INTERIM REMEDIAL MEASURE CONSTRUCTION COMPLETION REPORT

WEST WALL PORTION OF THE WASTEBED B/ HARBOR BROOK IRM

County of Onondaga, New York

Prepared for:

Honeywell

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MARCH 2014

CERTIFICATIONS

I, Mark T. Otten, certify that I am currently a New York State registered professional engineer (PE). I had primary direct responsibility for implementation of the subject construction program, and I certify that the Remedial Design was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Design.(1)

NYS Professional Engineer #81375	Date	Signature
	3/17/14	Mark T Otten

(1) This certification statement is required under Section 1.5 of the NYSDEC Program Policy DER-10: Technical Guidance for Site Investigation and Remediation, issued May 3, 2010 and shall be interpreted using the definitions of scope and responsibility provided in Section 1.5 of DER-10, particularly subsections 1.5(b)3. This certification was reviewed and signed in accordance with the provisions of New York Board of Regents Rule 29.3.

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LIST OF ACRONYMS

CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CM	Construction Manager
CQA	construction quality assurance
CQAP	Construction Quality Assurance Plan
CY	cubic yards
DNAPL	dense non-aqueous phase liquid
DUSR	Data Usability Summary Reports
ECs/ICs	Engineering and Institutional Controls
FER	Final Engineering Report
FCF	Field Change Form
FRP	fiberglass reinforced pipe
Ft.	feet
G.E.	Geotechnical Engineer
IRM	Interim Remedial Measure
LEI	Land Remediation, Inc.
$\mu g/m^3$	micrograms per cubic meter
NAPL	non-aqueous phase liquid
NYSDEC	New York State Department of Environmental Conservation
OMM Plan	Operation, Maintenance and Monitoring Plan
OP-TECH	OP-TECH Environmental Services, Inc.
OSC	Ontario Specialty Contracting, Inc.
OSHA	Occupational Safety and Health Administration
P.E.	Professional Engineer
PID	photoionization detector
PM	Project Manager
ppm	parts per million
PSP	Project Safety Plan
QA/QC	quality assurance/quality control
SHSO	Site Health and Safety Officer
SOLW	Solvay waste
SOP	Site Operations Plan
SWPPP	Stormwater Pollution Prevention Plan
VOCs	volatile organic compounds
WBB/HB	Wastebed B/Harbor Brook

SECTION 1

INTRODUCTION

1.1 BACKGROUND AND SITE DESCRIPTION

Honeywell International Inc. (Honeywell) entered into an Order on Consent (Index #D7-0008-01-09) with the New York State Department of Environmental Conservation (NYSDEC), to perform an Interim Remedial Measure (IRM) on a 90-acre property located in the City of Syracuse and the Town of Geddes, New York, known as the Wastebed B/Harbor Brook (WBB/HB) Site. The Order on Consent, effective November 25, 2003, required an IRM to address migration of site contaminants into Harbor Brook and Onondaga Lake.

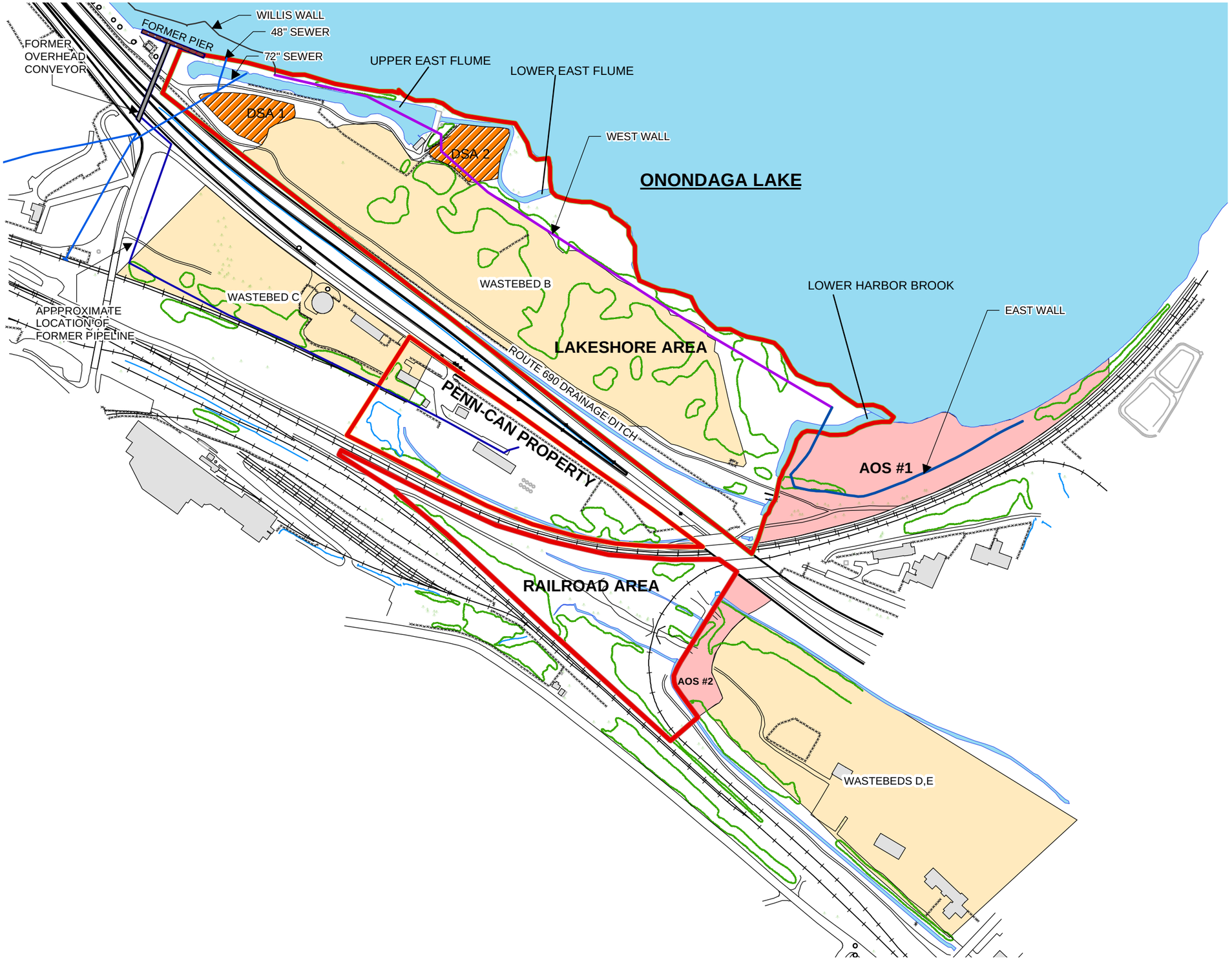
The WBB/HB site is located in the County of Onondaga, New York and is identified as "Now or Formerly Property of The Solvay Process Co." on the following Onondaga County Tax Maps:

- Tax Map No. 29-1-3.1, Liber 324, Page 441 (Town of Geddes)
- Tax Map No. 114-2-45, Liber 324, Page 441 (City of Syracuse)
- Tax Map No. 114-2-44, Liber 324, Page 441 (City of Syracuse)
- Tax Map No. 114-2-42, Liber 324, Page 441 (City of Syracuse)

The West Wall portion of WBB, the project site, is situated on an approximately 38-acre area bounded by Onondaga Lake to the north, I-690 to the south, Harbor Brook to the east, and the East Flume to the west (see Figure 1.1). The site boundaries are detailed in the land title survey provided in Appendix A. This Construction Completion Report (CCR) addresses the West Wall which is a continuation of the work performed under the WBB/HB IRM (i.e., Willis/Semet projects).

An electronic copy of this CCR with all supporting documentation is included as Appendix B.

FIGURE 1.1



LEGEND

- HARBOR BROOK SITE
- DREDGE SPOIL AREA
- ADDITIONAL AREA OF STUDY
- WASTEBEDS

HONEYWELL
WASTEBED B/
HARBOR BROOK SITE
GEDDES AND SYRACUSE, NY

SITE PLAN

N
W E
S

0 225 450 900
Feet

Note: Original base map information obtained from O'Brien & Gere Remedial Investigation Report (November 2007), Figure 2.

PARSONS
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(Q:\GIS\Harbor_Brook_RI\Figure_2\SITE_PLAN.mxd)1/10/2008 -- 1:13:03 PM

SECTION 2

INTERIM REMEDIAL MEASURE

2.1 INTERIM REMEDIAL MEASURE (IRM) SUMMARY

This IRM CCR describes the West Wall portion of the WBB/HB IRM Construction and presents Engineering Certification of the construction performed to satisfy the Order on Consent as identified in Section 1.0.

The West Wall IRM included construction of a subsurface sheet pile barrier wall and a groundwater collection trench from the eastern terminus of the Willis/Semet Barrier Wall to the western bank of lower Harbor Brook.

2.2 IRM OBJECTIVES

The primary objective of the West Wall IRM is to contain contaminants in the shallow and intermediate groundwater regimes within the site. The sheet pile barrier wall serves to contain impacted soils and prevent migration of potentially contaminated groundwater and non-aqueous phase liquid (NAPL) to Onondaga Lake. The groundwater collection trench was constructed inboard of the sheet pile barrier wall. The trench captures impacted groundwater along the length of the wall from the shallow and intermediate hydrogeologic units. Groundwater is pumped to the Willis Avenue Groundwater Treatment Plant. The West Wall IRM construction also included backfill of the former Upper East Flume, which was required to complete installation of the barrier wall.

The specific IRM objectives, as presented in the Order on Consent, are as follows:

- Eliminate, to the extent practicable, within the scope of this IRM, the discharge of contaminated groundwater and NAPL (and collect NAPLs, as feasible) into Harbor Brook and Onondaga Lake.
- Eliminate, to the extent practicable, within the scope of this IRM, the potential human health and ecological impacts associated with site constituents of concern.
- Eliminate, to the extent practicable, within the scope of this IRM, potential impacts to fish and wildlife resources associated with on-going discharges of contaminants of concern from the site.

The West Wall IRM is part of a larger hydraulic control system consisting of the Willis Avenue/Semet Tar Beds Sites (Willis/Semet) IRM and the Wastebed B/Harbor Brook IRM to address area groundwater. This system, which includes a sheet pile barrier wall along the Onondaga Lake shoreline and a groundwater collection system, was constructed in three phases beginning in 2006 and finishing in 2012. The system was designed and constructed to eliminate, to the extent practicable, the discharge of contaminated groundwater and NAPL to Onondaga Lake from the Southwest Shoreline area of Onondaga Lake. These IRMs were constructed consistent with the NYSDEC-approved designs. The system prevents the discharge of

contaminated groundwater and NAPL to the lake from this area and has addressed the potential for groundwater upwelling to impact the Onondaga Lake sediment cap consistent with the cap design assumptions for this area.

In addition to the above IRMs, a dense non-aqueous phase liquid (DNAPL) collection system was installed along the lakeshore in 1993. The system was expanded to include additional collection wells in 1995 and 2002. In 2012, the system was again expanded and the entire system upgraded and optimized.

2.3 DESCRIPTION OF SELECTED REMEDY

The West Wall IRM construction was completed in accordance with the remedy selected by the NYSDEC in the Order on Consent dated November 25, 2003 and included the following components:

- Installation of a sheet pile barrier wall from the eastern terminus of the Willis/Semet Barrier Wall to the western bank of Lower Harbor Brook
- Installation of a groundwater collection system along the barrier wall to achieve hydraulic control
- Grading and backfilling of portions of WBB
- Site restoration

2.4 REMEDIAL CONTRACTS

Honeywell was ultimately responsible for completing the IRM in accordance with the Order on Consent. The following subsections describe the roles and responsibilities of the other entities.

2.4.1 Regulatory Agency

The NYSDEC was the lead agency for the West Wall IRM. Mr. Tracy Smith was the Project Manager for NYSDEC. During construction, Mr. Smith attended weekly progress meetings and conducted site visits. The construction team coordinated design and field modifications with the NYSDEC. Agency approval correspondences are provided in Appendix C.

2.4.2 Remedial Action Contractor

The Parsons Corporation (Parsons) of Syracuse, NY was the contractor selected by Honeywell to carry out the remedial activities for the IRM. Parsons provided full-time construction management and oversight of the project activities. Some of these responsibilities included: management of remedial action sub-contractors, documentation of daily work activities, review of subcontractor submittals, providing engineering support for design and field changes, administration of quality assurance oversight and testing through laboratories, coordinating reviews of submittals and work plans, coordination with the NYSDEC and other regulatory agencies, and conducting project meetings.

SECTION 3

REMEDIAL ACTIVITIES

3.1 REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the site were conducted in accordance with the NYSDEC-approved Remedial Design Report, *West Wall Portion of the Wastebed B/ Harbor Brook IRM Final Design Report, November 2009*. All approved field design modifications to the Final Design Report are presented in Section 3.10 of this report. The following subsections describe the construction work performed to complete the IRM.

3.2 CONSTRUCTION PHASES

The IRM Construction was completed in two phases. Phase 1 construction began in December 2009 and was completed in April 2010 and consisted of the following items:

- Erosion and sediment control installation and maintenance
- Clearing and grubbing
- Site excavation and grading for creation of the work platform

Phase 2 construction began in July 2010 and was substantially completed in August 2011 and consisted of the following work items.

- East Flume backfilling and demolition of the spillway
- Installation of the sheet pile barrier wall
- Installation of a groundwater collection system
- Site restoration

Final grading and restoration of the East Flume was completed in December 2012.

Photos of the IRM Construction elements are provided in Appendix D.

3.3 GOVERNING DOCUMENTS

Construction was completed under the approved design, which includes the following governing documents:

- *West Wall Portion of the Wastebed B/Harbor Brook IRM Final Design Report,* (Parsons, 2009)
- *Wastebed B/Harbor Brook IRM Stormwater Pollution Prevention Plan (SWPPP) Phase 1,* (Parsons, 2009)
- *Wastebed B/Harbor Brook IRM West Wall Phase 1 Civil Work Project Interim Remedial Measure Work Plan*, (Parsons, 2009)

- *Stormwater Pollution Prevention Plan (SWPPP), West Wall Portion of the Wastebed B/Harbor Brook IRM Phase 2 Construction*, (Parsons, 2010)
- *Wastebed B/Harbor Brook Site IRM, West Wall Phase 2 Barrier Wall & Groundwater Collection System Interim Remedial Measure Work Plan*, (Parsons, 2010)

Agency approval correspondences of these documents are provided in Appendix C.

3.3.1 Final Design Report

The West Wall Portion of the *Wastebed B/Harbor Brook IRM Final Design Report* was submitted to the NYSDEC on November 19, 2009 and subsequently approved. The Final Design Report presented the following information:

- Pre-design investigation
- Basis of design
- Subsurface data
- Project schedule
- Summary of permits
- Response to NYSDEC comments
- Construction Quality Assurance and Procedure Plan
- Design calculations
- Design specifications
- Design drawings
- Design issues and construction activities

3.3.2 Site Specific Project Safety Plan

A Project Safety Plan (PSP) was prepared by Parsons to establish mandatory safety practices and procedures for the project. In addition, all subcontractors prepared and submitted their own PSPs to further define their specific tasks.

All remedial work performed under this Remedial Action was in full compliance with governmental requirements, including site and worker safety requirements mandated by the Federal Occupational Safety and Health Administration (OSHA).

The PSP was complied with for all remedial and invasive work performed at the site.

3.3.3 Construction Quality Assurance Plan

A Construction Quality Assurance Plan (CQAP) was prepared and submitted as Appendix L of the *Wastebed B/Harbor Brook IRM Final Design Report* (Parsons, November 2009). The CQAP managed performance of the remedial action tasks through designed and documented quality assurance/quality control (QA/QC) methodologies applied in the field and in the lab. The CQAP provided a detailed description of the observation and testing activities that were used to monitor construction quality and confirm that remedy construction was in conformance with the

remediation objectives and specifications. Approved deviations from the CQAP are presented in Section 3.10 of this report.

In addition, the Phase 2 remedial action contractor prepared and submitted a Quality Control Plan which identified their personnel, procedures, instructions, records and forms to be used in the quality control process.

3.3.4 Soil/Materials Management Plan

Management of soil and other materials was governed by the requirements described in the Final Design and Work Plan documents listed in Section 3.3 (a separate Soil/Materials Management Plan was not prepared). Excavated material was observed for signs of visible contamination and was segregated and stockpiled on-site as necessary.

3.3.5 Stormwater Pollution Prevention Plan

A Stormwater Pollution Prevention Plan (SWPPP) was completed for each phase of construction. The NYSDEC-approved SWPPP's for Phase 1 and Phase 2 are dated October 1, 2009 and July 20, 2011, respectively. Agency approvals are included in Appendix C. In addition, the Phase 2 remedial action contractor prepared and submitted an Erosion and Sediment Control Plan to implement the SWPPP.

The erosion and sediment controls for all remedial construction were performed in accordance with the requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control and the site-specific SWPPPs.

3.3.6 Community Air Monitoring Plan

Community Air Monitoring Plan (CAMP) monitoring is defined as perimeter or fence line monitoring. Fence line monitoring is defined as along the perimeter of Honeywell property or 200 feet (ft.) downwind of a work area; whichever distance is less.

Due to the nature of known or potential contaminants at this site, continuous monitoring for volatile organic compounds (VOCs) and particulates was required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities included, but were not limited to, soil/waste excavation and handling, trenching, and the installation of sheet piles.

No exceedences of the VOC action levels occurred during construction. Elevated particulate levels were recorded on the air monitors on two dates during construction. Results of the CAMP monitoring are presented in Section 3.4.8 and Appendix E.

The following sections summarize the CAMP monitoring approach, instruments, action levels, and response measures, etc.

3.3.6.1 VOC Monitoring

VOCs were monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis. Upwind concentrations were measured at the start of each work day and periodically thereafter to establish background conditions. VOC monitoring was

performed using two Gas MiniRAE 2000 photoionization detectors (PIDs), one upwind and one downwind. The calibration of the PIDs was checked at least daily for the contaminant(s) of concern or for an appropriate surrogate and when required, a full calibration was performed in accordance with the manufacturer's specifications.

The PIDs calculated 15-minute running average concentrations which were recorded and compared to the VOC action levels specified below:

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceed 5 parts per million (ppm) above background for the 15-minute average, temporarily halt work activities and continue monitoring. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, resume work activities with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, halt work activities, identify the source of the vapors, take corrective actions to abate emissions, and continue monitoring. After these steps, resume work activities provided that the total organic vapor level 200 ft. downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure (whichever is less; but in no case less than 20 ft.) is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, shutdown work activities.

3.3.6.2 Particulate Monitoring

Particulate concentrations were monitored continuously at the upwind and downwind perimeters of the exclusion zone at two temporary particulate monitoring stations, one upwind and one downwind. The particulate monitoring was performed using DataRAM 4 model DR-4000 real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. In addition, fugitive dust migration was visually assessed during all work activities. The particulate levels were compared to the levels specified below:

- If the downwind PM-10 particulate level was 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust was observed leaving the work area, employ dust suppression techniques. Continue work with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust was migrating from the work area.
- If after implementation of dust suppression techniques the downwind PM-10 particulate levels remain greater than 150 $\mu g/m^3$ above the upwind level, stop work and re-evaluate the dust suppression techniques initiated. Resume work provided that dust suppression measures and other controls have reduced the downwind PM-10

particulate concentration to within 150 $\mu g/m^3$ of the upwind level and prevented visible dust migration.

Since many particulate monitoring instruments operate on nepholometric principles, they can record false positive results during certain atmospheric conditions. For this reason, particulate monitoring was suspended during periods of:

- Steady rain
- Heavy fog, where dust suppression methods preclude visible dust emissions and prior results indicate that dust suppression measures for controlling particulate migration are adequate
- Site activities that did not generate particulate containing hazardous constituents

3.3.6.3 Odors

The site-specific Project Safety Plan (PSP) directed that all projects must consider the potential for off-site odors that could result in complaints by the public when disturbing contaminated materials. The project team did not receive odor complaints associated with the West Wall construction.

3.3.7 Site Operations Plan

The Remedial Contractor prepared Site Operations Plans (SOPs) detailing how the work was to be performed in compliance with the Order on Consent. The SOPs were submitted to NYSDEC in a timely manner prior to the start of work and subsequently approved by NYSDEC.

3.4 REMEDIAL PROGRAM ELEMENTS

3.4.1 Roles and Responsibilities

The roles and responsibilities of the team members include the following:

NYSDEC: The NYSDEC was the lead agency for the construction. The NYSDEC's designated Project Manager participated in progress meetings, conducted site inspections, and provided regulatory approval for components of the remedy. The NYSDEC's Project Manager conducted and participated in public meetings, as necessary, and was the point of contact for public questions and concerns.

Parsons: The Parsons Project Manager (PM) served as Honeywell's representative. The PM was responsible for ensuring that construction was completed in accordance with the Contract Documents and approved Final Design. The PM interfaced directly with Honeywell, NYSDEC and the Parsons' project staff as necessary.

The Parsons Construction Manager (CM) was responsible for completion of the construction work. The CM communicated directly with the PM for project needs and monitor on-site construction activities.

The Parsons full-time on-site Site Health and Safety Officer (SHSO) was responsible for implementation of the PSP and to ensure work was performed in compliance with the PSP and

applicable regulations. The SHSO also implemented air monitoring program and report data, performed routine safety inspections, and reported and investigated near misses or incidents.

Parsons and Geosyntec design engineers provided engineering support as needed and reviewed construction submittals that required engineering interpretation.

The Parsons Construction Quality Assurance (CQA) staff was on-site during the construction and made daily field observations to monitor that the construction, installation, materials, workmanship and QC performed by the subcontractors were conducted in accordance with the approved design drawings and specifications. The CQA Manager was also responsible for conducting CQA testing (or working with independent testing subcontractor).

The Parsons CM and CQA Manager were on-site during the construction and made daily field observations and reports.

3.4.2 Remedial Contractor

Parsons was the Remedial Contractor selected by Honeywell to carry out the remedial construction. The West Wall construction was completed in two phases under separate subcontracts. Project personnel for Parsons included:

- Alan Steinhoff (Senior PM)
- Mike Broschart (Engineering Support/Design Team Interface)
- Matthew Warren (PM, Phase 1, 2)
- Thomas Abrams (PM, Phase 2)
- Ken Sommerfield (CM, Phase 1)
- William Long (CM, Phase 2)
- William Salomone, P.E. (Design Engineer)
- Mark Hoffman (Quality Assurance, Phase 1)
- Benedict McAllister (Quality Assurance, Phase 1)
- Dan Douglass (Quality Assurance, Phase 2)
- Bill Moon (SHSO, Phase 1)
- John Scurek (SHSO, Phase 2)
- Dale Dolph (SHSO, Phase 2)
- Rebecca Absolom (Document Control)
- Mark Otten, P.E., Certifying Engineer

The following subsections identify Parsons' subcontractors who performed the remedial design construction.

3.4.3 Consultants

Geosyntec Consultants of Atlanta, GA completed the following activities under subcontract to Parsons:

- Technical oversight and consulting for installation of the barrier wall
- Documentation of steel sheet pile installation
- Installation of sheet pile geotechnical instrumentation
- Initial monitoring of sheet pile geotechnical instrumentation
- Technical oversight and consultant for the certification of the barrier wall

Project personnel for Geosyntec included:

- Jay Beech, Ph.D., P.E.
- Chris Conkle, P.E., G.E.
- Ming Zhu, Ph.D., P.E.

3.4.4 Subcontractors

The IRM construction was completed in two phases under separate subcontracts.

Phase 1 (December 2009 through April 2010): The Phase 1 subcontractor, OP-TECH Environmental Services, Inc, (OP-TECH) of East Syracuse, NY, performed initial site preparation, clearing and grubbing, excavation, waste stockpiling, and finish grading and seeding. The work included creation of the work platform for use to install the barrier wall.

Project personnel for OP-TECH included:

- Thomas Rengert (PM)
- Michael Piercey (Construction Superintendent/QC Manager)

Phase 2 (July 2010 through August 2011): The Phase 2 subcontractor, Ontario Specialty Contracting, Inc. (OSC) of Buffalo, NY, completed construction of the sheet pile wall, site backfill and grading, groundwater collection system, and installation of instrumentation and monitoring systems.

Project personnel for OSC included:

- Don Wall (PM/CM)
- Lawrence Pirrone (PM/CM)
- Andrew Paluch and Sean Stenhouse (Construction Superintendent/QC Manager)
- Annemarie Kearns (Project Safety Representative)
- Jennifer Martin (Project Safety Representative)

Land Remediation Inc. (LRI) of Averill Park, NY performed sheet pile driving as a subcontractor to OSC. Project personnel for LRI included:

- William Lindheimer (PM)

O'Connell Electric of East Syracuse, NY performed installation of electrical power and controls for the groundwater collection and monitoring systems as a subcontractor to OSC. Project personnel for O'Connell Electric included:

- Ken Palmisano (PM)

Thew Associates of Marcy, NY performed survey services as a subcontractor to OSC. Project personnel for Thew included:

- Ryan Sadlon (PM)

Parratt–Wolff of East Syracuse, NY performed piezometer installation as a subcontractor to OSC. Personnel for Parratt-Wolff included:

- Shawn Pepling (PM)
- Shawn Bodah and Jolaan Price (Field Crew)

Grout Tech Inc., of Gansevoort, NY performed pipe grouting as a subcontractor to OSC.

AAC Contracting Inc., of Rochester, NY performed removal of the pipe asbestos as a subcontractor to OSC.

DGI Menard of Bridgeville, PA performed installation of the wick drains as a subcontractor to OSC.

3.4.5 Site Preparation

Phase 1: Op-Tech performed initial site preparation including mobilization of heavy equipment, utility mark out, installation of erosion and sediment controls, and clearing and grubbing.

A pre-construction meeting was held with NYSDEC and all contractors on December 15, 2009.

Phase 2: OSC performed initial site preparation including mobilization of heavy equipment, utility mark out, installation of erosion and sediment controls, maintenance of erosion and sediment controls, and clearing and grubbing.

A pre-construction meeting was held with NYSDEC and all contractors on June 28, 2010.

3.4.6 General Site Controls

The following activities related to site controls were performed:

- Site security – Parsons and its subcontractors coordinated locking of site trailers and perimeter gates daily during non-working hours.
- Job site record keeping – Parsons maintained records of personnel present at the site on the trailer sign-in sheet.
- Erosion and sedimentation controls – Parsons performed inspections of the erosion and sediment control features per the approved SWPPP and ensured repairs were made when needed.
- Equipment decontamination and residual waste management – Subcontractors coordinated with Parsons to complete decontamination of equipment prior to leaving the site as well as the removal of waste material for off-site disposal.

- Soil screening results – Subcontractors performed analytical conformance testing of imported soil materials prior to delivery to the site.
- Stockpile methods – Subcontractors performed stockpile management in accordance with the design.

3.4.7 Nuisance Controls

During Phases 1 and 2, subcontractors performed dust control for the construction haul roads as needed during dry periods. Dust control consisted of the application of water using a water truck. Subcontractors limited construction traffic to temporary access roads stabilized with gravel over the existing surface to reduce the potential erosion of soil outside of road areas.

Equipment decontamination was performed during Phases 1 and 2 by subcontractors. Equipment decontamination consisted of the removal of soils from excavation equipment prior to demobilization from the site. The decontamination pad was used for decontamination. Waste decontamination water was collected and pumped to the groundwater collection system.

No nuisance dust or odor complaints associated with the construction were received. Ambient dust level exceedences recorded by the monitoring equipment are discussed in the next section.

3.4.8 CAMP Results

A description of the VOC and particulate action levels and response actions for the CAMP are provided in Section 3.3.6. No exceedences of the VOC action levels occurred during construction. Elevated particulate levels were recorded on the air monitors on two dates during construction:

3-17-10: Particulate monitoring indicated several elevated readings (>100 $\mu g/m^3$) throughout the day in both the upwind and downwind particulate meters. Readings did not exceed the 15-minute action level. No elevated VOCs were detected. The high levels of particulates were determined to be due to work trucks traveling on the upper road. The particulate levels returned to levels less than 100 $\mu g/m^3$ after a minimal amount of water was applied to the road.

6-2-11: An elevated reading of 445 $\mu g/m^3$ was noted in the upwind particulate monitor. The cause of the elevated reading was determined to be road dust. Dust control measures were implemented with use of water trucks. No particulate exceedences (<100 $\mu g/m^3$) were detected at the downwind CAMP monitor.

Copies of all air monitoring (CAMP) field data are provided in electronic format in Appendix E.

3.4.9 Reporting

Parsons and its subcontractors prepared daily reports during construction. Parsons' daily reports include a description of the operations conducted for the day, equipment, and personnel on-site, problems encountered, weather conditions, and the results of monitoring equipment. Parsons maintained a separate photo log of the daily construction activities. Subcontractors

placed their daily reports on the Parsons SharePoint website for review on a daily basis. Daily reports are included in electronic format in Appendix F. The photo log is included in electronic format in Appendix D as required by the Consent Order.

3.5 BARRIER WALL INSTALLATION

Sheet pile driving for the barrier wall began on July 14, 2010 and was completed on March 8, 2011. Pile driving was suspended between September 8, 2010 and January 27, 2011 during East Flume initial backfilling. Sheet piles were driven to the depths and extents in accordance with the design. The as-built location of the barrier wall is shown on the survey drawings provided in Appendix A. The final sheet pile log is provided in Appendix G. Record drawings of the barrier wall are included in Appendix H. Modifications to the barrier wall are presented in Appendix I.

3.5.1 Steel Sheet Piles

The barrier wall was constructed of model AZ 19-700 steel sheet piles manufactured by Skyline Steel LLC (a wholly owned subsidiary of Arcelor Mittal). Sheet piles were welded into pairs and special fabrications were prepared by Dura-Bond Pipe, LLC. The upper 13 ft. of the welded sheet pile pairs were coated by Dura-Bond with Carboline Bitumastic® 300 M coal tar epoxy.

Sheet pile sealant consisted of Swellseal® WA, manufactured by DeNeef Construction Chemicals Inc. The sealant was applied at the factory, covered, and shipped to the site installed on the steel sheets. During sheet pile installation, it was discovered that some sheets were shipped with improperly applied sealant and had to have the sealant reapplied in the field.

Zinc anodes were installed every 15 linear ft. horizontally on alternating sides of the barrier wall for cathodic protection of the steel wall in accordance with the design. Anodes were attached to the wall using steel angle brackets welded to the steel sheeting. Brackets were field coated with Sherman Williams Targuard® coal tar epoxy. A log of the anode brackets is shown on the as-built survey drawings provided in Appendix A.

3.5.2 Sheet Pile Installation

Sheet pile pairs for the barrier wall were driven by LRI, Inc. using an ABI Mobilram with a vibratory hammer. Sheeting installation began at approximately Station 9+00 and proceeded to the east to Station 36+48. Driving resumed at Station 0+00 and proceeded to the east to Station 9+00. Sheet pile pairs were connected by threading the interlocking channel of the previously installed pile to form the barrier wall.

The sheeting alignment was controlled by using offset stakes and steel tape and was documented by Parsons using GPS based survey equipment. Plumbness was monitored by the use of a standard 4-ft. level and controlled by adjusting the vibratory hammer angle of impact as the piles were driven.

3.5.3 Sheet Pile and Barrier Wall QA/QC Activities

Sheet pile wall QA/QC activities included review of the steel mill certificates, inspections of the steel sheeting, shop welds, sealant, and epoxy coating application during fabrication.

During sheet pile driving, LRI personnel documented the following information for each sheet pile pair.

- Sheet pile ID number
- Design sheet pile length
- Actual sheet pile length
- Length of coating
- Date of installation
- Start time and end time for driving
- Bottom elevation of each pile
- Notes, such as pile type, driving conditions, strapping, etc.
- Where deviations were noted, vertical plumbness at 1/2 and at full depth

Sheet pile driving was observed and documented by Geosyntec as a representative of Parsons. Pile driving records were prepared daily and reviewed by Geosyntec. In addition, periodic checks of welds, sealant installation, plumbness, and sheet pile elevations were performed by Geosyntec. The pile driving record and other QA/QC data are provided in Appendix G. Record drawings of the barrier wall are provided in Appendix H. Field modifications to the barrier wall are provided in Appendix I. Submittals for the sheet pile barrier wall are provided in Appendix J.

3.5.4 Sheet Pile Wall Instrumentation

The following monitoring instruments were installed on the barrier wall in accordance with the design:

- Thirteen (13) inclinometers attached to the sheet piles along the wall
- Thirteen (13) inclinometers installed on land inboard of the sheet pile barrier wall
- Six (6) vibrating wire piezometers installed on land inboard of the sheet pile barrier wall to measure groundwater elevation. These instruments were nested with six of the 13 inboard inclinometers.

Baseline conditions were established for the barrier wall based on instrument readings prior to dredging. Monitoring of sheet pile movement, lateral and vertical fill movement, and groundwater elevations for geotechnical purposes are currently ongoing and will continue until the dredging and capping of the lake is complete. It is planned for these instruments to be removed following completion of the local dredging work. Additional groundwater piezometers were also installed to evaluate the performance of the collection system. The permanent groundwater collection trench piezometers are discussed in Section 3.8.4.

The sheet pile wall inclinometers were installed by Parsons and Geosyntec. Instrumentation is shown on the record drawings included in Appendix H.

3.6 EAST FLUME DEMOLITION

Installation of the barrier wall and collection trench required demolition of the East Flume spillway. The East Flume demolition consisted of the following work:

- Erosion protection and dewatering
- Demolition of the spillway
- Removal of the former diffuser pipeline asbestos coating (limited to areas of pipe cutting)
- Grouting and removal of a section of the diffuser pipeline following removal of the asbestos coating
- Backfill of the East Flume with a geotextile fabric, engineered fill, and gravel

The following paragraphs describe the work completed and modifications to the original design:

1) Riprap erosion protection was installed in the Lower East Flume. The Upper East Flume was then dewatered to the Lower East Flume and the water quality monitored for turbidity prior to discharge to the lake in accordance with the design. The readings were taken using a hand-held turbidity meter to ensure that water discharged from the Lower East Flume had no visible difference in color or clarity from the lake water and no increase in turbidity of 10 percent or more. Turbidity readings were recorded in the field log books and daily construction reports (Appendix F).

2) The existing geotextile and vegetation covering the spillway, wood walkway, handrail, steel grating and wood weir were removed in accordance with the design.

3) Prior to removal of the existing 60-inch pipeline between the Lakeshore Pumping Station and the lake, it was determined that the pipeline coating contained asbestos and that grouting was required to plug the pipe to prevent lake water intrusion. A copy of the asbestos test report is included in Appendix L. The asbestos abatement was performed by AAC Contracting Inc. as a subcontractor to OSC. Pipe grouting was performed by Grout Tech Inc., as a subcontractor to OSC.

4) OSC removed approximately 65 ft. of the pipe following the grouting and asbestos abatement work.

5) The design called for a 5-ft. layer of backfill material to be installed within the Upper East Flume to the work platform elevation (365 ft. above mean sea level). During construction, the fill placement for the work platform resulted in displacement of a thick upper layer of highly-saturated sediment in an area of the East Flume. Due to the poor structural stability of this material, backfilling of the East Flume as planned was not deemed possible. A re-evaluation of the barrier wall stability and grading plan was subsequently performed because of the influence of backfill in the East

Flume on stability of the barrier wall. The re-evaluation resulted in a revised grading plan with less backfill in the East Flume. The revised East Flume grading plan was submitted to and approved by the NYSDEC as Field Change Form (FCF)-15 (Appendix I).

6) Regrading of the East Flume, covering with six inches of topsoil and seeding in accordance with FCF-15. Note that additional backfill material was not required and the saturated sediments had dried sufficiently to allow regrading.

3.7 GROUNDWATER COLLECTION TRENCH INSTALLATION

The groundwater collection trench system is comprised of the groundwater collection pipe, groundwater force main, three collection sumps, backfill material, wick drains, piezometers, and supporting electrical and other ancillary equipment. The West Wall collection trench system was installed by OSC.

The groundwater collection trench system was installed between September 9, 2010 and June 14, 2011 by OSC. Installation began at the east end of the trench alignment at collection sump CS-6 and continued to the west to collection trench Station 0+50. Excavation conditions ranged from soft digging of peat material in the wetland areas to hardened rock-like material within approximately 300 ft. east of the Lakeshore Pumping Station. Groundwater in the trench during construction was collected and disposed as described in Section 3.7.4.

The as-built location for the collection system is shown on the survey drawing provided in Appendix A. Photographs of the collection trench excavation have been included in the project photograph log provided in Appendix D. Record drawings of the groundwater collection trench are provided in Appendix H. Conformance and performance testing of the backfill material including geotechnical and analytical lab testing results are discussed in Section 3.9.5. Submittals are included Appendix J.

3.7.1 Piping

The collection trench installation included a 6-inch diameter slotted fiberglass reinforced pipe (FRP) collection pipe and a 4-inch solid-wall FRP force main. Cleanout risers were installed at 100-ft. intervals along the collection pipe in accordance with the design.

3.7.2 Mechanical and Electrical Equipment

The collection system includes electronically controlled pumps, mechanical valves, sensors, and flow meters. The system is powered and controlled by panels in the Lakeshore Pumping Station. A monitoring system provides automatic and manual control of the collection sump pumps as well as alarm monitoring and data collection. Permanent groundwater piezometers were installed to monitor the performance of the collection system. A summary of the devices related to the collection system consist of:

- Submersible pumps
- Hydrostatic pressure transducers
- Float switches

- Variable frequency drives with output filters
- Seven (7) groundwater piezometers

One groundwater pump is installed in each collection sump. The groundwater pumps are model 3885 WE1534H submersible pumps manufactured by Goulds Pumps.

3.7.3 Groundwater Collection Trench Installation

OSC excavated existing material and placed the spoils in the stockpile area per the Work Plan. The 6-inch slotted FRP was installed to the elevation as indicated on the design drawings. The 4-inch solid FRP force main was installed at a depth of 4-ft. below the finished grade. The collection trench was backfilled with pipe bedding (washed stone) and drainage medium (Type 1B coarse aggregate) in accordance with the design. OSC performed hydrostatic testing of the force main piping at a pressure of 105 pounds per square inch for two hours under the observation of Parsons. A copy of the test report is included in Appendix G.

A total of three collection sumps (CS-4, CS-5, and CS-6) and three adjacent valve vaults were installed in the collection trench system. Collection sumps and valve vaults are precast concrete structures coated with Sherman Williams Targuard® coal tar epoxy to minimize potential contact with the groundwater.

Several blockages in the collection pipe that could not be cleared via water jetting were discovered during routine cleaning in early 2012. OSC remobilized to the site, investigated the blockages and made repairs from July 9-20, 2012. The areas with blockages were first re-jetted by Sun Environmental. Areas that could not be cleared via jetting were then excavated to expose the collection pipe. At three locations, the factory fused coupler was found to have pulled apart causing a gap in the collection pipe:

- 50 ft west of CS-4
- 75 ft west of the third cleanout west of CS-6
- 30 ft west of CS-6

The gaps were repaired by installing a stainless steel clamp or two clamps and a length of 6-inch pipe depending on gap length. The trench was then backfilled with pipe bedding and drainage medium in accordance with the design.

3.7.4 Groundwater Collection Trench Piezometer Installation

Parratt Wolff Drilling, a subcontractor to OSC, installed a total of seven permanent groundwater piezometers as part of the collection system. Boreholes were drilled using hollow stem augers, then the well constructed with an FRP screen and riser, sand filter pack, cement/bentonite grout seal and cover. The wells were then developed to less than 50 nephelometric turbidity units and constant temperature, pH and conductivity levels prior to piezometer installation. The development logs are included in Appendix J, Submittal #69. One Geokon 4500AL-170kPa vibrating wire piezometer was then installed in each well and connected to a central data logging units for data downloading. The groundwater piezometers are permanent instruments to evaluate the performance of the collection system. (Note that

numbering of the piezometers was changed in the Operation, Maintenance and Monitoring Reports from the numbers shown in this report.)

3.7.5 Wick Drain Installation

The wick drain material selected and installed was AmerDrain 607, manufactured by the American Wick Drain Corporation. The wick drains were installed between June 20, 2011 and June 30, 2011 by DGI Menard, a subcontractor to OSC. The wick drains were installed on an alignment located between collection pipe and piezometer cable conduit on 3-ft. intervals, except at locations of shallow refusal or utility obstructions as described in FCF-14 (Appendix I). The wick drains were driven approximately to the depth of the top of stratum M2 silt-clay, except for as noted on the survey drawing. The as-built wick drains are shown on the survey drawings provided in Appendix A. Wick drain submittals are included in Appendix J.

3.7.6 Groundwater Collection Trench QA/QC

OSC provided QC for the installation of the collection trench system. The QC activities provided by OSC are described in the QA/QC provided in Submittal 6, provided in Appendix J. Parsons provided QA for the installation of the collection trench. QA activities executed by the Parsons QA team included: photographs of daily work activities, observation of installed materials, observation of excavation work, observation of backfill materials, observation of well development, observation of FRP pressure testing and collecting system measurements including verification of the collection pipe and sump elevations.

3.7.7 Site Restoration

Site restoration was performed following completion of construction of the barrier wall and the groundwater collection trench in accordance with the design. Site restoration along the barrier wall and trench consisted of the replacement of the gravel work platform which was removed to install these features. Disturbed areas outside of the trench area were restored with topsoil, seed and mulch.

In the stockpile area, cover soil material was placed over the completed stock piles at a minimum depth of 6 inches, and native vegetation was planted to minimize contact with stormwater runoff in accordance with the design. Site restoration work is shown in the project photographic log provided in Appendix D.

3.7.8 Construction Water Management

Construction water is defined as water collected from excavations. Construction water generated during collection trench excavation and construction was pumped into temporary holding tanks on-site. Water collected in the tanks was filtered through bag filters or particulates allowed to settle prior to discharge into the existing collection system for ultimate treatment at the Willis Avenue groundwater treatment plant. Approximately 8.2 million gallons of construction water was collected and treated from August 23, 2010 thru June 30, 2011 (Appendix K). The temporary holding tanks were decontaminated and demobilized at the end of construction in accordance with the design.

3.8 DISPOSAL OF WASTES

3.8.1 East Flume Diffuser Pipe

As discussed in Section 3.6, the demolition of the East Flume required removal of a section of an abandoned 60-inch pipe between the Lakeshore Pumping Station and the barrier wall. Prior to removal of the pipe, Honeywell determined that the pipe coating material contained non-friable asbestos. AAC Contracting, a subcontractor to OSC, performed asbestos abatement and removal of a 65-ft. section of the pipe in coordination with Parsons. The asbestos-coated pipe was disposed of as non-friable asbestos waste at the Camillus C&D Landfill, New York as directed by Honeywell. A waste manifest for the asbestos-coated is provided in Appendix K.

3.8.2 Excavated Soil

During Phase 1, approximately 33,853 cubic yards (CY) of material were excavated to install the work platform and placed on-site in small hills or drumlins. During Phase 2, approximately 12,000 CY of material excavated during installation of the barrier wall and groundwater collection trench was placed in Annexes A, B and C (Appendix H, East Wall Drawing C-030).

The excavated material was observed to consist primarily of Solvay Waste (SOLW) with minor components of other fill materials. In accordance with the design, excavated material was visually observed for signs of contamination (e.g., NAPL, grossly stained) and, if visibly contaminated, stockpiled separately. During Phase 2, approximately 2,250 CY of visually contaminated material was temporarily staged on-site in Annex A. Since completion of the West Wall IRM, additional material from construction of the East Wall, Upper Harbor Brook and Outboard Area has been placed in WBB and mixed with the West Wall material.

Analytical testing of the material placed in the drumlins and Annex A was performed after consultation with the NYSDEC. Sampling of the drumlins was performed in March and October 2010. Sampling of Annex A soils was performed in December 2011. The sampling results showed the material to be non-hazardous. Based on the analytical results, NYSDEC approved the materials to remain on WBB following completion of the IRM. The final location of the material will be evaluated during the final remedy for the WBB/HB site as discussed in the Wastebed B/Harbor Brook Materials Management, Grading and Disposal Plan (O'Brien & Gere, 2013). A copy of the analytical testing results and NYSDEC approval to leave the material on WBB are provided in Appendix L. A drawing showing the location of the drumlins and Annexes A, B and C is provided in Appendices H and L.

3.9 DOCUMENTATION

3.9.1 Testing and Verification

Parsons subcontractors performed QC testing in accordance with the CQAP portion of the Final Design Report. Some of the QC tasks performed included the following:

- Review of Mill Certificates, Shop Drawings, Welding Inspection Reports, Coal Tar Epoxy Coating Inspection Reports, and final driving logs for the steel sheet piles that

make up the barrier wall. Testing and verification reports for the steel sheet piles are provided in Appendix G.

- Testing of the East Flume discharge pipe for asbestos (Appendix L)
- Turbidity monitoring of the East Flume discharge (Appendix F)
- Geotechnical and chemical testing was conducted for imported soil and gravel used for backfill material. General borrow source materials include engineered fill, work platform gravel fill material, Type 1B course aggregate, blended stone, low permeability soil, and topsoil. Initial samples were conducted for each borrow source for conformance to the specifications. Test results are included in Tables 3.1 through 3.7 and Appendices J and L.
- Surveying was conducted to verify elevations and locations of: excavations following the removal of soil, sheet piles, pipes, electrical and mechanical structures, as well as final grades. The survey drawings are included in Appendix A.
- Testing and verification was conducted for the quality control of the collection system and instrumentation. Hydrostatic pressure testing was performed for the force main. All gages and control devices connected to lines being tested were disconnected for the duration of the test.

3.9.2 Meeting Reports

Project coordination meetings were conducted on a weekly basis every Tuesday during construction. Meeting attendees included representatives from Honeywell, the NYSDEC PM, Parsons CM, and Parsons CQA, Parsons SHSO, and Parsons subcontractors. Weekly meeting minutes are provided in Appendix F.

3.9.3 Reports

Reports for construction quality assurance performed included daily construction summary reports, weekly meeting minutes, phase meeting minutes, field inspection logs, FCFs, and final documentation. Identification and resolution of construction issues or deficiencies were handled via field correspondence and meetings.

Parsons' daily construction reports and weekly meeting minutes were entered into the Primavera Contract Manager software. Quality Control Phase meetings were conducted for each definable feature of construction. Phase meetings included three phases (preparatory, initial and follow-up) and final inspections. Daily reports, weekly meeting minutes and phase meeting minutes are provided in Appendix F.

3.9.4 Soil/Materials Management

During Phase 1, excess material was generated from excavations to install the work platform. During Phase 2, additional excess material was generated during installation of the barrier wall and groundwater collection trench. Excess excavated material was stockpiled in on-site staging areas, tested for contaminants, determined to be non-hazardous and allowed to remain on WBB as described in Section 3.8.2. Following completion of the excavation work, the stockpiles were stabilized with vegetation to minimize contact with stormwater and runoff. The

final location of the material will be evaluated during the final remedy for the WBB/HB site as discussed in the Wastebed B/Harbor Brook Materials Management, Grading and Disposal Plan (O'Brien & Gere, 2013). As-built survey drawings are provided in Appendix A.

3.9.5 Imported Soil and Gravel Material

The quantities of each imported material per source are shown in Table 3.1. A summary of the analytical tests collected for imported backfill material is provided in Table 3.2 and the analytical results for backfill are provided in Appendix L. A summary of the geotechnical testing results for imported backfill is provided in Tables 3.3 through 3.7. Imported soil and gravel materials were primarily used to backfill the collection trench and for surface treatments such as low permeability soil and gravel.

3.9.6 Stormwater Pollution Prevention

The erosion and sediment controls for the IRM construction were installed and maintained in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control and the NYSDEC-approved site-specific SWPPPs for Phase 1 and Phase 2 dated October 1, 2009 and July 20, 2011, respectively.

Parsons performed inspections of erosion and sediment controls per the approved SWPPP during construction. SWPPP inspections logs are provided in Appendix M.

3.9.7 Remedial Performance/Documentation Sampling

Remedial performance, end-point sampling, or Data Usability Summary Reports (DUSRs) for site contamination were not part of the IRM.

3.9.8 Construction Documentation

Final reports for the Phase 1 construction provided by Op-Tech included a final as-built topographic survey, and documentation of the volume of material excavated/ stockpiled. The site topography was modified slightly to accommodate the barrier wall and collection trench; therefore, the area was re-surveyed following completion of Phase 2 construction.

Final reports for the Phase 2 construction provided by OSC included the following documents:

- As-built sheet pile driving log
- Log of imported aggregate material
- Logs of installed anodes and wick drains
- Owner's manuals for the collection system operational equipment
- Electrical record drawings
- As-built topographic survey

3.10 DEVIATIONS FROM THE FINAL DESIGN

During construction, a total of 15 deviations from the final design were required. Deviations presented in this section are modifications that required evaluation and approval by the design engineer and/or the NYSDEC prior to implementation. However, none of the field changes impacted the design intent or long-term effectiveness of the system. Typical minor construction modifications or "field fit" of the components that do not require design evaluation, approval by the design engineer, or the NYSDEC are not covered under this section but are recorded on the final project record drawings. For example, the actual collection system alignment may deviate slightly from the design drawings to accommodate field conditions; however, the general location and extents of the collection system is installed in accordance with the final design. Field changes are documented on a Parsons' Field Change Form (FCF) and numerically identified with the prefix "FCF".

The following approved changes were implemented:

FCF-1: Modification of the Swell Seal application to the sheet piles
FCF-2: Allowance of sheet pile plumbness
FCF-3: Modification of the sheet pile depths
FCF-4: Electrical revisions
FCF-5: Installation of clay plugs in the collection trench
FCF-6: Modification to the alignment of the collection trench
FCF-7: Modification to the electrical connections in the hand holes
FCF-8: Modification to the collection sump elevations
FCF-9: Replacement sheet piles
FCF-10: Installation of valve supports in the collection sumps
FCF-11: Explanation of the gradation of the NYSDOT #1B material
FCF-12: Modification to the anode bracket
FCF-13: Modification to the anode plate
FCF-14: Modifications to the wick drain alignment
FCF-15: East Flume Stability and Re-Evaluation

FCFs and supporting documentation are provided in Appendix I.

3.11 CONTAMINATION REMAINING AT THE SITE

As presented in Section 2.2, the primary objective of the West Wall IRM is to contain impacted soils and prevent migration of potentially contaminated groundwater and non-aqueous phase liquid (NAPL) to Onondaga Lake. The groundwater collection trench captures impacted groundwater along the length of the wall from the shallow and intermediate hydrogeologic units. The IRM objective does not include excavation or removal of a contamination source or post-remedial sampling.

3.12 FINAL COVER SYSTEM

In order to prevent exposure to remaining contamination at the site, additional measures will be evaluated and constructed in the future under other IRMs or the final remedy for the site.

3.13 ENGINEERING AND INSTITUTIONAL CONTROLS

This IRM does not require Engineering and Institutional Controls (ECs/ICs).

Procedures for monitoring, operating and maintaining the groundwater collection system and site final closure systems are provided in the Operation, Maintenance and Monitoring Plan (OMM Plan) for the Onondaga Lake Lakeshore Barrier Wall Hydraulic Containment System for the site.

The final site remedy will include an environmental easement or deed restriction placed on the property as required.

Table 3.1 - Summary of Imported Material

Material	Application	Vendor and Source	Volume Imported (cy)
NYSDOT #1B Aggregate	Collection Trench Backfill	Saunders - Marcellus/ South Onondaga	7,964
NYSDOT #1 and #2 Aggregate Blend	Collection Trench Bedding	Saunders - Marcellus/ South Onondaga	1,424
Topsoil	Topsoil	Riccelli - Ryan Homes	1,584
Engineered Fill, Type 4	East Flume Backfill	Riccelli - Granby Pit - Oswego	7,115
Clay	Low Permeablity layer	Riccelli - Granby Pit - Oswego	1,433

Notes.
1. Volumes of imported material are calculated based on material unit weight and load quantities.

Table 3.2 - Summary of Analytical Testing of Imported Material

Material	Test Type	Vendor	Source	Imported Quantity to Date (ton)	Imported Quantity to Date (cy)	Application	Submittal #	Sample Date
NYS DOT #1B	Initial	Saunders	Marcellus	0	0	Trench Backfill	18	9/15/2010
NYS DOT #1B	Conformance	Saunders	Marcellus	956	478	Trench Backfill	31	10/21/2010
NYS DOT #1B	Conformance	Saunders	Marcellus	4,797	2,399	Trench Backfill	37	12/10/2010
NYS DOT #1B	Conformance	Saunders	Marcellus	10,180	5,090	Trench Backfill	40A	3/11/2011
NYS DOT #1 and #2	Initial	Saunders	Marcellus	0	0	Trench Bedding	18	9/15/2010
Type 4 (Engineered Fill)	Initial	Riccelli	Granby Pit	0	0	Flume Backfill	34	10/20/2010
Type 4 (Engineered Fill)	Conformance	Riccelli	Granby Pit	0	0	Flume Backfill	37	12/10/2010
Type 4 (Engineered Fill)	Conformance	Riccelli	Granby Pit	12,094	7,114	Flume Backfill	40A	3/11/2011
Topsoil	Initial	Riccelli	Ryan Homes	0	0	Topsoil	15	11/13/2009
Clay	Initial	Riccelli	Granby Pit	0	0	Collection Trench-Low Perm Layer	56	5/12/2011

Table 3.3 - Summary of Geotechnical Testing of Imported Material

Material	Test Type	Vendor	Source	Imported Quantity to Date (ton)	Imported Quantity to Date (cy)	Application	Submittal #	Sample Date
NYS DOT #1B	Initial	Saunders	Marcellus	0	0	Trench Backfill	18	3/25/2009
NYS DOT #1B	Conformance	Saunders	Marcellus	2,313	1,157	Trench Backfill	31	11/10/2010
NYS DOT #1B	Conformance	Saunders	Marcellus	6,485	3,243	Trench Backfill	37	1/10/2011
NYS DOT #1B	Conformance	Saunders	Marcellus	13,140	6,570	Trench Backfill	40A	3/28/2011
NYS DOT #1 and #2	Initial	Saunders	Marcellus	0	0	Trench Bedding	18	9/24/2010
NYS DOT #1 and #2	Conformance	Saunders	Marcellus	2,278	1,424	Trench Bedding	40A	3/25/2011
Type 4 (Engineered Fill)	Initial	Riccelli	Granby Pit	0	0	Flume Backfill	34	12/2/2010
Type 4 (Engineered Fill)	Conformance	Saunders	Marcellus	11,078	6,516	Flume Backfill	37	1/23/2011
Type 4 (Engineered Fill)	Conformance	Saunders	Marcellus	0	0	Flume Backfill	40A	3/21/2011
Topsoil	Initial	Riccelli	Ryan Homes	0	0	Topsoil	15	9/16/2010
Clay	Initial	Riccelli	Granby Pit	0	0	Collection	56	4/15/2011

Table 3.4 - Geotechnical Testing Results for NYS DOT #1B Material

	End Use	***Trench Backfill***	Trench Backfill	Trench Backfill	Trench Backfill	Trench Backfill
	Vendor	**-**	Saunders	Saunders	Saunders	Saunders
	Source	**-**	Marcellus	Marcellus	Marcellus	Marcellus
	Test	***Specification***	Initial	Conformance	Conformance	Conformance
	Submittal	**-**	18	31	37	40A
	Material Type	***NYSDOT #1B***	NYS DOT #1B	NYS DOT #1B	NYS DOT #1B	NYS DOT #1B
Sieve	**Units**	**-**				
0.375	**% Finer**	**-**	-	100.0	100.0	100.0
0.250"	**% Finer**	***100.0***		-	-	-
#4	**% Finer**	**-**	100.0	100.0	97.6	99.0
1/8"	**% Finer**	***90-100***				
#8	**% Finer**	**-**	72.3	97.0	67.7	73.7
#16	**% Finer**	**-**	43.5	32.0	39.0	47.6
#30	**% Finer**	**-**	24.1	15.0	22.3	30.5
#50	**% Finer**	**-**	11.9	4.7	12.5	17.0
#80	**% Finer**	***0-15***	-	-	-	-
#100	**% Finer**	**-**	3.3	1.9	7.2	8.0
#200	**% Finer**	***0-1***	1.4	0.6	2.7	2.0

Table 3.5 - Geotechnical Testing Results for NYSDOT #1/#2 Blend Material

	Application	***Trench Bedding***	Trench Bedding	Trench Bedding	Trench Bedding	Trench Bedding
	Vendor	-	Saunders	Saunders	Saunders	Saunders
	Source	-	Marcellus	Marcellus	Marcellus	Marcellus
	Test	***Specification ASTM #57***	Initial	Initial	Initial	Initial
	Submittal	-	18	18	18	40A
	Material Type	***NYS DOT #1/#2 Blend***	NYS DOT #1	NYS DOT #2	NYS DOT #1/#2 Blend	NYS DOT #1/#2 Blend
Sieve	**Units**					
6"	**% Finer**	-	-	-	-	-
5"	**% Finer**	-	-	0	-	-
4"	**% Finer**	-				-
3"	**% Finer**	-		0		-
2"	**% Finer**	-	-	-	-	-
1.5"	**% Finer**	***100.0***	-	100.0	100.0	100.0
1"	**% Finer**	***95-100***	100.0	97.3	98.7	98.7
0.75"	**% Finer**	-	100.0	68.5	84.3	84.3
0.50"	**% Finer**	***25-60***	94.2	10.9	53.4	53.4
0.375	**% Finer**	-	41.1	2.2	28.0	28.0
0.250"	**% Finer**		10.9	0.5	-	-
#4	**% Finer**	***0 - 10***	4.1	-	3.5	3.5
1/8"	**% Finer**	-				-
#8	**% Finer**	***0-5***	2.3	-	1.1	1.1
#10	**% Finer**	-	-	-	-	-
#16	**% Finer**	-	-	-	-	-
#20	**% Finer**	-	-	-	-	-
#30	**% Finer**	-	-	-	-	-
#40	**% Finer**	-	-	-	-	-
#50	**% Finer**	-	-	-	-	-
#60	**% Finer**	-	-	-	-	-
#80	**% Finer**	-	-	-	-	-
#100	**% Finer**	-	-	-	-	-

Table 3.6 - Geotechnical Testing Results for Type 4 (Engineered Fill) Material

	End Use	***Flume Backfill***	Flume Backfill	Flume Backfill	Flume Backfill	Flume Backfill	Flume Backfill
	Vendor	-	Riccelli	Riccelli	Riccelli	Riccelli	Riccelli
	Source	-	Granby Pit	Granby Pit	Granby Pit	Granby Pit	Granby Pit
	Test	***Specification***	Initial	Initial	Initial	Initial	Conformance
	Submittal	-	34 (North)	34 (South)	34 (East)	34 (West)	37
	Material Type	***Type 4 (Engineered Fill)***	Type 4 (Engineered Fill)	Type 4 (Engineered Fill)	Type 4 (Engineered Fill)	Type 4 (Engineered Fill)	Type 4 (Engineered Fill)
Sieve	**Units**						
6"	**% Finer**	-	-	-	-	-	-
5"	**% Finer**	-	-	0	-	-	-
4"	**% Finer**	-	-	-	-	-	100.0
3"	**% Finer**	***100.0***	-	0	-	-	100.0
2"	**% Finer**	-	100.0	100	100	100.0	-
1.5"	**% Finer**	-	-	-	-	-	-
1"	**% Finer**	-	-	-	-	-	-
0.75"	**% Finer**	-	-	-	-	-	-
0.50"	**% Finer**	-	-	-	-	-	-
0.375	**% Finer**	-	-	-	-	-	-
0.250"	**% Finer**	-	57.0	60.0	56.0	56.0	96.2
#4	**% Finer**	-	-	-	-	-	-
1/8"	**% Finer**	-					
#8	**% Finer**	-	-	-	-	-	-
#10	**% Finer**	-	-	-	-	-	-
#16	**% Finer**	-	-	-	-	-	-
#20	**% Finer**	-	-	-	-	-	-
#30	**% Finer**	-	-	-	-	-	-
#40	**% Finer**	-	18.0	22.0	20.0	20.0	17.4
#50	**% Finer**	-	-	-	-	-	-
#60	**% Finer**	-	-	-	-	-	-
#80	**% Finer**	-	-	-	-	-	-
#100	**% Finer**	-	-	-	-	-	-
#200	**% Finer**	***0-12***	4.0	6.0	4.0	4.0	5.1

Table 3.6 - Geotechnical Testing Results for Type 4 (Engineered Fill) Material

	End Use	***Flume Backfill***	Flume Backfill	Flume Backfill	Flume Backfill
	Vendor	-	Riccelli	Riccelli	Riccelli
	Source	-	Granby Pit	Granby Pit	Granby Pit
	Test	***Specification***	Conformance	Conformance	Conformance
	Submittal	-	40A	40A	40A
	Material Type	***Type 4 (Engineered Fill)***	Type 4 (Engineered Fill)	Type 4 (Engineered Fill)	Type 4 (Engineered Fill)
Sieve	**Units**				
6"	**% Finer**	-	-	-	-
5"	**% Finer**	-	-	-	-
4"	**% Finer**	-	100.0	100.0	100.0
3"	**% Finer**	***100.0***	93.2	90.6	100.0
2"	**% Finer**	-	84.1	67.8	76.7
1.5"	**% Finer**	-	76.4	57.3	67.9
1"	**% Finer**	-	63.5	49.1	61.4
0.75"	**% Finer**	-	55.4	41.8	54.5
0.50"	**% Finer**	-	47.0	36.0	45.8
0.375	**% Finer**	-	42.8	32.5	41.2
0.250"	**% Finer**	-	36.8	28.2	35.0
#4	**% Finer**	-	33.1	25.5	31.6
1/8"	**% Finer**	-	-	-	-
#8	**% Finer**	-	-	-	-
#10	**% Finer**	-	24.4	19.0	23.3
#16	**% Finer**	-	-	-	-
#20	**% Finer**	-	-	-	-
#30	**% Finer**	-	16.8	13.0	16.0
#40	**% Finer**	-	14.7	11.4	14.0
#50	**% Finer**	-	-	-	-
#60	**% Finer**	-	11.1	8.5	10.5
#80	**% Finer**	-	-	-	-
#100	**% Finer**	-	7.8	5.9	7.2
#200	**% Finer**	***0-12***	4.7	3.4	4.2

Table 3.7 - Geotechnical Testing Results for Topsoil

4	**End Use**	***Topsoil***	Topsoil
	Vendor	**-**	Riccelli
	Source	**-**	Ryan Homes
	Test	***Specification***	Initial
	Submittal	**-**	#15
	Material Type	***Topsoil***	Topsoil
Sieve	**Units**		
6"	**% Finer**	**-**	-
5"	**% Finer**	**-**	-
4"	**% Finer**	**-**	-
3"	**% Finer**	**-**	-
2"	**% Finer**	***100***	-
1.5"	**% Finer**	**-**	-
1"	**% Finer**	***90-100***	-
0.75"	**% Finer**	**-**	-
0.50"	**% Finer**	**-**	-
0.375	**% Finer**	**-**	100.0
0.250"	**% Finer**	***85-100***	99.9
#4	**% Finer**	**-**	99.6
1/8"	**% Finer**	**-**	
#8	**% Finer**	**-**	-
#10	**% Finer**	**-**	99.2
#16	**% Finer**	**-**	-
#20	**% Finer**	**-**	-
#30	**% Finer**	**-**	97.5
#40	**% Finer**	**-**	96.4
#50	**% Finer**	**-**	-
#60	**% Finer**	**-**	93.7
#80	**% Finer**	**-**	-
#100	**% Finer**	**-**	90.5
#200	**% Finer**	***20-85***	82.3

APPENDIX A

AS-BUILT SURVEY DRAWINGS

APPENDIX B

DIGITAL COPY OF THE CCR

(SEE CD)

APPENDIX C

NYSDEC APPROVALS OF SUBSTATIVE TECHNICAL REQUIREMENTS

(SEE CD)

APPENDIX D

CONSTRUCTION PHOTOS

(SEE CD)

APPENDIX E

CAMP FIELD DATA

(SEE CD)

APPENDIX F

DAILY CONSTRUCTION REPORTS, WEEKLY MEETING MINUTES

(SEE CD)

APPENDIX G

QA/QC DATA

(SEE CD)

APPENDIX H

RECORD DRAWINGS

APPENDIX I

APPROVED MODIFICATIONS TO THE FINAL DESIGN

(SEE CD)

APPENDIX J

SUBMITTALS

(SEE CD)

APPENDIX K

OFF-SITE WASTE MANIFESTS

(SEE CD)

APPENDIX L

ANALYTICAL TEST DATA

(SEE CD)

APPENDIX M

SWPPP INSPECTION LOGS

(SEE CD)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau D, 12th Floor
625 Broadway, Albany, New York 12233-7013
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Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

December 17, 2009

Mr. Alfred J. Labuz
Honeywell International, Inc.
Suite 700
5000 Brittonfield Parkway
East Syracuse, NY 13057

Re: Wastebed B/Harbor Brook IRM – West Wall Phase 1 IRM Work Plan
Consent Order #D7-0008-01-09

Dear Mr. Labuz:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the November 2009 Wastebed B/Harbor Brook IRM West Wall Phase 1 – Civil Work Project Interim Remedial Measure Work Plan (work plan) submitted with your letter dated December 3, 2009. This work is being performed under the Wastebed B/Harbor Brook Interim Remedial Measure (IRM) and includes the clearing and grubbing and regrading of the area prior to installation of the sheet pile barrier and groundwater collection system for the Wastebed B/Harbor Brook IRM West Wall.

The work plan is hereby approved. NYSDEC looks forward to commencement of this work scheduled to begin in December 2009 and be completed in April 2010. If you have any questions, please contact me at 518-402-9796.

Sincerely,

Tracy A. Smith
Project Manager

ecc: J. Gregg, NYSDEC
G. Townsend, NYSDEC
J. Heath, Esq.
M. Broschart, Parsons
R. Nunes, USEPA
L. Speer
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Alexander B. Grannis
Commissioner

March 5, 2010

Mr. John P. McAuliffe
Remediation & Evaluation Services
Honeywell International, Inc.
Suite 700
5000 Brittonfield Parkway
East Syracuse, NY 13057

Re: Cultural Resource Management Report Phase 1B Archaeological Work Plan: Onondaga Lake Project, Upland and Shoreline Area, Wastebed 13, Geddes Brook IRM, Tributary of Geddes Brook, Ninemile Creek RI/FS, Shoreline Survey, and Wastebed B/Harbor Brook IRM

Dear Mr. McAuliffe:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the "Cultural Resource Management Report Phase 1B Archaeological Work Plan: Onondaga Lake Project, Upland and Shoreline Area, Wastebed 13, Geddes Brook IRM, Tributary of Geddes Brook, Ninemile Creek RI/FS, Shoreline Survey, and Wastebed B/Harbor Brook IRM" (Phase 1B CRS work plan) dated October 2, 2009 and revised pages to the Phase 1B CRS work plan provided in your letter to me dated January 29, 2010. Based on this review the Phase 1B CRS work plan is approved and work can proceed conditioned on the revised pages included in your January 29, 2010 letter being inserted into all copies of the Phase 1B CRS work plan that are distributed by Honeywell (including any copies distributed within Honeywell), to its agents, and to the public, if any. If you have any questions, please contact me at 518-402-9796.

Sincerely,

Tracy A. Smith
Project Manager
Division of Environmental Remediation

ec: Robert Nunes, EPA
Mark Sergott, NYSDOH
Donald Hesler/File
Margaret Sheen, Esq., Region 7
Jeff Gregg, NYSDEC
Lindsay Speer
Joseph Heath, Esq.
Nancy Herter, SHPO
John Vetter, EPA
Geoff Laccetti, NYSDOH
Pete Petrone, Parsons
Gregg Townsend, Region 7
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New York State Department of Environmental Conservation
Division of Water, Region 7
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Alexander B. Grannis
Commissioner

July 21, 2010

Al Labuz
Honeywell International
301 Plainfield Road
Suite 330
North Syracuse, New York 13212

Re: West Wall – Wastebed B/Harbor Brook IRM – Phase 2, Geddes (T), Onondaga County

Dear Mr. Labuz,

The Department has received a Stormwater Pollution Prevention Plan (SWPPP) and revisions dated July 20, 2010, for the above project. Our review of this material has determined that the SWPPP meets the minimum requirements of the *SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001).*

This acceptance does not relieve you of any other requirements listed in the General Permit (GP-0-10-001), or protect you from enforcement action initiated by this Department if permit violations are observed during inspections of the site by DEC staff. Construction activity will be authorized upon issuance of all other applicable Uniform Procedures Act (UPA) permits.

You must conduct inspections of the erosion and sediment controls and stormwater management structures weekly as required by General Permit GP-0-10-001 and you must modify those controls if they prove to be ineffective in preventing the mobilization and transport of soils from your property. The Department may also perform periodic inspections of the site to ensure compliance with this requirement.

If you have any questions or need any assistance, please contact me at (315) 426-7504.

Sincerely,

Ellen Hahn

Ellen Hahn, CPESC, CPSWQ
Stormwater Control Specialist

ecc: William Salomone, Parsons
Michael Broschart, Parsons
Tracy Smith, NYSDEC
Sandra Lizlovs, NYSDEC

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Alexander B. Grannis
Commissioner

July 23, 2010

Mr. Alfred J. Labuz
Honeywell International, Inc.
301 Plainfield Road
Suite 330
Syracuse, NY 13212

Re: Wastebed B/Harbor Brook Site IRM – West Wall Phase 2 Barrier Wall & Groundwater Collection System IRM Work Plan (Site #734075)

Dear Mr. Labuz:

The New York State Department of Environmental Conservation (NYSDEC) has completed its review of the work plan submitted by Honeywell entitled "Wastebed B/Harbor Brook Site IRM – West Wall Phase 2 Barrier Wall & Groundwater Collection System Interim Remedial Measure Work Plan" (work plan), submitted with your letter dated July 23, 2010. This work is being performed under the Wastebed B/Harbor Brook Interim Remedial Measure (IRM) and includes the installation of a sheet pile barrier and groundwater collection system for the Wastebed B/Harbor Brook IRM West Wall.

The work plan, which includes the associated Stormwater Pollution Prevention Plan (as approved in the attached July 21, 2010 letter from Ellen Hahn to you), is hereby approved. If you have any questions, please contact me at 518-402-9796.

Sincerely,

Tracy A. Smith
Project Manager

ecc: J. Gregg, NYSDEC
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Joe Martens
Acting Commissioner

February 3. 2011

Mr. John P. McAuliffe, P.E.
Honeywell International, Inc.
301 Plainfield Road
Suite 330
Syracuse, NY 13212

Re: Cultural Resource Management Report Phase 1B Reconnaissance/Survey
Onondaga Lake Project, Upland and Shoreline Area, Wastebed B/Harbor Brook IRM

Dear Mr. McAuliffe:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the "Cultural Resource Management Report Phase 1B Reconnaissance/Survey Onondaga Lake Project, Upland and Shoreline Area, Wastebed B/Harbor Brook IRM" (WBB/HB Phase 1B CRS report) dated February 1, 2011. Based on this review the Phase 1B CRS report is approved. If you have any questions, please contact me at 518-402-9796.

Sincerely,

Tracy A. Smith
Project Manager

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