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.003 J**	**0.01 J**	**0.01**	0.01 U
bis (2-Ethylhexyl) phthalate	NYSDEC 91-2	0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Carbazole	NYSDEC 91-2	ND	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chrysene	NYSDEC 91-2	0.000002 (GV)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.006 J**	**0.019 J**	**0.018**	0.01 U
Dibenzo(a,h)anthracene	NYSDEC 91-2	ND	0.01 U	0.01 U	0.01 U	1.0 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.003 J**	0.01 U
Dibenzofuran	NYSDEC 91-2	ND	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Fluoranthene	NYSDEC 91-2	0.05 (GV)	0.01 U	0.004 J	0.002 J	**0.11 J**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011	0.037 J	0.034	NT
Fluorene	NYSDEC 91-2	0.05 (GV)	0.01 U	0.006 J	0.008 J	**0.18 J**	0.01 U	0.01 U	0.002 J	0.01 U	0.01 U	0.012	0.022 J	0.022	0.01 U
Hexachlorocyclopentadiene	NYSDEC 91-2	0.005	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.01 U
Indeno(1,2,3-cd)pyrene	NYSDEC 91-2	0.000002	0.01 U	0.01 U	0.01 U	1.0 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.008 J**	**0.007 J**	NT
Naphthalene	NYSDEC 91-2	0.01 (GV)	0.01 U	0.01 U	0.01 U	**4.0 B**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Penta chlorophenol	NYSDEC 91-2	0.001	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.01 U
Phenanthrene	NYSDEC 91-2	0.05 (GV)	0.01 U	0.002 J	0.01 U	**0.39 J**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.002 J	**0.055 J**	**0.053**	NT
Phenol	NYSDEC 91-2	0.001	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.01 U
Pyrene	NYSDEC 91-2	0.05 (GV)	0.01 U	0.003 J	0.002 J	**0.16 J**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.019	**0.055 J**	**0.058**	NT
Total PAHs	NYSDEC 91-2	-	BDL	0.021 J	0.022 J	6.47 JB	BDL	BDL	0.004 J	BDL	BDL	0.102 J	0.421 J	0.348 J	BDL
Total Semivolatiles (2)	NYSDEC 91-2	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

(1) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1),
"Ambient Water Quality Standards and Guidance Values", October 22, 1993

(2) Total semivolatiles do not include TICs.

GV - Guidance Value

BDL - Below Detection Limits

* Indicates the values used when a reanalysis of the sample was run by laboratory

DUP #1: Duplicate of MW-22

NOTE: Only the detected analytes are reported in the tables

TABLE 7-1
GROUNDWATER QUALITY RESULTS -BTEX
January 2004

Sample Name	Sample Date	Benzene (μg/L)	Ethylbenzene (μg/L)	Toluene (μg/L)	o-Xylene (μg/L)	m&p-Xylene (μg/L)
NYSDEC Std./Guidance Value [(a)] (μg/L)		1	5	5	5	5
MW-2	1/14/2004	5 U	5 U	5 U	5 U	5 U
MW-3	1/13/2004	5 U	5 U	5 U	5 U	5 U
MW-4	1/13/2004	5 U	5 U	5 U	5 U	5 U
MW-8	1/14/2004	5 U	5 U	5 U	5 U	5 U
MW-11	1/14/2004	5 U	5 U	5 U	5 U	5 U
MW-16	1/13/2004	5 U	5 U	5 U	5 U	5 U
MW-16 DUP	1/13/2004	5 U	5 U	5 U	5 U	5 U
MW-17	1/13/2004	5 U	5 U	5 U	5 U	5 U
MW-19	1/15/2004	5 U	5 U	5 U	5 U	5 U
MW-22	1/13/2004	5 U	5 U	5 U	5 U	5 U
MW-24	1/14/2004	5 U	5 U	5 U	5 U	5 U
MW-25	1/12/2004	5 U	5 U	5 U	5 U	5 U
MW-26	1/15/2004	5 U	5 U	5 U	5 U	5 U
EB011604	1/16/2004	5 U	5 U	5 U	5 U	5 U
TB-01-011304	1/13/2004	5 U	5 U	5 U	5 U	5 U
TB-01-011404	1/14/2004	5 U	5 U	5 U	5 U	5 U
TB011504	1/15/2004	5 U	5 U	5 U	5 U	5 U
TB011604	1/16/2004	5 U	5 U	5 U	5 U	5 U

U - non detected analyte, corresponding value is the Reporting Limit.
J - estimated value, concetration less than the Reporting Limit but greater than the Method Detection Limit.
D - diluted value.

(a) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, June 1998.

TABLE 7-2
GROUNDWATER QUALITY RESULTS - PAHs
January 2004

Sample Name	Sample Date	Acenaphthene (μg/L)	Acenaphthylene (μg/L)	Anthracene (μg/L)	Benzo(a) anthracene (μg/L)	Benzo(a) pyrene (μg/L)	Benzo(b) fluoroanthene (μg/L)	Benzo(g,h,i) perylene (μg/L)	Benzo(k) fluoroanthene (μg/L)	Chrysene (μg/L)	Dibenzo(a,h) anthracene (μg/L)
NYSDEC Std/Guidance Value [(a)] (μg/L)		20 (GV)	NA	50 (GV)	0.002 (GV)	ND	0.002 (GV)	NA	0.002 (GV)	0.002 (GV)	NA
MW-2	1/14/2004	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
MW-3	1/13/2004	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
MW-4	1/13/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-8	1/14/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-11	1/14/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-16	1/13/2004	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
MW-16 DUP	1/13/2004	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
MW-17	1/13/2004	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
MW-19	1/15/2004	1 J	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
MW-22	1/13/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-24	1/14/2004	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
MW-25	1/12/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-26	1/15/2004	1.4 J	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U
EB011604	1/16/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U

U - non detected analyte, corresponding value is the Reporting Limit.
J - estimated value, concetration less than the Reporting Limit but greater than the Method Detection Limit.
D - diluted value.
GV - Guidance Value
NA - Not Applicable

(a) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, June 1998.

TABLE 7-2
GROUNDWATER QUALITY RESULTS - PAHs
January 2004

Sample Name	Sample Date	Fluoranthene (μg/L)	Fluorene (μg/L)	Indeno(1,2,3-cd)pyrene (μg/L)	Naphthalene (μg/L)	Phenanthrene (μg/L)	Pyrene (μg/L)
NYSDEC Std/Guidance Value [(a)] (μg/L)		50 (GV)	50 (GV)	0.002 (GV)	10 (GV)	50 (GV)	50 (GV)
MW-2	1/14/2004	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
MW-3	1/13/2004	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
MW-4	1/13/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-8	1/14/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-11	1/14/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-16	1/13/2004	10 U	10 U	10 U	10 U	10 U	10 U
MW-16 DUP	1/13/2004	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
MW-17	1/13/2004	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U	9.8 U
MW-19	1/15/2004	1.5 J	9.7 U	9.7 U	9.7 U	9.7 U	2.4 J
MW-22	1/13/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-24	1/14/2004	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U	9.7 U
MW-25	1/12/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
MW-26	1/15/2004	11 U	11 U	11 U	11 U	11 U	11 U
EB011604	1/16/2004	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U

U - non detected analyte, corresponding value is the Reporting Limit.
J - estimated value, concetration less than the Reporting Limit but greater than the Method Detection Limit.
D - diluted value.
GV - Guidance Value
NA - Not Applicable

(a) NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, June 1998.

TABLE 3-7

GROUNDWATER ANALYTICAL RESULTS
MAY/JUNE 2004
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

Chemical Name	T.O.G.S. 1.1.1	MW-2 6/2/2004	MW-3 5/252004	MW-4 5/25/2004	MW-6R 6/2/2004	MW-7 5/25/2004	MW-8 5/25/2004	MW-9R 6/7//2004	MW-10R 5/21/2004
BTEXs (ug/l)									
Benzene	0.7	5 U	3.9 J	5 U	61	60	13	5 U	120
Ethylbenzene	5	5 U	5 U	5 U	1 J	140	5 U	5 U	77
Toluene	5	5 U	5 U	5 U	5 U	3.1 J	5 U	5 U	1.8 J
Xylene-o	5	5 U	5 U	5 U	3.2 J	54	5 U	5 U	28
Xylenes	5	5 U	5 U	5 U	1.9 J	11	5 U	5 U	12
Total BTEXs		0	3.9	0	67.1	268.1	13	0	238.8
PAHs (ug/l)									
Acenaphthene	20	9.8 U	1.6 J	9.3 U	16	26	9.3 U	9.3 U	NA
Acenaphthylene	20	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Anthracene	50	9.8 U	9.3 U	9.3 U	1.3 J	1.3 J	9.3 U	9.3 U	NA
Fluoranthene	50	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Benzo(a)anthracene	0.002	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Benzo(a)pyrene	0.002	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Benzo(b)fluoranthene	0.002	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Benzo(g,h,i)perylene	5	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Benzo(k)fluoranthene	0.002	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Chrysene	0.002	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Dibenzo(a,h)anthracene	50	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Fluorene	50	9.8 U	9.3 U	9.3 U	7.4 J	7.4 J	9.3 U	9.3 U	NA
Indeno(1,2,3-cd)pyrene	0.002	9.8 U	9.3 U	9.3 U	9.3 U	9.5 U	9.3 U	9.3 U	NA
Naphthalene	10	9.8 U	9.3 U	9.3 U	5.5 J	15	9.3 U	9.3 U	NA
Phenanthrene	50	9.8 U	9.3 U	9.3 U	6.9 J	3.3 J	9.3 U	9.3 U	NA
Pyrene	50	9.8 U	9.3 U	9.3 U	1.2 J	1.1 J	9.3 U	9.3 U	NA
Total PAHs		0	1.6	0	38.3	54.1	0	0	NA

TABLE 3-7

GROUNDWATER ANALYTICAL RESULTS
MAY/JUNE 2004
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

Chemical Name	MW-10R 6/1/2004	MW-11 6/2/2004	MW-12 6/2/2004	MW-13 6/3/2004	MW-16 6/7/2004	MW-18 6/7/2004	MW-19 6/1/2004	MW-19 DUP 6/1/2004
BTEXs (ug/l)								
Benzene	1 J	5 U	77	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	880	5 U	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	4 J	5 U	5 U	5 U	5 U	5 U
Xylene-o	5 U	5 U	1.3 J	5 U	5 U	5 U	5 U	5 U
Xylenes	5 U	5 U	350	5 U	5 U	5 U	5 U	5 U
Total BTEXs	1	0	1312.3	0	0	0	0	0
PAHs (ug/l)								
Acenaphthene	2.4 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Acenaphthylene	1.6 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Anthracene	1.3 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Fluoranthene	2.2 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Benzo(a)anthracene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Benzo(a)pyrene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Benzo(b)fluoranthene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Benzo(g,h,i)perylene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Benzo(k)fluoranthene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Chrysene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Dibenzo(a,h)anthracene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Fluorene	5 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Indeno(1,2,3-cd)pyrene	9.4 U	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Naphthalene	19	9.6 U	110	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Phenanthrene	7.7 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
Pyrene	1.4 J	9.6 U	9.3 U	9.3 U	9.3 U	9.3 U	1.9 J	1.8 J
Total PAHs	40.6	0	110	0	0	0	1.9	1.8

TABLE 3-7

GROUNDWATER ANALYTICAL RESULTS
MAY/JUNE 2004
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

Chemical Name	MW-20 6/1/2004	MW-22 6/3/2004	MW-23 6/7/2004	MW-24 6/4/2004	MW-24 DUP 6/4/2004	MW-25 6/4/2004	MW-26 6/4/2004	MW-27 5/25/2004	MW-28R 6/7/2004
BTEXs (ug/l)									
Benzene	4.3 J	5 U	5 U	5 U	5 U	5 U	2.9 J	16	16
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	3.6 J	5 U	9.2
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylene-o	5 U	5 U	5 U	5 U	5 U	5 U	2 J	5.2	3.6 J
Xylenes	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1.4 J
Total BTEXs	4.3	0	0	0	0	0	8.5	21.2	30.2
PAHs (ug/l)									
Acenaphthene	4.6 J	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	2.2 J	6.3 J	1.3 J
Acenaphthylene	2.3 J	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Anthracene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Fluoranthene	1.2 J	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Benzo(a)anthracene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Benzo(a)pyrene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Benzo(b)fluoranthene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Benzo(g,h,i)perylene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Benzo(k)fluoranthene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Chrysene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Dibenzo(a,h)anthracene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Fluorene	2.9 J	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	3 J	9.3 U
Indeno(1,2,3-cd)pyrene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Naphthalene	4.8 J	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	17	9.4 U	17
Phenanthrene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	1.9 J	9.3 U
Pyrene	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.3 U
Total PAHs	15.8	0	0	0	0	0	19.2	11.2	18.3

TABLE 3-7

GROUNDWATER ANALYTICAL RESULTS
MAY/JUNE 2004
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

Chemical Name	MW-29 6/3/2004	MW-30 6/3/2004	MW-32 6/1/2004	MW-33 6/8/2004	MW-34 6/2/2004	MW-35 6/7/2004	MW-36 5/21/2004	MW-36 6/8/2004
BTEXs (ug/l)								
Benzene	1700	40	5 U	31	1.3 J	5 U	52	28
Ethylbenzene	110	730	5 U	5.2	2.5 J	5 U	42	74
Toluene	14	2.2 J	5 U	5 U	5 U	5 U	1.7 J	1.4 J
Xylene-o	5.3 J	3.2 J	5 U	7.7	5 U	5 U	1 J	1.4 J
Xylenes	34	9.4	5 U	1.3 J	5 U	5 U	2.3 J	4.5 J
Total BTEXs	1863.3	784.8	0	45.2	3.8	0	99	109.3
PAHs (ug/l)								
Acenaphthene	63	1.8 J	18	63	63	9.3 U	NA	1.3 J
Acenaphthylene	27 U	9.3 U	6.4 J	6.5 J	9.3 U	9.3 U	NA	9.3 U
Anthracene	64	9.3 U	8.9 J	25	8.9 J	9.3 U	NA	9.3 U
Fluoranthene	130	9.3 U	9.2 J	36	9 J	9.3 U	NA	9.3 U
Benzo(a)anthracene	43	9.3 U	3.3 J	13	9.3 U	9.3 U	NA	9.3 U
Benzo(a)pyrene	22 J	9.3 U	2.1 J	12	9.3 U	9.3 U	NA	9.3 U
Benzo(b)fluoranthene	17 J	9.3 U	1.6 J	5.4 J	9.3 U	9.3 U	NA	9.3 U
Benzo(g,h,i)perylene	8.4 J	9.3 U	9.3 U	5.9 J	9.3 U	9.3 U	NA	9.3 U
Benzo(k)fluoranthene	16 J	9.3 U	2.1 J	6.8 J	9.3 U	9.3 U	NA	9.3 U
Chrysene	37	9.3 U	3.3 J	13	9.3 U	9.3 U	NA	9.3 U
Dibenzo(a,h)anthracene	3.9 J	9.3 U	9.3 U	1.6 J	9.3 U	9.3 U	NA	9.3 U
Fluorene	80	2.4 J	21	40	68	9.3 U	NA	1.6 J
Indeno(1,2,3-cd)pyrene	8.8 J	9.3 U	9.3 U	4.5 J	9.3 U	9.3 U	NA	9.3 U
Naphthalene	33	9.3 U	9.3 U	70	6.1 J	9.3	NA	9.3 U
Phenanthrene	200	1.5 J	7.5 J	98	20	9.3 U	NA	9.3 U
Pyrene	110	9.3 U	5.6 J	45	6.1 J	9.3 U	NA	9.3 U
Total PAHs	836.1	5.7	89	445.7	181.1	0	NA	2.9

TABLE 3-7

GROUNDWATER ANALYTICAL RESULTS
MAY/JUNE 2004
TROY (WATER STREET) SITE - AREA 2
TROY, NEW YORK

Chemical Name	MW-37 6/8/2004	MW-38 6/8/2004	MW-124B 6/1/2004	MW-134B 6/1/2004	PZ-1 6/3/2004
BTEXs (ug/l)					
Benzene	220	1.9 J	110	5 U	5 U
Ethylbenzene	99	5 U	6.6	5 U	5 U
Toluene	14	5 U	65	5 U	5 U
Xylene-o	81	5 U	24	5 U	5 U
Xylenes	28	5 U	50	5 U	5 U
Total BTEXs	442	1.9	255.6	0	0
PAHs (ug/l)					
Acenaphthene	5.4 J	120	31	9.3 U	39
Acenaphthylene	9.3 U	30	33	9.3 U	12
Anthracene	9.3 U	33	7.4 J	9.3 U	17
Fluoranthene	9.3 U	56	6.2 J	9.3 U	32
Benzo(a)anthracene	9.3 U	19	1.2 J	9.3 U	20
Benzo(a)pyrene	9.3 U	14	9.3 U	9.3 U	17
Benzo(b)fluoranthene	9.3 U	9.6	9.3 U	9.3 U	8.6 J
Benzo(g,h,i)perylene	9.3 U	6.2 J	9.3 U	9.3 U	8.4 J
Benzo(k)fluoranthene	9.3 U	10	9.3 U	9.3 U	9.6
Chrysene	9.3 U	16	1 J	9.3 U	18
Dibenzo(a,h)anthracene	9.3 U	2.5 J	9.3 U	9.3 U	2.4 J
Fluorene	1 J	91	29	9.3 U	26
Indeno(1,2,3-cd)pyrene	9.3 U	6.4 J	9.3 U	9.3 U	6.6 J
Naphthalene	9.3 U	2400 D	590 D	9.3 U	4.3 J
Phenanthrene	1.8 J	180 J	27	9.3 U	17
Pyrene	9.3 U	39	4.9 J	9.3 U	53
Total PAHs	8.2	3032.7	730.7	0	290.9

Notes:
J - Estimated value.
U - not detected to the reporting limit.
Shading - Indicates an excedence of New York State groundwater guidance value or standard (TOGS 1.1.1).
NA - not analyzed.

TABLE 3-2
SHALLOW ZONE INTERIM AQUEOUS BTEX RESULTS SUMMARY
ISCO Pilot Test
Troy (Water Street) Site - Area 2
Troy, New York

				8/16/05 --- Shallow Injections ---9/6/05					9/7/05 --- Deep Injections --- 9/25/05			
	Constituents	Units	Baseline 8/3/2005	Round 1S 8/18/2005	Round 2S 8/25/2005	Round 3S 8/29/2005	Round 4S 9/6/2005	Round 5S 9/8/2005	Round 1D 9/14/2005	Round 2D 9/19/2005	Round 3D 9/23/2005	Round 4D 9/29/2005
MP-1S	Benzene	ug/L	37	53	28	19	16	16	NA	NA	NA	NA
	Ethylbenzene	ug/L	26	41	14	13	7.9	13	NA	NA	NA	NA
	m&p-Xylenes	ug/L	1.2 J	2.5 J	1.2 J	1.1 J	0.94 J	1.4 J	NA	NA	NA	NA
	o-Xylene	ug/L	9.3	16	7	5.7	4.5 J	6.4	NA	NA	NA	NA
	Toluene	ug/L	1.1 J	1.5 J	1.1 J	1.1 J	1 J	0.85 J	NA	NA	NA	NA
	Total BTEX	ug/L	75	114	51	40	30	38	NA	NA	NA	NA
MP-4S	Benzene	ug/L	5 U	NA	NA	NA	NA	2.3 J	NA	NA	NA	NA
	Ethylbenzene	ug/L	88	NA	NA	NA	NA	100	NA	NA	NA	NA
	m&p-Xylenes	ug/L	45	NA	NA	NA	NA	49	NA	NA	NA	NA
	o-Xylene	ug/L	30	NA	NA	NA	NA	36	NA	NA	NA	NA
	Toluene	ug/L	5.9	NA	NA	NA	NA	6.6	NA	NA	NA	NA
	Total BTEX	ug/L	169	NA	NA	NA	NA	194	NA	NA	NA	NA
MP-6	Benzene	ug/L	0.43 J	NA	NA	NA	NA	1.2 J	NA	NA	NA	NA
	Ethylbenzene	ug/L	0.68 J	NA	NA	NA	NA	2.6 J	NA	NA	NA	NA
	m&p-Xylenes	ug/L	5 U	NA	NA	NA	NA	0.6 J	NA	NA	NA	NA
	o-Xylene	ug/L	0.47 J	NA	NA	NA	NA	2 J	NA	NA	NA	NA
	Toluene	ug/L	5 U	NA	NA	NA	NA	0.38 J	NA	NA	NA	NA
	Total BTEX	ug/L	1.58	NA	NA	NA	NA	7	NA	NA	NA	NA

TABLE 3-2
SHALLOW ZONE INTERIM AQUEOUS BTEX RESULTS SUMMARY
ISCO Pilot Test
Troy (Water Street) Site - Area 2
Troy, New York

Well	Constituents	Units	Baseline 8/3/2005	Round 1S 8/18/2005	Round 2S 8/25/2005	Round 3S 8/29/2005	Round 4S 9/6/2005	Round 5S 9/8/2005	Round 1D 9/14/2005	Round 2D 9/19/2005	Round 3D 9/23/2005	Round 4D 9/29/2005
				8/16/05 --- Shallow Injections ---9/6/05					9/7/05 --- Deep Injections --- 9/25/05			
MP-7S	Benzene	ug/L	12	0.52 J	10	5 J	11	1.4 J	5 U	6.3	5 U	NA
	Ethylbenzene	ug/L	29	9.6	12	4.9 J	2.2 J	0.74 J	5 U	5.9	5 U	NA
	m&p-Xylenes	ug/L	2.3 J	1.3 J	3.1 J	3 J	1.4 J	0.39 J	5 U	2.5 J	5 U	NA
	o-Xylene	ug/L	13	7.4	7.3	2.8 J	1.4 J	0.38 J	5 U	2.3 J	5 U	NA
	Toluene	ug/L	1.1 J	0.29 J	5.1	2.8 J	2.9 J	0.64 J	5 U	2.5 J	5 U	NA
	Total BTEX	ug/L	57	19.1	38	19	19	3.6	ND	19.5	ND	NA
MP-8S	Benzene	ug/L	120	58	43	49	91	110	25 J	44	5.3	3.6 J
	Ethylbenzene	ug/L	210	300	170	180 D	240	400	92	50	15	16
	m&p-Xylenes	ug/L	12	19 J	10	13	18 J	28 J	9.6 J	7.9	2.1 J	5.8
	o-Xylene	ug/L	70	92	67	78	85	130	41	19	4.2 J	9.6
	Toluene	ug/L	6.5 J	4.2 J	4.5 J	7.8	9.2 J	10 J	6.2 J	9	1.6 J	2.5 J
	Total BTEX	ug/L	419	473	295	328	443	678	174	130	28	38
MP-9S	Benzene	ug/L	330	7.6 J	23	1.1 J	18	5 U	NA	NA	NA	NA
	Ethylbenzene	ug/L	1000	320	130	21	62	3.2 J	NA	NA	NA	NA
	m&p-Xylenes	ug/L	96	37	14	4.1 J	8.6	2 J	NA	NA	NA	NA
	o-Xylene	ug/L	300	160	51	12	29	5 J	NA	NA	NA	NA
	Toluene	ug/L	15 J	2.2 J	2 J	5 U	2.2 J	5 U	NA	NA	NA	NA
	Total BTEX	ug/L	1741	527	220	38	120	10	NA	NA	NA	NA

TABLE 3-2
SHALLOW ZONE INTERIM AQUEOUS BTEX RESULTS SUMMARY
ISCO Pilot Test
Troy (Water Street) Site - Area 2
Troy, New York

	Constituents	Units	Baseline 8/3/2005	Round 1S 8/18/2005	Round 2S 8/25/2005	Round 3S 8/29/2005	Round 4S 9/6/2005	Round 5S 9/8/2005	Round 1D 9/14/2005	Round 2D 9/19/2005	Round 3D 9/23/2005	Round 4D 9/29/2005
				8/16/05 --- Shallow Injections ---9/6/05				9/7/05 --- Deep Injections --- 9/25/05				
MP-10	Benzene	ug/L	82	63	70	64	NA	73	NA	NA	NA	NA
	Ethylbenzene	ug/L	980 D	810	870 D	990 D	NA	920 D	NA	NA	NA	NA
	m&p-Xylenes	ug/L	37	28 J	36	33	NA	32	NA	NA	NA	NA
	o-Xylene	ug/L	280 D	220	250 D	260	NA	260 D	NA	NA	NA	NA
	Toluene	ug/L	4.6 J	3.6 J	4.1 J	3.8 J	NA	4 J	NA	NA	NA	NA
	Total BTEX	ug/L	1384	1125	1230	1351	NA	1289	NA	NA	NA	NA
MP-11S	Benzene	ug/L	4.7 J	NA	5.2	8.1	14	4.5 J	4.2 J	NA	NA	NA
	Ethylbenzene	ug/L	170	NA	5.9	9.7	7	4.1 J	3.5 J	NA	NA	NA
	m&p-Xylenes	ug/L	5.6 J	NA	1.9 J	2.1 J	2.6 J	2.5 J	2 J	NA	NA	NA
	o-Xylene	ug/L	37 J	NA	3.8 J	4.6 J	3.8 J	2.6 J	2 J	NA	NA	NA
	Toluene	ug/L	1.3 J	NA	2.4 J	2.7 J	4.6 J	2.8 J	2.3 J	NA	NA	NA
	Total BTEX	ug/L	171	NA	19.2	27.2	32	16.5	14	NA	NA	NA
MP-12S	Benzene	ug/L	20	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Ethylbenzene	ug/L	8.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
	m&p-Xylenes	ug/L	3.4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	o-Xylene	ug/L	5.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Toluene	ug/L	1.4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total BTEX	ug/L	39	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3-2
SHALLOW ZONE INTERIM AQUEOUS BTEX RESULTS SUMMARY
ISCO Pilot Test
Troy (Water Street) Site - Area 2
Troy, New York

Location	Constituents	Units	Baseline 8/3/2005	Round 1S 8/18/2005	Round 2S 8/25/2005	Round 3S 8/29/2005	Round 4S 9/6/2005	Round 5S 9/8/2005	Round 1D 9/14/2005	Round 2D 9/19/2005	Round 3D 9/23/2005	Round 4D 9/29/2005
				8/16/05 --- Shallow Injections ---9/6/05					9/7/05 --- Deep Injections --- 9/25/05			
MP-13S	Benzene	ug/L	3.7 J	NA	NA	NA	15 J	15 J	NA	NA	NA	NA
	Ethylbenzene	ug/L	2.8 J	NA	NA	NA	500	490	NA	NA	NA	NA
	m&p-Xylenes	ug/L	4.1 J	NA	NA	NA	220	220	NA	NA	NA	NA
	o-Xylene	ug/L	3.6 J	NA	NA	NA	230	220	NA	NA	NA	NA
	Toluene	ug/L	2.6 J	NA	NA	NA	140	130	NA	NA	NA	NA
	Total BTEX	ug/L	16.8	NA	NA	NA	1105	1075	NA	NA	NA	NA
MW-21	Benzene	ug/L	510	250	460	390	NA	370	NA	NA	NA	NA
	Ethylbenzene	ug/L	1400	860	1500	1400	NA	1200 D	NA	NA	NA	NA
	m&p-Xylenes	ug/L	160	89	160	170	NA	130	NA	NA	NA	NA
	o-Xylene	ug/L	300	180	310	330	NA	260	NA	NA	NA	NA
	Toluene	ug/L	19 J	11 J	18 J	17 J	NA	14	NA	NA	NA	NA
	Total BTEX	ug/L	2389	1390	2448	2307	NA	1974	NA	NA	NA	NA
MW-27	Benzene	ug/L	120	NA	NA	NA	NA	170	NA	NA	NA	NA
	Ethylbenzene	ug/L	110	NA	NA	NA	NA	360 D	NA	NA	NA	NA
	m&p-Xylenes	ug/L	5.5	NA	NA	NA	NA	35	NA	NA	NA	NA
	o-Xylene	ug/L	26	NA	NA	NA	NA	100	NA	NA	NA	NA
	Toluene	ug/L	2.6 J	NA	NA	NA	NA	5.2	NA	NA	NA	NA
	Total BTEX	ug/L	264	NA	NA	NA	NA	670	NA	NA	NA	NA

TABLE 3-2
SHALLOW ZONE INTERIM AQUEOUS BTEX RESULTS SUMMARY
ISCO Pilot Test
Troy (Water Street) Site - Area 2
Troy, New York

				8/16/05 --- Shallow Injections ---9/6/05				9/7/05 --- Deep Injections --- 9/25/05					
	Constituents	Units	Baseline 8/3/2005	Round 1S 8/18/2005	Round 2S 8/25/2005	Round 3S 8/29/2005	Round 4S 9/6/2005	Round 5S 9/8/2005	Round 1D 9/14/2005	Round 2D 9/19/2005	Round 3D 9/23/2005	Round 4D 9/29/2005
MW-39	Benzene	ug/L	250 D	NA	NA	NA	NA	210 D	NA	NA	NA	NA
	Ethylbenzene	ug/L	770 D	NA	NA	NA	NA	1100 D	NA	NA	NA	NA
	m&p-Xylenes	ug/L	50	NA	NA	NA	NA	60	NA	NA	NA	NA
	o-Xylene	ug/L	240 D	NA	NA	NA	NA	310 D	NA	NA	NA	NA
	Toluene	ug/L	8.1	NA	NA	NA	NA	7.5	NA	NA	NA	NA
	Total BTEX	ug/L	1318	NA	NA	NA	NA	1688	NA	NA	NA	NA
IP-1	Benzene	ug/L	100	NA	NA	NA	NA	5 U	NA	NA	NA	NA
	Ethylbenzene	ug/L	680	NA	NA	NA	NA	0.47 J	NA	NA	NA	NA
	m&p-Xylenes	ug/L	25 J	NA	NA	NA	NA	5 U	NA	NA	NA	NA
	o-Xylene	ug/L	200	NA	NA	NA	NA	5 U	NA	NA	NA	NA
	Toluene	ug/L	4.7 J	NA	NA	NA	NA	5 U	NA	NA	NA	NA
	Total BTEX	ug/L	1010	NA	NA	NA	NA	0.47	NA	NA	NA	NA

Notes:
U - indicates that the analyte was not detected above the associated value
J - indicates that the analyte was detected below of the detection limit and the reported value is an estimated value
D - indicates that the reported value reflects using a secondary dilution factor
NA - indicated constituent not analyzed during the monitoring event

TABLE 4
GROUNDWATER ANALYTICAL RESULTS - FEBRUARY/MARCH 2008
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria TOGS 1.1.1 Guidance	Class GA Groundwater Criteria NYS Part 703 Standard	Units	Loc ID / FM ID(1) / Date	MW-5	MW-7	MW-9R	MW-9R-DUP	MW-10R	MW-12	MW-13	MW-14R	MW-15
				FM ID(1)	WT(F)	WT(F/AD)	WT(AD)	WT(AD)	WT(F/AD)	WT(F/AD/LSG)	WT(AD)	WT(F/L/GT)	WT(F/AD/LSG)
				Date	3/4/2008	3/3/2008	2/28/2008	2/28/2008	2/21/2008	2/28/2008	2/29/2008	2/28/2008	2/29/2008
Volitile Organic Compounds													
BTEX													
Benzene	--	1	µg/L		0.5 U	35	0.5 U	0.5 U	63	36	0.5 U	0.5 U	0.5 U
Toluene	--	5	µg/L		0.7 U	4 J	0.7 U	0.7 U	0.7 J	2 J	0.7 U	0.7 U	0.7 U
Ethylbenzene	--	5	µg/L		0.8 U	60	0.8 U	0.8 U	49	56	0.8 U	0.8 U	0.8 U
Xylenes, Total	--	5	µg/L		0.8 U	24	0.8 U	0.8 U	13	9	0.8 U	0.8 U	0.8 U
Total BTEX	--	--	µg/L		ND	123	ND	ND	126	103	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)													
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	10	--	µg/L		1 U	59	1 U	1 U	17	4 J	0.9 U	1 U	0.9 U
Acenaphthylene	--	--	µg/L		1 U	1 U	1 U	1 U	7	0.9 U	0.9 U	1 U	0.9 U
Acenaphthene	20	--	µg/L		1 U	30	1 U	1 U	59	0.9 U	0.9 U	1 U	0.9 U
Fluorene	50	--	µg/L		1 U	9	1 U	1 U	20	0.9 U	0.9 U	1 U	0.9 U
Phenanthrene	50	--	µg/L		1 U	1 U	1 U	1 U	2 J	0.9 U	0.9 U	1 U	0.9 U
Anthracene	50	--	µg/L		1 U	1 J	1 U	1 U	3 J	0.9 U	0.9 U	1 U	0.9 U
Fluoranthene	50	--	µg/L		1 U	1 U	1 U	1 U	4 J	0.9 U	0.9 U	1 U	0.9 U
Pyrene	50	--	µg/L		1 U	1 U	1 U	1 U	3 J	0.9 U	0.9 U	1 U	2 J
Benzo(a)anthracene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Chrysene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Benzo(b)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Benzo(k)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Benzo(a)pyrene	--	0	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Benzo(g,h,i)perylene	--	--	µg/L		1 U	1 U	1 U	1 U	1 U	0.9 U	0.9 U	1 U	0.9 U
Total PAHs	--	--	µg/L		ND	99	ND	ND	115	4	ND	ND	2

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.

Abbreviations for Formation IDs:

WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till

(2) - Results representative of a filtered sample. Filtered and unfiltered sample collected from location due to high tubidity levels.

Boxed concentrations are at or above New York State Class GA Groundwater Standards or Guidance values.

TABLE 4
GROUNDWATER ANALYTICAL RESULTS - FEBRUARY/MARCH 2008
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria TOGS 1.1.1 Guidance	NYS Part 703 Standard	Units	Loc ID / FM ID(1) / Date	MW-16 WT(F/AD) 2/28/2008	MW-23 WT(F) 2/29/2008	MW-25 WT(F/AD) 2/29/2008	MW-26 WT(F/AD) 2/29/2008	MW-31 WT(F/AD) 2/28/2008	MW-32 WT(F/AD) 2/26/2008	MW-33 WT(F/AD) 2/26/2008	MW-35R WT(F/AD) 2/26/2008	MW-36 WT(F) 2/28/2008	MW-37 WT(F/AD) 3/4/2008	MW-124B WT(F) 2/28/2008	PZ-1 WT(F/AD) 3/3/2008
Volitile Organic Compounds																
BTEX																
Benzene	--	1	µg/L		0.5 U	0.5 U	0.5 U	0.5 U	190	2 J	0.5 U	0.5 U	31	2 J	18	0.5 U
Toluene	--	5	µg/L		0.7 U	0.7 U	0.7 U	0.7 U	18	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	5 J	0.7 U
Ethylbenzene	--	5	µg/L		0.8 U	0.8 U	0.8 U	0.8 U	29	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	3 J	0.8 U
Xylenes, Total	--	5	µg/L		0.8 U	0.8 U	0.8 U	0.8 U	21	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	20	0.8 U
Total BTEX	--	--	µg/L		ND	ND	ND	ND	258	2	ND	ND	31	2	46	ND
Semi-Volatile Organic Compounds (SVOCs)																
Polycyclic Aromatic Hydrocarbons (PAHs)																
Naphthalene	10	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Acenaphthylene	--	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	2 J	1 U	1 U	1 U	0.9 U	11	2 J
Acenaphthene	20	--	µg/L		1 U	1 U	1 U	1 J	6	4 J	1 U	1 U	1 J	0.9 U	17	7
Fluorene	50	--	µg/L		1 U	1 U	1 U	1 U	5	4 J	1 U	1 U	1 J	0.9 U	23	4 J
Phenanthrene	50	--	µg/L		1 U	1 U	1 U	1 U	4 J	1 U	1 U	1 U	1 U	0.9 U	1 J	1 U
Anthracene	50	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	2 J	1 U	1 U	1 U	0.9 U	4 J	1 U
Fluoranthene	50	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	4 J	1 U	1 U	1 U	0.9 U	4 J	1 U
Pyrene	50	--	µg/L		1 U	1 U	1 U	1 U	1 J	2 J	1 U	1 U	1 U	0.9 U	2 J	1 U
Benzo(a)anthracene	0.002	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Chrysene	0.002	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Benzo(a)pyrene	--	0	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		1 U	1 U	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	0.9 U	1 U	1 U
Total PAHs	--	--	µg/L		ND	ND	ND	1	16	18	ND	ND	2	ND	62	13

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.
Abbreviations for Formation IDs:
WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till
(2) - Results representative of a filtered sample. Filtered and unfiltered sample collected from location due to high tubidity levels.

Boxed concentrations are at or above New York State Class GA Groundwater Standards or Guidance values.

TABLE 4
GROUNDWATER ANALYTICAL RESULTS - FEBRUARY/MARCH 2008
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria TOGS 1.1.1 Guidance	NYS Part 703 Standard	Units	Loc ID / FM ID(1) / Date	PZ-2 WT(F) 3/3/2008	PZ-4 WT(F/AD) 2/21/2008	PZ-5a WT(F) 3/4/2008	PZ-5b AD 3/4/2008	PZ-5c LSG 3/4/2008	PZ-5c(2) LSG 3/4/2008	PZ-6a WT(F/AD) 2/20/2008	PZ-6b LSG 2/20/2008	PZ-6c LSG 2/20/2008	PZ-6c-DUP LSG 2/20/2008	PZ-7 WT(F/AD) 2/25/2008	PZ-8a WT(AD) 2/26/2008	PZ-8b LSG 2/26/2008
Volitile Organic Compounds																	
BTEX																	
Benzene	--	1	µg/L		0.5 U	0.5 U	220	21	9 J	6 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	--	5	µg/L		0.7 U	0.7 U	12 J	4 J	3 J	2 J	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Ethylbenzene	--	5	µg/L		0.8 U	0.8 U	60	9	21	6 J	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Xylenes, Total	--	5	µg/L		0.8 U	0.8 U	54	5 J	18	11	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Total BTEX	--	--	µg/L		ND	ND	346	39	51	25	ND	ND	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs)																	
Polycyclic Aromatic Hydrocarbons (PAHs)																	
Naphthalene	10	--	µg/L		1 U	1 U	1300	60	750	770	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Acenaphthylene	--	--	µg/L		1 U	1 U	22	9	43	14	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Acenaphthene	20	--	µg/L		1 J	2 J	25	33	48	24	5	8	1 U	1 U	1 U	1 U	1 U
Fluorene	50	--	µg/L		2 J	1 U	37	18	120	27	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Phenanthrene	50	--	µg/L		1 U	1 U	19	14	210	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Anthracene	50	--	µg/L		1 U	1 U	5 J	4 J	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Fluoranthene	50	--	µg/L		1 U	1 U	8	4 J	140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Pyrene	50	--	µg/L		1 U	1 U	6	3 J	110	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)anthracene	0.002	--	µg/L		1 U	1 U	2 J	1 U	59	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chrysene	0.002	--	µg/L		1 U	1 U	1 J	1 U	54	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		1 U	1 U	2 J	1 U	56	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	29	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	--	0	µg/L		1 U	1 U	2 J	1 U	50	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 U	1 U	1 U	1 U	24	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	1 U	1 U	1 U	8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		1 U	1 U	1 U	1 U	24	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total PAHs	--	--	µg/L		3	2	1429	145	1795	835	5	8	ND	ND	ND	ND	ND

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.

Abbreviations for Formation IDs:
WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till

(2) - Results representative of a filtered sample. Filtered and unfiltered sample collected from location due to high tubidity levels.

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

TABLE 4
GROUNDWATER ANALYTICAL RESULTS - FEBRUARY/MARCH 2008
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

	Class GA Groundwater Criteria			Loc ID	PZ-8c	PZ-12a	PZ-12b	PZ-12c	PZ-14	PZ-15a	PZ-15c	PZ-15c(2)	PZ-17a	PZ-17b
Constituent	TOGS 1.1.1	NYS Part 703	Units	FM ID(1)	LSG	WT(F)	AD	LSG	WT(F/AD)	WT(F/AD)	LSG	LSG	AD	LSG
	Guidance	Standard		Date	2/26/2008	3/3/2008	3/3/2008	3/3/2008	3/3/2008	2/27/2008	2/27/2008	2/27/2008	3/3/2008	2/27/2008
Volitile Organic Compounds														
BTEX														
Benzene	--	1	µg/L		0.5 U	**46**	**150**	**4 J**	**7**	0.5 U	**12**	**8**	**25**	**7**
Toluene	--	5	µg/L		0.7 U	1 J	3 J	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	5 J	0.7 U
Ethylbenzene	--	5	µg/L		0.8 U	0.8 J	2 J	0.8 U	0.8 U	0.8 U	1 J	0.8 U	**46**	0.8 U
Xylenes, Total	--	5	µg/L		0.8 U	**7**	**7**	0.8 U	0.8 U	0.8 U	**9**	4 J	**26**	0.8 U
Total BTEX	--	--	µg/L		ND	55	162	4	7	ND	22	12	102	7
Semi-Volatile Organic Compounds (SVOCs)														
Polycyclic Aromatic Hydrocarbons (PAHs)														
Naphthalene	10	--	µg/L		1 U	9	**50**	1 U	4 J	1 U	2 J	2 J	1 U	1 J
Acenaphthylene	--	--	µg/L		1 U	2 J	1 U	4 J	1 U	1 U	2 J	1 U	12	4 J
Acenaphthene	20	--	µg/L		1 U	**23**	13	3 J	1 J	1 U	**75**	**21**	**45**	14
Fluorene	50	--	µg/L		1 U	11	7	14	1 U	1 U	12	2 J	30	4 J
Phenanthrene	50	--	µg/L		1 U	10	4 J	14	1 U	1 U	2 J	1 U	20	11
Anthracene	50	--	µg/L		1 U	2 J	1 J	4 J	1 U	1 U	3 J	1 U	8	4 J
Fluoranthene	50	--	µg/L		1 U	1 J	1 U	3 J	1 U	1 U	3 J	1 U	12	10
Pyrene	50	--	µg/L		1 U	2 J	1 U	2 J	1 U	1 U	5 J	1 U	12	9
Benzo(a)anthracene	0.002	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	**4 J**	**5**
Chrysene	0.002	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	**3 J**	**5**
Benzo(b)fluoranthene	0.002	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	**3 J**	**4 J**
Benzo(k)fluoranthene	0.002	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	**1 J**	**2 J**
Benzo(a)pyrene	--	0	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	**3 J**	**4 J**
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	**1 J**	**1 J**
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		1 U	0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	2 J	2 J
Total PAHs	--	--	µg/L		ND	60	75	44	5	ND	104	25	156	80

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.
Abbreviations for Formation IDs:
WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till
(2) - Results representative of a filtered sample. Filtered and unfiltered sample collected from location due to high tubidity levels.

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

TABLE 5
GROUNDWATER ANALYTICAL RESULTS COMPARISON - FEBRUARY/MARCH 2008 DATA AND MAY 2008 DATA
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria		Units	Loc ID	MW-37		PZ-5a		PZ-5b		PZ-5c	
	TOGS 1.1.1	NYS Part 703		FM ID(1)	WT(F/AD)		WT(F)		AD		LSG	
	Guidance	Standard		Date	3/4/2008	5/13/2008	3/4/2008	5/12/2008	3/4/2008	5/12/2008	3/4/2008	5/13/2008
Volitile Organic Compounds												
BTEX												
Benzene	--	1	µg/L		2 J	13	220	170	21	20	9 J	3 J
Toluene	--	5	µg/L		0.7 U	3 J	12 J	12	4 J	2 J	3 J	1 J
Ethylbenzene	--	5	µg/L		0.8 U	2 J	60	9 J	9	4 J	21	10
Xylenes, Total	--	5	µg/L		0.8 U	4 J	54	24	5 J	2 J	18	9
Total BTEX	--	--	µg/L		2	22	346	215	39	28	51	23
Semi-Volatile Organic Compounds (SVOCs)												
Polycyclic Aromatic Hydrocarbons (PAHs)												
Naphthalene	10	--	µg/L		0.9 U	1 U	1300	660	60	10	750	460
Acenaphthylene	--	--	µg/L		0.9 U	2 J	22	6	9	6	43	16
Acenaphthene	20	--	µg/L		0.9 U	8	25	8	33	36	48	34
Fluorene	50	--	µg/L		0.9 U	16	37	11	18	18	120	73
Phenanthrene	50	--	µg/L		0.9 U	3 J	19	5 J	14	11	210	89
Anthracene	50	--	µg/L		0.9 U	1 J	5 J	1 J	4 J	3 J	70	11
Fluoranthene	50	--	µg/L		0.9 U	2 J	8	1 J	4 J	4 J	140	12
Pyrene	50	--	µg/L		0.9 U	1 U	6	1 U	3 J	3 J	110	8
Benzo(a)anthracene	0.002	--	µg/L		0.9 U	1 U	2 J	1 U	1 U	1 U	59	1 J
Chrysene	0.002	--	µg/L		0.9 U	1 U	1 J	1 U	1 U	1 U	54	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		0.9 U	1 U	2 J	1 U	1 U	1 U	56	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	29	1 U
Benzo(a)pyrene	--	0	µg/L		0.9 U	1 U	2 J	1 U	1 U	1 U	50	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	24	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	8	1 U
Benzo(g,h,i)perylene	--	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	24	1 U
Total PAHs	--	--	µg/L		ND	32	1429	692	145	91	1795	704

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.
Abbreviations for Formation IDs:
WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

TABLE 5
GROUNDWATER ANALYTICAL RESULTS COMPARISON - FEBRUARY/MARCH 2008 DATA AND MAY 2008 DATA
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria TOGS 1.1.1 Guidance	NYS Part 703 Standard	Units	Loc ID / FM ID(1) / Date	PZ-15a WT(F/AD) 2/27/2008		PZ-15a WT(F/AD) 5/12/2008		PZ-15a - DUP WT(F/AD) 5/12/2008		PZ-15c LSG 2/27/2008		PZ-15c LSG 5/12/2008	
Volitile Organic Compounds														
BTEX														
Benzene	--	1	µg/L		0.5	U	0.5	U	0.5	U	12		5	
Toluene	--	5	µg/L		0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
Ethylbenzene	--	5	µg/L		0.8	U	0.8	U	0.8	U	1	J	0.8	U
Xylenes, Total	--	5	µg/L		0.8	U	0.8	U	0.8	U	9		10	
Total BTEX	--	--	µg/L		ND		ND		ND		22		15	
Semi-Volatile Organic Compounds (SVOCs)														
Polycyclic Aromatic Hydrocarbons (PAHs)														
Naphthalene	10	--	µg/L		1	U	1	U	1	U	2	J	3	J
Acenaphthylene	--	--	µg/L		1	U	1	U	1	U	2	J	2	J
Acenaphthene	20	--	µg/L		1	U	1	U	1	U	75		81	
Fluorene	50	--	µg/L		1	U	1	U	1	U	12		5	
Phenanthrene	50	--	µg/L		1	U	1	U	1	U	2	J	1	U
Anthracene	50	--	µg/L		1	U	1	U	1	U	3	J	1	U
Fluoranthene	50	--	µg/L		1	U	1	U	1	U	3	J	1	J
Pyrene	50	--	µg/L		1	U	1	U	1	U	5	J	1	J
Benzo(a)anthracene	0.002	--	µg/L		1	U	1	U	1	U	1	U	1	U
Chrysene	0.002	--	µg/L		1	U	1	U	1	U	1	U	1	U
Benzo(b)fluoranthene	0.002	--	µg/L		1	U	1	U	1	U	1	U	1	U
Benzo(k)fluoranthene	0.002	--	µg/L		1	U	1	U	1	U	1	U	1	U
Benzo(a)pyrene	--	0	µg/L		1	U	1	U	1	U	1	U	1	U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1	U	1	U	1	U	1	U	1	U
Dibenzo(a,h)anthracene	--	--	µg/L		1	U	1	U	1	U	1	U	1	U
Benzo(g,h,i)perylene	--	--	µg/L		1	U	1	U	1	U	1	U	1	U
Total PAHs	--	--	µg/L		ND		ND		ND		104		93	

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.

<u>Abbreviations for Formation IDs:</u>
WT - Water Table   LSG - Lower Sand & Gravel Unit
F - Fill   L - Lacustrine
AD - Alluvial Deposits   GT - Glacial Till

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

TABLE 6
GROUNDWATER ANALYTICAL RESULTS COMPARISON - 2008 GROUNDWATER DATA
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria TOGS 1.1.1 Guidance	Class GA Groundwater Criteria NYS Part 703 Standard	Units	Loc ID / FM ID[1] / Date	MW-37 WT(F/AD) 3/4/2008	MW-37 WT(F/AD) 5/13/2008	MW-37 WT(F/AD) 9/11/2008	PZ-5a WT(F) 3/4/2008	PZ-5a WT(F) 5/12/2008	PZ-5a WT(F) 9/11/2008	PZ-5b AD 3/4/2008	PZ-5b AD 5/12/2008	PZ-5b AD 9/11/2008
Volitile Organic Compounds													
BTEX													
Benzene	--	1	µg/L		2 J	13	41	220	170	170	21	20	12
Toluene	--	5	µg/L		0.7 U	3 J	4 J	12 J	12	12 J	4 J	2 J	1 J
Ethylbenzene	--	5	µg/L		0.8 U	2 J	3 J	60	9 J	74	9	4 J	2 J
Xylenes, Total	--	5	µg/L		0.8 U	4 J	8	54	24	48	5 J	2 J	0.8 U
Total BTEX	--	--	µg/L		2	22	56	346	215	304	39	28	15
Semi-Volatile Organic Compounds (SVOCs)													
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	10	--	µg/L		0.9 U	1 U	73	1300	660	1700	60	10	6
Acenaphthylene	--	--	µg/L		0.9 U	2 J	10	22	6	30	9	6	6
Acenaphthene	20	--	µg/L		0.9 U	8	24	25	8	37	33	36	53
Fluorene	50	--	µg/L		0.9 U	16	39	37	11	54	18	18	23
Phenanthrene	50	--	µg/L		0.9 U	3 J	8	19	5 J	40	14	11	31
Anthracene	50	--	µg/L		0.9 U	1 J	3 J	5 J	1 J	6	4 J	3 J	6
Fluoranthene	50	--	µg/L		0.9 U	2 J	4 J	8	1 J	7	4 J	4 J	5
Pyrene	50	--	µg/L		0.9 U	1 U	3 J	6	1 U	5 J	3 J	3 J	5 J
Benzo(a)anthracene	0.002	--	µg/L		0.9 U	1 U	1 J	2 J	1 U	1 U	1 U	1 U	1 U
Chrysene	0.002	--	µg/L		0.9 U	1 U	1 J	1 J	1 U	1 U	1 U	1 U	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		0.9 U	1 U	1 J	2 J	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	--	0	µg/L		0.9 U	1 U	1 J	2 J	1 U	1 U	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		0.9 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total PAHs	--	--	µg/L		ND	32	168	1429	692	1879	145	91	135

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.

Abbreviations for Formation IDs:

WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

BROWN AND CALDWELL

TABLE 6
GROUNDWATER ANALYTICAL RESULTS COMPARISON - 2008 GROUNDWATER DATA
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

	Class GA Groundwater Criteria			Loc ID	PZ-5c			PZ-12a		PZ-12b		PZ-12c	
Constituent	TOGS 1.1.1	NYS Part 703	Units	FM ID(1)	LSG			WT(F)		AD		LSG	
	Guidance	Standard		Date	3/4/2008	5/13/2008	9/11/2008	3/3/2008	9/10/2008	3/3/2008	9/11/2008	3/3/2008	9/10/2008
Volitile Organic Compounds													
BTEX													
Benzene	--	1	µg/L		9 J	3 J	1 J	46	49	150	150	4 J	2 J
Toluene	--	5	µg/L		3 J	1 J	0.7 U	1 J	0.9 J	3 J	3 J	0.7 U	0.7 U
Ethylbenzene	--	5	µg/L		21	10	4 J	0.8 J	0.8 U	2 J	2 J	0.8 U	0.8 U
Xylenes, Total	--	5	µg/L		18	9	2 J	7	7	7	6	0.8 U	0.8 U
Total BTEX	--	--	µg/L		51	23	7	54.8	56.9	162	161	4	2
Semi-Volatile Organic Compounds (SVOCs)													
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	10	--	µg/L		750	460	1 U	9	13	50	1 J	1 U	1 J
Acenaphthylene	--	--	µg/L		43	16	6	2 J	2 J	1 U	1 U	4 J	2 J
Acenaphthene	20	--	µg/L		48	34	17	23	23	13	12	3 J	2 J
Fluorene	50	--	µg/L		120	73	27	11	10	7	7	14	9
Phenanthrene	50	--	µg/L		210	89	5	10	8	4 J	1 J	14	13
Anthracene	50	--	µg/L		70	11	6	2 J	1 J	1 J	1 U	4 J	3 J
Fluoranthene	50	--	µg/L		140	12	15	1 J	1 U	1 U	1 U	3 J	3 J
Pyrene	50	--	µg/L		110	8	11	2 J	1 U	1 U	1 U	2 J	2 J
Benzo(a)anthracene	0.002	--	µg/L		59	1 J	3 J	0.9 U	1 U	1 U	1 U	1 U	1 U
Chrysene	0.002	--	µg/L		54	1 U	2 J	0.9 U	1 U	1 U	1 U	1 U	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		56	1 U	2 J	0.9 U	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		29	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	--	0	µg/L		50	1 U	2 J	0.9 U	1 U	1 U	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		24	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		8	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		24	1 U	1 U	0.9 U	1 U	1 U	1 U	1 U	1 U
Total PAHs	--	--	µg/L		1795	704	96	60	57	75	21	44	35

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.

Abbreviations for Formation IDs:

WT - Water Table — LSG - Lower Sand & Gravel Unit
F - Fill — L - Lacustrine
AD - Alluvial Deposits — GT - Glacial Till

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

BROWN AND CALDWELL

P:\National_Grid\Nimo_Troy\132071(SI&IRMs)\SuppInv\GW_Quality\Dec08_deliverable\Tables\Table-6_GW_Results(Sept08_May08_Feb08_comparison).xls\Tab_X
12/16/2008

TABLE 6
GROUNDWATER ANALYTICAL RESULTS COMPARISON - 2008 GROUNDWATER DATA
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria		Units	Loc ID	PZ-15a					PZ-15c		
	TOGS 1.1.1	NYS Part 703		FM ID(1)	WT(F/AD)					LSG		
	Guidance	Standard		Date	2/27/2008	5/12/2008	5/12/2008 (DUP)	9/10/2008	9/10/2008 (DUP)	2/27/2008	5/12/2008	9/10/2008
Volitile Organic Compounds												
BTEX												
Benzene	--	1	µg/L		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	12	5	16
Toluene	--	5	µg/L		0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Ethylbenzene	--	5	µg/L		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1 J	0.8 U	0.8 U
Xylenes, Total	--	5	µg/L		0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	9	10	12
Total BTEX	--	--	µg/L		ND	ND	ND	ND	ND	22	15	28
Semi-Volatile Organic Compounds (SVOCs)												
Polycyclic Aromatic Hydrocarbons (PAHs)												
Naphthalene	10	--	µg/L		1 U	1 U	1 U	1 U	1 U	2 J	3 J	6
Acenaphthylene	--	--	µg/L		1 U	1 U	1 U	1 U	1 U	2 J	2 J	2 J
Acenaphthene	20	--	µg/L		1 U	1 U	1 U	1 U	1 U	75	81	110
Fluorene	50	--	µg/L		1 U	1 U	1 U	1 U	1 U	12	5	19
Phenanthrene	50	--	µg/L		1 U	1 U	1 U	1 U	1 U	2 J	1 U	1 U
Anthracene	50	--	µg/L		1 U	1 U	1 U	1 U	1 U	3 J	1 U	1 J
Fluoranthene	50	--	µg/L		1 U	1 U	1 U	1 U	1 U	3 J	1 J	1 U
Pyrene	50	--	µg/L		1 U	1 U	1 U	1 U	1 U	5 J	1 J	1 J
Benzo(a)anthracene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chrysene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	--	0	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total PAHs	--	--	µg/L		ND	ND	ND	ND	ND	104	93	139

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.
Abbreviations for Formation IDs:
WT - Water Table LSG - Lower Sand & Gravel Unit
F - Fill L - Lacustrine
AD - Alluvial Deposits GT - Glacial Till

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

BROWN AND CALDWELL

TABLE 6
GROUNDWATER ANALYTICAL RESULTS COMPARISON - 2008 GROUNDWATER DATA
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

Constituent	Class GA Groundwater Criteria TOGS 1.1.1 Guidance	NYS Part 703 Standard	Units	Loc ID / FM ID(1) / Date	PZ-17a AD 3/3/2008	PZ-17a AD 9/10/2008	PZ-17b LSG 2/27/2008	PZ-17b LSG 9/9/2008
Volitile Organic Compounds								
BTEX								
Benzene	--	1	µg/L		25	24	7	1 J
Toluene	--	5	µg/L		5 J	3 J	0.7 U	0.7 U
Ethylbenzene	--	5	µg/L		46	21	0.8 U	0.8 U
Xylenes, Total	--	5	µg/L		26	17	0.8 U	0.8 U
Total BTEX	--	--	µg/L		102	65	7	1
Semi-Volatile Organic Compounds (SVOCs)								
Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	10	--	µg/L		1 U	8	1 J	1 U
Acenaphthylene	--	--	µg/L		12	21	4 J	1 J
Acenaphthene	20	--	µg/L		45	65	14	10
Fluorene	50	--	µg/L		30	49	4 J	2 J
Phenanthrene	50	--	µg/L		20	37	11	5
Anthracene	50	--	µg/L		8	21	4 J	1 J
Fluoranthene	50	--	µg/L		12	29	10	3 J
Pyrene	50	--	µg/L		12	30	9	2 J
Benzo(a)anthracene	0.002	--	µg/L		4 J	11	5	1 U
Chrysene	0.002	--	µg/L		3 J	9	5	1 U
Benzo(b)fluoranthene	0.002	--	µg/L		3 J	6	4 J	1 U
Benzo(k)fluoranthene	0.002	--	µg/L		1 J	3 J	2 J	1 U
Benzo(a)pyrene	--	0	µg/L		3 J	7	4 J	1 U
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 J	2 J	1 J	1 U
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	--	--	µg/L		2 J	3 J	2 J	1 U
Total PAHs	--	--	µg/L		156	301	80	24

Notes:
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
ND - Not detected.
(1) - Saturated formation adjacent to screen.

Abbreviations for Formation IDs:

WT - Water Table	LSG - Lower Sand & Gravel Unit
F - Fill	L - Lacustrine
AD - Alluvial Deposits	GT - Glacial Till

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

TABLE 2
GROUNDWATER ANALYTICAL RESULTS - JANUARY 2010 SAMPLING
TROY (WATER ST.) SITE - AREA 2
TROY, NEW YORK

	Class GA Groundwater Criteria			Loc ID	PZ-2		PZ-2 - DUP	PZ-3
Constituent	TOGS 1.1.1	NYS Part 703	Units	FM ID[(1)]	WT(F)	WT(F)	WT(F)	WT(F)
	Guidance	Standard		Date	3/3/2008	1/20/2010	1/20/2010	1/20/2010
Volitile Organic Compounds (VOCs)								
BTEX								
Benzene	--	1	µg/L		0.5 U	0.5 U	0.5 U	0.5 U
Toluene	--	5	µg/L		0.7 U	$\boxed{\mathbf{9}}$	$\boxed{\mathbf{9}}$	$\boxed{\mathbf{9\ J}}$
Ethylbenzene	--	5	µg/L		0.8 U	0.8 U	0.8 U	0.8 U
Xylenes, Total	--	5	µg/L		0.8 U	0.8 U	0.8 U	0.8 U
Total BTEX	--	--	µg/L		ND	9	9	9
Semi-Volatile Organic Compounds (SVOCs)								
Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	10	--	µg/L		1 U	NA	NA	NA
Acenaphthylene	--	--	µg/L		1 U	NA	NA	NA
Acenaphthene	20	--	µg/L		1 J	NA	NA	NA
Fluorene	50	--	µg/L		2 J	NA	NA	NA
Phenanthrene	50	--	µg/L		1 U	NA	NA	NA
Anthracene	50	--	µg/L		1 U	NA	NA	NA
Fluoranthene	50	--	µg/L		1 U	NA	NA	NA
Pyrene	50	--	µg/L		1 U	NA	NA	NA
Benzo(a)anthracene	0.002	--	µg/L		1 U	NA	NA	NA
Chrysene	0.002	--	µg/L		1 U	NA	NA	NA
Benzo(b)fluoranthene	0.002	--	µg/L		1 U	NA	NA	NA
Benzo(k)fluoranthene	0.002	--	µg/L		1 U	NA	NA	NA
Benzo(a)pyrene	--	ND	µg/L		1 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.002	--	µg/L		1 U	NA	NA	NA
Dibenzo(a,h)anthracene	--	--	µg/L		1 U	NA	NA	NA
Benzo(g,h,i)perylene	--	--	µg/L		1 U	NA	NA	NA
Total PAHs	--	--	µg/L		3			

Notes:
J - The analyte was positively identified ; the associated numerical value is the approximate concentration of the analyte in the sample.
U - The analyte was analyzed for, but was not detected. Value shown is representative of the method detection limit.
-- Groundwater Standard or Guidance Value not established.
NA - Not analyzed.
ND - Not detected.
(1) - Saturated formation adjacent to screen.
Abbreviations for Formation IDs:
WT - Water Table F - Fill

Boxed concentrations are above New York State Class GA Groundwater Standards or Guidance values.

Brown AND Caldwell

APPENDIX I

Mass Flux Calculations

Evaluation of Mass Flux to Hudson River

Objective:
Estimate constituent mass flux from groundwater under Area 2 to adjacent Hudson River.

Benzene and Naphthalene are selected for the evaluation because:
1. They are present at relatively high concentrations.
2. They have relatively low groundwater quality and surface water quality criteria.
3. They are generally associeated associated with MGPs.

Methods:
1. Groundwater flow estimated using calibrated GW flow model.

2. Constituent concentrations based on Feb/March 2008 data. Re-sample data (May 2008, Sept. 2008) on some key wells (PZ-5a, PZ-5c) are lower in concentration than Feb/March 2008 data. Naphthalene and Benzene concentrations at PZ-5c have decreased from 750 ug/L and 9 ug/L in 3/08 to <1 ug/L and 1 ug/L in 9/08 respectively.

3. Hudson River flow based on USGS Records. (see attached USGS flow records)
a. 2875 ft^3/s = lowest monthly mean discharge on record for gauging station upstream of Troy dam. (Sept. 1964) At site, river is tidal, so flow includes water from above dam, any contributions between dam and site, and the tidal estuary component of flow.

Estimates are considered conservative due to:
1. Overburden disregarded that PZ-4 is ND, and used relatively high values for MW-10R.
2. Assumed no attenuation between PZ-5c and river in LSG.
3. Assumed historically low flow condition in river.
4. Used Feb/Mar 2008 data. (See above)

Summary of Results:
<u>Naphthalene</u>
Estimated instream concentration due to groundwater discharge from site = 0.000336 ug/L
- (4 to 5 orders of magnitude below surface water quality criteria of 10 ug/L)

To cause instream concentration in river to equal the surface water quality criteria for naphthalene (10 ug/L), the flow in the river would have to decrease to less than 0.1 ft^3/s (0.0035% of 2875 ft^3/s)

<u>Benzene</u>
Estimated instream concentration due to groundwater discharge from site = 6.97×10^{-5} ug/L
- (4 orders of magnitude below surface water quality criteria of 1 ug/L)

To cause instream concentration in river to equal the surface water quality criteria for benzene (1 ug/L), the flow in the river would have to decrease to 0.2 ft^3/s (0.007% of 2875 ft^3/s)

- There is additional constituent flux to Hudson River via groundwater discharge to Wynantskill Creek, however, the creek discharge to river does not contribute significant additional mass or cause exceedance of surface water criteria.

Conclusions:
1. Discharge of groundwater to Hudson River is not expected to cause exceedance of surface water quality criteria.

Naphthalene Mass Flux to Hudson River

Equations:

$C_{gw} = (C1*C2)^{1/2}$ (Geometric Mean)

$mf = C_{gw} \times Q$

$C_r = mf / Q_r$

$Q_{r\_min} = mf / C_c$

Mass Flux: Naphthalene

Where:

mf = mass flux, ug/s

Q= Groundwater discharge, $ft^3/d \times 0.3277 = cm^3/s$. From groundwater flow model

C_{gw} = Constituent concentration in groundwater $(ug/l)/1000 = ug/cm^3$

Q_r= River discharge, $ft^3/s \times 28.32 = l/s$

C_r= Constituent concentration in river, ug/l

C1= Constituent concentration in groundwater, contour interval one, ug/l

C2= Constituent concentration in groundwater, contour interval two, ug/l

Q_{r_min}= minimum threshold river flow required to result in exceedence of surface water quality standard, ft^3/s

C_c = Surface water quality criteria, ug/l = 10 ug/L

	Contour Interval (ug/l)		Q ft^3/d	Q cm^3/s	Geometric Mean C_{gw} for Contour Interval ug/l	Geometric Mean C_{gw} for Contour Interval ug/cm^3	mf ug/s
Fill/AD North	1	10	36.1	11.8	3.162	0.003	0.037
	10	100	0.0	0.0	31.623	0.032	0.000
	100	1000	0.0	0.0	316.228	0.316	0.000
Fill/AD South	1	10	79.1	25.9	3.162	0.003	0.082
	10	100	0.0	0.0	31.623	0.032	0.000
	100	1000	0.0	0.0	316.228	0.316	0.000
Total mf Fill/AD							0.119
LSG	1	10	63.6	20.8	3.162	0.003	0.066
	10	100	29.7	9.7	31.623	0.032	0.308
	100	1000	28.6	9.4	316.228	0.316	2.968
	1000	1000	54.6	17.9	1000.000	1.000	17.901
	100	1000	51.2	16.8	316.228	0.316	5.310
	10	100	57.8	18.9	31.623	0.032	0.599
	1	10	62.3	20.4	3.162	0.003	0.065
Total mf LSG							27.216
Total mf							27.335

Q_r ft^3/s	Q_r l/s	Total mf ug/s	C_r ug/l
2875	81420	27.335	$\boxed{0.000336}$

Q_r = lowest monthly mean discharge on record = 2875 ft^3/s (See attached USGS flow records)

Surface Water Quality Criteria, C_c = 10 ug/L

Q_{r_min} = 27.335 (ug/s) / 10 (ug/L) = 2.7 L/s ≈ 0.1 ft^3/s

To exceed surface water standard, river flow would need to decrease to 0.1 ft^3/s which is 0.003% of 2875 ft^3/s.

Benzene Mass Flux to Hudson River

Equations:

$C_{gw} = (C1*C2)^{1/2}$ (Geometric Mean)

$mf = C_{gw} \times Q$

$C_r = mf / Q_r$

$Q_{r\_min} = mf / C_c$

Mass Flux: Benzene

Where:

mf = mass flux, ug/s

Q= Groundwater discharge, $ft^3/d \times 0.3277 = cm^3/s$. From groundwater flow model

C_{gw} = Constituent concentration in groundwater (ug/l)/1000=ug/cm^3

Q_r= River discharge, $ft^3/s \times 28.32$ =l/s

C_r= Constituent concentration in river, ug/l

C1= Constituent concentration in groundwater, contour interval one, ug/l

C2= Constituent concentration in groundwater, contour interval two, ug/l

Q_{r_min}= minimum threshold river flow required to result in exceedence of surface water quality standard, ft^3/s

C_c = Surface water quality criteria, ug/l = 1 ug/L

	Contour Interval (ug/l)		Q ft^3/d	Q cm^3/s	Geometric Mean C_{gw} for Contour Interval ug/l	Geometric Mean C_{gw} for Contour Interval ug/cm^3	mf ug/s
Fill/AD	1	10	18.086	5.926782	3.162	0.003	0.019
North	10	100	18.083	5.925799	31.623	0.032	0.187
	100	100	36.149	11.84603	100.000	0.100	1.185
	10	100	27.496	9.010439	31.623	0.032	0.285
	1	10	42.937	14.07045	3.162	0.003	0.044
Fill/AD	1	10	16.916	5.543373	3.162	0.003	0.018
South	10	100	152.24	49.88905	31.623	0.032	1.578
	100	100	50.75	16.63078	100.000	0.100	1.663
	10	100	16.916	5.543373	31.623	0.032	0.175
	1	10	16.916	5.543373	3.162	0.003	0.018
Total mf Fill/AD							5.171
LSG	1	10	66.237	21.70586	3.162	0.003	0.069
	10	10	115.76	37.93455	10.000	0.010	0.379
	1	10	52.547	17.21965	3.162	0.003	0.054
	1	10	0	0	3.162	0.003	0.000
	1	10	0	0	3.162	0.003	0.000
Total mf LSG							0.502
Total mf							5.674

Total Flow	253.74
#cells	15
Flow/cell	16.916

Qr ft^3/s	Qr l/s	Total mf ug/s	C_r ug/l
2875	81420	5.674	6.97E-05

Q_r = lowest monthly mean discharge on record = 2875 ft^3/s (See attached USGS flow records)

Surface Water Quality Criteria, C_c = 1 ug/L

Q_{r_min} = 5.674 (ug/s) / 1 (ug/L) = 5.7 L/s ≈ 0.2 ft^3/s

To exceed surface water standard, river flow would need to decrease to 0.2 ft^3/s which is 0.007% of 2875 ft^3/s.

National Water Information System: Web Interface

USGS Surface-Water Monthly Statistics for the Nation

The statistics generated from this site are based on approved daily-mean data and may not match those published by the USGS in official publications. The user is responsible for assessment and use of statistics from this site. For more details on why the statistics may not match, click here.

USGS 01358000 HUDSON RIVER AT GREEN ISLAND NY

Available data for this site Time-series: Monthly statistics GO

Albany County, New York Hydrologic Unit Code 02020003 Latitude 42°45'08", Longitude 73°41'22" NAD27 Drainage area 8,090 square miles Gage datum -0.31 feet above sea level NGVD29	**Output formats** HTML table of all data Tab-separated data Reselect output format

00060, Discharge, cubic feet per second,
Monthly mean in cfs (Calculation Period: 1946-03-01 -> 2007-09-30)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1946			32,270	10,640	18,280	15,820	6,334	5,684	4,882	7,495	7,747	9,014
1947	15,140	15,800	21,090	34,440	35,720	26,650	12,530	7,473	5,147	4,779	7,302	7,757
1948	5,902	10,650	36,280	25,940	19,710	12,310	7,171	5,957	3,891	4,307	8,764	13,990
1949	33,970	21,970	19,020	17,340	10,050	4,686	3,673	3,958	5,220	5,756	8,618	14,830
1950	23,360	13,630	22,150	30,220	14,300	8,106	5,028	5,216	9,615	5,635	11,320	19,930
1951	16,390	23,920	23,230	40,460	11,230	7,541	13,520	8,577	8,221	10,140	20,580	20,280
1952	24,900	17,830	20,930	41,420	21,950	14,390	7,114	5,317	5,122	4,531	4,878	14,960
1953	15,410	18,350	30,290	28,540	33,040	6,147	4,130	4,996	4,346	4,708	5,122	12,390
1954	9,629	21,760	18,520	31,730	25,690	14,330	4,972	4,350	6,411	5,013	14,530	16,880
1955	11,410	11,950	27,090	38,110	9,716	8,343	4,529	6,458	4,948	19,980	21,310	11,850
1956	9,977	8,409	18,640	43,510	23,540	13,150	6,286	4,769	8,002	7,068	8,430	14,990
1957	12,320	11,370	15,570	15,730	10,050	5,361	6,249	4,923	3,994	4,697	6,847	18,580
1958	13,610	10,350	18,670	37,870	15,780	9,327	5,632	5,324	6,529	9,676	12,060	9,497
1959	13,390	12,240	19,260	35,850	11,950	6,266	4,245	3,802	3,996	9,806	22,880	26,550
1960	16,690	18,610	12,660	51,670	14,330	10,610	6,541	5,877	10,990	6,716	7,601	6,951
1961	4,187	13,040	19,530	23,200	17,420	13,130	7,560	6,189	5,721	4,541	6,706	8,090
1962	10,280	7,368	17,250	34,790	14,760	4,809	3,395	4,733	3,829	6,468	9,295	9,815
1963	6,852	6,259	18,780	31,350	14,820	6,078	3,921	4,601	3,724	3,630	5,502	7,270
1964	9,603	7,328	26,950	25,750	9,431	3,819	3,131	3,298	2,875	2,967	3,270	6,096
1965	5,314	9,108	9,123	19,280	8,309	3,573	3,082	2,912	4,009	7,298	10,680	10,650
1966	8,130	11,630	23,090	15,630	18,410	8,270	3,674	4,233	5,630	5,847	7,042	9,118
1967	9,616	7,633	11,360	30,940	17,060	6,197	5,075	5,749	4,934	6,973	11,740	16,510
1968	8,867	9,513	24,860	18,300	18,490	15,710	9,795	4,440	4,463	5,173	14,400	15,600
1969	11,680	12,760	17,470	40,730	20,910	9,995	5,430	6,102	4,133	4,856	14,270	11,800
1970	8,206	15,340	15,060	39,350	14,550	6,404	5,997	3,923	6,165	8,186	9,333	11,390

1971	9,002	12,110	20,220	37,270	35,240	7,334	6,233	8,929	9,315	7,811	7,291	17,000
1972	13,410	10,930	26,860	37,960	40,520	29,630	18,380	7,616	6,309	7,291	26,150	27,010
1973	26,210	20,460	29,410	30,960	27,600	13,050	10,390	5,591	4,791	5,650	8,280	26,420
1974	22,010	18,640	20,730	30,170	22,960	8,791	11,780	6,359	10,390	9,049	17,180	19,380
1975	19,070	19,370	23,680	25,580	20,000	12,970	7,464	8,966	17,030	23,400	22,500	18,780
1976	14,740	31,260	31,690	36,760	31,800	15,220	15,280	14,630	9,573	23,230	17,930	14,080
1977	7,956	8,032	43,540	40,560	16,020	7,325	5,735	5,439	14,410	30,140	23,440	26,480
1978	26,310	14,120	21,870	33,560	18,730	9,954	4,643	5,976	6,195	8,608	8,020	10,700
1979	20,160	11,850	44,240	38,120	19,570	8,318	4,644	5,248	7,800	11,080	16,420	15,190
1980	9,044	4,527	22,380	26,430	9,676	6,796	5,080	4,596	4,170	5,586	8,542	9,632
1981	5,239	30,060	12,340	13,580	11,580	5,973	4,943	4,717	8,224	16,120	13,950	11,350
1982	11,330	12,750	21,890	38,300	12,510	15,240	6,421	4,396	4,310	4,394	6,926	8,244
1983	9,159	12,440	20,500	37,540	36,620	12,640	4,480	5,477	4,685	5,432	11,970	28,220
1984	10,880	26,190	16,430	33,180	29,810	14,750	10,200	6,226	6,695	6,393	9,779	15,810
1985	15,530	11,260	20,520	16,110	8,206	5,530	4,696	3,657	6,033	7,180	14,800	11,650
1986	10,860	12,650	35,710	24,110	12,070	14,260	8,036	10,830	7,686	11,890	19,230	18,510
1987	9,274	7,104	21,380	34,720	5,505	6,170	5,728	4,178	12,040	17,860	16,050	15,720
1988	9,470	12,340	16,270	16,820	12,650	4,233	4,629	4,910	5,656	7,437	19,970	11,630
1989	6,870	9,030	12,060	23,890	27,060	18,490	7,985	6,853	8,831	14,470	21,390	10,600
1990	13,530	24,850	35,110	31,590	34,980	8,839	5,553	8,746	5,604	16,990	23,100	24,330
1991	18,130	17,560	24,620	23,200	12,270	5,154	4,027	4,448	4,908	7,629	10,660	12,850
1992	10,730	8,340	14,430	22,910	17,720	12,180	8,968	7,181	7,680	10,140	18,780	15,490
1993	19,110	9,746	16,010	61,820	13,250	7,157	4,706	4,935	5,573	6,787	12,110	14,230
1994	8,194	11,920	19,850	50,060	20,130	8,223	8,777	9,361	6,720	6,268	8,853	14,010
1995	17,320	9,279	18,170	9,073	5,577	4,590	3,339	3,426	3,587	12,750	24,500	11,580
1996	26,010	17,810	16,270	33,190	38,200	12,470	13,570	6,766	6,553	10,170	21,650	34,940

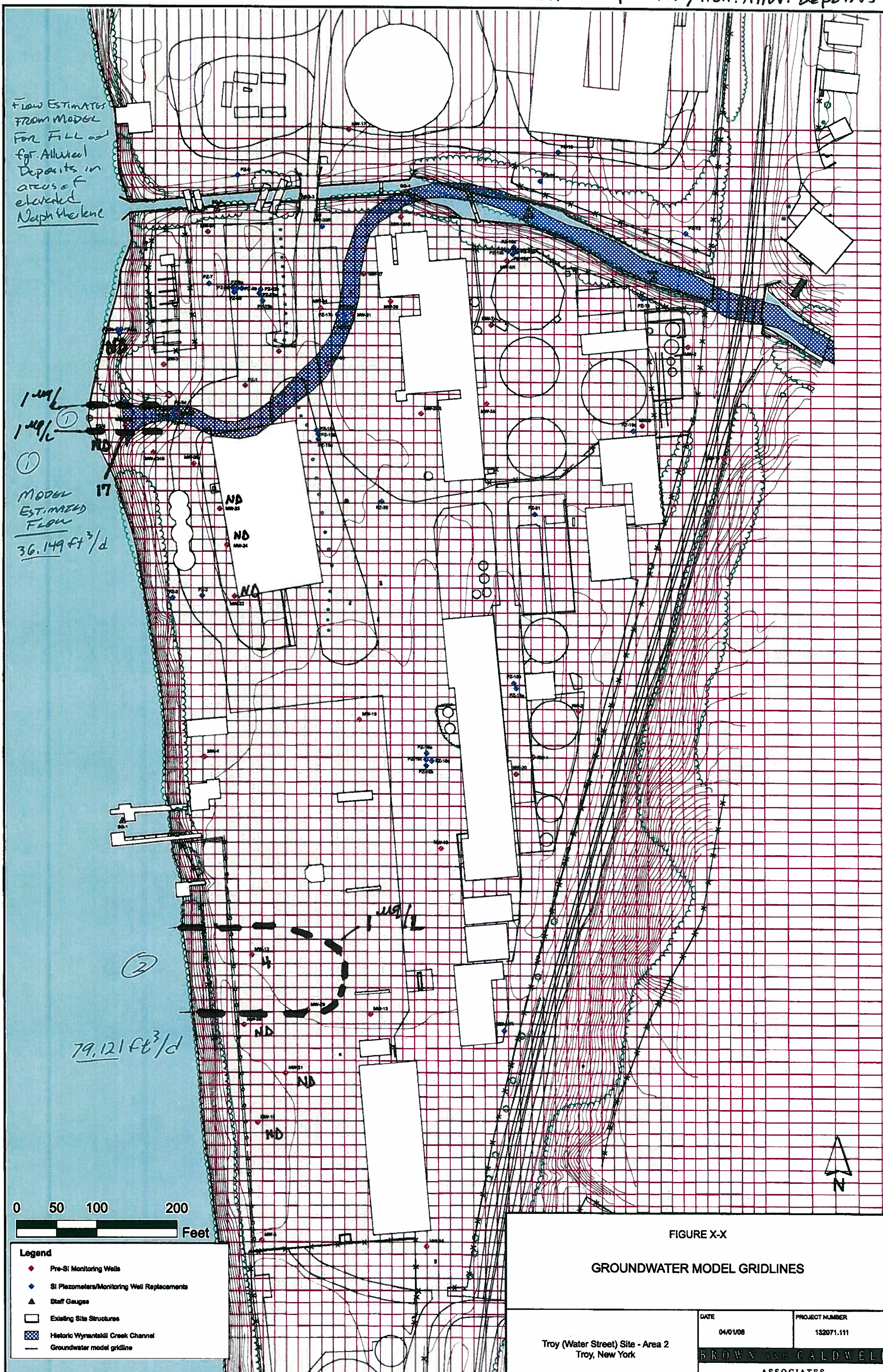
1997	16,430	18,230	24,120	30,840	22,720	6,350	5,397	4,458	4,477			
2000										9,303	10,890	17,450
2001	10,290	12,210	14,560	49,470	12,060	16,150	6,913	3,700	4,120	4,057	5,802	7,736
2002	5,971	14,960	19,270	24,370	22,990	17,050	5,360	3,979	4,890	8,774	18,540	14,330
2003	11,720	9,864	30,960	28,430	21,350	14,490	6,535	11,630	8,890	18,810	25,980	29,910
2004	17,260	10,510	23,000	23,890	18,590	10,560	9,122	14,100	15,960	7,835	12,400	25,950
2005	21,560	13,880	16,160	36,590	13,490	10,630	7,565	4,458	5,677	24,210	26,790	22,930
2006	28,680	22,430	17,370	19,900	19,530	31,420	23,780	9,110	6,599	19,320	26,540	20,610
2007	29,960	11,450	29,930	44,140	17,610	6,880	5,332	4,019	3,899			
Mean of monthly Discharge	14,100	14,100	22,000	31,000	19,000	10,700	7,030	6,000	6,540	9,520	13,700	15,600
** No Incomplete data have been used for statistical calculation												

Questions about sites/data?
Feedback on this web site

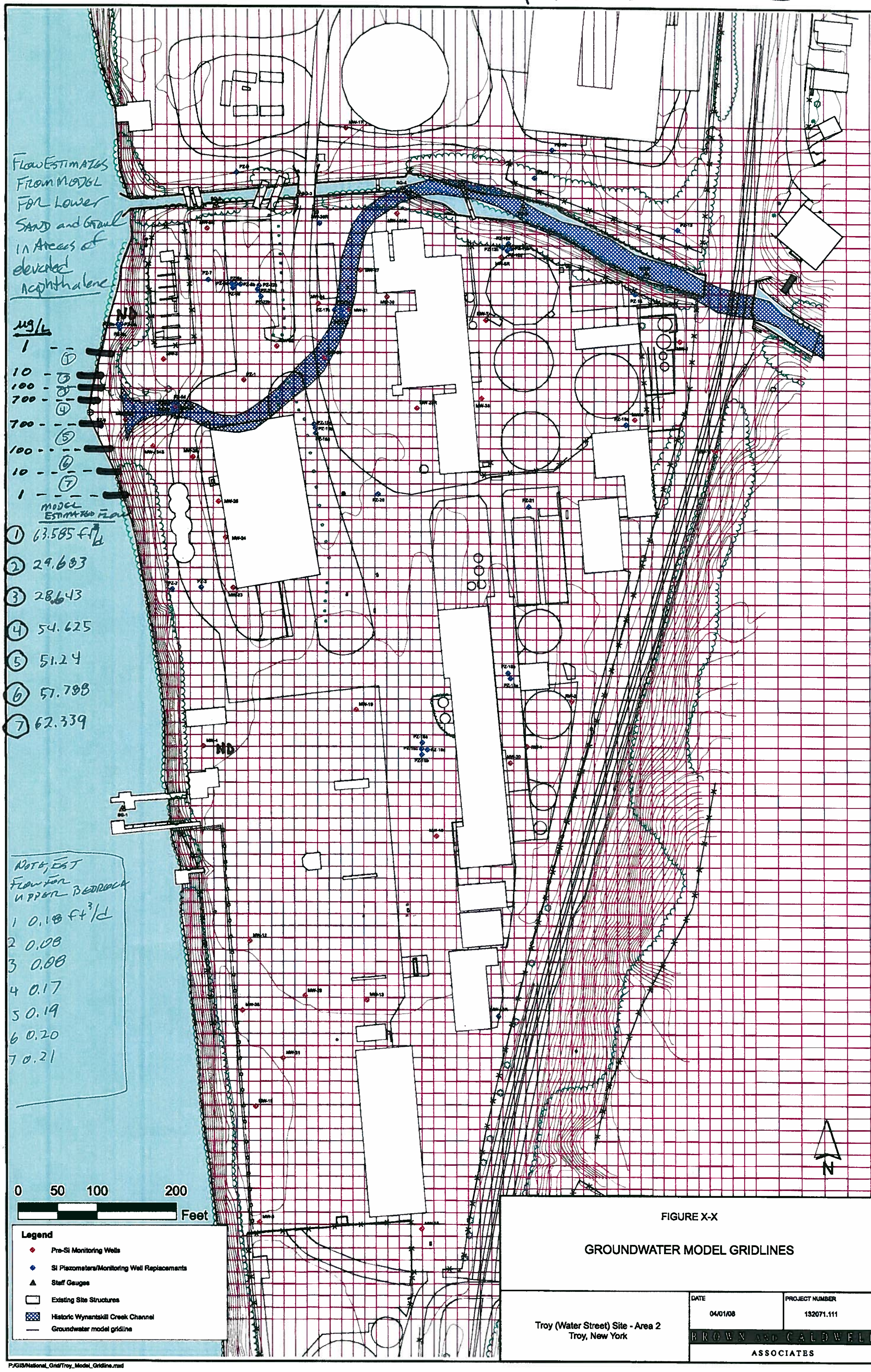
Automated retrievals

Top
Explanation of terms
Subscribe for NWISWeb changes

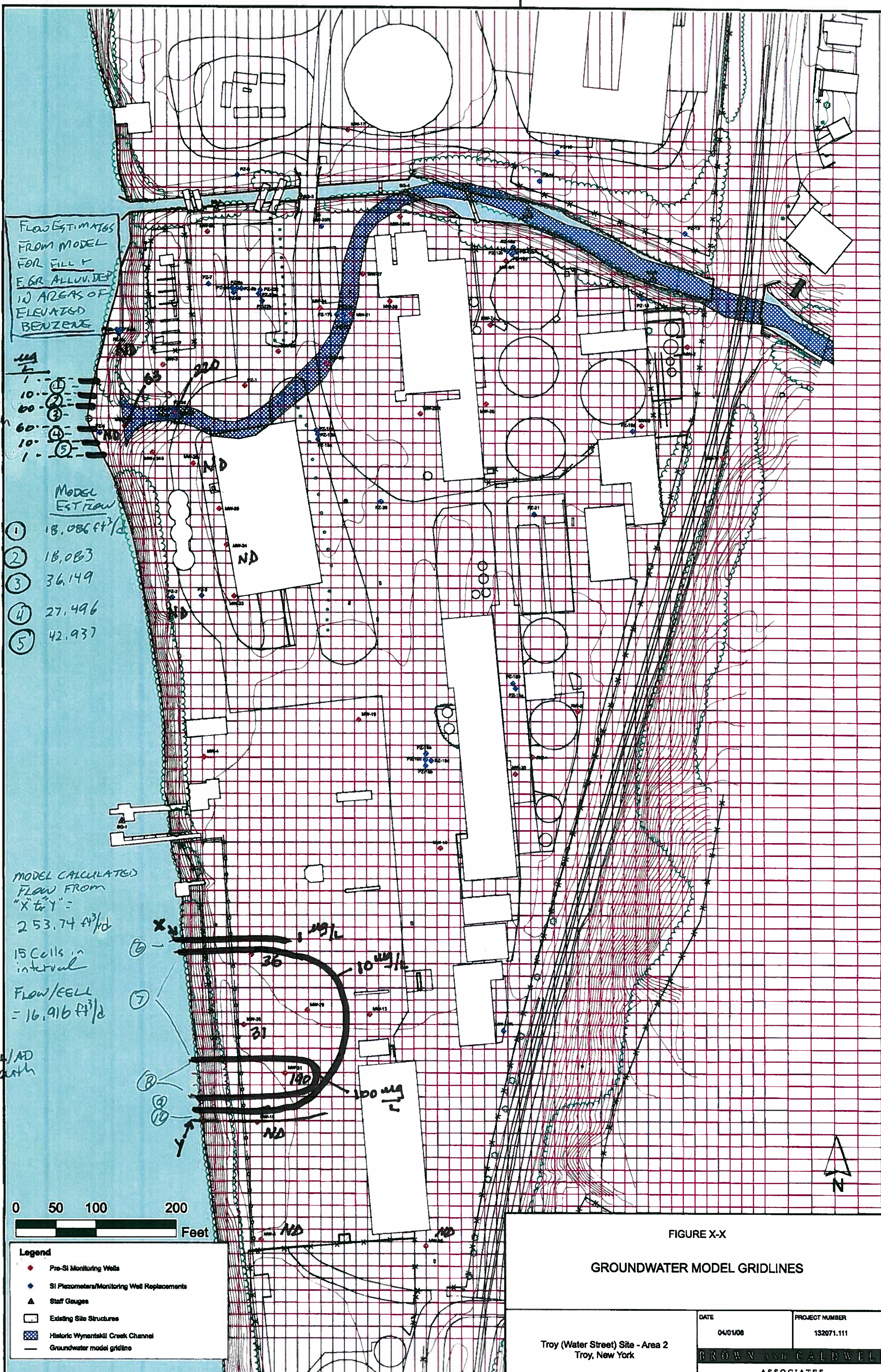
MODEL FLOW ESTIMATES | Naphthalene Areas Fill / F.Gr. Allov. Deposits



MODEL FLOW ESTIMATES \ Naphthalene Areas Lower Sand & Gravel



MODEL FLOW ESTIMATES | BENZENE AREAS FILL / F.GR. ALLUVIAL DEPOSITS



P:/GIS/National_Grid/Troy_Model_Gridline.mxd

MODEL FLOW ESTIMATES | BENZENE AREAS Lower Sand & Gravel

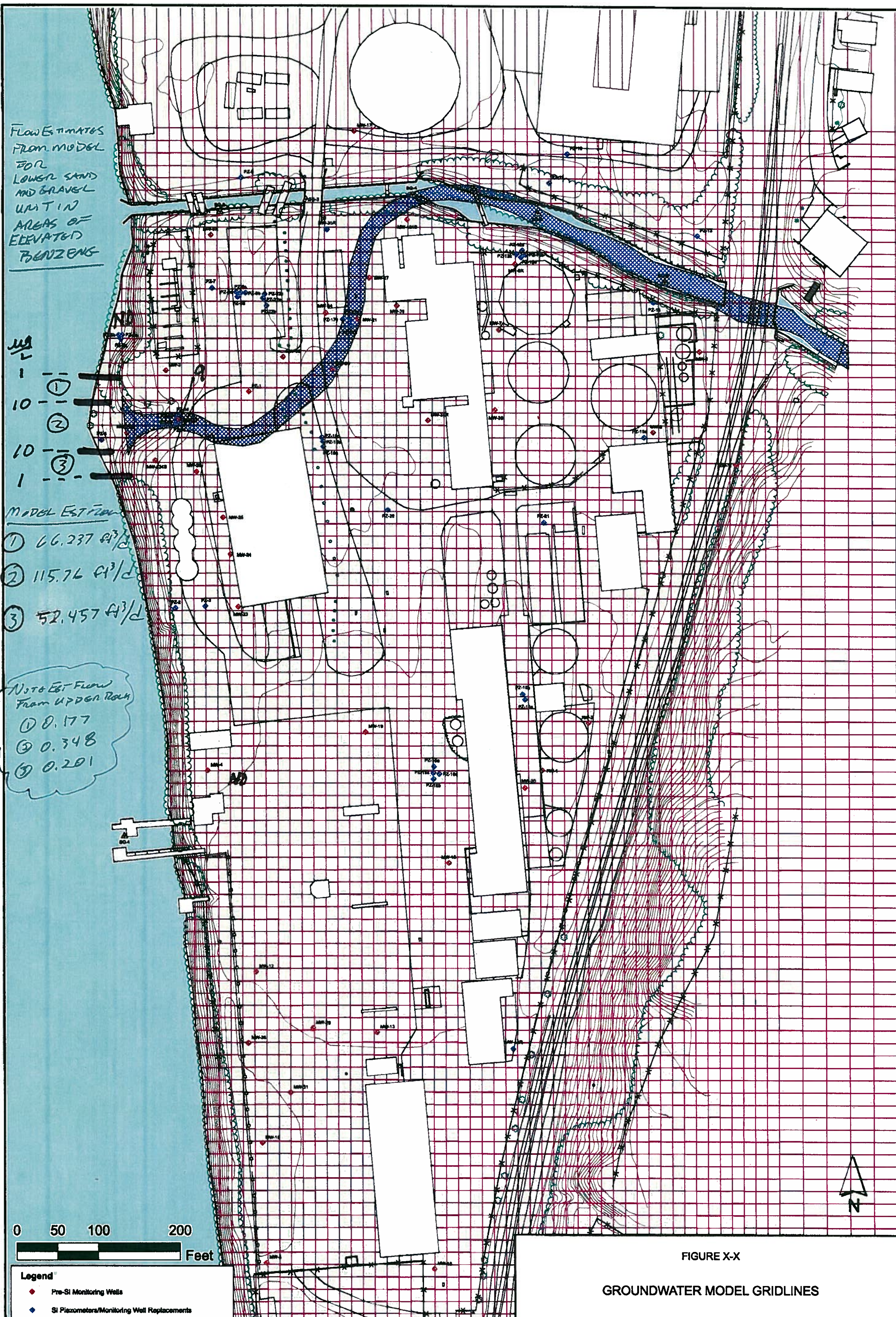


FIGURE X-X

GROUNDWATER MODEL GRIDLINES

Troy (Water Street) Site - Area 2
Troy, New York

DATE	PROJECT NUMBER
04/01/08	132071.111

BROWN AND CALDWELL ASSOCIATES

P:/GIS/National_Grid/Troy_Model_Gridline.mxd

Evaluation of Mass Flux to Wynantskill Creek

Objective:
Estimate constituent mass flux from groundwater under Area 2 to adjacent Wynantskill Creek.

Methods:

1. Groundwater flow estimated using Darcy's Law.

2. No discharge data available for Wynantskill Creek adjacent to site.

3. Assumed 10 ft. wide x 1 ft. deep flowing at 1 ft/sec
- flow $\approx$ 10 ft^3/sec

4. Geomectric mean of K's from slug tests of nearby wells in fill (PZ-10, PZ-11, -PZ-12a, PZ-13, PZ-14) = 8.1×10^{-3} cm/s

5. Used Groundwater Quality Data from Feb/March 2008 (see attached marked-up maps)

Summary of Results:

Naphthalene
estimated instream concentration due to groundwater discharge from site = 0.0035 ug/L
- (3 to 4 orders of magnitude below surface water quality criteria of 10 ug/L)

Note: Surface water sampling during the Remedial Investigation indicated ND for naphthalene and other PAHs in creek.

To exceed surface water criteria, flow would need to decrease to 0.0035 ft^3/sec.

Benzene
Estimated instream concentration due to groundwater discharge from site = 0.035 ug/L
- (1 to 2 orders of magnitude below surface water quality criteria of 1 ug/L)

To exceed surface water criteria, flow would need to decrease to 0.35 ft^3/sec.

Conclusions:

1. Discharge of groundwater to Wynantskill Creek is not expected to cause exceedence of surface water quality criteria in the creek.

2. Does not contribute sufficient mass to Hudson River to cause a potential issue with the groundwater flux directly from site to Hudson.

3. Mass flux calculations support results from surface water sampling of Wynantskill Creek which indicated ND for naphthalene and other PAHs.

Napthalene Mass Flux to Wynantskill Creek

mf = kiA * C

Where:
mf = mass flux, ug/s
k = hydraulic conductivity, cm/s
i = hydraulic gradient, dimensionless
A = cross-sectional area, cm^2 (L * b)
C = (ug/L)/1000=ug/cm^3

Overburden Groundwater Flux

Contour Interval	Geomean	Segment Length	Thickness
1			
10	3.16	300	8

1-10 Contour

k =	8.1E-03	hydraulic conductivity, cm/s			Geometric mean of slug tests near unlined Wynantskill
i =	0.016	hydraulic gradient, dimensionless			Measured in vicinity of selected contours
C=	3.16227766	ug/L =	0.003162	ug/cm^3	Geometric mean concentration between selected contours
L =	300	ft =	9144	cm	Length of segment between selected contours [C]
b =	8	ft =	243.84	cm	Saturated thickness
mf =	9.1E-01	ug/s	2.9E+01	g/yr	0.06 lbs/yr
mf_{ob} =	1	ug/s	29	g/yr	0 lbs/yr

River Concentration

$$C_R = \frac{mf_{ob} + mf_{br}}{Q_R}$$

Where:
Q_R = Wynantskill channel flow, L/s 10
mf_{ob} = Overburden groundwater flux (See above)
mf_{br} = Bedrock groundwater flux = 0

Q_R = 10 ft^3/s = 283.2 L/s

C_R = $\boxed{0.0035 \text{ ug/L}}$ (estimated instream Naphthalene concentration is ≈ 3000 times below the surface water quality standard of 10 ug/L)

Surface Water Quality Criteria, C_c = 10 ug/L
Q_{r_min} = minimum threshold creek flow required to result in exceedence of surface water quality standard, ft3/s

Q_{r_min}= mf / C_c = 1 (ug/s) / 10 (ug/s) = 0.1 L/s = 0.0035 ft^3/s

Benzene Mass Flux to Wynantskill Creek

mf = kiA * C

Where:

mf = mass flux, ug/s
k = hydraulic conductivity, cm/s
i = hydraulic gradient, dimensionless
A = cross-sectional area, cm^2 (L * b)
C = (ug/L)/1000=ug/cm^3

Overburden Groundwater Flux

Contour Interval	Geomean	Segment Length	Thickness
1			
10	3.16	50	8
100	31.62	320	8

1-10 Contour

k =	8.1E-03	hydraulic conductivity, cm/s			Geometric mean of slug tests near unlined Wynantskill
i =	0.016	hydraulic gradient, dimensionless			Measured in vicinity of selected contours
C=	3.16227766	ug/L =	0.003162	ug/cm^3	Geometric mean concentration between selected contours
L =	50	ft =	1524	cm	Length of segment between selected contours [C]
b =	8	ft =	243.84	cm	Saturated thickness
mf =	1.5E-01	ug/s	4.8E+00	g/yr	0.01 lbs/yr

10-100 Contour

k =	8.1E-03	hydraulic conductivity, cm/s			Geometric mean of slug tests near unlined Wynantskill
i =	0.016	hydraulic gradient, dimensionless			Measured in vicinity of selected contours
C=	31.6227766	ug/L =	0.031623	ug/cm^3	Geometric mean concentration between selected contours
L =	320	ft =	9753.6	cm	Length of segment between selected contours [C]
b =	8	ft =	243.84	cm	Saturated thickness
mf =	9.7E+00	ug/s	3.1E+02	g/yr	0.7 lbs/yr
mf_{ob} =	10	ug/s	312	g/yr	1 lbs/yr

River Concentration

$$C_R = \frac{mf_{ob} + mf_{br}}{Q_R}$$

Where:

Q_R =	Wynantskill channel flow, L/s	10
mf_{ob} =	Overburden groundwater flux	(See above)
mf_{br} =	Bedrock groundwater flux = 0	

Q_R = 10 ft^3/s = 283.2 L/s

$C_R = \boxed{0.035 \text{ ug/L}}$ (estimated instream Benzene concentration is ≈ 30 times below the surface water quality standard of 1ug/L)

Surface Water Quality Criteria, C_c = 1 ug/L

Q_{r_min} = minimum threshold river flow required to result in exceedence of surface water quality standard, ft3/s

Q_{r_min}= mf / C_c = 10 (ug/s) / 1 (ug/s) = 10 L/s = 0.35 ft^3/s

NAPHTHALENE MASS FLUX
TO WYNANTSKILL CREEK

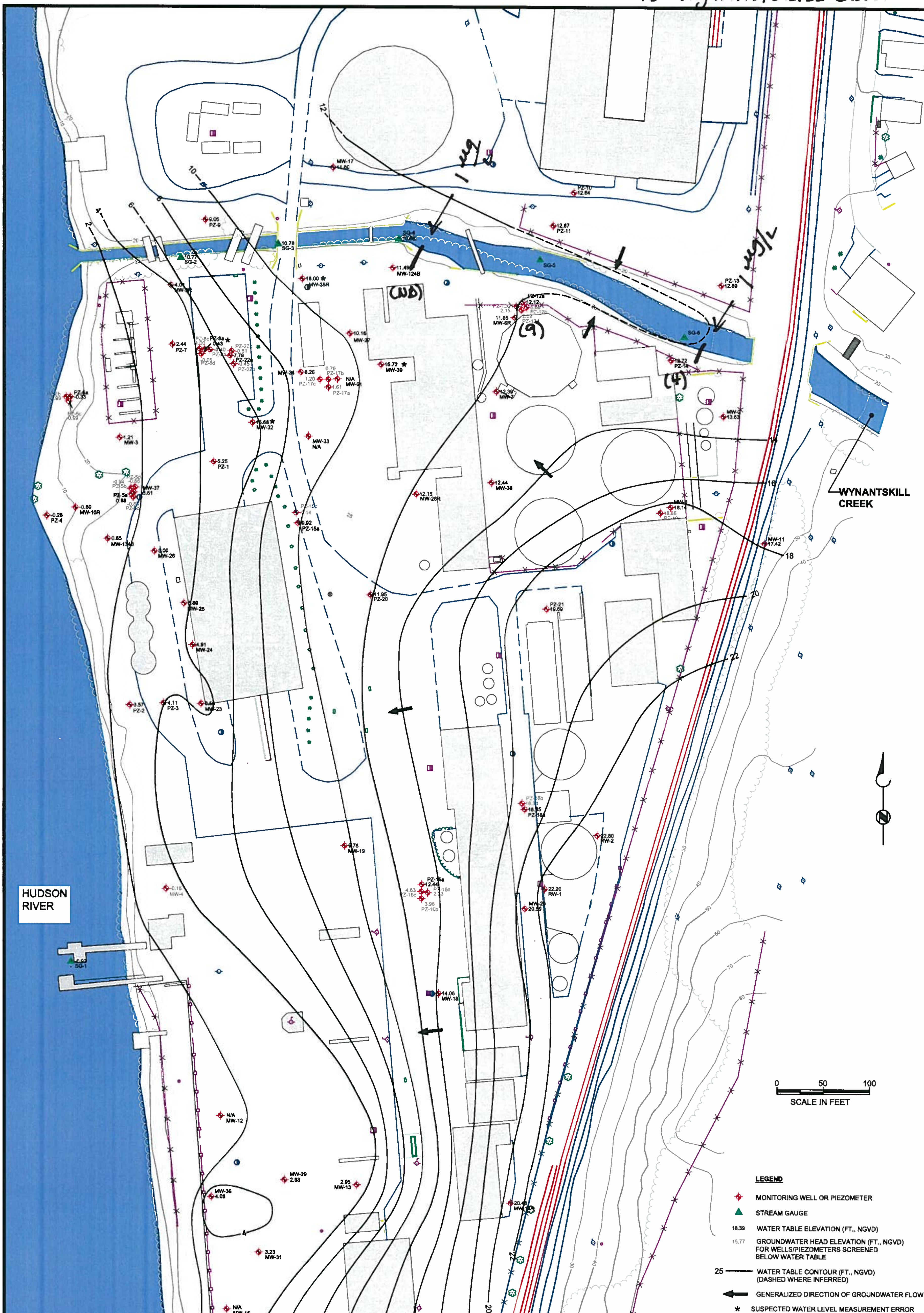


FIGURE 8B
WATER TABLE CONTOUR MAP
(NOVEMBER 26, 2007)

PROJECT LOCATION	DATE	PROJECT NUMBER
NATIONAL GRID TROY (WATER ST.) SITE-AREA 2 TROY, NEW YORK	FEB., 2008	132071 / 107
	BROWN AND CALDWELL ASSOCIATES ALLENDALE, NEW JERSEY	

Feb 26, 2008 - 2:07pm rjames
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\WATER TABLE CONTOUR MAP (NOVEMBER 2007).dwg

BENZENE MASS FLUX TO WYNANTSKILL CREEK

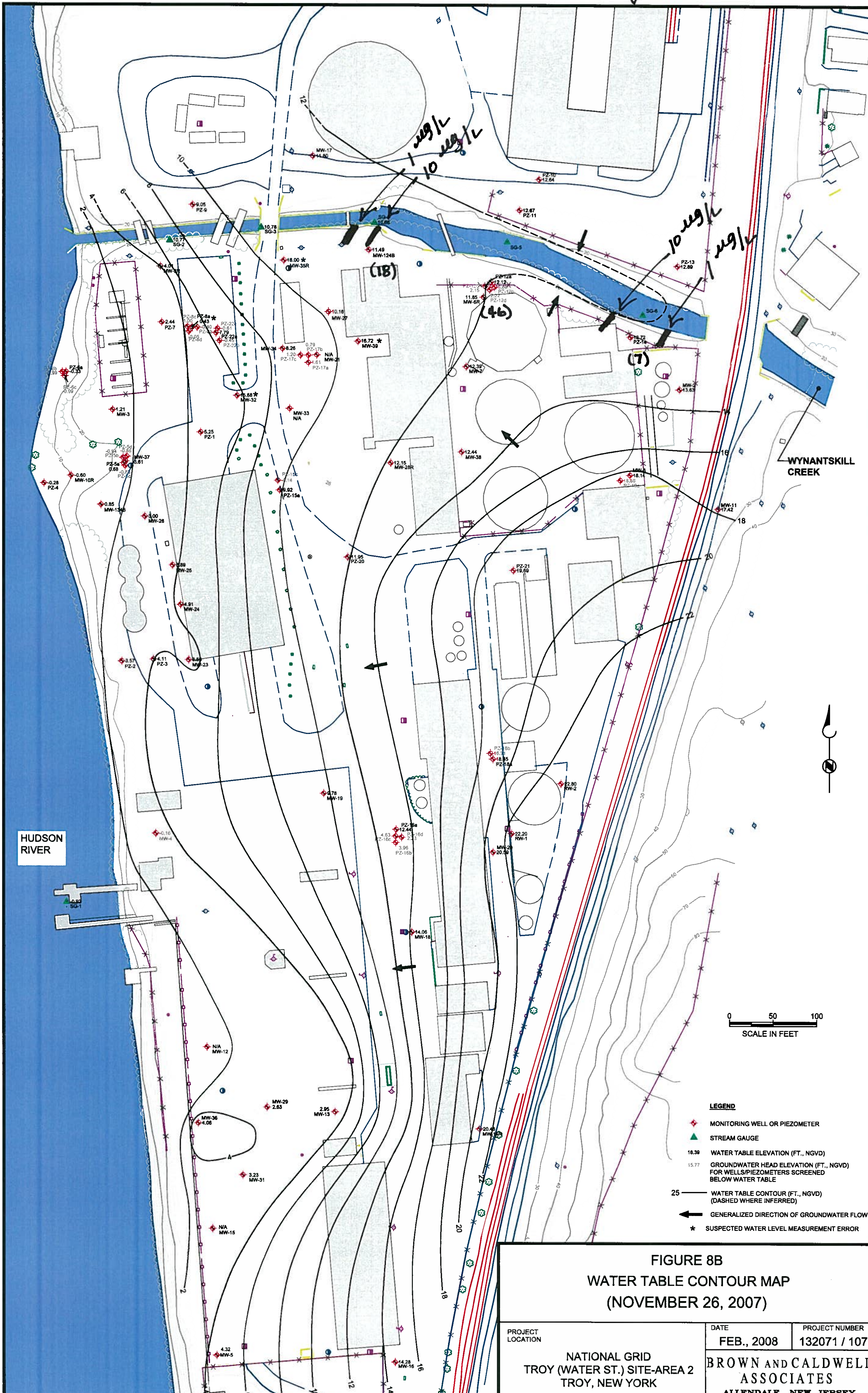


FIGURE 8B
WATER TABLE CONTOUR MAP
(NOVEMBER 26, 2007)

PROJECT LOCATION	DATE	PROJECT NUMBER
NATIONAL GRID TROY (WATER ST.) SITE-AREA 2 TROY, NEW YORK	FEB., 2008	132071 / 107
	BROWN AND CALDWELL ASSOCIATES ALLENDALE, NEW JERSEY	

Feb 26, 2008 - 2:07pm rjames
P:\DRAFTING\NATIONAL_GRID\NIMO_TROY\132071\107\WATER TABLE CONTOUR MAP (NOVEMBER 2007).dwg