FINAL INTERIM REMEDIAL ACTION REPORT

REMEDIAL WORK ELEMENT II
GROUNDWATER EXTRACTION AND TREATMENT
RICHARDSON HILL ROAD LANDFILL SITE

Sidney, New York

Prepared For:

AMPHENOL CORPORATION

358 Hall Avenue
Wallingford, CT 06492

and

Honeywell

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AUGUST 2007

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AUGUST 2007

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SECTION 1

INTRODUCTION

1.1 PURPOSE

This Draft Interim Remedial Action (RA) Report describes the construction of Remedial Work Element II of the Remedial Action for the Richardson Hill Road Landfill (RHRL) Site, United States Environmental Protection Agency (USEPA) Site #NYD980507735. Remedial Work Element II includes the construction of a Groundwater Treatment Plant (GWTP), a network of recovery wells, a groundwater extraction trench, and associated groundwater monitoring wells. This report has been prepared pursuant to the requirements of the Consent Decree entered into by AlliedSignal, Inc., a predecessor company of Honeywell International, Inc (Honeywell) and Amphenol Corporation (Amphenol), effective February 16, 1999 (USEPA, 1999), and Section X.I.C. of the Statement of Work. The guidance document "Close Out Procedures for National Priorities List Sites" (USEPA, 2000) was used as guidance in preparing this Interim RA Report. The construction of Remedial Work Element I (Earthwork) is presented in a separate Interim RA Report (Parsons, 2007a). For both Remedial Work Elements I and II, construction activities were completed the week of October 2, 2006; a final inspection was conducted on October 10, 2006; and field survey work was completed on November 30, 2006.

1.2 PROJECT TEAM

This section provides a summary of the involved parties and their roles. Contact information for each party is provided in Table 1.1.

1.2.1 Agencies

USEPA

The USEPA was the lead agency for the RHRL Remedial Action. Young Chang was the USEPA project manager, served as the point of contact for the agencies, and conducted periodic site inspections.

EarthTech was contracted by USEPA to provide full-time on-site oversight. Amit Haryani represented Earth Tech on-site during the period from September 2002 through October 27, 2003. Jeff Hall represented Earth Tech on-site during the period October 28, 2002 through 2005. Dan Bennett represented Earth Tech on-site in 2006. Martin Derby served as project manager for Earth Tech through October 3, 2003 and Jim Kaczor thereafter.

NYSDEC

Gerard Burke, P.E. represented the New York State Department of Environmental Conservation (NYSDEC) and conducted periodic site inspections.

NYCDEP

The New York City Department of Environmental Protection (NYCDEP) was involved with the project because the RHRL is located within the Delaware Watershed System, which is part of the New York City water supply system. Joe Damrath and Chuck Malinowski represented NYCDEP and conducted periodic site inspections. Mary Ellen Cariseo also represented NYCDEP, and conducted periodic site inspections, including inspections of the septic system constructed for the groundwater treatment plant.

1.2.2 Amphenol/Honeywell

Amphenol and Honeywell were ultimately responsible for completing the Remedial Action in accordance with the Consent Decree. Joseph Bianchi (Project Coordinator pursuant to Section XII of the Consent Decree) and Samuel Waldo represented Amphenol. Rich Galloway, John Mojka, and Frank Leming (who was on site in 2004 and 2005) represented Honeywell. As described below, Amphenol and Honeywell procured the remedial action contractors (Samco, Shaw, and DA Collins) and the Engineer (Parsons) for Remedial Work Element II.

1.2.2.1 SAMCO

Samco Technologies, Inc. (Samco) constructed the GWTP and piping/electrical connections to the North Area wells. Tom Davide (Project Manager/Site Supervisor), Mike Garver (Health & Safety Officer/Site Supervisor), and Matt Burger (Chief Engineer) formed Samco's on-site management team. Samco also started up and operated the GWTP through 2005.

1.2.2.2 Shaw Environmental

Shaw Environmental (Shaw) constructed the groundwater extraction trench and associated piping to the GWTP. John Waechter (Project Manager), Scott Sutton (Site Superintendent, 2003), Jeff Gage (Site Superintendent, 2004), Charles Greene (Health & Safety Officer), Louis Mannina (Project Business Agent) and Geoff Goolden (Field Engineer) formed Shaw's on-site management team.

1.2.2.3 DA Collins Environmental

DA Collins Environmental (DA Collins) restored surfaces at the groundwater extraction trench in 2006, and through a subcontractor (Lawson Surveying & Mapping), provided a final survey of the restored area as well as survey information regarding groundwater monitoring and recovery wells at the extraction trench and the North Area. Dave MacDougall was DA Collins Project Manager; Mike Landon was Site Superintendent in 2005; Dean Blodget was Site Superintendent in 2006.

1.2.2.4 OMI, Inc.

OMI, Inc. (OMI) operated the GWTP in 2006. David Reault was OMI's Project Manager.

1.2.2.5 Parsons

Parsons provided full-time on-site construction oversight during the construction of Remedial Work Element II. Specific activities conducted by Parsons included conducting daily inspections of construction activities, documenting work activities, reviewing contractor submittals, providing engineering support for design and field changes, reviewing contractor quality control test results, conducting quality assurance testing through a subcontractor (i.e., geotechnical testing and concrete testing by CME Associates, Inc.), coordinating reviews of submittals and work plans with the agencies and remedial action contractors, and coordinating periodic project meetings. Parsons' on-site representatives included: Matt Millias (2002-2003), Ed Rudy (2002 - May 2003), Chris Kibler (May 2003 – August 2003); Bill Bingham (September 2003 – April 2004); Norm Sulock (2004 - 2005), and Ron Prohaska (2006). Project Managers for Parsons included Matt Millias (2002 - 2003), Bill Long (2004-2005), and Jim O'Loughlin (2006).

1.3 REPORT BASIS

This report is based on the following:

- Documentation and Quality Control (QC) testing results provided by the Remedial Action Contractors during construction;
- Observations by Parsons during construction;
- Quality Assurance (QA) testing performed by Parsons or its subcontractor(s);
- The information presented in the report entitled "Richardson Hill Road Landfill – Groundwater Treatment Plant – Phase I – Construction Certification Report" (Parsons, 2003a); USEPA comments on this report transmitted by letter dated October 31, 2003 (USEPA, 2003); and responses to these comments transmitted by letter dated December 1, 2003 (Parsons, 2003b); and
- Post-construction site inspections and evaluations performed by Parsons in 2006.

1.4 REPORT ORGANIZATION

This report is organized as follows:

Section 1 provides an introduction to the project and presents the project team.

Section 2 provides site background information, including site history, a summary of previous site investigations, and a summary of the remedial design.

Section 3 summarizes Remedial Work Element II construction activities in the North Area, including construction of the GWTP and North Area recovery wells.

Section 4 summarizes Remedial Work Element II construction activities in the South Area, including construction of the groundwater extraction trench.

Section 5 presents a chronology of events.

Section 6 presents a summary of performance standards and construction quality control.

Section 7 presents supplemental information, including a summary of health and safety during construction, site-specific observations and lessons learned, and a summary of the groundwater treatment plant dedication ceremony.

Section 8 presents a summary of operation and maintenance activities.

Section 9 presents a summary of final inspections and certifications.

Supporting the text are the following appendices:

Appendix A: Field Change Orders, Field Memos, Request for Information

Appendix B: Record Drawings

Appendix C: Boring Logs, Well Construction Diagrams

Appendix D: Daily Field Reports

Appendix E: Photographic Log

Appendix F: QA/QC Documentation

Appendix G: Operational Data

Appendix H: Supplemental Information

This Interim RA Report was prepared pursuant to Section X.I.C. of the Statement of Work and the guidance presented in Exhibit 2-3 of "Close Out Procedures for National Priorities List Sites." To facilitate comparison of report contents to the requirements/guidance provided by these documents, the following cross references are provided:

Statement of Work, Section X.I.C

Section 1 – Introduction: See Section 2 of the Interim RA Report

Section 2 – Chronology of Events: See Section 5 of the Interim RA Report

Section 3 – Performance Standards and Construction Quality Control: See Section 6 of the Interim RA Report

Section 4 – Construction Activities: See Sections 3 and 4 of the Interim RA Report

Section 5 – Final Inspection: See Section 9 of the Interim RA Report

Section 6 – Notice of Completion: See Section 9 of the Interim RA Report

Section 7 – Operation and Maintenance: See Section 8 of the Interim RA Report

Section 8 – Certification: See Section 9 of the Interim RA Report

Guidance Document, Exhibit 2-3

Section I – Introduction: See Section 2 of the Interim RA Report

Section II – Operable Unit Background: See Section 2 of the Interim RA Report

Section III – Construction Activities: See Sections 3 and 4 of the Interim RA Report

Section IV – Chronology of Events: See Section 5 of the Interim RA Report

Section V – Performance Standards and Construction Quality Control: See Section 6 of the Interim RA Report

Section VI – Final Inspections and Certifications: See Sections 7 and 9 of the Interim RA Report

Section VII – Operation and Maintenance Activities: See Section 8 of the Interim RA Report

Section VIII – Summary of Project Costs: See Section 7 of the Interim RA Report

Section IX – Observations and Lessons Learned: See Section 7 of Interim RA Report

Section X – Operable Unit Contact Information: See Section 1 of the Interim RA Report

TABLE 1.1
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SECTION 2

BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The RHRL site is located in the Towns of Sidney and Masonville, Delaware County, New York. The site is located in a rural residential area on Richardson Hill Road, approximately 2.5 miles southeast of Sidney Center. Information regarding the site can be found at the following website: www.epa.gov/region02/cleanup/sites/nytoc_sitename.htm. As shown on Record Drawing C-101, the RHRL site consists of the South Area and the North Area.

Within the South Area is the main landfill, which is approximately 8 acres in size and is situated along a hillside above a marsh and the South Pond. The landfill was used primarily for the disposal of municipal refuse. Located within the landfill was a former pit, approximately 25 ft wide by 105 ft long by 14 ft deep, which was used for the disposal of waste oil. Some of the disposed oils contained volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs).

Surface water and groundwater from the landfill and adjacent hillside drain towards the marsh and South Pond. Water from the South Pond drains into Herrick Hollow Creek (HHC), which eventually flows into Cannonsville Reservoir on the west branch of the Delaware River. Cannonsville Reservoir is part of the Delaware Watershed System, supplying water to the New York City metropolitan area (USEPA, 1997). As described in this report and as shown on Record Drawing C-101, Remedial Work Element II includes a groundwater extraction trench between the landfill and the South Pond.

The North Area is located approximately 1,000 ft northeast of the main landfill and was comprised of two former waste disposal areas and the North Pond. The North Area is located on a drainage divide between the Susquehanna and Delaware River basins, with the primary surface water drainage towards the Susquehanna basin. Water from the North Pond drains northwards through a series of beaver dams and into Carr's Creek, which is a tributary of the Susquehanna River (USEPA, 1997). As described in this report and as shown on Record Drawing C-101, Remedial Work Element II includes a groundwater recovery well network in the North Area and a groundwater treatment plant to treat extracted groundwater from both the extraction trench in the South Area east of the landfill and the recovery wells in the North Area.

2.2 SITE HISTORY

The land on which the main landfill is located was purchased by Mr. Devere Rosa, Jr. in 1964 for the purpose of operating a refuse disposal area. Devere Rosa, Sr. received a permit from the New York State Department of Health (NYSDOH) in June 1964 to operate the landfill. The landfill was operated from approximately July 1964 until October 1968. In October 1968, Mr. Rosa, Sr. signed an order issued against him by the NYSDOH to close the landfill (USEPA, 1997).

Waste materials deposited in the landfill consisted primarily of municipal refuse from the Town of Sidney. In addition to municipal waste, spent oils from the Scintilla Division of the Bendix Corporation, a predecessor to Honeywell and Amphenol, were disposed in the landfill from approximately July 1964 until July 1966. The spent oils were reportedly disposed as free liquids in the waste oil disposal pit.

Based on the results of a USEPA site investigation and a New York State Department of Environmental Conservation (NYSDEC) Phase II investigation, the RHRL site was listed on the National Priorities List (NPL) on July 1, 1987. On July 22, 1987, Amphenol and Honeywell entered into an Administrative Order on Consent (AOC), Index Number II CERCLA-70205, with the USEPA to perform a remedial investigation and feasibility study (RI/FS) at the site.

In November 1991, interim remedial measures were conducted to discourage unauthorized access to the RHRL site. The measures consisted of installing a 4-ft high-visibility fence and posting signs around the former waste oil disposal pit and runoff area. "No Trespassing/USEPA Information" signs were also posted at 50-ft intervals along the site perimeter (O'Brien & Gere, 1995).

On September 30, 1993 USEPA issued an AOC, Index Number II CERCLA-93-0214, and a Unilateral Administrative Order (UAO), Index Number II CERCLA-93-0217, to Amphenol and Honeywell in response to a reported fish kill in the South Pond. The work performed pursuant to these orders included excavation of approximately 2,200 cubic yards (cy) of sediment from the South Pond, installation of seep interceptor collection basins upgradient of the South Pond, installation of a sediment trap weir system at the outlet of the South Pond, and installation and maintenance of two whole-house supply water treatment systems (USEPA, 1997). The status of the two whole-house supply water treatment systems, as reported by Amphenol, is provided in Appendix H.

Upon completion of the RI/FS, a Record of Decision (ROD) documenting selection of a remedial action for the site by USEPA was signed on September 30, 1997.

On February 16, 1999, a Consent Decree between USEPA, Honeywell and Amphenol was lodged with the United States District Court. The Consent Decree (USEPA, 1999) required Honeywell and Amphenol to implement the Remedial Action (RA) specified in the ROD for the RHRL.

A Remedial Design Work Plan (RDWP) for the RHRL was submitted to and approved by USEPA (Parsons Engineering Science, Inc. (Parsons), August 1999). The RDWP included a Pre-Design Investigation and the Remedial Design. The pre-design investigation was conducted between October 1999 and January 2000 to supplement information presented in previous reports and to refine the basis of the Remedial Design. A description of the activities and findings from the pre-design investigation was presented in the Pre-Design Investigation Report (Parsons, 2000).

The Final (100%) Remedial Design Report (Parsons, 2002) was submitted to USEPA on August 22, 2002. USEPA approved the portion of the Remedial Design pertaining to the GWTP on August 26, 2002. On October 14, 2002, revised drawings were issued by Parsons reflecting the relocation of the GWTP from the South Area to the North Area. On May 7, 2003, USEPA approved the Remedial Design (i.e., portions other than the GWTP), including the groundwater extraction trench.

The Remedial Design, as it pertains to Remedial Work Element II, is discussed in further detail in Section 2.4. A chronology of major events relating to the design and construction of Remedial Work Element II is presented in Section 5.

2.3 SITE INVESTIGATION SUMMARY

A Remedial Investigation (RI) was conducted between 1988 and 1996 to evaluate the nature and extent of contamination at, and emanating from, the RHRL site (O'Brien & Gere, 1995). The RI included the collection and analyses of surface and subsurface soil, groundwater, surface water, and sediment samples. Additional site investigation was also performed as part of the pre-design investigation. This section presents a brief summary of the site investigation results, based on the summary presented in the Remedial Design Work Plan (Parsons, 1999).

2.3.1 Geology and Hydrogeology

The subsurface geology of the site is characterized by unconsolidated glacial deposits overlying bedrock. The unconsolidated deposits consist of soil mixed with municipal refuse in the landfill underlain by a dense reddish brown to gray glacial till. Bedrock beneath the till consists of interbedded layers of shale, siltstone, and sandstone. The depth to bedrock varies from 18 ft to 39 ft.

Groundwater at the site was encountered in the overburden, shallow bedrock (18 to 70 ft), and the deeper bedrock (greater than 70 ft). The overburden and shallow bedrock flow regimes appear to be hydraulically connected and isolated from the deeper bedrock groundwater flow system. Groundwater in the overburden and shallow bedrock flows towards the center of the valley and generally follows the site topography.

2.3.2 Surface Soils

PCBs were detected in surface soil samples (0 to 1 ft) in the main landfill area at concentrations ranging from less than 5 milligrams per kilogram (mg/kg) to 950 mg/kg, based on field screening data, and up to 730 mg/kg, based on laboratory analytical data. However, there was poor correlation between the screening data and the laboratory analytical data. Screening results were often several orders of magnitude greater than the laboratory results. The highest PCB concentrations were detected in the landfill near the former waste oil disposal pit. PCB concentrations decreased with distance away from the pit. Two locations along the north access road were also found to contain surface soils with PCBs exceeding the 1 mg/kg NYSDEC surface soil cleanup objective (TAGM 94-HWR-4046).

During the RI, PCBs were also detected in the North Area at concentrations ranging from less than 5 mg/kg to 42.2 mg/kg based on field screening data; however, none of those surface soil samples were analyzed by a laboratory. The highest PCB concentrations were detected in two suspected disposal areas which were identified by the geophysical and soil vapor surveys.

Two surface soil samples collected from the same areas during the predesign investigation had PCB concentrations below 1 mg/kg.

2.3.3 Subsurface Soils

VOCs and PCBs were detected in subsurface soils at the site. The most prevalent VOCs were 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE), toluene, ethylbenzene, and xylene. In the South Area, total VOC concentrations ranged up to 287 mg/kg and PCB concentrations ranged up to 7,000 mg/kg. The highest concentrations were detected in the vicinity of the former waste oil disposal pit. PCB concentrations decreased significantly at depths below 8 ft. PCB concentrations in borings along the east side of Richardson Hill Road ranged up to 44 mg/kg.

VOCs and PCBs were detected at lower concentrations in subsurface soils in the North Area. Total VOC concentrations ranged up to 3.84 mg/kg and PCB concentrations ranged up to 1.5 mg/kg. The highest concentration was detected in test pit TP-6 located in one of the isolated fill areas. All of the North Area subsurface soil samples were below the VOC cleanup objectives and the 10 mg/kg NYSDEC subsurface soil PCB cleanup objective (TAGM 94-HWR-4046).

2.3.4 Groundwater

Groundwater samples were collected from the site monitoring wells between November 1988 and February 1995. In the main landfill area, groundwater in the overburden zone contained detectable levels of VOCs and PCBs. The most prevalent VOCs in the overburden groundwater were TCE, tetrachloroethene (PCE), and 1,1,1-trichloroethane (1,1,1-TCA), and their breakdown products, 1,2-DCE, 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA) and vinyl chloride. Total VOC concentrations in groundwater ranged from 1 microgram per liter (ug/l) to 29,860 ug/l. PCB concentrations ranged from less than 0.065 ug/l to 1,400 ug/l. The highest concentrations were detected in monitoring wells adjacent to and downgradient of the former waste oil disposal pit. The VOC and PCB plumes from the landfill materials and former waste oil disposal pit extended in an easterly direction towards the South Pond. The PCB plume was less extensive than the VOC plume and was centered around the former waste oil disposal pit.

Similar VOCs and PCBs were detected in the shallow bedrock groundwater in the main landfill area. The VOC and PCB plumes, however, were smaller in extent and generally had concentrations about an order of magnitude less than in the overburden groundwater.

In the North Area, groundwater in the overburden zone contained detectable levels of VOCs and PCBs. The primary VOC detected in the overburden groundwater was TCE. Total VOC concentrations ranged from less than 1 ug/l to 1,776 ug/l and PCB concentrations ranged from less than 0.066 ug/l to 0.2 ug/l. VOCs were also detected in a shallow bedrock groundwater monitoring well, MW-9D. The total VOC concentration detected in the shallow bedrock groundwater was 164 ug/l. The primary VOC detected in the shallow bedrock was TCE at a concentration of 150 ug/l. No distinct source areas were identified in the North Area during the remedial investigations.

The MW-12 group consists of three, open hole bedrock groundwater monitoring wells, which, as shown on Record Drawing C-1 & C-2 (1 of 2), are located east of South Pond and Herrick Hollow Creek. These wells were installed as part of the RI/FS for the Sidney Landfill site, which is northwest of the Richardson Hill Road Landfill site. Trichloroethene and the degradation species 1,2-dichloroethene, as well as 1,1,1-trichloroethane, have been detected in well(s) from the MW-12 Group. It is Parsons understanding that for administrative purposes, the MW-12 Group and its monitoring was assigned to the RHRL site in September 2004 (JTM Associates, 2006, USEPA, 2007). Because the groundwater collection trench was not specifically designed to collect groundwater from the vicinity of the MW-12 group, a plan to assess water quality chemistry, associated hydrogeology, and source of contamination in the MW-12 group is currently being developed by others (JTM Associates, 2006, USEPA, 2007, JTM Associates, 2007), and monitoring of the MW-12 Group has been included in the RHRL site O&M plan.

VOCs and PCBs were not detected in the deep bedrock groundwater at the site.

2.3.5 Surface Water

VOCs and PCBs were detected in surface water samples collected from the South Pond. Total VOC concentrations ranged from 3 ug/l to 1,982 ug/l, and PCB concentrations ranged from non-detectable to 2.9 ug/l. The highest concentrations were adjacent to a seep area along the western shore of the pond. VOCs detected along the western shoreline were 1,2-DCE, vinyl chloride, 1,1,1-TCA, TCE, 1,1,-DCA, methylene chloride, acetone, and toluene.

VOCs and PCBs were detected at low concentrations in surface water samples collected downstream of the South Pond. VOCs detected were 1,2-DCE (1 to 4 ug/l), methylene chloride (0.9 to 8 ug/l), and carbon disulfide (10 to 12 ug/l). PCB concentrations ranged from 0.14 ug/l to 0.42 ug/l. PCBs were not detected in samples beyond approximately 2,600 ft downstream of the South Pond.

Low concentrations of TCE (4 ug/l) and 1,2-DCE (1 ug/l) were detected in surface water samples from the North Pond. PCB concentrations in samples from the North Pond ranged from non-detect to 0.3 ug/l. A sample collected from a small pond located between the North Pond and South Pond contained TCE at 9 ug/l, but did not contain PCBs.

2.3.6 Sediments

VOCs and PCBs were detected in the South Pond sediments (O'Brien & Gere, 1995 and 1996). Prior to the excavation of approximately 2,200 cubic yards of sediment during a 1994 removal action, total VOC concentrations in the South Pond sediments ranged from 0.013 mg/kg to 4.96 mg/kg. The most prevalent VOCs were 1,2-DCE and toluene; however, low concentrations of methylene chloride, acetone, 2-butanone, xylene, ethylbenzene, chlorobenzene, 1,1,-DCE, 1,1,1-TCA, TCE, chloromethane, carbon disulfide, and vinyl chloride were also detected. PCB concentrations ranged from less than 0.6 mg/kg to 1,300 mg/kg. The highest concentrations of PCBs prior to the 1994 removal action were detected in sediments along the western shoreline of the South Pond downgradient of the former waste oil disposal pit. The pre-design sampling results indicated a maximum PCB concentration of 70 mg/kg, including some exceedances of the 1 mg/kg PCB sediment cleanup goal presented in the Record of Decision in the prior sediment removal area. The results indicated that PCBs exceeding the 1 mg/kg cleanup goal were generally limited to the top one ft of pond sediment.

PCBs were also detected in sediments from Herrick Hollow Creek, the ponds, and the floodplain located downstream of the South Pond. PCB concentrations in the stream channel sediments ranged from 0.33 mg/kg to 180 mg/kg. Concentrations in the pond sediments ranged from 0.048 mg/kg to 150 mg/kg and concentrations in the flood plain sediments ranged from 0.066 mg/kg to 49 mg/kg. The results indicated that PCBs exceeding the 1 mg/kg cleanup goal were limited to the top six inches of floodplain sediment. PCBs exceeding 1 mg/kg were not detected beyond approximately 3,600 ft downstream of the South Pond. With the exception of chloromethane in one sample, VOCs were not detected in sediments downstream of the South Pond.

Sediments collected from the North Pond contained low concentrations of methylene chloride, carbon disulfide, toluene, and xylenes. PCBs were detected in only one sample, at a concentration of 0.37 mg/kg which was below the 1 mg/kg cleanup PCB goal.

2.4 REMEDY SUMMARY

2.4.1 Remedial Objectives/Selected Remedy

Based on results of the RI, FS, and public comments, the USEPA issued a ROD on September 30, 1997 and a Consent Decree, effective February 16, 1999. The objectives of the remediation at the RHRL site, as stated in the Consent Decree, were to:

- Reduce or eliminate contaminant leaching to groundwater;
- Control surface water runoff and erosion;
- Mitigate the migration of contaminated groundwater;
- Restore groundwater quality to levels which meet state and federal drinking water standards;
- Prevent human contact with contaminated soils, sediments and groundwater; and
- Minimize exposure of fish and wildlife to contaminants in surface water, sediments and soils (USEPA, 1999).

Components of Remedial Work Element I of the selected remedy generally included the excavation and removal of soils and sediments, the off-site disposal of certain soils, the consolidation of certain soils and sediments in a TSCA cell constructed at the location of the former landfill, the consolidation of remaining soils and sediment beneath a cap constructed over the former landfill, and associated operation and maintenance activities. These components are described in greater detail in the Interim Remedial Action Report for Remedial Work Element I (Parsons, 2007a). Components of Remedial Work Element II of the selected remedy as presented in the Statement of Work attached to the Consent Decree included:

- Extraction of contaminated groundwater from the overburden and shallow bedrock in the South Area utilizing a downgradient interceptor trench and in the North Area utilizing extraction wells, and treatment of extracted groundwater by air-stripping, activated carbon, and/or other appropriate treatment followed by discharge to surface water.
- Securing institutional controls (i.e., the placement of restrictions on the installation and use of groundwater wells at the Site). The securing of institutional controls with respect to that portion of the Site that is owned by the Owner Settling Defendants is the responsibility of the Owner Settling Defendants. (The securing of institutional controls is not addressed in this Interim RA Report.)
- Operation and maintenance of the groundwater extraction/treatment system(s).
- Long-term monitoring of groundwater.

2.4.2 Remedial Design

A summary of the primary components of Remedial Work Element II, as presented in Section 3 of the Final (100%) Remedial Design Report (Parsons, 2002), is presented below. Also presented are primary clarifications and field adjustments to the design that occurred during construction. These clarifications and field adjustments were documented in Field Change Orders, Field Memos, and Requests for Information. Field Change Orders (FCOs), Field Memos, and Requests for Information pertinent to Remedial Work Element II are included in Appendix A. In the subsections below, each summary of the design component is followed by a summary of the constructed component, in italics, for comparative purposes.

2.4.2.1 Groundwater Treatment System

The Final (100%) Remedial Design Report, related drawings issued for construction, and subsequent workplans and clarifications indicated that:

- The groundwater treatment system would have the capacity to accommodate a maximum flow of 100 gallons per minute (gpm) and treat site-related constituents to discharge limits issued by NYSDEC on August 9, 2001. The groundwater treatment system would have the capacity to accommodate flows of approximately 30 to 80 gpm from the extraction trench, and of approximately 10 gpm from the North Area recovery wells. *As discussed in Section 7, the GWTP has an overall hydraulic capacity of 100 gpm. As further discussed in Section 7, a review of recent operating records over the 6-month period April 2006 through September 2006 indicates that the GWTP is treating site-related constituents in recovered groundwater to below effluent discharge limits issued by NYSDEC, which were re-issued effective March 1, 2006. During this period, average daily influent flows from the extraction trench ranged from approximately 10 to 50 gpm, while average daily influent flows from the north area recovery wells typically ranged from 3 to 4 gpm. Daily average effluent flows during this period were as high as 65 gpm.*
- The groundwater treatment system would consist of the following unit processes: flow equalization; pH adjustment to pH 2 (for acid cracking of oil-water emulsion); gravity oil / water separation; pH adjustment to neutral pH; poly-aluminum chloride

(PAC) addition; polymer addition; flocculation; clarification; post-clarification filtration; air stripping; post-air stripping filtration; granular activated carbon (GAC) adsorption; final filtration; and solids dewatering. *As discussed in Section 3 and/or as shown on the Record Drawings, the following unit processes were installed consistent with the design: flow equalization; pH adjustment; gravity oil / water separation; pH adjustment; PAC addition; polymer addition; flocculation; clarification; post-clarification filtration; air stripping; post-air stripping filtration; GAC adsorption; final filtration; and solids dewatering. (Filtration is provided by bag filter systems.)*

- Discharge from the treatment plant would be to the area of the South Pond, which flows to Herrick Hollow Creek, and eventually to the Cannonsville Reservoir, a New York City drinking water source. The discharge would be sampled with an automatic flow-proportioned composite sampler and analyzed for the parameters specified in the discharge permit. *As discussed in Section 3 and/or shown on the Record Drawings, plant effluent is discharged to the marsh upgradient of the South Pond. Discharge is sampled by connecting an ISCO autosampler to a hose bib along the effluent piping and collecting a 24-hour time-weighted composite sample.*

- Operational procedures for the treatment plant would be provided in a post-remedial Operation and Maintenance Manual. *As discussed in Section 7, Samco, the primary contractor responsible for the construction of the GWTP and for its operation through December 2005, prepared an Operation and Maintenance Manual that addressed GWTP unit processes as well as the PlantScape central operations control system. OMI, which has operated the groundwater treatment system since January 2006, subsequently prepared an addendum to the Operations and Maintenance Manual, which was included as an appendix to the draft site-wide Operations and Maintenance Manual for Post-Remedial Activities (Parsons, 2006), which was submitted to USEPA on August 24, 2006.*

- The treatment system would be controlled by a series of local control panels that provide information on operational status to a central control panel. The control panel would have alarms to shut down the North Area extraction wells, collection trench sump pumps, and relevant process equipment due to process upsets, excursions, or other conditions (e.g. tank level) outside set-point boundaries. The alarms would activate an autodialer to automatically notify the plant operator via telephone. *As discussed in Sections 3 and 7 and/or as shown on the Record Drawings, control panels were installed with the process equipment and connected to the PlantScape operations control center. Information recorded by sensors (e.g., tank level, pump pressure) is transmitted to the PlantScape center. A number of interlocks automatically shut down or restart the North Area extraction well pumps, collection trench sump pumps, and relevant process and conveyance equipment based on set-points (e.g., tank level, pump pressure).*

2.4.2.2 North Area Recovery Wells

The Final (100%) Remedial Design Report, related drawings issued for construction, and subsequent workplans and clarifications indicated that:

- Four extraction wells would be installed in the North Area approximately 67 ft apart. *As discussed in Section 3 and/or as shown on the Record Drawings, four extraction wells were installed, ranging from approximately 62 ft to 67 ft apart.*

- As described in a scope of work approved by USEPA on January 23, 2003, each well would consist of a 6-inch diameter, 25-ft long stainless steel screen installed in a 10-inch diameter borehole in bedrock to a depth of 70 ft. As further described in USEPA comments to the scope of work dated October 29, 2002 and responded to by Parsons on November 5, 2002; wells would be cased 2 ft into bedrock and would be constructed to allow collection of the shallow, weathered bedrock groundwater. *As discussed in Section 3 and/or as shown on the Record Drawings, each extraction well consists of a 6-inch diameter, 25-ft long, 0.30 slot stainless steel screen installed in a 10-inch diameter borehole in bedrock to a depth of approximately 70 ft. Recovery well risers extended approximately 2-ft. into bedrock. The primary sand pack (Morie #2) extended 2 ft. above the well screen and a secondary sand pack (Morie #00) was installed to 2 ft above the bedrock-overburden interface. The secondary sand pack hydraulically connected the bedrock-overbuurden interface to the primary sand pack to allow collection of shallow weathered bedrock groundwater.*

- As described in a scope of work approved by USEPA on January 23, 2003, ten 2-inch diameter piezometers (NMW-1 through NMW-10), screened 30 ft in bedrock, would be installed at locations in-line with and downgradient of the recovery wells. Each 2-inch piezometer would be screened in bedrock. *As discussed in Section 3 and/or as shown on the Record Drawings, ten 2-inch diameter piezometers (NMW-1 through NMW-10), screened 30 ft in bedrock, were installed at locations in-line with and downgradient of the recovery wells.*

2.4.2.3 Groundwater Extraction Trench

The Final (100%) Remedial Design Report, related drawings issued for construction, and subsequent workplans and clarifications indicated that:

- The groundwater extraction trench would be approximately 1100 ft long by 3 ft wide and would extend from ground surface to bedrock. As described in FCO #006A, the final alignment of the trench would be shifted approximately 5 ft east and the extraction trench and associated high density polyethylene (HDPE) panels on the downgradient side of the trench would extend a minimum of 2 ft into the dense till overlying the bedrock. *As discussed in Section 4 and/or as shown on the Record Drawings, the trench is approximately 1147.5 ft long and a minimum of 3 ft wide, and extends approximately 2 ft to 13 ft into dense till/bedrock.*

- The extraction system would consist of a 3-ft wide vertical zone of high permeability material (gravel and sand) and would include 3 sumps that would extend to the bottom of the trench. The sumps would be 200 ft from each end of the trench with the center sump equidistant from the end sumps. As described in FCO #001, the sumps would be constructed of 24-inch diameter perforated pipe. *As discussed in Section 4 and/or as shown on the Record Drawings, the trench was a minimum of 3 ft wide and was backfilled with a uniform gradation, pea gravel-sized stone having a permeability on the order of 5 to 7 cm/sec. Three sumps were installed in the trench using 24-inch diameter perforated pipe. Sump 1 is approximately 190 ft from the north end of the trench; Sump 3 is approximately 180 ft from the southern end of the trench; and Sump 2 is approximately 385 ft from Sump 1 and approximately 420 ft from Sump 3.*

- An 8-inch diameter slotted collection pipe would be installed horizontally within the trench at elevation 1738 and connected to each vertical sump. Cleanouts would be provided for the slotted pipe. As described in FCO #001, the 8-inch diameter slotted collection pipe and associated cleanouts would not be installed, and instead, as described in FCO #001 and FCO #006A, four of the piezometers to be installed in the trench for monitoring of water levels would be installed with 8-inch diameter stainless steel screens; the 8-inch diameter screens could serve in the future as sumps for submersible pumps to augment groundwater recovery if necessary. *As discussed in Section 4 and/or as shown on the Record Drawings, four 8-inch diameter piezometers with stainless steel screens (SSC-1 through SSC-4) were installed within the extraction trench.*

- As described in a scope of work submitted to and approved by USEPA on September 20, 2004, and consistent with FCO #006A, to facilitate extraction of groundwater from bedrock, the six piezometers to be installed within the trench for monitoring of water levels would be screened within the trench, cased through remaining till, and extended a minimum of 12.5 ft into shallow bedrock with a 10-ft screen in bedrock. *As discussed in Section 4 and/or as shown on the Record Drawings, the six in-trench piezometers* (TMW-1, TMW-8, SSC-1 through SSC-4) *are screened in the trench with 10-ft screens and extend into bedrock at lengths ranging from approximately 13 ft (TMW-1) to 21 ft (SSC-3).*

- As described in a scope of work submitted to and approved by USEPA on September 20, 2004, consistent with FCO #006A, six 2-inch diameter piezometers (TMW-2 through TMW-7) would be installed approximately 4 ft downgradient of the trench. The piezometers would be screened from the bottom of the trench to approximately 4 ft below grade. *As discussed in Section 4 and/or as shown on the Record Drawings, six 2-inch diameter piezometers (TMW-2 through TMW-7) were installed approximately 4 ft downgradient of the trench. The piezometers were screened with 10-slot schedule 40 PVC well screens from the bottom of the trench to approximately 4 ft below grade.*

- Each extraction sump would be equipped with a pressure transducer to measure the water level in each sump, a gate valve to throttle flow if necessary, and a flow meter. A single underground pipeline would be provided to carry the combined flow from the three sumps to the groundwater treatment plant. As described in a field memorandum dated August 30, 2004, based on the presence of two inline ball valves, the gate valves would not be installed. *As discussed in Section 4 and/or as shown on the Record Drawings, each extraction sump is equipped with a pressure transducer and flow* *meter. A single underground pipeline has been provided to carry the combined flow to the groundwater treatment plant.*

- Each extraction sump would be equipped with a dilute acid feed pipeline to depress pH and keep iron in groundwater in solution; three acid feed pumps would be installed at the groundwater treatment plant. *As discussed in Section 4 and/or as shown on the Record Drawings, each extraction sump is equipped with an acid injection line, and acid feed pumps are located in the GWTP.*

SECTION 3

NORTH AREA CONSTRUCTION ACTIVITIES

3.1 INTRODUCTION

This section describes the construction of the groundwater treatment plant and North Area recovery well network. The construction of the GWTP and the electrical and mechanical portion of the North Area recovery well network, and associated construction quality control, was performed by Samco Technologies, Inc. (Samco). Samco self-performed construction of the major system components at their Tonawanda, NY facility prior to shipment to the site. Samco procured and managed (3) first tier subcontractors to complete construction of the GWTP:

Evans Mechanical – Mechanical Subcontractor: Evans was responsible for rigging large system components, installing HVAC, installing mechanical piping and plumbing, and performing pipe leak testing.

Matco Electric – Electrical Subcontractor: Matco was responsible for installing and testing the electrical system and instrumentation controls. Matco also installed the fire alarm system.

Garbade Construction – Building and Earthwork Subcontractor: Garbade was responsible for the overall GWTP building and site work. Garbade's crew installed the building footers, grade beams, containment walls, equipment pads, and GWTP office. Garbade procured several second tier subcontractors to provide assistance:

Gary Dyer Excavating – Earthwork Subcontractor: Dyer was responsible for site grading and access road installation.

Reliance – Fence Subcontractor: Reliance was responsible for installing the security fence and gates.

Pendall – Building Erector: Pendall installed the building walls and roof.

Consolidated Masonry Contractors - Specialty Concrete Finishers: Consolidated Masonry Contractors installed and finished the main slab.

U.S. Reinforcing - Iron Workers: U.S. Reinforcing installed the reinforcing bar for concrete work.

T. Douglas Painters: T. Douglas Painters painted concrete surfaces including the main slab, containment areas, and equipment pads, and other surfaces including bollards, railings, and the GWTP office.

Osterhouts - Hydroseed Subcontractor: Osterhouts hydroseeded disturbed site areas following finish grading.

Wakin Land Surveying - Surveying Subcontractor: Wakin Land Surveying completed the initial GWTP building markout and a survey of the North Area.

There were several North Area activities that were not completed by Samco. The North Area recovery and monitoring wells were installed in 2003 by Eichelbergers, Inc. under subcontract to Parsons. In 2003, Shaw installed the GWTP septic system leach field and associated piping from the septic tank, and paved the GWTP driveway. In 2006, DA Collins placed concrete barriers at the GWTP. In addition, to facilitate comparative assessment of groundwater elevations across the Site, the North Area recovery and monitoring wells were re-surveyed in 2006 by Lawson Surveying and Mapping under subcontract to DA Collins.

A narrative description of the construction activities undertaken for the remedial action, including relevant QA/QC data, is presented in the subsections below. Record Drawings are provided in Appendix B; photographs are provided in Appendix E.

3.2 SITE PREPARATION

After completion of the Final (100%) Design but prior to the start of construction, Amphenol purchased the former Spizziri property which included the North Area. As a result of the purchase, the GWTP was relocated from RHR adjacent to the South Pond to the North Area. Additionally, the existing house and shed were available for use. Honeywell, Amphenol, and Parsons established a field office within the house. The shed was set up for equipment storage and a worker break room. Temporary electrical power from the field office was installed within the storage shed for lighting and heat.

3.2.1 Temporary Facilities

Two temporary field trailers, one each for the remedial action contractors and USEPA/EarthTech personnel were installed. The field trailers were equipped with temporary power, bottled water, phone, fax, copier, and computer service. The RAC trailer was initially used by Samco during construction of the GWTP and then by Shaw during construction of the extraction trench. Temporary electrical service (pole and single phase 120V) was provided by New York State Electric and Gas (NYSEG) for the two field trailers. Temporary toilet facilities were also provided. Until permanent power to the GWTP was installed, Samco utilized temporary generators for most construction activity needs.

3.2.2 Temporary Erosion Control

To reduce soil erosion, Samco installed temporary silt fence parallel to RHR within the southeast corner of the North Area and along the entire western side of the North Area at the toe of slope.

Due to water infiltration from springs located east of the GWTP, a drainage ditch was installed from RHR past the northern fence line. The drainage ditch, which was approximately

450 ft long, 3 ft deep, and 2 ft wide, consisted of pipe bedding sand, 6-inch diameter ADS pipe, and NYSDOT No. 2 stone.

3.2.3 Temporary Access Road

To provide access to the GWTP during construction, Samco installed a temporary access road. Two existing access points off RHR on either side of the field office were improved. The access road was installed around the field office, storage shed and GWTP. The access road, generally 15 ft wide, consisted of 6 inches of compacted NYSDOT Item #4 fill over woven geotextile. Due to wet conditions, cobbles and NYSDOT No. 1/2/3 stone were added and compacted for stabilization.

3.2.4 Initial Survey Markout

Utilizing existing survey control points located along RHR and the revised GWTP building design drawing, Wakin Land Surveying marked out the GWTP building. Elevation control points were established for use throughout construction.

3.3 PERMANENT SECURITY FENCE

A permanent security fence was installed around the North Area. The 6-ft high chain link fence was equipped with three strands of barbed wire, two 20-ft wide, double-leaf access gates along RHR, and one 10-ft wide, single-leaf access gate along the northern line. Each gate was equipped with a keyed-alike entry lock. The fence configuration encloses the GWTP, extraction wells, monitoring wells, house, shed and access road.

3.4 SITE GRADING

The North Area generally slopes from east to west and north to south. The site was graded to create a level area for construction of the GWTP. Native soil removed from the eastern side of the GWTP was used as fill on the western side. NYSDOT Item #4 was imported to the site for placement under concrete slabs when native material was disturbed. Compaction test results are provided in Appendix F. As shown in Appendix F, with a few exceptions test results exceed 95% compaction and in all cases test results exceed 90% compaction. Based upon a review of actual loads, slab construction, materials placed, and underlying soils, adequate compaction was achieved to support footings and equipment loads on the pad.

3.5 GWTP FOUNDATION

The GWTP building footprint is 60 ft east to west and 82 ft north to south. Approximately 350 cy of concrete was placed for the foundation including footers, grade beams, containment walls, main slab, raised slabs, and equipment pads. Documentation regarding the concrete placed is presented in Appendix F, including trip tickets provided by Otsego Ready Mix and concrete field and laboratory test reports provided by CME Associates, Inc. As shown in the concrete field and laboratory test reports, 28-day compressive strength test results were greater than 4000 psi.

3.5.1 Footers

To support the static load of the building and system components, a series of point footers and separate continuous footers were constructed with reinforced concrete. The point footers were located at the corners and midpoints of the building footprint. Continuous footers were installed below the exterior and interior containment walls.

3.5.2 Grade and Containment Walls

Reinforced concrete grade beams were constructed on top of the footers to distribute the building and system loads. The 8-inch thick grade beams also served as the containment walls for exterior tanks (47 inches above finished floor), caustic tank (47 inches above finished floor), and the main building containment curb (9 inches above finished floor). Hydraulic connection between the exterior containment area and the main building containment area provides a minimum of 110% spill capacity for the equalization tank, T-1, which has a volume of 26,000 gallons and is the largest tank in the containment area.

Penetrations through aboveground containment walls are equipped with watertight link seals. The caustic tank is located within a contained area not connected with the main containment area. Also, the acid and polymer storage totes are located on top of gratings that cover secondary containment wells constructed below the floor surface. The wells provide spill containment for these chemicals separate from the building slab/containment system to facilitate cleanup, prevent the chemicals from migrating into areas across which personnel tread, and prevent mixing with water that may be contained within the slab/containment system.

3.5.3 Main Slab and Raised Pads

The main slab was constructed of 10-inch reinforced concrete. Due to weather and schedule issues, a high early strength concrete mix was used. As shown on Record Drawing C-201, the main slab of the building is generally at elevation 1792 ft, with some pitch for drainage, and serves as the bottom of the main building containment area. Raised slabs for the office and filter press roll-off as well as raised pads for system components were constructed of 10-inch reinforced concrete on top of the main slab.

A main slab drain was installed to collect process water, general cleanup water, and/or tank spills. The pre-engineered drain encircles the process train and gravity flows to the main sump which is located in the center of the GWTP. The main sump (350 gallon capacity) is equipped with level sensors and a submersible pump that conveys water collected in the sump to the equalization tank (T-1).

3.5.4 Coating and Painting

Concrete surfaces that may come into contact with chemicals within a containment area received three coats of a 2-part epoxy coating system. For raised slabs and raised equipment pads, top concrete surfaces received two coats of 2-part epoxy.

The GWTP exterior and interior office walls, and other surfaces including office trim, window frames, and doors, were primed and painted. A drop ceiling and floor tile were also installed within the office. Other painted objects associated with GWTP included safety railings, exterior/interior bollards, safety ladders, and exterior propane piping.

3.6 GWTP BUILDING

3.6.1 Building Structure and Roof

The GWTP building is an 82-ft by 60-ft pre-engineered building with an eave height of approximately 20 ft. The building structure consists of steel columns, trusses, lateral bracing and diagonal cables. The building has a gable, standing seam galvalum metal roof, with a peak height of approximately 30 ft and a 4:12 (vertical:horizontal) pitch. The exterior walls are painted sheet metal. The building is insulated with fiberglass batts. Rain gutters, down spouts, and roof ice breakers are installed on the east and west sides.

3.6.2 Overhead and Man Doors

Three overhead rollup doors and three man doors were installed for building access. The southwest overhead door (14 ft high by 12 ft wide) was sized to allow large delivery trucks to pull into the GWTP building for offloading and pumping chemicals. The southeast overhead door (14 ft high by 10 ft wide) allows access to the filter press roll-off container. The northeast overhead door (14 ft high by 10 ft wide) allows access to the carbon units and air stripper.

3.6.3 Office

The GWTP office is made up of a control room and a restroom. The main control center (MCC) and main control panel (MCP) are located within the control room along with a desk, chair, computer, phone/fax, air conditioner, electrical baseboard heaters, window, and a door with viewing glass. The restroom contains a toilet, sink, exhaust fan, mirror, waste receptacle, and door.

3.6.4 Permanent Heating

Two 1,000-gallon propane tanks were installed approximately 30 ft east of the GWTP to provide propane fuel to the permanent heaters. The tanks are positioned on a 12-inch reinforced concrete slab and protected by bollards, jersey barriers, and the adjacent earthen slope. Black iron piping was installed below the access road between the tanks and the building. Piping was installed to four wall-hung unit heaters, located in each of the building corners and a central air makeup heater located at slab elevation along the north wall. Each unit heater is equipped with its own thermostat. The air makeup unit also has a separate setting to control air temperature.

3.6.5 Permanent Power

Amphenol/Honeywell contracted separately with NYSEG to install a 3-phase power line from Route 27 up Richardson Hill Road to the site. New power poles and lines were installed and terminated at a power pole inside the North Area fence. Three transformers and breakers were installed on the on-site power pole. Overhead power lines were hung from the on-site power pole to the southeast corner of the GWTP where the main building breaker box was installed. From that point, the 3-phase power line was run below the main concrete slab diagonally to the motor control center (MCC) at the northwest corner of the building.

3.6.6 Fire Alarm System

A building fire alarm system was installed. Two heat sensors within the main process area (located along the ceiling) and one smoke detector within the office were integrated with the alarm system. Fire alarm inspection/testing results are presented in Appendix F, including an initial inspection report dated February 28, 2003 and a more recent inspection report dated September 27, 2006.

3.6.7 Air Ventilation System

An air make-up system was installed to provide the GWTP building with a minimum of four clean air exchanges per hour. The air make-up system consists of an air handling unit, temperature controls, and three exhaust fans with associated louvers. The air handling unit, located outside the northern wall, was installed on a reinforced concrete slab. Temperature controls are positioned inside the building at the north wall mounted air intake. The exhaust fans were balanced and associated louvers were spaced along the southern wall to draw air evenly from within the building.

3.6.8 Permanent Emergency Diesel Generator

A permanent emergency diesel generator (EDG) was installed. The EDG was installed outside the western GWTP wall on a reinforced concrete slab (6 ft wide by 12 ft long by 12 inches thick). As described in a letter to USEPA dated December 1, 2003 (Parsons, 2003), the EDG was installed during Winter 2003, and despite efforts to heat frozen structural fill prior to pad installation, settlement occurred during Spring 2003. As described in the daily reports and the photo log, on May 28, 2003, the EDG frame was raised and the space between the frame and the pad was grouted.

On August 25, 2006, the frame was checked with a 3-ft builder’s level, and observed to be level along the axis of the generator, with an approximate ½-inch pitch away from the building perpendicular to the axis of the generator. On December 5, 2006, the EDG was inspected by Penn Power Systems, which indicated that there was no undue torsional stress on the EDG that would effect operation of the unit. The Penn Power Systems report is included in Appendix F. The O&M plan for the GWTP indicates that the level of the EDG frame will continue to be checked on a periodic basis and results reviewed with the EDG vendor performing routine maintenance.

The EDG was sized to provide 400 Amp, 460 Volt service to the GWTP. Prior to operation, the diesel tank was filled and the system tested. Startup testing results are presented in Appendix F.

3.6.9 Bollards / Concrete Barriers

Sixteen interior bollards and ten exterior bollards were installed in 2003 at critical components of the GWTP. In 2006, concrete barriers were installed to supplement the bollards at the propane tanks, gas meter, groundwater lines entering and exiting the equalization tank T-1, the emergency diesel generator, and the make-up air unit.

3.6.10 Septic System

The GWTP contains a single occupancy restroom with one toilet and one sink. The restroom uses water from the clean water tank located inside the GWTP. A septic system to service the GWTP restroom was constructed pursuant to a Subsurface Treatment System Determination issued by NYCDEP on June 26, 2003, which was based on a design prepared by Parsons dated June 13, 2003. The septic system was designed based on a loading rate of 40 gallons per day.

As shown on Record Drawing C-01, the system includes a 1,000-gallon pre-cast concrete septic tank, installed northwest of the GWTP between the edge of the asphalt pavement and the perimeter fence. A riser with a 24-inch diameter cover was installed from the top of the tank to final grade to provide for pumping of the tank. A 4-inch diameter PVC discharge pipe was installed from the GWTP to the septic tank. The 4-inch diameter PVC pipe was installed inside a 6-inch diameter cast iron pipe to provide protection beneath the access road. From the septic tank, a 4-inch diameter PVC pipe runs to a distribution box located approximately 100 ft northwest of the GWTP. Perforated PVC pipes (4-inch diameter, 15-ft long) were installed from the distribution box to distribute sewage within the leach field.

An engineered fill system was installed for the leach field. As described in the June 13, 2003 design, percolation tests indicated that the native soil met the minimum acceptable percolation rates at the primary leach field location to a depth of 16 inches. However, the design required a total of 24 inches of acceptable soil under the leach field; therefore, an additional 8 inches of engineered fill, meeting a percolation range of 5 to 15 minutes/inch, was included in the design and placed during construction. A representative from NYCDEP conducted percolation tests on the placed material during construction (i.e., November 2003); however, these test results were not available for inclusion in this report. On November 21, 2006, O'Brien & Gere Engineers, under subcontract to Parsons, conducted percolation tests on the engineered fill. The testing indicated that the engineered fill had a percolation rate of 11.5 to 13 minutes/inch, which is within the range of 5 to 15 minutes/inch presented in the design. Percolation test results are included in Appendix F.

3.7 GWTP SYSTEM

3.7.1 Equipment, Instrumentation, and Controls

Based on the approved process design, Samco designed and constructed system component skids at their Tonawanda, NY facility and delivered them to the site. Equipment (e.g., tanks, pumps, and mixers) were delivered to the site and installed. Equipment names, descriptions, and other pertinent information is presented on Table 3.1.

Samco, Matco, and Evans installed instrumentation and controls throughout the GWTP. A Programmable Logic Controller (PLC) was installed to control the system. An autodialer was setup to communicate directly with the PLC. A summary of instrumentation and controls is presented on Table 3.2.

3.7.2 Start-up and Testing

Following installation, equipment and systems were started and tested by Samco. Appendix F presents the results of equipment tests performed on equipment, piping, instrumentation, and controls during construction. The start-up and operation of the system is further described in Section 7.

3.8 CERTIFICATE OF OCCUPANCY

Based on a final inspection conducted by the Delaware County Code Enforcer on May 28, 2003, a Certificate of Occupancy was issued for the GWTP. A copy of the Certificate of Occupancy is included in Appendix F.

3.9 NORTH AREA RECOVERY WELLS

3.9.1 Recovery Wells

Under subcontract to Parsons, Eichelbergers, Inc. installed four 6-inch diameter stainless steel recovery wells (RW-1 through RW-4) with 25 ft of 0.30 slot screen within the shallow bedrock. The wells were constructed with stickup risers, caps, sand pack, and grout seals. A reinforced concrete pad was also installed at each well. The wells were developed. Appendix C presents well construction diagrams and well development documentation.

Following well installation, Samco installed submersible pumps [Grundfos RediFlow3], level transducers, electrical/instrumentation wiring, and pitless adaptors at each well. Piping and electrical/instrumentation wiring was also installed between each well and the GWTP.

3.9.2 North Area Monitoring Wells

Under subcontract to Parsons, Eichelbergers Inc. installed ten 2-inch diameter PVC monitoring wells (NMW-1 thru NMW-10) with 30-ft, 0.30-slot screens and 5-inch diameter black iron outer casings. The wells were constructed with stickup risers, locked caps, sand pack, and grout seals. A concrete pad was also installed around each well. The wells were developed. Appendix C presents well construction diagrams and well development documentation.

3.9.3 Other North Area Wells

Prior to construction, nine wells existed within the North Area: monitoring wells MW-8, MW-9S, MW-9D, MW-9DD, MW-15, MW-16; pump test well PW-1; and observation wells OI-1 and OI-2. As part of remedial construction, PW-1 was cut down to meet final grades. OI-1 was lengthened to meet final grades. MW-9S, MW-9D, MW-9DD, MW-15 and OI-2 were not altered. MW-8 and MW-16 were abandoned.

3.10 FINAL RESTORATION OF SURFACES AND DEMOBILIZATION

On April 1, 2003, Samco transferred the two temporary field trailers, electrical service, and phone service to Shaw. Samco personnel utilized the Parsons' field office for the remainder of GWTP construction, start-up, and testing. Following completion of construction, Samco demobilized personnel, equipment, storage boxes, remaining materials, and temporary sanitary facilities.

Shaw completed the final restoration of surfaces at the North Area, including paving the North Area access road with asphalt (approximately 4 inches of subbase material and 2 inches of top coat).

3.11 SURVEY

In 2003, Wakin Land Surveying completed a survey of the North Area including locations of the GWTP, storage shed, field office, access road, security fence, wells, septic system, utilities, pullboxes, and other features. Spot elevations within the North Area were collected as well. The survey drawing prepared by Wakin is presented in Appendix B.

In 2006, to facilitate comparative assessment of groundwater elevations across the Site, the North Area recovery and monitoring wells were re-surveyed by Lawson Surveying and Mapping. The survey drawing prepared by Lawson is presented in Appendix B.

TABLE 3.1

GWTP EQUIPMENT SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Equipment ID	Description	Information
T-1	Equalization Tank	Carbon steel with polyurethane liner; 26,000 gal
T-2	PAC Mix Tank	1st Chamber of Reaction Treatment Unit (RTU)
T-3	Polymer Flash Mix Tank	2nd Chamber of RTU
T-4	Flash Mix Flocculation Tank	3rd Chamber of RTU
T-5	Clear Well Tank	HDPE; 1,100 gal
T-6	Sludge Tank	Fiberglass-Reinforced Plastic; 13,300 gal
T-7	Pre-Coat Make Up Tank	HDPE; 600 gal
T-8	Acid Storage Tote	HDPE; 350 gal; 98% Sulfuric Acid (H_2SO_4)
T-9	Caustic Bulk Storage Tank	HDPE; 5,500 gal; 50% Sodium Hydroxide (NaOH)
T-10	Oil Collection Tank	Galvanized Steel with Polyethylene Liner; 275 gal
T-11	Dilute Acid Tank	HDPE; 550 gal; 10% H_2SO_4
T-12	N/A	N/A
T-13	Potable Water Tank	HDPE; 500 gal
T-14	Effluent Tank	HDPE; 6,000 gal
T-15	Polymer Bulk Storage Tote	HDPE; 350 gal
T-16	PAC Bulk Storage Tank	Fiberglass-Reinforced Plastic; 3,000 gal
OWS-1	Oil Water Separator	Three chambers: (1) 1,500 gal cracking tank, (2) coalescing oil/water separator, and (3) 1,500 gal final pH adjustment tank; baffled vertically; skid -mounted unit
RTU	Reaction Treatment Unit	Consists of PAC Mix Tank (T-2), Polymer Flash Mix Tank (T-3), and Floc Tank (T-4) on one skid mounted unit with 3 separate chambers
IPC-1	Inclined Plate Clarifier	Diagonally mounted plates used to drop out suspended particulate solids
AS-1	Air Stripper	100 gpm capacity; 4 trays; in-line silencers

TABLE 3.1 (CONTINUED)

GWTP EQUIPMENT SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Equipment ID	Description	Information
FP-1	Filter Press	18 cf capacity; 39 polypropylene plates; 383 sq ft filtration area.
AC-1	Air Compressor and Tank	120 psi; 50 gallon capacity; filter bypass; dryer
B-1	Air Stripper Blower	900 cfm
GAC-1	Granular Activated Carbon Vessel	5,000 lb; Carbon Steel with Epoxy Lining
GAC-2	Granular Activated Carbon Vessel	5,000 lb; Carbon Steel with Epoxy Lining
P-1	Lead Pump from T-1 to OWS	40 gpm; Centrifugal
P-2	Lag Pump from T-1 to OWS	60 gpm; Centrifugal
P-3	Lead Pump from T-5 to AS-1	40 gpm; Centrifugal
P-4	Lag Pump from T-5 to AS-1	60 gpm; Centrifugal
P-5	Lead Pump from AS-1 to Carbon Units	40 gpm; Centrifugal
P-6	Lag Pump from AS-1 to Carbon Units	60 gpm; Centrifugal
P-7	Sludge Pump from IPC-1 to T-6	Max 189 gpm; Air Diaphragm
P-8	Sludge Pump from T-6 to FP-1	Max 189 gpm; Air Diaphragm
P-9	Pre Coat Feed Pump	Max 82 gpm; Air Diaphragm
P-10	Floor Sump Pump	100 gpm; submersible
P-11	N/A	N/A
P-12	N/A	N/A
P-13	Potable Water Pump	37 gpm; Centrifugal
P-14	Effluent Recirculation Plant Water Pump	100 gpm; Centrifugal
P-15	Exterior Containment Floor Sump	150 gpm; Air Diaphragm
P-16	Acid Transfer Pump from T-8 to T-11	Chemical Feed; 4.8 gpm

TABLE 3.1 (CONTINUED)

GWTP EQUIPMENT SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Equipment ID	Description	Information
P-17	N/A	N/A
P-18	N/A	N/A
P-19	Backwash Pump	225 gpm; Centrifugal
P-20	Acid Transfer Pump from truck tote to Acid Storage Tote T-8.	Air Diaphragm
P-21	Polymer Transfer Pump from truck tote to Polymer Bulk Storage Tote T-15.	Max 57 gpm; Air Diaphragm
P-22	Equalization Tank Secondary Containment Overflow Pump	Air Diaphragm
CP-1	Acid Feed Pump from T-8 to OWS-1	20 gph; Air Diaphragm
CP-2	Caustic Feed Pump from T-9 to OWS-1	20 gph; Air Diaphragm
CP-3	PAC Metering Pump from T-16 to T-2	20 gph; Air Diaphragm
CP-4	Acid Feed Pump from T-8 to T-2	20 gph; Air Diaphragm
CP-5	Acid Feed Pump from T-8 to T-14	7 gph; Air Diaphragm
CP-6	Caustic Feed Pump from T-9 to T-2	20 gph; Air Diaphragm
CP-7	Caustic Feed Pump from T-9 to T-14	7 gph; Air Diaphragm
CP-S-1	Dilute Acid Metering Pump from T-11 to Collection Sump S-1	19 gph; Air Diaphragm
CP-S-2	Dilute Acid Metering Pump from T-11 to Collection Sump S-2	19 gph; Air Diaphragm
CP-S-3	Dilute Acid Metering Pump from T-11 to Collection Sump S-3	19 gph; Air Diaphragm
P-RW-1	Recovery Well RW-1 Submersible Pump	7 gpm

TABLE 3.1 (CONTINUED)

GWTP EQUIPMENT SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Equipment ID	Description	Information
P-RW-2	Recovery Well RW-2 Submersible Pump	7 gpm
P-RW-3	Recovery Well RW-3 Submersible Pump	7 gpm
P-RW-4	Recovery Well RW-4 Submersible Pump	7 gpm
PB-1	Polymer Blend Unit to	Plastic variable drive electric pump
PB-2	Polymer Blend Unit	Plastic variable drive electric pump
MX-1	T-1 Mixer	Sharpe 2.0-Hp
MX-2	OWS-1 Mixer (cracking tank)	Sharpe 1/3 Hp
MX-3	OWS-1 Mixer (final pH adjustment tank)	Sharpe 1/3 Hp
MX-4	T-11 Mixer	Sharpe 1/2Hp
MX-5	RTU Mixer (PAC)	Sharpe 1/3 Hp
MX-6	RTU Mixer (Polymer)	Sharpe 1/4 Hp
MX-7	RTU Mixer (Floc)	Sharpe 1/3 Hp
MX-8	IPC-1 Mixer	Not Used
MX-9	T-6 Mixer	Sharpe 1/3 Hp variable drive 0 – 10 rpm
MX-10	Precoat Mixer	Sharpe 1/2 Hp
BF-1	Bag Filter between T-5 and AS-1	100 gpm; 50 µm
BF-2	Bag Filter between T-5 and AS-1	100 gpm; 50 µm
BF-3	Bag Filter between AS-1 and Carbon Units	100 gpm; 25 µm
BF-4	Bag Filter between AS-1 and Carbon Units	100 gpm; 25 µm
BF-5	Bag Filter between Carbon Units and Effluent Tank T-14	100 gpm; 5 µm

TABLE 3.2
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
PL-201, -221, -231, -241	R	Recovery Wells (RW 1, 2, 3, 4)	Pump Operation Indicator Light (Off)
PL-201, -221, -231, -241	G	Recovery Wells (RW 1, 2, 3, 4)	Pump Operation Indicator Light (On)
HS-202, -222, -232, -242		Recovery Wells (RW 1, 2, 3, 4)	Pump Switch (Hand-Off-Auto)
LIC-201, -221, -231, -241		Recovery Wells (RW 1, 2, 3, 4)	Level Controller for Pump
PE-201, -221, -231, -241		Recovery Wells (RW 1, 2, 3, 4)	Level Measurement (Element)
FE-203, -223, -233, -243		Recovery Wells (RW 1, 2, 3, 4)	Flow Rate (Element)
FQI-203, -223, -233, -243		Recovery Wells (RW 1, 2, 3, 4)	Flow Rate (Indicator/Totalizer)
PI-201, -221, -231, -241		Recovery Wells (RW 1, 2, 3, 4)	Flow Pressure (Indicator)
AE-405		Recovery Wells Combined Flow	pH Measurement (Element)
AI-405		Recovery Wells Combined Flow	pH Measurement (Indicator)
PI-205		Recovery Wells Combined Flow	Pressure Indicator
LSL-340		Dilute Acid Tank (T-11)	Low Level Switch
HS-341		Dilute Acid Tank (T-11)	Mixer Switch (On/Off)
PI-301, -302, -303		Dilute Acid Feed Pumps (CP-S-1, -2, -3)	Pressure Indicator
HS-342, -343, -344		Dilute Acid Feed Pumps (CP-S-1, -2, -3)	Pump Switch (Hand-Off-Auto)
AE-404		Collection Sump Combined Flow	pH Measurement (Element)
AI-404		Collection Sump Combined Flow	pH Measurement (Indicator)
PL-403	R	Equalization Tank (T-11)	Mixer Operation Indicator Light (Off)
PL-403	G	Equalization Tank (T-11)	Mixer Operation Indicator Light (On)
HS-403		Equalization Tank (T-11)	Mixer Switch (Hand-Off-Auto)
LE-402		Equalization Tank (T-11)	Level Measurement (Element)
LIT-402		Equalization Tank (T-11)	Level Measurement (Indicator/Transmitter)
LI-402		Equalization Tank (T-11)	Level Controller
TE-401		Equalization Tank (T-11)	Temperature Measurement (Element)
TIT-401		Equalization Tank (T-11)	Temperature Measurement (Indicator/Transmitter)

TABLE 3.2 (CONTINUED)
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
TAL-401		Equalization Tank (T-11)	Low Temperature Alarm
LSH-406		Floor Sump	Floor Sump Pump High Level Switch
LSL-406		Floor Sump	Floor Sump Pump Low Level Switch
HS-411		Equalization Tank Lead Pump (P-1)	Pump Switch (Hand-Off-Auto)
HS-410		Equalization Tank Lag Pump (P-2)	Pump Switch (Hand-Off-Auto)
PI-407		Equalization Tank Lead Pump (P-1)	Pump Discharge Pressure Indicator
PI-408		Equalization Tank Lag Pump (P-2)	Pump Discharge Pressure Indicator
FE-415		Oil/Water Separator (OWS-1) Feed	Flow Measurement (Element)
FQI-415		Oil/Water Separator (OWS-1) Feed	Flow Measurement (Totalizer)
FCV-412		Oil/Water Separator (OWS-1) Feed	Flow Control Valve
HS-412		Oil/Water Separator (OWS-1) Feed	Control Valve Switch (Hand-Off-Auto)
AE-420		OWS-1 Cracking Tank	pH Measurement (Element)
AIT-420		OWS-1 Cracking Tank	pH Measurement (Indicator/Transmitter)
AIC-420		OWS-1 Cracking Tank	pH Controller
HS-421		OWS-1 Cracking Tank	Mixer (MX-2) Switch (Hand-Off-Auto)
HS-422		OWS-1 Final pH Adjustment Tank	Mixer (MX-3) Switch (Hand-Off-Auto)
AE-423		OWS-1 Final pH Adjustment Tank	pH Measurement (Element)
AIT-423		OWS-1 Final pH Adjustment Tank	pH Measurement (Indicator/Transmitter)
AIC-423		OWS-1 Final pH Adjustment Tank	pH Controller
HS-424		Oil/Water Separator (OWS-1)	Oil Drain Valve Switch (Hand-Off-Auto)
KV-424		Oil/Water Separator (OWS-1)	Oil Drain Valve Timer
KC-424		Oil/Water Separator (OWS-1)	Oil Drain Valve Controller (Solenoid)
LSH-425		Oil Collection Tank (T-10)	High Level Switch for Alarm
LE-460		Acid Storage Tote	Level Measurement (Element)

TABLE 3.2 (CONTINUED)
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
LIT-460		Acid Storage Tote	Level Measurement (Indicator/Transmitter)
HS-461		Acid Transfer Pump P-16 to T-11	Switch (Start/Stop)
YI-461		Acid Transfer Pump P-16 to T-11	Pulse Counter (Flow Measurement/Control)
PI-401		Acid Feed Pump CP-1 (to OWS-1)	Pressure Indicator
HS-430		Acid Feed Pump CP-1 (to OWS-1)	Switch (Hand-Off-Auto)
PI-402		Acid Feed Pump CP-4 (to T-2)	Pressure Indicator
HS-431		Acid Feed Pump CP-4 (to T-2)	Switch (Hand-Off-Auto)
PI-403		Acid Feed Pump CP-5 (to T-14)	Pressure Indicator
HS-432		Acid Feed Pump CP-5 (to T-14)	Switch (Hand-Off-Auto)
LE-470		Caustic Bulk Storage Tank (T-9)	Level Measurement (Element)
LIT-470		Caustic Bulk Storage Tank (T-9)	Level Measurement (Indicator/Transmitter)
TI-443		Caustic Bulk Storage Tank (T-9)	Temperature Measurement (Indicator)
PI-404		Caustic Feed Pump CP-2 (to OWS-1)	Pressure Indicator
HS-440		Caustic Feed Pump CP-2 (to OWS-1)	Switch (Hand-Off-Auto)
PI-405		Caustic Feed Pump CP-6 (to T-2)	Pressure Indicator
HS-441		Caustic Feed Pump CP-6 (to T-2)	Switch (Hand-Off-Auto)
PI-406		Caustic Feed Pump CP-7 (to T-14)	Pressure Indicator
HS-442		Caustic Feed Pump CP-7 (to T-14)	Switch (Hand-Off-Auto)
LSL-480		Potable Water Storage Tank (T-13)	Low Level Switch for Alarm
PI-409		Potable Water Storage Tank (T-13)	Pressure Indicator
PI-410		Potable Water Storage Tank (T-13)	Pressure Indicator
HS-450		Potable Water Storage Tank (T-13)	Emergency Eye Wash/Shower Switch (On/Off)
LE-540		PAC Bulk Storage Tank (T-16)	Level Measurement (Element)
LIT-540		PAC Bulk Storage Tank (T-16)	Level Measurement (Indicator/Transmitter)

TABLE 3.2 (CONTINUED)
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
PI-501		PAC Metering Pump CP-3 (to T-2)	Pressure Indicator
HS-570		PAC Metering Pump CP-3 (to T-2)	Pump Switch (Hand-Off-Auto)
FS-502		PAC Metering Pump CP-3 (to T-2)	Flow Switch
AE-503		PAC Mix Tank (T-2)	pH Measurement (Element)
AIC-503		PAC Mix Tank (T-2)	pH Controller
HS-501		PAC Mix Tank (T-2)	Mixer (MX-5) Switch (On/Off)
HS-520		Polymer Mix Tank (T-3)	Mixer (MX-6) Switch (Hand-Off-Auto)
SIC-520		Polymer Mix Tank (T-3)	Mixer (MX-6) Speed Controller
HS-521		Floc Tank (T-4)	Mixer (MX-7) Switch (Hand-Off-Auto)
SIC-521		Floc Tank (T-4)	Mixer (MX-7) Speed Controller
FS-581		Polymer Blend Unit PB-1	Flow Switch
HS-580		Polymer Blend Unit PB-1	Switch (Hand-Off-Auto)
LE-550		Polymer Bulk Storage Tote (T-15)	Level Measurement (Element)
LIT-550		Polymer Bulk Storage Tote (T-15)	Level Measurement (Indicator/Transmitter)
PI-503		Sludge Pump (P-7)	Compressed Air Supply Pressure Indicator
PI-504		Sludge Pump (P-7)	Discharge Pressure Indicator
KV-532		Sludge Pump (P-7)	Sludge Discharge Valve (Three-Way) Switch (Hand-Off-Auto)
LAH-560		Floor Sump	High Level Alarm
LSHL-560		Floor Sump	Time Switch, High/Low
TSL-561		Building	Low Temperature Switch for Alarm
TAL-561		Building	High Temperature Switch for Alarm
LE-601		Clear Well Tank (T-5)	Level Measurement (Element)
LIT-601		Clear Well Tank (T-5)	Level Measurement (Indicator/Transmitter)

TABLE 3.2 (CONTINUED)
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
PI-601		Air Stripper Lead Feed Pump (P-3)	Discharge Pressure Indicator
HS-602		Air Stripper Lead Feed Pump (P-3)	Switch (Hand-Off-Auto)
PI-602		Air Stripper Lag Feed Pump (P-4)	Discharge Pressure Indicator
HS-603		Air Stripper Lag Feed Pump (P-4)	Switch (Hand-Off-Auto)
FCV-605		Air Stripper Feed	Flow Control Valve
HS-605		Air Stripper Feed	Flow Control Valve Switch (Hand-Off-Auto)
PI-603		Air Stripper Feed Bag Filters (BF-1, BF-2)	Pre-Filter Pressure Indicator
PI-604		Air Stripper Feed Bag Filters (BF-1, BF-2)	Post-Filter Pressure Indicator
PDSH-610		Air Stripper Feed Bag Filters (BF-1, BF-2)	Differential Pressure Switch, High (Switch for Tier 1 Alarm)
PDSHH-610		Air Stripper Feed Bag Filters (BF-1, BF-2)	Differential Pressure Switch, High (Switch for Tier 2 Alarm)
PI-621		Air Stripper (AS-1)	Intake Vacuum Pressure Indicator
PSL-621		Air Stripper (AS-1)	Intake Low Vacuum Pressure Switch
HS-622		Blower B-1	Switch (Hand-Off-Auto)
LSL-620		Air Stripper (AS-1)	Sump Low Level Switch
LSH-620		Air Stripper (AS-1)	Sump High Level Switch
LSHH-620		Air Stripper (AS-1)	Sump High-High Level Switch
LAH-620		Air Stripper (AS-1)	Sump High Level Alarm
HS-630		Carbon Vessels Lead Feed Pump (P-5)	Switch (Hand-Off-Auto)
HS-631		Carbon Vessels Lag Feed Pump (P-6)	Switch (Hand-Off-Auto)
HS-654		Polymer Blend Unit (PB-2)	Switch (Hand-Off-Auto)
AI-641		Sludge Tank (T-6)	Mixer (MX-9) Amperage Indicator
HS-641		Sludge Tank (T-6)	Mixer (MX-9) Switch (On/Off)
SIC-641		Sludge Tank (T-6)	Mixer (MX-9) Speed Controller

TABLE 3.2 (CONTINUED)
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
LE-640		Sludge Tank (T-6)	Level Measurement (Element)
LIT-640		Sludge Tank (T-6)	Level Measurement (Indicator/Transmitter)
PI-608		Filter Press Sludge Feed Pump (P-8)	Compressed Air Supply Pressure Indicator
CV-651		Filter Press Sludge Feed Pump (P-8)	Compressed Air Supply Solenoid Control Valve
PI-609		Filter Press (FP-1) Feed	Sludge/Pre-Coat Slurry Combined Flow Pressure Indicator
YIC-650		Filter Press (FP-1)	Press/Pre-Coat Controller
HS-653		Pre-Coat Pump (P-9)	Compressed Air Supply Solenoid Switch (Hand-Off-Auto)
HS-652		Pre-Coat Make-Up Tank (T-7)	Mixer (MX-10) Switch (On/Off)
LSL-656		Pre-Coat Make-Up Tank (T-7)	Low Level Switch
PI-701		Carbon Vessel Feed Bag Filters (BF-3, BF-4)	Pre-Filter Pressure Indicator
PI-702		Carbon Vessel Feed Bag Filters (BF-3, BF-4)	Post-Filter Pressure Indicator
PDSH-701		Carbon Vessel Feed Bag Filters (BF-3, BF-4)	Differential Pressure Switch, High High (Switch for Tier 1 Alarm)
PDSHH-701		Carbon Vessel Feed Bag Filters (BF-3, BF-4)	Differential Pressure Switch, High High (Switch for Tier 2 Alarm)
PI-703		Carbon Vessel Feed	Post-Filter Pressure Indicator
PI-704		Carbon Vessel GAC-1	Internal Pressure Indicator
PI-705		Carbon Vessel GAC-1	Discharge Pressure Indicator
PI-706		Carbon Vessel GAC-2	Discharge Pressure Indicator
PI-707		Carbon Vessel Effluent to Bag Filter BF-5	Pre-Filter Pressure Indicator
PI-708		Carbon Vessel Effluent to Bag Filter BF-5	Post-Filter Pressure Indicator
AE-724		Effluent Tank (T-14)	pH Measurement (Element)

TABLE 3.2 (CONTINUED)
GWTP INSTRUMENTATION SUMMARY
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Tag Number	Suffix	Service	Description
AIC-724		Effluent Tank (T-14)	pH Controller
AAL-724		Effluent Tank (T-14)	Low pH Alarm
AAH-724		Effluent Tank (T-14)	High pH Alarm
LSL-722		Effluent Tank (T-14)	Low Level Switch
LSH-723		Effluent Tank (T-14)	High Level Switch
HS-720		Effluent Recirculation/Plant Water Pump (P-14)	Switch (Hand-Off-Auto)
PI-709		Effluent Recirculation/Plant Water Pump (P-14)	Discharge Pressure Indicator
LE-721		Effluent Tank (T-14)	Parshall Flume Flow Measurement (Element)
LIT-721		Effluent Tank (T-14)	Parshall Flume Flow Transmitter
FQI-721		Effluent Tank (T-14)	Discharge Flow Totalizer
HS-722		Backwash Pump (P-19)	Switch (Hand-Off-Auto)
PI-710		Backwash Pump (P-19)	Pressure Indicator
FI-701		Backwash Pump (P-19)	Flow Measurement (Indicator)

SECTION 4

SOUTH AREA CONSTRUCTION ACTIVITIES

4.1 INTRODUCTION

This section describes the construction of the groundwater extraction trench. The groundwater extraction trench construction and associated construction quality control was performed by Shaw Environmental of Trenton, New Jersey (Shaw).

Shaw self-performed construction of the major system components. Shaw procured and managed the following four first tier subcontractors to complete construction of the groundwater extraction trench:

> *GeoSolutions – Vertical Barrier Wall Subcontractor:* GeoSolutions was responsible for fabricating and providing the high density polyethylene (HDPE) barrier wall panels and providing guidance for panel installation.
>
> *Len Crawford Electric – Electrical Subcontractor:* Len Crawford Electric was responsible for installing and testing of electrical system components for the extraction trench.
>
> *Eichelbergers, Inc. – Drilling Subcontractor:* Eichelbergers, Inc. was responsible for installation of the extraction trench monitoring wells.
>
> *B&B Hi-Tech Solutions – Surveying Subcontractor:* B&B was responsible for site surveying during construction.

As constructed, the extraction trench is approximately 1147.5 ft long and was excavated using bio-polymer slurry techniques. The trench alignment, shown on Record Drawing C-9, was approximately 5 ft east from the original design, consistent with FCO #006A. The trench was a minimum of 3 ft thick and had bottom elevations ranging from 1728.5 ft to 1742.4 ft. An HDPE barrier wall with hydrophilic joints was installed, typically within 1 ft of the bottom of the trench, using a steel frame system. The trench was backfilled with clean, uniform gradation, pea gravel-sized stone. Three groundwater recovery sumps were installed in the trench, and piezometers and/or monitoring wells were installed within and downgradient of the trench. Major equipment provided by Shaw used in the construction of the trench consisted of the following:

- A slurry batching plant which included: four 20,000-gallon frac tanks for storage of potable water, mixed slurry, and decanted in-trench slurry; two cone-bottom flash mixers used for mixing the slurry; one water truck; and miscellaneous pumps, valves, hoses, supply lines, tanks, and other equipment required to adequately supply slurry to the trench.

- Extraction trench construction equipment which included: two front end loaders; one Terex 860 backhoe; one Cat 375 trackhoe with long reach excavation arm; one scissor lift platform; one 50-ton hydraulic crane; and two off-road dump trucks.
- Equipment to conduct tests on the bio-polymer slurry. These primarily included a marsh funnel and a mud balance along with other equipment to assess the properties of the slurry.

Restoration of surfaces in the vicinity of the extraction trench was completed by DA Collins in 2005 and 2006. In addition, to facilitate comparative assessment of groundwater elevations across the Site, the collection sumps and extraction trench wells were re-surveyed in 2006 by Lawson Surveying and Mapping under subcontract to DA Collins.

A narrative description of the construction activities undertaken for the remedial action, including relevant QA/QC data, is presented in the subsections below. Record Drawings are provided in Appendix B; photographs are provided in Appendix E.

4.2 SITE PREPARATION / WORK PLATFORM CONSTRUCTION

A work platform was constructed prior to extraction trench excavation to provide a structurally sound working area and trench stability (i.e., the work platform provided a vertical differential between the groundwater table and the slurry level in the trench). In order to construct the work platform, several other tasks were first completed. An existing telephone cable located on the east side of Richardson Hill Road was relocated to prevent damage during trench excavation. The South Pond was drained and sediment along the west bank of the South Pond was removed to prepare the area for clean fill. Municipal waste located in and parallel to Richardson Hill Road at the toe of the landfill (Waste Area L4) was excavated, placed in the TSCA cell or landfill area depending on PCB concentrations, and compacted. The draining and sediment removal in the South Pond, the remediation of Waste Area L4, and the restoration of these areas is described in the Interim RA Report for Remedial Work Element I.

The work platform was approximately 50 ft wide, extending from the centerline of Richardson Hill Road toward and into a portion of the South Pond, and ranged in elevation from 1759 ft to 1760 ft from north to south. The width and location of the platform allowed one lane of Richardson Hill Road to remain open during non-working hours; however, the road was generally closed during trench construction. The work platform material consisted of structural backfill material supplied by Clarke Industries of Sidney, New York. Documentation concerning the material provided is included in Appendix F. The reports provided indicate that PCBs were not detected in samples of the material at detection limits ranging from 35 to 120 ug/kg. The work platform was compacted to provide structural stability during trench construction. Compaction test reports are provided in Appendix F.

4.3 TRENCH EXCAVATION

The trench was excavated using bio-polymer slurry techniques to maintain stable sidewalls during excavation and backfilling. Guar gum (G150) supplied by Rantec Corporation of Ranchester, Wyoming was used to create the bio-polymer slurry. Two additives were mixed with the slurry: Busan 1059 WS biostat supplied by Buckman Laboratories of Memphis, Tennessee was used as a growth microbial inhibitor and soda ash from HCI U.S.A. Distribution Companies, Inc. of St. Louis, Missouri was used as a pH buffer. Material Safety Data Sheets and bio-polymer compatibility testing results are included in Appendix F.

Shaw furnished the water for use in preparing the bio-polymer slurry. As described in the USEPA approved Remedial Action Workplan, the water was supplied from a pond located at the north end of Richardson Hill Road. As shown on Table 4.1, an initial characterization sample of the water was non-detect for PCBs. During construction, the water was tested by Shaw weekly for pH, total hardness, total dissolved solids (TDS), and total organic carbon (TOC). As shown on Table 4.1, the water met specified requirements for hardness (LT 50 mg/l), total organic carbon (LT 50 mg/l), total dissolved solids (LT 50 mg/l), and pH (6.5 - 7.5), with the exception of pH on several occasions, which did not affect the performance of the slurry. Water characterization laboratory reports are provided in Appendix F.

Fresh slurry was prepared and stored in 20,000-gallon frac tanks at the north end of the trench alignment. Slurry was sampled and tested by Shaw once each day it was prepared and prior to pumping to the trench. Parsons observed and documented the testing results, and also performed calibration testing of the marsh funnels and mud balance with water. As shown on Table 4.2, the results achieved the minimum specified requirement for viscosity (i.e., minimum of 80 sec). While the pH of fresh slurry was slightly greater than specified (i.e., 9.5 - 10), and the density slightly less than specified (i.e., minimum of 63.5 pounds per cubic foot (pcf)), these variances did not affect the in-trench performance of the slurry.

Fresh slurry was pumped to the trench excavation to maintain the slurry within approximately 1 ft of the top of the platform. In-trench slurry samples were obtained twice per shift (from various trench depths) and tested. In-trench slurry samples were not obtained on non-work days. The requirement for sand testing of the in-trench slurry was waived in FCO #001. Parsons observed and documented the testing results. As shown on Table 4.3, the results achieved the minimum specified requirements for viscosity (i.e., minimum of 80 sec), with the exception of several occasions where viscosity dropped below requirements. This appeared to be related to heavy precipitation events around the time of the observed change. Typically, fresh slurry was added and the viscosity returned to a satisfactory condition. Lime was added to the trench prior and after the rain events to stabilize the pH. While the pH of in-trench slurry was on occasion slightly greater than specified (i.e., 9.5 to 10), and the density on occasion less than specified (i.e., minimum of 63.5 pcf), these variances did not affect the in-trench performance of the slurry.

The trench excavation commenced at the southern end of the trench at Station 11+50 and continued north to Station 0+00. Trench bottom elevations were recorded every 10 linear ft and are summarized in Table 4.4. As shown on Table 4.4, the trench was keyed a minimum of 2 ft into dense till/bedrock, consistent with FOC #006A, with the exception of a few localized areas where refusal was encountered. The top of the dense till/bedrock was identified in the field based on the excavation effort and observed trench spoils. The excavation effort at the top of the dense till/bedrock became noticeably more difficult and vibrations were typically felt adjacent to the trench. In the southern portion of the trench, practical refusal was encountered at many locations resulting in a trench depth less than anticipated by FCO #006A. The trench spoils from this area typically consisted of rock fragments, occasional cobbles, and limited amounts of soil. Additionally, the excavator teeth were broken on several occasions. Although top of bedrock was believed to have been reached along portions of the trench based on excavation effort and material excavated (i.e., rock fragments), top of bedrock can not be confirmed based on these observations alone and consistent with FCO # 006, portions of trench may have extended into dense till. Parsons visually examined and classified the excavated material to confirm the excavation was keyed a minimum of 2 ft below the top of the dense till/bedrock as presented in FCO #006A. Samples of the key material were also obtained and stored on site until completion of the trench.

After each section of the trench was excavated, the excavator bucket was dragged along the trench bottom to smooth the surface. The depth of the bottom of the trench was then measured at 10-ft horizontal intervals using a weighted tape. A profile of the wall is presented on Record Drawing C-9. The trench spoils were stockpiled in a lined bermed area east of the alignment between Stations 6+00 and 9+00.

Groundwater elevations along the alignment of the trench were monitored prior to and during trench excavation to assess whether the work platform was high enough to provide sufficient stability during extraction trench excavation. Monitoring points included existing wells, a temporary sump and a test pit installed by Shaw. Groundwater elevations at the sump installed by Shaw at Station 3+60 were higher than those assumed in the trench stability design calculations, apparently due heavy rains during the previous week. Parsons performed additional trench stability calculations during construction using the in-trench slurry properties and the anticipated trench depths. The calculations indicated a factor of safety below 1.0 with groundwater at the higher level; therefore, pumping of groundwater from the sump was recommended and performed. The pumped groundwater was treated at the onsite GWTP. A test pit was excavated to a depth of 12 ft along the trench alignment to evaluate if the water level observed in the sump was representative of the groundwater conditions along the trench. The pit was left overnight and no groundwater was observed. Shaw proceeded with the trench excavation based on the observed performance of the trench and observations from the test pit. Pumping from the sump was stopped once slurry was observed in it.

4.4 HDPE VERTICAL PANEL INSTALLATION / BACKFILLING

The HDPE vertical barrier system consisted of 80-mil smooth HDPE panels. The HDPE liner used to fabricate the panels was supplied and manufactured by Agru America, Inc. of Georgetown, South Carolina. The interlocking joints were installed by Geo-Solutions of Pittsburgh, Pennsylvania. Parsons visually inspected panels prior to installation for defects. Defects were observed in Panels 50 and 51 prior to installation in the trench. Shaw repaired the defects in accordance with the specifications and submitted repair documentation, which is included in Appendix F. Manufacturer's QA/QC test data for the panels is included in Appendix F.

The HDPE panels were installed by attaching panels to a steel installation frame in the staging areas. The frame with the HDPE panels attached to it was lifted and transported to the trench with a rubber-tired crane. The new panels were "threaded" into the joints of the previously installed panel. The joint seal was attached to the bottom of each panel. Parsons visually inspected the rolls of hydrophilic seal for damage and previous exposure to water prior to installation. The panels were then lowered slowly into the trench while feeding the joint sealer into place. Parsons observed the installation of the panels and joint sealer and documented the bottom elevation of each panel.

The trench was backfilled with clean, uniform gradation, pea gravel-sized stone supplied by Clark Company of Sidney, New York. Documentation concerning the material provided is included in Appendix F. The reports indicate that the samples of the material had tested permeability of 5 cm/sec and 7 cm/sec, consistent with the minimum requirement of 0.01 cm/sec presented in FCO #001, although the graduations varied somewhat from NYSDOT 1A. The reports also indicate that PCBs were not detected in samples of the material at detection limits of 34 and 41 ug/kg.

Parsons visually inspected the backfill material for the presence of debris or deleterious material prior to use. Typically, backfilling occurred once the excavation had proceeded 2 or 3 panel lengths from the toe of the backfill. Parsons observed the backfilling and documented the trench soundings in 10-ft intervals at the end of each work day and prior to the start of the next work day.

To hold the panels in place against the downgradient wall of the extraction trench, 40-ft by 10-ft steel plates, fitted with plastic pipe on the bottom to minimize damage to the panels, were placed into the trench. The steel plates were removed after sufficient backfill had been placed to hold the panels in place. Parsons observed the installation and removal of the plates. At Panel #20 the corner of the steel plate tore the HDPE. The limits of the tear were located above the final grades in the area and the excess HDPE including torn area were removed prior to final grading.

During the backfilling of Panels #16 and #17, damage to the panels was observed. The backfill appeared to be vertically dragging Panels #16 and #17 downward into the trench. A steel plate was lowered into the trench at Joint 15/16 to prevent any backfill from going behind Panel #15. Backfill was then brought to the work platform level at Panel #15 and trench construction continued. Corrective measures were implemented at Panels #16 and #17 as described in Section 4.6 below after completion of the trench.

After backfilling the trench was completed, a non-woven separation geotextile (TNS - E080) was installed horizontally over the trench stone, approximately 2 ft below final finished grade. Manufacturer's information concerning the non-woven geotextile installed is included in Appendix F. The trench was then backfilled with excess platform material.

4.5 TRENCH DE-MOBILIZATION

4.5.1 Disposal of In-trench Material

The material excavated from the trench was stockpiled in a lined berm area east of the trench between Stations 6+00 and 9+00. A breaking agent, LEB 4 (Liquid Enzyme Breaker), supplied by Rantec Corporation, was mixed with the material to break down the bio-polymer slurry. A Material Safety Data Sheet for LEB 4 is included in Appendix F. The material was then solidified with Portland cement and transported to the landfill for disposal. The placement of this material within the landfill, and the results of post-removal testing of the stockpile area performed with immunoassay field test kits, is described in the Interim RA Report for Remedial Work Element I.

4.5.2 Disposal of Slurry

LEB-4 (Liquid Enzyme Breaker) supplied by Rantec Corporation was used to break down the slurry from the stockpile in the lined bermed area. The excess water/slurry from the excavation spoils area was decanted and pumped to adjacent storage tanks. The tanks were then transported to the water treatment plant for treatment. Shaw also injected approximately 18 gallons of bio-polymer breakdown agent into the trench via the exposed stone and the sumps. The viscosity of the water from the trench was tested and the bio-polymer in the trench was considered broken when the viscosity was 26 seconds +/- 1 second. Documentation concerning the flushing and bio-polymer breakdown procedure is included in Appendix F. As discussed in Section 7, groundwater has been pumped from the trench since November 2004 at expected flow rates, which typically range from 10 to 50 gpm, further indicating that the breakdown of the bio-polymer was effective.

4.5.3 Removal of Excess Work Platform Material

The removal of the excess work platform material was initiated towards the end of trench the construction. The excess material was used during the restoration of Herrick Hollow Creek. The placement of this material during the restoration of Herrick Hollow Creek, and the results of pre-characterization testing performed with immunoassay field test kits, is described in the Interim RA Report for Remedial Work Element I.

4.6 REPAIR OF SHIFTED PANELS #16 AND #17

As described in Section 4.4, during the backfilling of Panels #16 and #17, damage to the panels was observed. Consistent with FCO #008, the affected area was excavated to a depth of 19 ft after the remainder of the trench was completed. A six-inch diameter HDPE pipe was installed horizontally at the bottom of the trench between Panels #15 and #17 to provide hydraulic conductivity across the repair area. The sides of the effected area were covered with a filter fabric from ground surface to the bottom of the trench, thereby covering the exposed face of the trench media. High-slump concrete was slowly deposited in lifts to prevent the pipe from dislodging and to backfill the excavated area to within 2 ft of finished grade. The area was then regraded to the final grade with clean fill material.

4.7 GROUNDWATER COLLECTION AND CONVEYANCE SYSTEM

Three 24-inch diameter perforated HDPE SDR 11 collection sumps were installed in the trench alignment prior to backfilling. The diameter of the sumps was modified per FCO #001 from 36 inches to 24 inches. The HDPE pipe was supplied by Rinker Materials of Gainesville, Texas; product information is included in Appendix F. Parsons observed the drilling of holes in the bottom of the collection sumps and inspected the pipe for damage prior to installation. The width of the trench at the sump locations was increased by six inches to allow for the installation. The locations of the sumps are shown on Record Drawing C-9.

Sump configuration and equipment are shown on Record Drawing C-102. The precast concrete sump vaults were manufactured by Binghamton Precast of Binghamton, New York. A submersible pump, flow sensor, and level transducer were installed in each sump. The submersible pumps were Redi-Flo4 manufactured by Grundfos Pumps Corporation of Olathe, Kansas. The flow sensors were Series FP-3000, and associated flow meter/controllers were Sigma Model SDM-693, both manufactured by Sigma Controls, Inc. of Perkasie, Pennsylvania. Insulation and heat tracing was installed on the 3-inch diameter HDPE groundwater pipes within each sump.

As described in the Field Memorandum dated August 30, 2004, included in Appendix A, the design included provision for an oil skimmer system in Sump 1. This portion of the groundwater extraction trench is downgradient of the former waste oil pit. As described in the Field Memorandum, field observations during construction indicated that the oil skimmer may not be necessary. Based on these observations, the skimmer itself was not installed, although provision for the future installation of the skimmer, if necessary, was retained. It should be noted that based on discussions with OMI and review of OMI reports, oil has not been observed in any of the extraction trench sumps or monitoring wells in 2006.

As shown on Record Drawings C-101 through C-105, a 3-inch diameter fusion-welded HDPE pipe, which each sump was connected to, was installed to convey recovered groundwater to the GWTP. Three ½-inch diameter fusion-welded HDPE pipes were also installed to convey dilute acid from the GWTP to each sump to reduce scaling of the water conveyance piping. The acid pipes were installed within 2-inch and 4-inch diameter fusion-welded HDPE pipes to provide secondary containment. The fusion-welded HDPE pipe to convey water and dilute acid was manufactured by Rinker Materials of Gainesville, Texas. The HDPE pipe couplings, tees, and other fittings were manufactured by Central Plastics Company of Shawnee, Oklahoma.

The HDPE pipes were equipped with a copper trace conductor and overlying warning tape. Electrical/instrumentation wiring and conduits with overlying warning tape were also installed from each sump to the GWTP. Precast concrete pullboxes were installed along both the piping and conduits runs. The piping and conduit runs were backfilled with clean fill, compacted, and restored with topsoil and seeding. The HDPE groundwater and acid pipes were air pressure tested; test results are presented in Appendix F.

4.8 MONITORING WELLS

4.8.1 Monitoring Wells Installation

Six pairs of monitoring wells (TMW-1 thru TMW-8 and SSC-1 thru SSC-4) were installed along the trench alignment, as shown on Record Drawing C-9. Each pair consisted of one well within the trench and one downgradient. The in-trench wells were installed approximately 13 to 21 ft into the underlying bedrock to provide hydraulic conductivity with the overlying trench backfill. The wells downgradient of the trench were installed to approximately the same depth as the adjacent trench. Well construction diagrams and well development documentation are provided in Appendix C; additional information regarding the wells is shown on Record Drawing C-103. Four of the wells within the trench (SSC-1 through SSC-4) were installed with 8-inch diameter stainless steel screens, to facilitate conversion to recovery wells at a later date, if necessary.

4.8.2 Monitoring Well Decommissioning

As shown on Table 4.5, a total of 34 existing wells, piezometers, and observation points were abandoned during the remediation. Several wells identified for abandonment in the design were not found; however, several previously unknown wells were found and abandoned. Many of the wells to be abandoned were not constructed as depicted in the historical well diagrams. Variations were found in the well and backfill materials, well diameters and grout location. Adjustments to the abandonment methods were made as needed depending on the individual well construction. The abandonment methods used are listed in Table 4.5.

During remediation, as described in FCO #002, USEPA had directed that wells MW-3S, MW-3D, MW-5D, MW-7S, and MW-7D not be abandoned. However, all but well MW-7D were destroyed during construction of the groundwater extraction trench. Further discussion concerning these wells is included in Appendix G.

4.9 FINAL RESTORATION OF SURFACES AND DEMOBILIZATION

In 2004, following completion of construction activities, the area disturbed for construction of the extraction trench was graded by Shaw. In 2005, DA Collins covered portions of the extraction trench work area with 6 inches of topsoil and seeded. Other portions of the work platform were used as a staging area for cap construction and were not restored until 2006.

In September and October of 2006, following completion of cap construction, which was performed as part of Remedial Work Element I, DA Collins completed the restoration of surfaces at the extraction trench, including the application of topsoil and seeding. Documentation concerning the topsoil provided in 2005 and 2006 is included in Appendix F. The reports indicate that PCBs were not detected in samples of the topsoil at detection limits of 38 ug/kg, 37 ug/kg, and 36 ug/kg. The telephone line that had been relocated to construct the extraction trench was re-installed between Richardson Hill Road and the extraction trench. At the request of Amphenol, guard rails were installed between Richardson Hill Road and each of the three collection sumps. A gravel turn around area was also provided.

On October 13, 2006, DA Collins completed demobilization from the site, including removal of equipment, field trailers, temporary sanitary facilities, and debris.

4.10 SURVEY

In 2006, Lawson Surveying and Mapping, under subcontract to DA Collins, surveyed finished surfaces in the vicinity of the extraction trench. To facilitate comparative assessment of groundwater elevations across the Site, Lawson also surveyed the locations and top of casing elevations of extraction trench monitoring wells, the collection sumps, including the top of 24-inch HDPE riser. The survey drawing prepared by Lawson is presented in Appendix B.

TABLE 4.1

POTABLE WATER FOR SLURRY TEST RESULTS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Collection Date (mm/dd/yyyy)	**Source**	**Total Hardness** (mg/L $CaCO_3$)	**Total Organic Carbon (TOC)** (mg/L)	**Total Dissolved Solids (TDS)** (mg/L)	**pH** (pH)	**Comments**
Criteria		LT 50	LT 50	LT 500	6.5 to 7.5 SU	
05/08/2003	Jess Howe's Pond	19.5	LT 6	47	7.6	Notes 1, 2.
06/10/2004	Jess Howe's Pond	27	LT 10	47	7.2	
07/09/2004	Jess Howe's Pond	31 B	LT 10	10	7.2	
07/15/2004	Jess Howe's Pond	32	LT 10	46	7.5	
07/21/2004	Jess Howe's Pond	30	LT 10	48	7.4	
07/26/2004	Jess Howe's Pond	32	LT 10	49	8.5	Note 2.
08/02/2004	Jess Howe's Pond	29	NA	56	8.2	Notes 2,3.

Notes:
1. Initial characterization sample. PCBs non-detect, at detection limits ranging from 0.05 to 0.10 ug/L, depending on arochlor.
2. pH outside specified range of 6.5 to 7.5 SU. Did not affect performance of slurry.
3. NA = Sample result not available.

TABLE 4.2

FRESH SLURRY PROPERTY TEST RESULTS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Material	Date	Time	pH	Temp	Viscosity	Density	Notes	Comments
				(°F)	(seconds)	(pcf)		
Criteria			**9.5-10 SU**		**>80**	**>63.5**		
Fresh Slurry	7/9/2004	11:00	10.4	64	105	63		Notes 1, 2
	7/10/2004	7:30	10.4	71	120	62.4	Tank 1 (White)	Notes 1, 2
	7/10/2004	7:30	10.3	73	110	62.5	Tank 2 (Green)	Notes 1, 2
	7/10/2004	13:55	10.3	78	116	63	Outlet Pipe @ Trench	Notes 1, 2
	7/11/2004	7:25	10.5	72	120	63	Tank 2 (Green)	Notes 1, 2
	7/11/2004	14:10	10.4	78	105	62.4	Tank 2 (Green)	Notes 1, 2
	7/12/2004	7:50	10.5	76	110	62.4	Tank 2 (Green)	Notes 1, 2
	7/12/2004	7:50	10.5	73	90	62.4	Tank 1 (White)	Notes 1, 2
	7/12/2004	14:45	10.4	NT	95	63	Tank 1 (White)	Notes 1, 2
	7/13/2004	7:50	10.4	70	115	62.5	Tank 1 (White)	Notes 1, 2
	7/13/2004	7:50	10.4	71	110	62.5	Tank 2 (Green)	Notes 1, 2
	7/13/2004	13:30	10.3	70	97	62.4	Tank 1 (White)	Notes 1, 2
	7/13/2004	13:30	10.4	72	101	62.4	Tank 2 (Green)	Notes 1, 2
	7/13/2004	15:30	10.4	75	113	NT	Outlet Pipe @ Trench	Notes 1, 3
	7/14/2004	8:00	10.4	71	100	62.5	Tank 2 (Green)	Notes 1, 2
	7/14/2004	8:00	10.4	70	115	62.4	Tank 1 (White)	Notes 1, 2
	7/14/2004	16:00	10.5	74	85	NT	Tank 2 (Green)	Notes 1, 3
	7/14/2004	16:00	10.5	73	83	NT	Tank 1 (White)	Notes 1, 3
	7/15/2004	7:45	10.5	71	83	NT	Tank 1 (White)	Notes 1, 3
	7/15/2004	7:45	10.5	72	85	NT	Tank 2 (Green)	Notes 1, 3
	7/15/2004	15:30	10.5	72	90	NT	Tank 2 (Green)	Notes 1, 3
	7/15/2004	15:30	10.5	72	98	NT	Tank 1 (White)	Notes 1, 3
	7/16/2004	7:45	10.5	70	88	63.2	Tank 2 (Green)	Notes 1, 2
	7/16/2004	8:05	10.5	69.5	97	63.3	Tank 1 (White)	Notes 1, 2
	7/16/2004	4:00	10.5	72.5	100	NT	Tank 1 (White)	Notes 1, 3
	7/16/2004	4:15	10.5	72	95	NT	Tank 2 (Green)	Notes 1, 3
	7/17/2004	7:35	10.5	70	100	62	Tank 1 (White)	Notes 1, 2, 4
	7/17/2004	7:35	10.5	70	100	62	Tank 2 (Green)	Notes 1, 2, 4
	7/17/2004	8:05	10.5	68	113	63	Outlet Pipe @ Trench	Notes 1, 2
	7/17/2004		10.5	73	120	62.4	Tank 1 (White)	Notes 1, 2, 4
	7/17/2004		10.5	73	105	62.4	Tank 2 (Green)	Notes 1, 2, 4
	7/18/2004	7:30	10.5	71.5	100	63.9	Tank 2 (Green)	Note 1
	7/18/2004	7:50	10.5	71	115	63.9	Tank 1 (White)	Note 1
	7/18/2004	15:00	10.5	70	120	63.9	Tank 1 (White)	Note 1
	7/18/2004	15:00	10.5	70	115	63.9	Tank 2 (Green)	Note 1
	7/19/2004	7:20	10.5	69	120	64.3	Tank 1 (White)	Note 1
	7/19/2004	7:40	10.5	69	115	64.3	Tank 2 (Green)	Note 1
	7/19/2004	15:45	10.5	74	118	64.0	Tank 1 (White)	Note 1
	7/19/2004	15:30	10.5	74	115	64.0	Tank 2 (Green)	Note 1
	7/20/2004	7:45	10.5	71.5	115	64.1	Tank 1 (White)	Note 1
	7/20/2004	7:30	10.5	71.5	115	64.1	Tank 2 (Green)	Note 1
	7/20/2004	16:00	10.5	76	105	64.0	Tank 1 (White)	Note 1
	7/20/2004	16:15	10.5	75	113	64.0	Tank 2 (Green)	Note 1
	7/21/2004	7:45	10.5	70.5	100	64.0	Tank 1 (White)	Note 1
	7/21/2004	7:30	10.5	70	115	64.0	Tank 2 (Green)	Note 1
	7/21/2004	16:30	10.5	77	105	64.0	Tank 1 (White)	Note 1
	7/21/2004	16:15	10.5	77	105	64.0	Tank 2 (Green)	Note 1
	7/22/2004	7:45	10.5	70.5	100	64.0	Tank 1 (White)	Note 1
	7/22/2004	7:30	10.5	70	115	64.0	Tank 2 (Green)	Note 1
	7/22/2004	16:30	10.5	79	105	62.0	Tank 1 (White)	Notes 1, 2, 4
	7/22/2004	16:00	10.5	78.5	105	62.0	Tank 2 (Green)	Notes 1, 2, 4

TABLE 4.2

FRESH SLURRY PROPERTY TEST RESULTS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Material	Date	Time	pH	Temp	Viscosity	Density	Notes	Comments
				(°F)	(seconds)	(pcf)		
Fresh Slurry	7/23/2004	7:45	10.5	76	92	62.4	Tank 1 (White)	Notes 1, 2, 4
	7/23/2004	7:30	10.5	75.5	108	62.4	Tank 2 (Green)	Notes 1, 2, 4
	7/23/2004	15:10	10.5	79	93	62.4	Tank 1 (White)	Notes 1, 2, 4
	7/23/2004	15:20	10.5	79	93	62.4	Tank 2 (Green)	Notes 1, 2, 4
	7/28/2004	7:15	10.5	73	92	62.8	Tank 1 (White)	Notes 1, 2, 4
	7/28/2004	7:25	10.5	73	110	62.8	Tank 2 (Green)	Notes 1, 2, 4
	7/28/2004	15:30	10.5	68	100	62.9	Tank 1 (White)	Notes 1, 2
	7/28/2004	15:40	10.5	68	100	62.9	Tank 2 (Green)	Notes 1, 2
	7/29/2004	7:40	10.5	67	100	62.8	Tank 1 (White)	Notes 1, 2
	7/29/2004	7:30	10.5	70	100	62.8	Tank 2 (Green)	Notes 1, 2
	7/29/2004	16:30	10.5	74	100	62.8	Tank 1 (White)	Notes 1, 2
	7/29/2004	16:40	10.5	74	100	62.8	Tank 2 (Green)	Notes 1, 2
	7/30/2004	7:40	10.5	68	105	62.9	Tank 1 (White)	Notes 1, 2
	7/30/2004	7:30	10.5	70	100	62.6	Tank 2 (Green)	Notes 1, 2
	7/30/2004	14:55	10.5	75	95	62.8	Tank 1 (White)	Notes 1, 2
	7/30/2004	15:05	10.5	74	90	62.8	Tank 2 (Green)	Notes 1, 2
	7/31/2004	7:25	10.5	72	96	62.9	Tank 1 (White)	Notes 1, 2
	7/31/2004	7:35	10.5	71	96	62.9	Tank 2 (Green)	Notes 1, 2
	7/31/2004	15:05	10.5	75.5	98	62.6	Tank 1 (White)	Notes 1, 2
	7/31/2004	15:10	10.5	75	98	62.6	Tank 2 (Green)	Notes 1, 2
	8/1/2004	7:35	10.5	70	115	62.9	Tank 1 (White)	Notes 1, 2
	8/1/2004	7:25	10.5	72	100	62.9	Tank 2 (Green)	Notes 1, 2
	8/1/2004	15:35	10.5	78	100	62.5	Tank 1 (White)	Notes 1, 2
	8/1/2004	15:45	10.5	79	100	62.5	Tank 2 (Green)	Notes 1, 2
	8/2/2004	7:45	10.5	71	98	62.6	Tank 1 (White)	Notes 1, 2
	8/2/2004	7:35	10.5	70	98	62.6	Tank 2 (Green)	Notes 1, 2
	8/2/2004	17:20	10.5	78	93	63.0	Tank 1 (White)	Notes 1, 2
	8/2/2004	17:15	10.5	78	95	63.0	Tank 2 (Green)	Notes 1, 2
	8/3/2004	7:30	10.5	71	95	63.0	Tank 1 (White)	Notes 1, 2
	8/3/2004	7:20	10.5	72	98	63.0	Tank 2 (Green)	Notes 1, 2
	8/3/2004	16:00	10.5	79	95	62.7	Tank 1 (White)	Notes 1, 2
	8/3/2004	15:45	10.5	79	95	62.7	Tank 2 (Green)	Notes 1, 2
	8/4/2004	7:35	10.5	74	97	63.0	Tank 1 (White)	Notes 1, 2
	8/4/2004	8:00	10.5	74	94	63.0	Tank 2 (Green)	Notes 1, 2
	8/4/2004	16:00	10.5	77	100	62.8	Tank 1 (White)	Notes 1, 2
	8/4/2004	16:15	10.5	78	95	62.8	Tank 2 (Green)	Notes 1, 2
	8/5/2004	7:35	10.5	70	105	63.0	Tank 1 (White)	Notes 1, 2
	8/5/2004	7:45	10.5	70	95	63.0	Tank 2 (Green)	Notes 1, 2
	8/6/2004	7:40	10.5	64	105	62.9	Tank 1 (White)	Notes 1, 2
	8/6/2004	7:30	10.5	64	105	62.9	Tank 2 (Green)	Notes 1, 2
	8/6/2004	15:25	10.5	70	110	63.1	Tank 1 (White)	Notes 1, 2
	8/6/2004	15:30	10.5	68	100	63.1	Tank 2 (Green)	Notes 1, 2
	8/7/2004	7:40	10.5	64	110	62.8	Tank 1 (White)	Notes 1, 2
	8/7/2004	7:30	10.5	64	110	62.8	Tank 2 (Green)	Notes 1, 2
	8/7/2004	15:30	10.5	67	110	62.8	Tank 1 (White)	Notes 1, 2
	8/7/2004	15:45	10.5	67	110	62.8	Tank 2 (Green)	Notes 1, 2
	8/8/2004	7:25	10.5	60	110	62.8	Tank 1 (White)	Notes 1, 2
	8/8/2004	7:15	10.5	60	110	62.8	Tank 2 (Green)	Notes 1, 2
	8/8/2004	17:00	10.5	76	100	62.8	Tank 1 (White)	Notes 1, 2
	8/9/2004	8:45	10.5	64	130	62.8	Tank 1 (White)	Notes 1, 2
	8/9/2004	16:15	10.5	69	110	62.8	Tank 1 (White)	Notes 1, 2

Notes:
1. pH outside specified range of 9.5 to 10 SU. Did not affect performance of slurry.
2. Density less than the minimum of 63.5 pcf. Did not affect performance of slurry.
3. NT - Not Tested
4. Unit weight measured with a triple beam.

TABLE 4.3

IN TRENCH SLURRY PROPERTY TEST RESULTS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Material	Date	Time	pH	Temp	Viscosity	Density	Notes	Comments
				(°F)	(seconds)	(pcf)		
Criteria			**9.5-10 SU**		**>80**	**>63.5**		
In trench Slurry	7/9/2004	17:00	10.5	NT	120	NT		Notes 1,3
	7/10/2004	7:30	10.4	66.8	130	NT		Notes 1,3
	7/10/2004	13:55	9.8	74	137	67	Lime added to trench slurry at end of day	
	7/11/2004	9:00	10.1	73	130	66		Note 1
	7/11/2004	14:10	9.9	74	110	67.5	Lime added to trench slurry at end of day	
	7/12/2004	7:50	10.0	73	131	67	Bottom of Trench at Station 11+40	
	7/12/2004	15:45	10.0	71	110	65	Station 11+00	
	7/13/2004	7:50	10.1	68	115	64.5		Note 1
	7/13/2004	17:30	10.3	63	115	63	Station 11+00 (top)	Notes 1, 2
	7/14/2004	7:30	10.0	68	115	64.5	Station 10+90	
	7/14/2004	15:45	10.1	71	114	65	Station 10+70 (middle)	Note 1
	7/15/2004	7:45	10.1	71	83	63	Station 10+50, top	Note1, 2
	7/15/2004	16:30	10.0	70	90	64	Station 10+10, 10' BGS	
	7/16/2004	8:30	10.1	68	95	65.5	Station 10+20	Note 1
	7/16/2004	16:42	10.1	70	89	67	Station 9+80, 5' bgs	Note 1
	7/17/2004	7:50	10.1	68	89	65.5	Station 9+70, 15' bgs	Note 1
	7/18/2004	7:55	10.5	68	92	65	Station 9+30	Note 1
	7/18/2004	15:00	10.5	73	96	64	Station 9+60, 5' bgs	Note 1
	7/19/2004	7:30	10.3	69	115	65	Station 9+00, 5' bgs	Note 1
	7/19/2004	17:45	10.5	73	140	66.5	Station 8+70, 5'bgs	Note 1
	7/20/2004	11:40	10.6	76	120	64	Station 8+50	Note 1
	7/20/2004	17:45	10.6	75	115	64.5	Station 8+10	Note 1
	7/21/2004	8:00	11.0	69	117	64.5	Station 7+90, 8' bgs	Note 1
	7/21/2004	13:30	11.1	73	105	65.0	Station 7+90, 8' bgs	Note 1
	7/22/2004	8:15	10.6	72	115	64.0	Station 7+50, Surface	Note 1
	7/22/2004	15:40	10.3	75	121	64.5	Station 7+00, 10' bgs	Note 1
	7/23/2004	8:10	10.4	75	112	63.0	Station 6+90, Surface	Note 1, 2
	7/23/2004	15:45	10.1	73	114	66	Station 6+30, 11' bgs	Note 1
		8:10	10.1	66	56	62.5	Station 5+20, 5' bgs	Note 1, 2
		15:45	10.0	69	96	66	Station 5+10, 20' bgs	Note 6
	7/29/2004	8:44	10.0	67	72	64	Station 4+80, at 5' bgs	Note 4
	7/29/2004	17:05	10.2	79	101	64	Station 4+60, at 2' bgs	Note 1
	7/30/2004	8:55	9.8	68	98	65	Station 5+50, at 5' bgs	
	7/30/2004	16:08	10.3	77	89	64	Station 5+50, at 1' bgs	Note 1
	7/31/2004	8:35	10.0	67	85	65	Station 4+30, at 10' bgs	
	7/31/2004	14:05	9.9	69	90	66	Station 4+10, at 25' bgs	
	8/1/2004	11:00	9.8	67	88	66	Station 3+90, at 25' bgs	
	8/1/2004	16:10	9.9	70	93	65	Station 3+60, at 5' bgs	
	8/2/2004	9:10	9.9	69	96	65.5	Station 3+40, at 15' bgs	
	8/2/2004	17:35	9.5	69	92	63	Station 3+30, at 15' bgs	Note 2
	8/3/2004	10:35	9.8	67	93	65	Station 3+10, 20' bgs	
	8/3/2004	15:20	9.5	72	90	65.5	Station 3+00, 15' bgs	
	8/4/2004	8:45	9.5	71	108	65	Station 2+70, surface	
	8/4/2004	13:55	9.5	68	87	66	Station 2+55, 3' bgs	
	8/5/2004	11:00	10.3	74	78	63.5	Station 2+10, surface	Note 1, 4, 5
	8/5/2004	17:10	9.7	72	75	64	Station 2+10, surface	Note 4, 5
	8/6/2004	10:30	9.5	65	90	66.5	Station 2+10, 10' bgs	
	8/6/2004	13:50	10.0	66	116	66	Station 2+10, 5' bgs	
	8/7/2004	8:00	9.8	63	95	66.5	Station 1+60, Surface	
	8/7/2004	17:20	9.5	65	95	65.5	Station 2+80, Surface	
	8/8/2004	7:55	9.5	62.5	97	67	Station 1+40, 5' bgs	
	8/8/2004	12:45	9.5	63	97	68.5	Station 1+10, 8' bgs	
	8/9/2004	8:15	9.5	64	154	66	Station 0+60, 8' bgs	
	8/9/2004	12:45	9.5	64	122	68	Station 0+50, 10' bgs	
	8/10/2004	8:40	8.8	64	120	67	Station 0+20, 10' bgs	Note 1
	8/10/2004		9.0	68	117	67	Station 0+00, Surface	Note 1

Notes:
1. pH outside specified range of 9.5 to 10 SU. Did not affect performance of slurry.
2. Density less than the minimum of 63.5 pcf. Did not affect performance of slurry.
3. NT - Not Tested
4. Viscosity less than the minimum 80 sec. Corrective measures taken as described in report.
5. May be attributed to heavy rainfall the previous evening.
6. Backhoe

TABLE 4.4

GROUNDWATER EXTRACTION TRENCH EXCAVATION DEPTHS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Station Number	Approx. Start of Panel Location	Panel Number	Date	Surveyed Platform Elevation (FT)	Approximate Top of Dense Till/Bedrock (FT)	Final Excavation Depth (FT)	Panel Installation Depth (FT)	Depth of Excavation into Dense Till/Bedrock (FT)	Comments
11+50	11+47.5	51	7/11/2004	1760.0	15.0	23.0	20	8.0	Excavation backfilled with stone to panel installation depth.
11+40			7/11/2004	1760.0	18.0	28.9	20	10.9	Excavation backfilled with stone to panel installation depth.
11+30	11+25	50	7/11/2004	1760.0	17.0	30.3	18	13.3	Excavation backfilled with stone to panel installation depth.
11+20			7/12/2004	1760.0	15.0	25.5	18	10.5	Excavation backfilled with stone to panel installation depth.
11+10	11+02.5	49	7/12/2004	1760.0	14.5	18.5	18	4.0	Excavation backfilled with stone to panel installation depth.
11+00			7/13/2004	1760.0	16.5	18.0	18	1.5	
10+90			7/13/2004	1760.0	19.0	20.0	18	1.0	
10+80	10+80	48	7/13/2004	1760.0	16.6	19.2	18	2.6	
10+70			7/13/2004	1760.0	12.5	18.2	18	5.7	
10+60	10+57.5	47	7/14/2004	1760.0	--	18.2	18		
10+50			7/14/2004	1760.0	15.0	19.0	18	4.0	
10+40	10+35	46	7/14/2004	1760.0	15.0	18.4	18	3.4	
10+30			7/15/2004	1760.0	16.0	18.5	18	2.5	
10+20	10+12.5	45	7/15/2004	1760.0	16.0	20.0	19	4.0	
10+10			7/15/2004	1760.0	15.7	19.5	19	3.8	
10+00			7/16/2004	1760.0	16.0	20.0	19	4.0	
9+90	9+90	44	7/16/2004	1760.0	--	20.0	19		
9+80			7/16/2004	1760.0	17.3	20.0	19	2.7	
9+70	9+67.5	43	7/16/2004	1760.0	16.5	19.3	18.25	2.8	
9+60			7/16/2004	1760.0	16.0	18.0	18.25	2.0	
9+50	9+45	42	7/17/2004	1760.0	--	19.0	18		
9+40			7/18/2004	1760.0	16.0	20.0	18	4.0	
9+30	9+22.5	41	7/18/2004	1760.0	15.0	20.0	18	5.0	
9+20			7/18/2004	1760.0	14.0	18.0	18	4.0	
9+10			7/18/2004	1760.0	14.0	18.0	18	4.0	
9+00	9+00	40	7/19/2004	1760.0	15.0	17.8	18	2.8	
8+90			7/19/2004	1760.0	15.0	17.8	18	2.8	
8+80	8+77.5	39	7/19/2004	1760.0	15.0	20.5	19	5.5	
8+70			7/20/2004	1760.0	15.0	19.0	19	4.0	
8+60	8+55	38	7/20/2004	1760.0	15.0	18.4	18	3.4	
8+50			7/20/2004	1760.0	15.0	18.0	18	3.0	
8+40	8+32.5	37	7/20/2004	1760.0	16.0	19.0	19	3.0	
8+30			7/20/2004	1760.0	16.0	19.0	19	3.0	
8+20			7/20/2004	1760.0	16.0	19.0	19	3.0	
8+10	8+10	36	7/21/2004	1760.0	16.0	18.5	18.5	2.5	
8+00			7/21/2004	1760.0	16.0	19.0	18.5	3.0	
7+90	7+87.5	35	7/21/2004	1760.0	16.0	19.0	18	3.0	
7+80			7/21/2004	1760.0	16.0	19.0	18	3.0	
7+70	7+65	34	7/21/2004	1760.0	16.0	18.0	18	2.0	
7+60			7/21/2004	1760.0	16.0	18.0	18	2.0	
7+50	7+42.5	33	7/21/2004	1760.0	16.0	18.5	18.5	2.5	
7+40			7/22/2004	1760.0	16.0	18.5	18.5	2.5	
7+30			7/22/2004	1760.0	16.0	18.0	18.5	2.0	
7+20	7+20	32	7/22/2004	1760.0	16.0	18.0	18	2.0	
7+10			7/22/2004	1760.0	16.0	17.6	18	1.6	
7+00	6+97.5	31	7/22/2004	1760.0	15.0	19.5	17	4.5	
6+90			7/22/2004	1760.0	15.0	20.0	17	5.0	
6+80			7/23/2004	1760.0	15.0	19.0	17	4.0	
6+70	6+65	30	7/23/2004	1760.0	16.0	19.5	18.7	3.5	
6+60			7/23/2004	1760.0	16.0	19.0	18.7	3.0	
6+50	6+43	29	7/24/2004	1760.0	15.0	23.5	22.25	8.5	
6+40			7/24/2004	1760.0	15.0	22.5	22.25	7.5	
6+30	6+30	28	7/24/2004	1760.0	14.0	22.5	25.5	8.5	
6+20			7/24/2004	1760.0	14.0	25.5	25.5	11.5	
6+10			7/24/2004	1760.0	14.0	27.0	25.5	13.0	
6+00	5+99	27	7/24/2004	1760.0	17.0	27.0	27	10.0	
5+90			7/25/2004	1760.0	23.0	27.0	27	4.0	
5+80	5+76	26	7/25/2004	1760.0	23.0	26.8	28	3.8	
5+70			7/25/2004	1760.0	25.0	27.7	28	2.7	

TABLE 4.4

GROUNDWATER EXTRACTION TRENCH EXCAVATION DEPTHS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Station Number	Approx. Start of Panel Location	Panel Number	Date	Surveyed Platform Elevation (FT)	Approximate Top of Dense Till/Bedrock (FT)	Final Excavation Depth (FT)	Panel Installation Depth (FT)	Depth of Excavation into Dense Till/Bedrock (FT)	Comments
5+60			7/25/2004	1760.0	25.0	28.3	28	3.3	
5+50	5+55	25	7/27/2004	1760.0	25.0	29.2	29	4.2	
5+40			7/27/2004	1760.0	26.0	29.0	29	3.0	
5+30	5+33	24	7/28/2004	1760.0	27.0	28.0	29	1.0	
5+20			7/28/2004	1760.0	27.0	29.0	29	2.0	
5+10	5+10	23	7/28/2004	1760.0	27.0	29.0	29.5	2.0	
5+00			7/28/2004	1760.0	27.0	29.5	29.5	2.5	
4+90	4+88	22	7/29/2004	1760.0	27.0	29.5	28.75	2.5	
4+80			7/29/2004	1760.0	27.0	30.0	28.75	3.0	
4+70	4+75	21	7/30/2004	1760.0	26.0	30.0	28.5	4.0	
4+60			7/30/2004	1760.0	26.0	29.0	28.5	3.0	
4+50	4+55	20	7/30/2004	1760.0	26.0	29.0	29	3.0	
4+40			7/31/2004	1760.0	27.0	30.0	29	3.0	
4+30			7/31/2004	1760.0	27.0	29.8	29	2.8	
4+20	4+23	19	7/31/2004	1760.0	25.0	30.5	28.75	5.5	
4+10			7/31/2004	1760.0	25.0	29.5	28.75	4.5	
4+00	4+00	18	8/1/2004	1760.0	24.0	29.5	29	5.5	
3+90			8/1/2004	1760.0	24.0	29.5	29	5.5	
3+80	3+78	17	8/1/2004	1760.0	24.0	29.0	28.5	5.0	
3+70			8/1/2004	1760.0	24.0	29.0	28.5	5.0	
3+60	3+55	16	8/2/2004	1760.0	24.0	29.0	29	5.0	
3+50			8/2/2004	1760.0	24.0	29.5	29	5.5	
3+40			8/2/2004	1760.0	24.0	29.0	29	5.0	
3+30	3+25	15	8/2/2004	1760.0	24.0	29.0	26	5.0	
3+20			8/2/2004	1760.0	23.0	28.0	26	5.0	
3+10	3+10	14	8/3/2004	1760.0	23.0	29.0	28.5	6.0	
3+00			8/3/2004	1760.0	24.0	29.0	28.5	5.0	
2+90	2+85	13	8/3/2004	1760.0	24.0	29.0	28	5.0	
2+80			8/3/2004	1759.8	24.0	28.5	28	4.5	
2+70			8/4/2004	1759.6	24.0	29.0	28	5.0	
2+60	2+63	12	8/4/2004	1759.5	23.0	28.9	26.5	5.9	
2+50			8/4/2004	1759.4	23.0	27.5	26.5	4.5	
2+40	2+40	11	8/5/2004	1759.3	23.0	28.5	27.4	5.5	
2+30			8/5/2004	1759.2	21.0	28.0	27.4	7.0	
2+20	2+17	10	8/6/2004	1759.0	21.0	29.0	29	8.0	
2+10			8/6/2004	1759.0	22.0	29.0	29	7.0	
2+00	1+95	9	8/6/2004	1759.0	22.0	29.3	28.8	7.3	
1+90			8/6/2004	1759.0	22.0	29.0	28.8	7.0	
1+80			8/7/2004	1759.0	24.0	29.5	28.8	5.5	
1+70	1+72	8	8/7/2004	1759.0	24.0	30.5	29.25	6.5	
1+60			8/7/2004	1759.0	24.0	29.5	29.25	5.5	
1+50	1+50	7	8/7/2004	1759.0	24.0	30.0	28.8	6.0	
1+40			8/7/2004	1759.0	24.0	30.0	28.8	6.0	
1+30	1+27	6	8/8/2004	1759.0	24.0	30.0	30	6.0	
1+20			8/8/2004	1759.0	24.0	30.5	30	6.5	
1+10			8/8/2004	1759.0	25.0	30.5	30	5.5	
1+00	1+04	5	8/8/2004	1759.0	25.0	31.0	29	6.0	
0+90			8/8/2004	1759.0	25.0	30.0	29	5.0	
0+80	0+78	4	8/8/2004	1759.0	24.0	30.0	28.9	6.0	
0+70			8/8/2004	1759.0	24.0	29.5	28.9	5.5	
0+60	0+56	3	8/8/2004	1759.0	24.0	30.5	28	6.5	
0+50			8/9/2004	1759.0	24.0	30.0	28	6.0	
0+40			8/9/2004	1759.0	24.0	29.5	28	5.5	
0+30	0+33	2	8/9/2004	1759.0	24.0	29.5	28.5	5.5	
0+20			8/10/2004	1759.0	24.0	29.0	28.5	5.0	
0+10	0+13	1	8/10/2004	1759.0	25.0	29.0	28	4.0	
0+00			8/10/2004	1759.0	25.0	30.0	28	5.0	
-0+10			8/10/2004	1759.0	25.0	30.0	28	5.0	

TABLE 4.5

LIST OF DECOMMISSIONED WELLS, PIEZOMETERS AND OBSERVATION POINTS
RICHARDSON HILL ROAD LANDFILL
SIDNEY, NEW YORK

Well Identification	Well Depth (feet)	Well Construction: Description	Primary Casing Diameter	Casing Material	Secondary Casing	Casing Material	Third Casing	Casing Material	Abandonment Method: Well Pulled	Well Grouted	Well Cut BGS	Well Overdrilled	Date of Abandonment
MW-1	22.5	Single-cased	2"	SS	NA	NA	NA	NA	Y	Y	N	N	5/8/2003
MW-2	29.5	Single-cased	2"	SS	NA	NA	NA	NA	N	Y	Y	N	5/8/2003
MW-3DD	140.0	Triple-cased	2"	PVC/SCH 40	8"	Steel	12"	Steel	N	Y	N	Y	5/14/2003
MW-5S	18.5	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	4/29/2003
MW-6	20.5	Single-cased	2"	SS	NA	NA	NA	NA	Y	Y	N	N	5/5/2003
MW-14	20.0	Single-cased	2"	SS	NA	NA	NA	NA	Y	Y	N	N	5/9/2003
MW-17	33.2	Single-cased	2"	SS	NA	NA	NA	NA	N	Y	Y	N	5/8/2003
MW-18S	19.1	Single-cased	2"	SS/SCH 5	NA	NA	NA	NA	Y	Y	N	N	4/30/2003
MW-18D	50.2	Double-cased	2"	PVC	6"	Steel	NA	NA	N	Y	Y	Y(42 FT)	5/12/2003
MW-18DD	143.0	Triple-cased	2"	PVC/SCH 40	8"	Steel	12"	Steel	Y	Y	Y	Y	5/7/2003
MW-19	37.0	Single-cased	2"	PVC	NA	NA	NA	NA	N	Y	Y	N	5/9/2003
MW-OP-15	20.0	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	5/8/2003
MW-OP-16	32.0	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	5/8/2003
MW-549	12.0	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	4/29/2003
MW-A	9.2	Single-cased	6"	PVC	NA	NA	NA	NA	Y	Y	N	N	5/5/2003
MW-B	17.5	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	5/5/2003
MW-??	12.0	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	4/29/2003
MW-??	12.0	Single-cased	2"	PVC	NA	NA	NA	NA	Y	Y	N	N	4/29/2003
PZ-1	18.0	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/29/2003
PZ-2	16.1	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/30/2003
PZ-3	12.0	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	N	4/29/2003
PZ-4	34.4	Single-cased	1"	PVC/SCH 40	NA	NA	NA	NA	Y	Y	N	Y	4/29/2003
PZ-5	34.1	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/30/2003
PZ-6	16.1	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/30/2003
PZ-7	23.2	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/29/2003
PZ-8	22.2	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/29/2003
PZ-9	22.7	Single-cased	1"	PVC	NA	NA	NA	NA	Y	Y	N	Y	4/29/2003
OP-1	6.0	Single-cased	6"	PVC	NA	NA	NA	NA	Y	Y	N	N	5/8/2003
OP-2	6.0	Single-cased	6"	PVC	NA	NA	NA	NA	Y	Y	Y	N	5/8/2003
TW-1	15.1	Single-cased	6"	Steel	NA	NA	NA	NA	Y	Y	N	N	5/5/2003
TW-2	34.7	Single-cased	6"	SS	NA	NA	NA	NA	N	Y	Y	N	5/5/2003
TW-3	23.0	Single-cased	6"	Steel	NA	NA	NA	NA	Y	Y	N	N	4/29/2003
MW-3S	19.5	Single-cased	2"	SS	NA	NA	NA	NA	Destroyed during extraction trench construction in 2004 (Not decommissioned)				
MW-3D	48.9	Double-cased	2"	PVC/SCH 40	6"	Steel	NA	NA	Destroyed during extraction trench construction in 2004 (Not decommissioned)				
MW-5D	51.5	Single-cased	2"	SS	NA	NA	NA	NA	Destroyed during extraction trench construction in 2004 (Not decommissioned)				
MW-7D	37.0	Double-cased	2"	PVC/SCH 40	6"	Steel	NA	NA	Destroyed during extraction trench construction in 2004 (Not decommissioned)				
MW-8	25.0	Single-cased	2"	SS	NA	NA	NA	NA	Not Available				2003
MW-16	20.0	Single-cased	2"	SS	NA	NA	NA	NA	Not Available				2003

NOTE:
1. Wells MW-516, MW-519 and MW-546 could not be located during construction for decommissioning.

LEGEND:
NA = Not Applicable
PVC = Polyvinyl Chloride
SCH = Schedule
MW = Monitoring Well
OP = Observation Point
PZ = Piezometer
UK = Unknown
SS = Stainless Steel
BGS = Below Ground Surface

SECTION 5

CHRONOLOGY OF EVENTS

A chronology of major events related to the design and construction of Remedial Work Element II, starting with the signing of the Record of Decision, is presented below:

CHRONOLOGY OF EVENTS

DATE	ACTIVITY
September 30, 1997	Record of Decision (ROD) for RHRL signed.
February 16, 1999	Consent Decree between USEPA, AlliedSignal, and Amphenol lodged with US District Court.
August 18, 1999	Remedial Design Work Plan submitted to USEPA.
September 22, 1999	Remedial Design Work Plan approved by USEPA.
October 11, 1999	Revisions to Remedial Design Work Plan distributed.
April 7, 2000	Pre-Design Investigation Report submitted to USEPA.
August 22, 2002	Final (100%) Remedial Design Report submitted to USEPA.
August 26, 2002	Remedial Design Report approved by USEPA (GWTP portion only).
September 19, 2002	Final Remedial Action Work Plan (GWTP) approved by USEPA.
September 19, 2002	Groundwater Treatment Plant and North Area Recovery Well construction initiated (mobilization)
October 3, 2002	Final Remedial Action Work Plan (GWTP) distributed.
October 14, 2002	Revised Design Drawings reflecting relocation of groundwater treatment plant to North Area distributed.
January 21, 2003	Remedial Action Work Plan Addendum (North Area Recovery Wells) submitted to USEPA.
January 23, 2003	Remedial Action Work Plan Addendum (North Area Recovery Wells) approved by USEPA.

CHRONOLOGY OF EVENTS (CONTINUED)

DATE	ACTIVITY
May 7, 2003	North Area recovery wells completed.
May 7, 2003	Remedial Design Report approved by USEPA. (Balance of remediation, including groundwater Extraction Trench. Approval based on letters submitted by Parsons on January 16, 2003 and April 11, 2003).
May 8, 2003	Pre-Final Inspection, GWTP and North Area Recovery Wells
July 18, 2003	Groundwater treatment plant construction completed.
July 21, 2003	Initiation of groundwater recovery and treatment, North Area
August 25, 2003	Operational Testing, GWTP and North Area recovery wells
May 21, 2004	Remedial Action Work Plan (including plan for groundwater extraction trench) conditionally approved by USEPA.
May 26, 2004	Groundwater Extraction Trench construction initiated (mobilization)
June 11, 2004	Final Remedial Action Work Plan (including plan for groundwater extraction trench) distributed.
November 2, 2004	Initiation of groundwater recovery and treatment, Extraction Trench
December 17, 2004	Extraction Trench construction completed (not including final restoration of surfaces).
August 29, 2006	Pre-Final Inspection, Extraction Trench
October 3, 2006	Extraction Trench construction completed (restoration of surfaces).
October 10, 2006	Final Inspection, Extraction Trench
November 30, 2006	Final Survey field work completed

SECTION 6

PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY ASSURANCE / QUALITY CONTROL

6.1 OVERVIEW

The construction was implemented pursuant to the Construction Quality Assurance Project Plan, which was appended to the Final (100%) Remedial Design Report (Parsons, 2002). A comparison of design remedy components to constructed remedy components is presented in Section 2.4. Documentation collected during the construction is discussed in Section 6.2, below.

Remedial Work Element II did not include any remedial excavations or post-excavation confirmatory sampling. Assessments of the operability of the systems installed (i.e., North Area Recovery Wells, Groundwater Extraction Trench, Groundwater Treatment Plant) are presented in Appendix G and summarized in Section 7.

6.2 DOCUMENTATION

6.2.1 Remedial Action Work Plan

In accordance with the Consent Decree, a RAWP was submitted to and approved by USEPA prior to commencement of the Remedial Work Element II work. Section 5 provides information regarding submittal, approval, and/or distribution dates.

6.2.2 Daily Field Reports

Parsons prepared and submitted Daily Field Reports for each day that work occurred. The daily reports documented the date, work activities, equipment, work force, deliveries, visitors, Health and Safety incidents/reportables, expected next day work activities, and photographs. Copies of the Daily Field Reports are included in Appendix D.

6.2.3 Photographic Log

Parsons took photographs to document progress of the work. Photographs were frequently submitted with the Daily Field Report. Select photographs that summarize the construction activities described in this report are included in Appendix E. A photo ID, description and date accompany each photograph.

6.2.4 Meeting Agendas and Minutes

Weekly and monthly status meetings were held while work was being performed. Meetings were not held during winter shutdown periods. The meeting discussions included, but were not limited to, safety, work completed the previous week, work expected for the next week, documentation, and other issues. Parsons prepared and distributed meeting agendas and minutes to record issues and action items.

6.2.5 Submittals

Parsons reviewed and commented on contractor submittals provided pursuant to the Technical Specifications. Submittals discussed in Sections 3 and 4 of the report are included in Appendix F.

6.2.6 Testing

Material testing was conducted pursuant to the Construction Quality Assurance Project Plan, which was appended to the Final (100%) Remedial Design Report (Parsons, 2002). Test results discussed in Sections 3 and 4 of the report are included in Appendix F.

6.3 USEPA OVERSIGHT ACTIVITIES

USEPA has two objectives for overseeing RD/RAs conducted by Potentially Responsible Parties (PRPs) on PRP-lead cleanups: 1) Ensure the remedies are protective of public health and the environment throughout the life of the project; and 2) Ensure the Remedial Action (RA) is implemented in compliance with the terms of the Consent Decree.

The intent of the oversight program is to focus USEPA efforts on the most significant aspects of the project, such as overall quality assurance (QA), scheduling, major changes due to changed field conditions, emergency actions, and project close out.

The responsibilities of the USEPA oversight contractor during Remedial Design included the following:

- assist in reviewing the professional qualifications of Remedial Design Professional, Remedial Action Constructor, and the Independent Quality Assurance Team;
- review the Remedial Design and Remedial Action Work Plans;
- review design support data including field investigations and treatability study results; and
- review Remedial Design submittals to determine if they are protective of the public health and the environment, comply with the Record of Decision (ROD), and will attain the performance criteria specified in the Consent Decree.

During Remedial Action, the USEPA oversight contractor provided full time field oversight and reviewed work for compliance with the Construction Quality Assurance Project Plan, schedule, and the approved plans and specifications. Construction oversight was limited to observing construction and comparing the work to a set of standards (in this case, the design plans and specifications, and the Construction Quality Assurance Project Plan prepared by contractors to the PRP's). The USEPA oversight contractor also performed spot checks of the Construction Quality Assurance Plan and reviewed quality assurance reports.

SECTION 7

SUPPLEMENTAL INFORMATION

7.1 HEALTH AND SAFETY

The Remedial Design included a project-specific Health and Safety Plan, which the remedial action contractors used as a basis to prepare Health and Safety Plans specific to their activities and procedures. The Health and Safety Plans prepared were dated as follows: (Samco, August 28, 2002; Shaw, March 8, 2003; and DA Collins, June 23, 2005).

Periodic safety meetings were conducted throughout the duration of the construction. Particular attention was given to safety along Richardson Hill Road, both for the perspective of the public using the road, and crews working in the vicinity of the road.

The daily reports, included in Appendix D, indicate that there were 3 injuries during the construction of Remedial Work Elements I and II, all occurring in 2003: on May 1, 2003, a surveyor from B&B Surveying, subcontracted to Shaw, slid off the edge of a roadway and fell on his shoulder; on May 2, 2003, an air hose broke and struck an employee from Fayette Transportation, subcontracted to Shaw, in the forehead; and on July 16, 2003, an employee of CME, subcontracted to Parsons, cut his thumb on a Shelby tube. The daily reports indicate that there were no injuries in 2002, 2004, 2005, or 2006.

7.2 SITE SPECIFIC OBSERVATIONS AND LESSONS LEARNED

One unique aspect of this project was the opportunity it provided for cultural resources investigation. As described on the PAF website (http://paf.binghamton.edu/projects/hh/), during the implementation of the remedy, crews from the Public Archaeology Facility (PAF) (State University, Binghamton, NY) searched the site, which lies in the uplands between the Susquehanna and Delaware valleys, for evidence of pre-historic sites. The goal was to identify whether Native Americans used this area, and if so, what kinds of activities were being carried out. The archeologists recovered thousands of artifacts in seven different locations used by Native Americans from about 1,000 to 6,000 years ago. Various stone tools, including projectile points, pottery fragments, and botanical remains (seeds, nuts, and corn) were all buried by centuries of soil deposition in the area. Evidence of hearths (fire pits) were also found, as was a unique stone feature that was believed to have been a seat upon which a Native American once sat to make tools. Together, the data from the investigation suggested that this environmental setting – the drainage divide – was favored for specialized types of land use and seasonal settlement over an extended period of time (4000 BC to AD 1600). The documentation of these sites in an upland context produced a unique archaeological case study, and a notable contribution to the understanding of Native American life.

7.3 GROUNDWATER TREATMENT PLANT DEDICATION

On May 1, 2003, the respondents, representatives of USEPA, and members of the community held a dedication ceremony for the Richardson Hill Road Landfill Groundwater Treatment Plant. The GWTP was dedicated to Henry Mitchell, former resident of Sidney, New York, environmentalist, and Amphenol Environmental Manager.

7.4 PROJECT COSTS

A summary of project costs as provided by Amphenol is presented on Table 7-1. Raw costs provided by Amphenol, and calculations showing an adjustment to 2006 $$ using the ENR Building cost index, are presented in Appendix H.

7.5 STATUS OF INSTITUTIONAL CONTROLS

The status of institutional controls and planned future land use will be provided to USEPA by separate communication by Amphenol and Honeywell.

TABLE 7-1
RICHARDSON HILL ROAD LANDFILL SITE
REMEDIAL WORK ELEMENTS I AND II
COST SUMMARY

Cost Item	ROD Estimate (1997 $$)	ROD Estimate (2006 $$)[2]	Actual Cost (2006 $$)[3,5]	Notes
RA Capital Cost	$7,871,000	$10,232,000	$22,616,000	4
RA O&M Cost (Annual)	$479,000	$623,000	$700,000	5
RA O&M Cost (PW)[1]	$5,993,000	$7,787,000	$8,690,000	
RA Present Worth	$13,864,000	$18,019,000	$31,306,000	
Difference between Actual RA Capital Cost and ROD Capital Cost Estimate:	$12,384,000, or +121%.			6

Notes:
1. ROD assumed discount rate of 7% for future work (e.g., O&M).
2. ROD Costs for work performed from 1997 to 2006 adjusted from 1997 $$ to 2006 $$ using ENR Building Cost Index (4369/3364).
3. Actual costs provided by Amphenol adjusted to 2006 $$ using ENR Building Cost Index. See Appendix H for. information provided by Amphenol.
4. Actual RA Capital Costs do not include approximately $1,200,000 in EPA oversight costs (EPA, 2007b).
5. Actual O&M Costs in 2005 and 2006 were approximately $500,000 for each year. Costs in these years were primarily for GWTP. Other site maintenance and monitoring not conducted in these years (RWE I Remedial Action ongoing). Total annual O&M cost estimated at $700,000. See Appendix H for cost information provided by Amphenol.
6. Difference between RA Capital Cost and ROD Estimate attributable to factors that include weather, schedule, and inclusion in the RA of the excavation and restoration of Herrick Hollow Creek segments #9 through #13.

SECTION 8

OPERATION AND MAINTENANCE

8.1 OPERATION AND MAINTENANCE MANUAL

A site-wide Operation and Maintenance Manual for Post Remedial Activities (site-wide O&M Manual) has been prepared for the site (Parsons, 2007b). This site-wide O&M Manual includes procedures for the operation and maintenance of the North Area recovery wells, the groundwater extraction trench, and the groundwater treatment plant. Monitoring activities identified in the plan include periodic collection and evaluation of water level data in the vicinity of the recovery wells and extraction trench to assess the effectiveness of groundwater collection, and periodic sampling and analysis of groundwater in the vicinity of the extraction trench. Appended to the site-wide O&M Manual is a detailed Operations and Maintenance Manual for the groundwater treatment plant, which had been prepared by Samco and updated by OMI. Operation and maintenance activities at the site have been initiated pursuant to the site-wide O&M Manual and previously submitted draft and interim plans.

8.2 GWTP PRELIMINARY OPERATIONAL ASSESSMENT

In order to assess the effectiveness of the GWTP, Parsons reviewed monthly GWTP operating reports prepared by OMI, the current GWTP operator, for the six-month period April 2006 through September 2006. This 6-month period was selected as being representative of current GWTP operations. The OMI reports reviewed are included in Appendix G, as is a memorandum prepared by Parsons which presents an evaluation of the information provided in the reports and associated GWTP operating data. Conclusions presented in the memorandum include:

- During the period April through September 2006, the GWTP operated a total of 4340.5 hours, with 51.5 hours of scheduled downtime and no unscheduled downtime during the period. The GWTP was in operation 98.8% of the time during the period.

- During the period April through September 2006, the GWTP treated a total of 8,248,500 gallons of groundwater from the North Area recovery wells and groundwater extraction trench. This equates to an average treatment rate of 30.3 gpm, accounting for the scheduled downtime. Based on review of the reports, the maximum volume treated in a month was 1,703,100 gallons (June 2006), which equates to an average daily treatment rate of 39.4 gpm. The maximum daily treatment rate recorded during the six month period was 65.2 gpm on April 23, 2006. The maximum daily treatment rates in June and July 2006 also surpassed 60 gpm.

- During the 6-month period April through September 2006, average daily influent flows from the extraction trench ranged from approximately 10 to 50 gpm, while average daily influent flows from the North Area recovery wells typically ranged from 3 to 4 gpm.

(See table in Appendix G summarizing GWTP flow rates and other operational data, provided by Samco and OMI from PlantScape output).

- During the period April 2006 through May 3, 2006, the concentrations of inorganic compounds in Outfall 001 were below effluent criteria, with the exception of selenium and copper, which were sporadically higher than effluent criteria before corrective actions were undertaken (i.e., cleaning of a flow control valve). For the balance of the 6-month period, the concentrations of inorganic compounds in Outfall 001 were below effluent discharge criteria.

- During the period April through September 2006, the concentrations of site-related constituents, including volatile organic compounds (VOCs), PCBs, and semivolatile organic compounds (SVOCs) in Outfall 001 were below effluent discharge criteria.

- Review of the reports and discussions with OMI indicate that oil has not been observed in the GWTP influent or collected in the oil/water separator during the period.

This assessment supports the conclusion that the GWTP, as constructed, meets the intent of the design.

8.3 NORTH AREA RECOVERY WELLS PRELIMINARY OPERATIONAL ASSESSMENT

In order to assess the effectiveness of the North Area bedrock recovery well network, Parsons evaluated groundwater elevation data collected at North Area piezometers NMW-1 through NMW-10, and MW-9D, during the period August 18, 2006 through June 29, 2007. The results of this evaluation are presented in a memorandum provided in Appendix G. The memorandum also describes a well recovery test which was conducted between September 27 and October 4, 2006. The conclusions of the evaluations performed were that:

- Drawdown in the 10 piezometers on the line of or downgradient of the four North Area recovery wells ranged from 3 to 9 ft.

- The drawdowns in the piezometers were indicative of a deep, wide cone of depression, indicating that hydraulic control is being achieved by the four North Area recovery wells.

As discussed above, this area will continue to be monitored pursuant to the draft site-wide O&M Manual.

8.4 GROUNDWATER EXTRACTION TRENCH PRELIMINARY OPERATIONAL ASSESSMENT

In order to assess the effectiveness of the groundwater extraction trench, Parsons evaluated groundwater elevation data collected at piezometers in and downgradient of the groundwater extraction trench, during the period July 6, 2006 through June 29, 2007. To further assist with the evaluation, on August 28, 2006, Parsons installed a staff gauge in the South Pond, which is downgradient of the groundwater extraction trench. The results of this evaluation are presented in a memorandum provided in Appendix G. The conclusions of the evaluations performed were that:

- During the period evaluated, water levels in the trench piezometers were generally lower than those in the downgradient piezometer at locations TMW-1/TMW-2 located at the north end of the trench, and SSC-2/TMW-4 located between sumps S-1 and S-2. Water levels at TMW-7/TMW-8, located at the south end of the trench, show almost no gradient between the pair; water levels in the two piezometers are within a few hundredths of a foot.

- During the period evaluated, water levels in the trench piezometers were sporadically higher than those in the downgradient piezometers at locations SSC-1/TMW-3 located between sumps S-1 and S-2, and SSC-3/TMW-5 located between sumps S-2 and S-3. The water levels in the trench piezometer at location SSC-4/TMW-6, located between Sumps S-2 and S-3, were frequently higher than in the downgradient piezometer.

- A review of water-level observations over time indicates that the groundwater extraction in the trench is exerting hydraulic control across the length of the trench by lowering water levels in the formation outside of the trench.

- South of Sump S-2, the drawdowns in the trench and piezometers, while less than in the north, are still significant and indicative of groundwater extraction and the mitigation of contaminant migration. The water levels in piezometer SSC-4, located in the trench between Sumps S-2 and S-3, are frequently higher than in downgradient piezometer TMW-6. However, based on the high permeability of the trench backfill, the low permeability of the adjacent till, and the low hydraulic gradient, water in this portion of the trench is more likely to travel through the high permeability trench backfill to the sumps than migrate to the east.

- North of Sump S-2, the hydraulic control of the overburden by the groundwater trench is demonstrated by large drawdowns in both the trench and downgradient piezometers and the comparative analysis of trench and downgradient groundwater elevations. While not necessary for hydraulic control, water levels in the piezometers and trench north of Sump S-2 are generally lower than the level of the South Pond, further demonstrating control. This portion of the trench is downgradient of the former waste oil pit.

Groundwater analytical data has not yet been collected over a full year to further evaluate the effectiveness of the trench. As discussed above, the trench will continue to be monitored pursuant to the site-wide O&M Manual (Parsons, 2007b). It should be noted that flexibility was included in the trench construction to enhance groundwater recovery across the trench (i.e., piezometers SSC-1 through SSC-4 were installed with 8-inch diameter stainless steel screens to allow for conversion to recovery sumps). This enhancement could be implemented, if necessary, based upon monitoring results.

SECTION 9

FINAL INSPECTION AND CERTIFICATIONS

9.1 FINAL INSPECTIONS

Samco, Parsons and Earth Tech conducted a pre-final inspections of the GWTP and North Area Recovery Wells during the week of May 5, 2003. A copy of the punchlist from that inspection is included in Appendix F. As shown on the punchlist, outstanding items were completed on July 18, 2003. This punchlist, indicating completion of outstanding items, was provided to USEPA on July 23, 2003 (Parsons, 2003a).

Shaw, Parsons, and Earth Tech conducted periodic inspections of the groundwater extraction trench during the construction. DA Collins, Parsons, and Earth Tech conducted a pre-final inspection of the South Area, including restoration of surfaces at the groundwater extraction trench, on August 29, 2006. A copy of the punchlist from that inspection is included in Appendix F; this punch list was updated on October 5, 2006 for use in a final site inspection, which was conducted on October 10, 2006. Attending the final inspection were representatives from USEPA, NYSDEC, Earth Tech, Amphenol, Honeywell, JTM Associates, DA Collins, and Parsons. This punchlist, indicating completion of outstanding items, is included in Appendix F.

9.2 RECORD DRAWINGS

Pursuant to Section 10.C.4.b of the Statement of Work, Record Drawings, for Remedial Work Element II facilities constructed pursuant to the Consent Decree, signed and stamped by a professional engineer licensed in New York, are included in Appendix B.

9.3 NOTICE OF COMPLETION

Pursuant to Section 10.C.6 of the Statement of Work, the following notice of completion is provided, signed by a qualified licensed professional engineer in New York:

> I certify that I am a Professional Engineer licensed in the State of New York. In my professional opinion, based on review of available project documents and observations during site visits, the Remedial Construction for Remedial Work Element II was completed in full satisfaction of the Consent Decree, Statement of Work, and the EPA-approved Remedial Design, as documented in this Remedial Action Report which includes EPA-approved Field Change Orders and other design and construction modifications.

By: Stephen J Miller 8/21/07

NYS PE # 064489-1

PARSONS

STATE OF NEW YORK
STEPHEN J. MILLER
No. 64489
LICENSED PROFESSIONAL ENGINEER

UNAUTHORIZED ALTERATION OR ADDITION TO THIS ENGINEERING DOCUMENT IS A VIOLATION OF SECTION 7209, PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.
PARSONS

9.4 CERTIFICATION

Pursuant to Section 10.C.8 of the Statement of Work, the following certification is provided, signed by a responsible corporate official of Amphenol:

> To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

By: Samuel J. Waldo

Title: Director, EHS & Support Services

Amphenol

SECTION 10

REFERENCES

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