THIRD FIVE-YEAR REVIEW REPORT FOR LCP BRIDGE STREET SUBSITE OF THE ONONDAGA LAKE SITE ONONDAGA COUNTY, NEW YORK

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York
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June 11, 2020

Date

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LIST OF ABBREVIATIONS & ACRONYMS

ANC	Atmospheric Nitrogen Company
ARARs	Applicable or Relevant and Appropriate Requirements
CFR	Code of Federal Regulations
CY	Cubic Yard
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FYR	Five-Year Review
gpm	gallon per minute
ICs	Institutional Controls
IRM	Interim Remedial Measure
LCP	Linden Chemicals and Plastics
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
mg/L	milligrams per liter
ng/L	nanograms per liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operation, Maintenance, and Monitoring
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
TCLP	Toxic Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
UU/UE	Unlimited Use and Unrestricted Exposure
VOCs	Volatile Organic Compounds

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of FYRs are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121, consistent with the National Contingency Plan (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

The Onondaga Lake site includes 11 subsites, which are defined as any site that is situated on Onondaga Lake's shores or tributaries that has contributed contamination to, or threatens to contribute contamination to, Onondaga Lake. Each subsite is an operable unit (OU). This FYR focuses only on the Linden Chemicals and Plastics (LCP) Bridge Street subsite (LCP subsite) (OU 5) of the Onondaga Lake site. The LCP subsite is located in Village of Solvay, Town of Geddes, Onondaga County, New York.

The work at the LCP subsite has been conducted as a single OU.

This is the third FYR for the LCP subsite. The triggering action for this statutory FYR is the signature date of the last review, October 8, 2014. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the LCP subsite above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The LCP subsite's third FYR team was led by Mark Granger, the EPA Remedial Project Manager (RPM). Participants included Kathryn Flynn (EPA hydrogeologist), Nicholas Mazziotta and Michael Sivak (EPA human health risk assessors), Mindy Pensak and Michael Clemetson (EPA ecological risk assessors), and Larisa Romanowski (EPA community involvement coordinator). The Village of Solvay and the potentially responsible party (PRP) were notified of the initiation of the FYR. The FYR began on May 9, 2019.

Site Background

The LCP subsite is located in the Village of Solvay, Onondaga County, New York in an industrial area south of the New York State Fairgrounds complex and a Conrail right-of-way and north of Belle Isle Road. A scrap yard owned by the Matlow Company and the former NAKOH Chemical Company are located northeast of the subsite. The WPS Syracuse Cogeneration facility (formerly known as Kamine) is located immediately west of the subsite. See **Figure 1** for the subsite location.

The LCP subsite encompasses approximately 30 acres, 20 acres of which was host to various former industrial, storage, and office buildings, as well as storage tanks and railroad tracks. These structures were remediated (*e.g.,* tank cleaning, lead and asbestos abatement) and demolished during an Interim Remedial Measure (IRM) completed in 2001. This 20-acre area subsequently

became a soil/sediment containment area covered with a low-permeability cap and surrounded by a slurry wall. The containment area received excavated contaminated soil, sediment, and debris from subsite-related remedial action (RA) efforts, as well as RA efforts related to materials that had migrated to Geddes Brook and Ninemile Creek. The containment area is surrounded by a fence that prevents public access. The remaining 10 acres are associated with flumes, wetlands, ditches, and other non-facility features. See **Figure 2** for the subsite plan.

From the mid-1800s to 1908, the land on which the LCP subsite is located was occupied by several companies that produced salt from naturally-occurring brine springs in the area. The subsite was subsequently developed and used for commercial/industrial purposes by the Atmospheric Nitrogen Company (ANC). ANC constructed and operated a plant that manufactured ammonia. Ammonia production eventually ceased and in the early 1950s, the facility was demolished. The resulting debris was used to fill the subsite.

In 1953, the Allied Chemical Corporation, a predecessor to AlliedSignal and then Honeywell, constructed a chlor-alkali facility at the LCP subsite to manufacture caustic soda (sodium hydroxide) and chlorine gas. In 1979, the facility was purchased by LCP. LCP installed a hydrochloric-acid production process in 1980 and a sodium-hypochlorite bleach production process in 1981. Manufacturing operations ceased in 1988. The eastern portion of the facility was leased by the HoltraChem Manufacturing Company from the mid-1990s through 1998 and was used as a product transfer station for the distribution of caustic soda and acids. Currently, no operations are conducted at the LCP subsite.

The on-site aquifers are not used for drinking water. Residents located in the vicinity of the LCP subsite use the public water supply provided by Onondaga County. Groundwater near the subsite will not be used as a source of potable water under future-use scenarios.

The property and surrounding areas are presently zoned industrial, and the reasonably-anticipated future land use is not expected to change.

Appendix A, attached, summarizes the documents utilized to prepare this FYR. **Appendix B**, attached, summarizes the subsite's topography, hydrology, and geology/hydrogeology. For more details related to site background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the site, please refer to:

www.epa.gov/superfund/onondaga-lake

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Onondaga Lake Site (LCP Bridge Street Subsite)		
EPA ID: NYD986913580		
Region: 2	**State:** NY	**City/County:** Village of Solvay/Onondaga County
SITE STATUS		

NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No
REVIEW STATUS	
Lead agency: State ***[If "Other Federal Agency", enter Agency name]*:**	
Author name (Federal or State Project Manager): Mark Granger	
Author affiliation: EPA	
Review period: 10/9/2014 - 10/8/2019	
Date of site inspection: 8/6/2019	
Type of review: Statutory	
Review number: 3	
Triggering action date: 10/8/2014	
Due date *(five years after triggering action date)*: 10/8/2019	

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In October 1995, the State of New York and Honeywell entered into a Stipulation and Order, under the 1992 Onondaga Lake Remedial Investigation/Feasibility Study (RI/FS) Interim Consent Decree, to conduct an RI/FS at the LCP subsite. Field work began in October 1995 and was completed in November 1996. In October 1997, Honeywell (as AlliedSignal) completed an RI report for the subsite. The report was subsequently modified by NYSDEC and reissued in March 1999. Honeywell completed the FS in May 1999. The need for a remedy was driven by the presence of unacceptable risks to human and ecological receptors attributable to mercury and PCBs.

Response Actions

In July 1986, LCP submitted a closure plan for the surface impoundments and subsequently obtained NYSDEC approval. The closure entailed the removal of sludge, liners, and impacted soil associated with the impoundments. The surface-impoundment closures were completed in July 1989.

In 1990, polychlorinated biphenyl (PCB)-contaminated soils were excavated and removed from the Eastern Rectiformer Area by LCP in accordance with the Toxic Substance Control Act

(TSCA). In March 1995, approximately 21,000 gallons of PCB-impacted oil were drained from transformers and rectifiers in the Western Rectiformer Area. As part of an IRM conducted by Honeywell (as AlliedSignal), approximately 200,000 pounds of PCB-impacted electrical equipment and the 21,000 gallons of PCB-impacted oil were disposed of off-site under TSCA and NYSDEC Part 375 requirements.

In March 1999, an IRM involving the drumming and off-site disposal of hazardous laboratory chemicals was conducted by Honeywell. In July 1999, a hazardous wastewater and sludge IRM was completed. Under this action, Honeywell removed hazardous wastewaters and sludges from the on-site tanks and disposed of the waste off-site.

In October 1999, NYSDEC obtained groundwater samples from north of the West Flume on an adjacent property in the vicinity of the Peroxide Building. Laboratory analysis characterized the groundwater as having elevated xylene concentrations (xylene was used by Allied Chemical in the hydrogen peroxide process).

In March 2000, an IRM was performed to remove portions of the on-site sewers that may have been releasing mercury-impacted water into the West Flume and East Ditch and plugged the downgradient ends of the sewers.

An IRM involving the demolition of most of the on-site structures commenced in May 2000. A Diaphragm and Mercury Cell Building demolition IRM commenced in July 2000. This IRM consisted of the removal and recycling of elemental mercury from cells inside the Mercury Cell Building, followed by the decontamination and demolition of the buildings. This work was completed in August 2001.

Based upon the results of the RI/FS, in September 2000 a Record of Decision (ROD) was finalized selecting a remedy for the site. The following remedial action objectives (RAOs) were selected:

- Eliminate, to the extent practicable, contaminant migration from the LCP subsite to the Onondaga Lake environs and environmental media (*e.g.,* groundwater, surface waters, soil, air and sediment);
- Restore, to the extent practicable, groundwater quality to levels which meet state and federal drinking water standards;
- Mitigate, to the extent practicable, the migration and potential migration of contaminated waters through LCP subsite sewers;
- Eliminate, to the extent practicable, the direct-contact threat associated with contaminated soil, surface water and groundwater; and
- Reduce, to the extent practicable, the level of contaminants in surface water and sediments to attain surface water Applicable or Relevant and Appropriate Requirements (ARARs) and sediment remedial goals to be protective of fish, wildlife and the resources upon which they depend.

The key components of the selected remedy include:

- Excavation of approximately 54,300 cubic yards (CY) of sediment exceeding upstream mercury concentrations. Backfilling of the excavated areas with clean fill and re-vegetating such areas, as appropriate. All excavated material will be dewatered, characterized and placed on-site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap. Restoration of any wetlands impacted by remedial activities. The restored wetlands will require routine inspection for several years to ensure adequate survival of the planted vegetation;
- Cleaning sewer catch basins and manhole structures and filling LCP subsite sewer systems with grout;
- Excavation of approximately 3,200 CY of brine muds and placement of the brine muds on-site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap;
- Excavation and on-site treatment of approximately 4,500 CY of mercury-contaminated principal threat waste shallow soils at the facility with on-site placement of the treated soils under a New York State 6 NYCRR Part 360 equivalent low-permeability cap;
- Excavation and off-site disposal of soils that contain PCB contamination above NYSDEC Division of Environmental Remediation Technical and Administrative Guidance Memorandum levels. All excavated material will be characterized and transported for treatment/disposal at an off-site Resource Conservation and Recovery Act- and/or Toxic Substances Control Act-compliant facility, as appropriate;
- Installation of a New York State 6 NYCRR Part 360 equivalent low-permeability cap over the facility to contain LCP subsite soils, excavated sediments and brine muds and demolition debris;
- Hydraulic containment of both the shallow and deep aquifers with a subsurface barrier wall and a groundwater collection-and-treatment system to maintain proper hydraulic gradients;
- Implementation of institutional controls (ICs) (*i.e.,* deed restrictions) to prohibit the use of groundwater at the LCP subsite and the disturbance of the subsite cap and slurry wall; and
- Long-term monitoring of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy.

The cleanup levels for affected media are as follows:

Media	Hg	PCB
Groundwater	0.70 ug/L	
Surface Soil	0.20 mg/kg	1 mg/kg
Subsurface Soil		10 mg/kg
Sediment	0.20 mg/kg	
Surface Water	2.60 ng/L	

Response Action Implementation

The remedial design was approved in September 2004 and the RA commenced in October 2004. The various components of the RA are described below.

Sewer Closure

The sewer system was closed in two phases. Sections of sewer lines within 10 feet of the West Flume and East Ditch were removed during an IRM performed in March 2000. The remaining portions of the sewer lines were closed from June through August 2005. The majority of the sewer system was closed by excavation and crushing; several sewer lines were closed by cleaning and grouting in place.

Cut-Off Wall Construction

Construction of a cut-off wall around the soil/sediment containment area to contain the contaminated groundwater was performed from July to September 2005. The cut-off wall consisted of a mixture of suitable soil and bentonite slurry with a hydraulic conductivity of less than 10^{-7} centimeters per second. The cut-off wall was keyed three feet into the underlying low-permeability till and was tied into an interim low-permeability cover.

Excavation and Treatment of Principal-Threat Waste

Principal-threat-waste excavation areas were identified as:

- Shallow soils beneath the Mercury Cell Building within the confines of the foundation down to a clay layer, or to approximately eight feet below ground surface;
- Shallow soils from the Mercury Retort and Still Areas with soils that when subject to the Toxic Characteristic Leaching Procedure (TCLP) testing exceeded the cleanup objective of 0.2 milligrams per liter (mg/L) for mercury in leachate; and
- Soils from the vicinity of the former Hydrogen Compressor Building with visible elemental mercury.

Excavation was conducted from October to December 2004. The concrete slab and soils from the Mercury Cell Building, Mercury Retort and Still Areas, and Hydrogen Compressor Building Area were excavated. Approximately 7,000 CY of material were stockpiled for treatment.

The excavated material was treated by soil washing to below 0.2 mg/L mercury in TCLP leachate and placed on the soil/sediment containment area. Eighty-seven CY of the soil-washed material required stabilization. A portion of that stabilized material did not pass TCLP testing and was disposed of off-site at an approved facility. Fifteen thousand seven hundred fifteen pounds of elemental mercury were recovered by the soil-washing process and shipped off-site for recycling.

Excavation of Sediments and Soils

West Flume Sediment Excavation

The West Flume sediment excavation was conducted from August through September 2006. Post-excavation samples were collected from the excavation bottom prior to backfilling and additional excavations conducted, as necessary. Twenty-two thousand five hundred CY of contaminated sediment was excavated from the West Flume and consolidated on the soil/sediment containment

area. Additionally, 40 CY of volatile organic compound (VOC)-contaminated soil were excavated and disposed of offsite. The West Flume excavation was backfilled with clean soil, covered with 6 inches of clean imported topsoil, and restored. The restoration consisted of seeding, placement of erosion control fabric, and planting of trees.

Wetlands Sediment Excavation

The Wetlands A and B sediment excavation was conducted from June 2005 to July 2007. Post-excavation samples were collected from the excavation bottom prior to backfilling and additional excavations conducted, as necessary and appropriate. Sixty-nine thousand two hundred CY of contaminated sediment was excavated from the wetlands and consolidated on the soil/sediment containment area. The wetlands were backfilled with clean imported soil, covered with one foot of clean imported topsoil and restored. Restoration consisted of seeding and planting of wetland plants and trees.

Brine Mud Disposal Area Excavation

From October 2003 to June 2006, 23,100 CY of material was excavated from the Brine Mud Disposal Area and consolidated on the soil/sediment containment area. The Brine Mud excavation was backfilled with clean soil, covered with six inches of clean imported topsoil, and seeded.

North Ditch Area Excavation

The North Ditch Area is located between the Matlow Scrap Yard and the Brine Mud Disposal Area. Excavation of the North Ditch Area was conducted from June through November 2005. Fourteen thousand nine hundred CY of contaminated soil was excavated from the North Ditch Area and consolidated on the soil/sediment containment area. The North Ditch Area excavation was backfilled with clean imported soil, covered with six inches of clean imported topsoil, and seeded.

MW-26 Area Excavation

The MW-26 Area is located on the northwestern portion of the subsite adjacent to Wetland A. Two thousand nine hundred CY of contaminated soil was excavated from this area and consolidated on the soil/sediment containment area. The MW-26 Area excavation was backfilled with clean imported soil and seeded.

PCB Soil Excavation

Approximately 300 CY of PCB-contaminated soil were excavated from the PCB excavation areas and disposed of off-site at an approved facility. The excavation areas were subsequently backfilled and regraded.

Soil/Sediment Containment Area

The soil/sediment containment area was constructed over most of the 20-acre facility-related area of the property. Excavated materials from the West Flume, Wetlands A and B, the Brine Mud Area and other subsite soils, excavated sediments and brine muds and demolition debris, *etc.* were consolidated at the on-site soil/sediment containment area. Treated principal threat waste was also consolidated there. One hundred thirty-two thousand CY of contaminated soil and sediment and waste and debris was consolidated at the soil/sediment containment area. A fence with gates was constructed around the soil/sediment containment area to prevent public access.

After completion of the aforementioned efforts, the soil/sediment containment area was used to dispose of contaminated soil and sediment and debris from the nearby Geddes Brook and Ninemile Creek cleanups (the LCP subsite was the source of the contamination in Geddes Brook and Ninemile Creek), as well as 33,400 CY of material from 2012 supplemental on-site excavations of the East Ditch, West Ditch, Wetlands A and C, and Dredge Spoils areas. See **Figure 3** for the locations of the 2012 on-site additional soil/sediment removals.

Interim Low-Permeability Soil Cover/Final Part 360 Cap

The soil/sediment containment area was originally covered with an interim low-permeability soil cover constructed in 2009. An interim cover was utilized to accommodate the subsequent excavation of contaminated material from the Geddes Brook/Ninemile Creek subsite over the course of several construction seasons, as well as material from the aforementioned supplemental on-site excavations. Due to the construction schedules for those efforts, the interim low-permeability soil cover was iteratively placed over the impacted materials.

With the completion of those excavation efforts in 2014, a New York State 6 NYCRR Part 360 cap (Part 360 cap) was installed and physically tied to the subsurface cut-off wall.

Groundwater Collection and Pre-Treatment System

The groundwater collection system, designed to recover water from the soil/sediment containment area, consists of two 10,000-gallon fiberglass groundwater storage tanks and 15 extraction wells. This system was completed in 2007. In 2009, a pre-treatment system consisting of a filter-feed pump, two 5-micron bag filters, two fiberglass-reinforced plastic granular-activated-carbon vessels and a flow meter was constructed. This system treats the collected water and then pumps it to the Onondaga County West Side Trunk Sewer (sanitary sewer), from which it flows to the Onondaga County Metropolitan Wastewater Treatment Facility for additional treatment.

After temporary-cover-related infiltration was eliminated with the 2015 completion of the Part 360 cap, the pumps were replaced as part of a general groundwater-extraction system upgrade in November 2017 to increase the overall pumping rate in order to better effect a sustained inward gradient. The pumping rate was increased three-fold and has been sustained since that time.

Long-Term Monitoring of Groundwater

Three monitoring wells were installed within the soil/sediment containment area to monitor for the potential movement of elemental mercury.

Engineering Controls

A fence was constructed around the subsite. The gate is locked to prevent unauthorized access.

Restoration

The remediated areas (*e.g.*, cap, wetlands, streams, *etc*.) were restored to provide a diversity of plant species (including a substantial percentage of reintroduced native species), as well as habitats for wading birds, ducks, amphibians, fish, and mammals.

Institutional Controls

The ROD called for ICs (*i.e.,* deed restrictions) to prohibit the use of groundwater; prohibit the disturbance of the Part 360 cap and slurry wall; and restrict unacceptable future use at the subsite. Because obtaining owner approval was not possible, consistent with *NYSDEC Division of Environmental Remediation-33, Institutional Controls: A Guide to Drafting and Recording Institutional Controls*, an Environmental Notice was finalized in lieu of deed restrictions in May 2015.

Table 1, below, summarizes the status of the ICs.

Table 1: **Summary of Implemented Institutional Controls**

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs needed?	ICs called for in the decision documents?	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Subsite property	Restrict groundwater use on the subsite property.	Environmental Notice May 2015
Engineered Controls	Yes	Yes	Subsite property	Protect engineering controls (*e.g.,* cap and slurry wall) on the subsite property.	Environmental Notice May 2015
Future Land Use	Yes	Yes	Subsite property	Restrict unacceptable future use of the subsite property.	Environmental Notice May 2015

Systems Operation/Operation & Maintenance

Requirements for operation, maintenance, and monitoring (OM&M) are identified in the OM&M Plan and include the operation of the groundwater collection system and the implementation of monitoring and inspections. OM&M activities are documented and submitted to NYSDEC in monthly reports.

Subsite inspections focus on four major items: 1) general site conditions (*i.e.,* access roads, security fence/gates, signs, erosion control measures); 2) groundwater collection/storage system (*i.e.,* building structure, extraction wells, piezometers, pumps, instrumentation, storage tanks); 3) Part 360 cap condition (*i.e.,* vegetative cover, vent pipes, drainage system, settlement and subsidence); and 4) static water-level measurements within the groundwater piezometers upgradient and downgradient of the cut-off wall.

The monitoring components of the OM&M Plan include:

- periodic sampling of groundwater, surface water/sediment, and biota; and
- wetlands assessments.

Three monitoring wells located within the area with deep elemental mercury within the Part 360 cap soil/sediment containment area are sampled quarterly for total mercury and inspected for the presence of elemental mercury. The OM&M Plan specifies that if elemental mercury is detected in a monitoring well, the three monitoring wells should be sampled each month for three months. In addition, groundwater from piezometers located outside the cut-off wall are sampled quarterly and analyzed for total mercury. See **Figure 4** for the locations of monitoring wells and piezometers.

Nine surface water/sediment annual monitoring locations were established. Surface water is analyzed for total and dissolved mercury and methyl mercury. Sediments are analyzed for total mercury and methyl mercury.

Prey fish in and around the West Flume, Wetland A, and Wetland C have been collected and analyzed annually during this review period for total mercury. The monitoring program for the restored Wetland B was completed in 2012.

Consistent with the requirements of the OM&M manual, restored Wetlands A and C were monitored twice annually for five years to evaluate the success of the restoration. The parameters monitored included vegetation (type, percent cover, and frequency), hydrology, invasive species (species, location and approximate size of patch), and wildlife usage. The monitoring program for the restored wetland B was completed in 2012.

Since 2008, approximately 17.5-million gallons of groundwater have been removed from inside the soil/sediment containment area.

Potential impacts on the subsite from climate change were assessed. The performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the subsite.

III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations from the 2014 FYR, as well as a discussion of the 2014 FYR's recommendations and the current status of those recommendations, are summarized in **Tables 2 and 3**, respectively, below.

Table 2: **Protectiveness Determinations/Statements from the 2014 FYR**

OU	Protectiveness Determination	Protectiveness Statement
05	**Will be Protective**	The implemented remedy is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

Table 3: Status of Recommendations from 2014 FYR

OU(s)	Issue	Recommendations	Current Status	Current Implementation Status Description
05	The subsite extraction wells may not be providing a complete inward gradient of the contaminated groundwater within the slurry wall.	Three years after the completion of the construction of an impermeable cap over the containment area/slurry wall, the effectiveness of the groundwater extraction system in sustaining an inward gradient should be determined.	Ongoing	After completion of the installation of the Part 360 cap in 2015, the fifteen-well extraction system was rebuilt and the extraction rate increased. The rebuilt extraction system was brought on line in November 2017. While substantial progress is apparent in establishing inward gradients, adjustments to the system may be required to establish sustained inward gradients in all areas within the slurry wall.
05	The placement of ICs, required as part of the ROD, is awaiting remedy completion to be finalized.	Finalize placement of ICs within one year of remedy completion.	Completed	The placement of ICs in the form of an Environmental Notice was completed in May 2015.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 1, 2019, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico and the U.S. Virgin Islands including the LCP Bridge Street subsite. The announcement can be found at the following web address:

https://www.epa.gov/aboutepa/fiscal-year-2020-five-year-reviews

In addition to this notification, a notice of the commencement of the FYR was sent to local public officials in July 2019. The notice was provided to the village of Solvay and town of Geddes by email on July 17, 2019, with a request that the notice be posted in the respective municipal offices and on the town and village webpages. In addition, on July 19, 2019, the notice was distributed via the NYSDEC's Onondaga Lake News email listserv, which includes approximately 11,000 subscribers. The purpose of the public notice was to inform the community that the EPA would be

conducting a FYR to ensure that the remedy implemented at the site remains protective of public health and is functioning as designed. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process or the site.

Once the FYR is completed, the FYR report will be made available online (www.epa.gov/superfund/onondaga-lake) and at the subsite information repositories. The information repositories are maintained at the NYSDEC Albany and Syracuse offices; the Onondaga County Public Library, Syracuse Branch at the Galleries, 447 South Salina Street, Syracuse New York; the Solvay Public Library, 615 Woods Road, Solvay, New York; the Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, New York and the EPA Region 2 Superfund Records Center, 290 Broadway, 18th Floor, New York, New York.

Data Review

Groundwater Analytical Data

Shallow, intermediate, and deep aquifer samples are collected quarterly from four piezometer clusters (PZ-1B, PZ-2B, PZ-3B and PZ-4B) located on the outside of the cut-off wall and from three monitoring wells located within the soil/sediment containment area (MW-34D, MW-35D and MW-36D). Samples are analyzed for total mercury. Samples were not collected in the second and third quarters of 2015 due to construction.

During the review period, with the exception of shallow piezometer PZ-2B-S located on the downgradient side of the soil/sediment containment area, there were only a limited number of mercury detections. Of the detections reported, most tended to be lower than 0.1 micrograms per liter (µg/L), which is below NYSDEC's standard of 0.7 µg/L. During the review period, the average mercury concentration in piezometer PZ-2B-S was 1.8 µg/L. This is less than the average concentration of 2.8 µg/l during the previous review period, but is significantly above the standard. Note that the shallow piezometer PZ-2B-S results are within the range of concentrations measured since 2008, strongly indicating that concentrations may be from residual contamination rather than indicative of migration from the containment area.

The three monitoring wells located within the soil/sediment containment area were not sampled in 2014 and 2015 due to the final cap construction activities. From 2016 to 2018, monitoring well 35-D showed the highest average concentration of mercury of 3.1 µg/L, compared to the average concentrations of 0.4 µg/L and 2.1 µg/L for monitoring wells MW-34-D and MW-36-D, respectively. Mercury concentrations are lower compared to those reported in 2011 before construction (maximum of 17.6 µg/L at monitoring well MW-35D reported). Because of the limited sampling, trends could not be established and will continue to be evaluated.

During each sampling event, the monitoring wells were also inspected for elemental mercury by the use of a copper probe. Elemental mercury was not detected during any of the sampling events.

Groundwater Hydraulic Monitoring

Water levels are measured at the seven piezometer clusters to confirm that pumping achieves an inward and upward groundwater flow around the soil/sediment containment area. Inward gradients are denoted when the interior shallow, intermediate, and deep piezometer water levels are lower than the corresponding exterior shallow, intermediate, and deep piezometer water levels. The upward gradients are denoted when the deep water levels are higher than intermediate water levels at piezometer locations inside the soil/sediment containment area.

Shallow piezometer PZ-6 has showed an inward gradient since September 2014, shallow piezometers PZ-5 and PZ-7 have shown an inward gradient since 2016, shallow piezometer PZ-3 has had an inward gradient since 2017, and shallow piezometer PZ-4 achieved an inward gradient in December 2018. Shallow piezometer PZ-2 has been fluctuating between inward and outward gradients since January 2018.

Although they have been fluctuating in the five-year period, the gradients at intermediate piezometers PZ-1, PZ-2, and PZ-3 appear to be inward for 2018. Piezometer PZ-4 has been inward since late 2017 and piezometers PZ-5, PZ-6, and PZ-7 have been consistently inward during the review period.

Most of the deep piezometers had outward gradients during the review period except for piezometers PZ-6 and PZ-7. The gradient at piezometer PZ-1 has been improving since 2017, but piezometers PZ-2, PZ-3, PZ-4, and PZ-5 show a flat trend of an outward gradient.

Inside piezometer clusters PZ-4, PZ-5, PZ-6, and PZ-7 have maintained an upward vertical gradient (*i.e.,* between the deep-inside and intermediate-inside zones) in this period and clusters PZ-1, PZ-2, and PZ-3 have shown an upward vertical gradient starting in 2018.

See **Figure 5** for trend graphs relative to gradients.

In assessing gradients it is important to note two aspects of the remedy that were completed during the review period. Specifically, and as discussed above, temporary cover-related infiltration was eliminated with the completion of the Part 360 cap and the groundwater extraction well pumps were replaced as part of a general system upgrade in 2017. The upgrade was undertaken primarily to increase the overall pumping rate to better effect sustained inward and upward gradients. The pumping rate was increased three-fold and has been sustained since that time.

Although the shallow and intermediate inward gradients, as well as upward gradients, were well established or improved during the review period, the majority of deep piezometers had a slight outward gradient. While it is favorable that upward gradients have been established between the deep-inside and intermediate-inside zones, it appears possible that the deep inward gradients have yet to be achieved; this could be due to a slower gradient response because of the extremely-low permeability of this unit (*i.e.,* till).

Surface Water

Surface water is sampled annually at four locations in the West Flume, two locations in Wetland A, and three locations in Wetland C. Samples are analyzed for total mercury, methyl mercury, and total dissolved mercury. In general, concentrations of dissolved mercury in surface water during the review period were below baseline RI concentrations for the wetland areas and the West Flume and remain below the acute and chronic aquatic standards (1,400 nanograms per liter [ng/L] and 770 ng/L, respectively).

The surface water standard of 2.6 ng/L (based on wildlife protection to total mercury) has also been consistently met in the West Flume. The dissolved mercury standard was exceeded at only one location in Wetland C during the review period, at surface water sample location LCP1-SW-71 in 2016. Wetland C did not exist in the previous review period, but the average West Flume dissolved mercury concentration in this period was 1.20 ng/L, similar to the previous average of 1.64 ng/L.

Both samples in Wetland A were above the 2.6 ng/L standard for mercury every year since 2015. The average of the the two samples was 0.98 ng/L in 2014 and then the average was 5.24 ng/L from 2015 to 2018. In the previous review, Wetland A dissolved mercury concentrations fluctuated around the average of 10.28 ng/L. An additional surface water sample was taken in the West Ditch in 2018; the dissolved mercury result was 0.63 ng/L, indicating that the surface water concentrations in Wetland A are not from water coming off the containment area.

The previous review predicted that surface water quality in the West Flume and wetland areas would continue to improve. While Wetland A dissolved mercury concentrations are decreasing, they still exceed the total mercury wildlife standard. See **Figure 6** for a map of surface-water sampling locations. See **Figure 7** for a summary of surface-water sampling results.

Sediment

The OM&M Plan specified that wetlands would be monitored for five years from the completion of restoration. After five years, if invasive species were unintrusive and mercury levels in sediment were below levels of concern (the ROD-specified level of 0.2 mg/kg), monitoring would be discontinued. Because Wetland B met these criteria in 2013, monitoring there was terminated.

Sediments are sampled annually at the same locations as surface water samples. The analytes include total mercury, methyl mercury, and total organic carbon. Sediment values for the West Flume and Wetland C were all below the NYSDEC Protection of Wildlife value for mercury in sediment (0.8 mg/kg). Mercury values in both the West Flume and Wetland C are generally showing a strong downward trend. In the West Flume, average total mercury ranged from 0.12 to 0.48 mg/kg between 2014 and 2018. This range reflects a continuous decline to levels below the cleanup goal during the most recent round of sampling (*i.e.*, a concentration of 0.48 mg/kg was reported in 2014 and 0.12 mg/kg was reported in 2018). Total mercury concentrations in Wetland C were low and stable, with an average range of 0.108 to 0.18 mg/kg. Therefore, the average concentrations of mercury in Wetland C were below the 0.2 mg/kg cleanup goal for the entire review period.

The highest sediment concentrations are found in Wetland A. Average concentrations of total mercury in Wetland A ranged from 0.92 mg/kg to 2.8 mg/kg during this review period. Due to elevated results at sediment location LCP-SW-68, supplemental sampling was conducted at additional locations in Wetland A and the West Ditch in 2018. Mercury concentrations in 13 of the 21 samples collected from Wetland A exceeded the ROD cleanup goal of 0.2 mg/kg. Five of these results (ranging from 2.85 to 5.92 mg/kg) also exceeded the NYSDEC Class C value for mercury in sediment (1 mg/kg). Class C values are considered likely to pose risk to aquatic life. Monitoring in Wetland A will continue at locations LCP1-SW-67 and LCP1-SW-68, with the addition of other locations, as appropriate.

See **Figure 6** for a map of sediment sampling locations. See **Figure 8** for a summary of sediment sampling results.

Biota

Baseline sampling was conducted in 2005 to establish body burden at the subsite prior to remediation in order to ensure that, in addition to overall habitat improvement, potential construction-related increases were subsequently obviated. The OM&M Plan established a long-term monitoring program that analyzes mercury concentrations in prey fish, benthic macro invertebrates, small mammals, and earthworms. The OM&M Plan specifies that monitoring should continue every two to three years until the results indicate that the remedy has been effective and the contaminant concentrations have stabilized. Based on the results of the monitoring program through 2013, the recommendation was made to discontinue the biota sampling; however, NYSDEC requested that prey fish be collected following the 2015 completion of construction of the final site cover. The 2005 average baseline value for preyfish is 0.14 mg/kg. Three sampling events (2015, 2017, and 2018) were conducted to collect and analyze prey fish from three reaches (A, B, and C) within the West Flume. Five samples from each location were analyzed for total mercury. The average prey fish tissue values for mercury ranged between 0.02 and 0.13 mg/kg within the three reaches during each sampling event. These results show that concentrations have continued to decline since the previous monitoring period (2008 to 2013) in all three reaches to levels below the average baseline concentration of 0.14 mg/kg.

Wetlands Assessments

Wetland A, Wetland B, and the West Flume were restored after the removal of contaminated sediments in 2008. Wetland C was constructed in 2012. Generally, these areas were covered with one foot of clean imported topsoil and restored or constructed to accommodate a variety of habitat types, including wet meadow/scrub-shrub fringe, emergent wetland, aquatic bed, open water, and drainage channel. These habitat types were created by the development of various water depth zones according to the wetland-restoration plan. To limit invasive species, the restoration plan places an emphasis on the development of aquatic-bed and deep-emergent-marsh habitat types. Assessments of the wetland restorations are made regularly in accordance with the OM&M Plan. The wetland assessments indicate that overall, the efforts to restore these areas have been very successful since the initiation of restoration activities. Areas that were previously dominated by a monoculture with little habitat value are now diverse wetlands that support a mix of plant and animal species. While common reed grass (an invasive species) occurs in several locations in

uplands around the restored areas, ongoing efforts to control the common reed grass have been successfully performed in accordance with the OM&M Plan. Wildlife usage of the restored wetlands and West Flume is extensive. In sum, the restored wetlands are thriving.

Site Inspection

A subsite inspection related to this FYR was conducted on August 6, 2019. Those in attendance included Robert Nunes, Mark Granger, Nick Mazziotta, and Thomas Mongelli from EPA; Tim Larsen, Don Hesler, and Jacky Luo from NYSDEC; Mark Sergott from the New York State Department of Health; Alma Lowry, Adelaide Rosa, and Richelle Brown representing the Onondaga Nation; Shane Blauvelt representing Honeywell; and Mark Arrigo and Natalia Cagide-Elmer of Parsons (Honeywell's contractor). Observations made during the inspection indicated that the remedy-related infrastructure was in good repair.

V. TECHNICAL ASSESSMENT

QUESTION A: *Is the remedy functioning as intended by the decision documents?*

The September 2000 ROD called for the excavation of sediment exceeding upstream mercury concentrations, backfilling of the excavated areas with clean fill and re-vegetating, sewer system closure, mercury removal from soil on the former plant property, construction of an underground cut-off wall and low-permeability engineered soil cover over the soil/sediment containment area, installation of an on-site groundwater collection system and a long-term monitoring of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy. The ROD also calls for the implementation of ICs to prohibit the use of groundwater at the LCP subsite and to prohibit the disturbance of the subsite Part 360 cap and slurry wall.

These measures were necessary to achieve the RAOs, to the extent practicable, of eliminating contaminant migration from the LCP subsite to the Onondaga Lake environs and environmental media; restoring groundwater quality to state and federal drinking water standards; mitigating the migration of contaminated waters through LCP subsite sewers; eliminating the direct contact threat associated with contaminated soil, surface water and groundwater and reducing the level of contaminants in surface water and sediments to attain surface water ARARs and sediment remedial goals to be protective of fish, wildlife and the resources upon which they depend.

Although the shallow and intermediate inward gradients, as well as upward gradients, were well established or improved during the review period, the majority of deep piezometers had a slight outward gradient. While it is favorable that upward gradients have been established between the deep-inside and intermediate-inside zones, it appears possible that the deep inward gradients have yet to be achieved; this could be due to a slower gradient response because of the extremely-low permeability of this unit (*i.e.,* till).

Concentrations of dissolved mercury in surface water during the review period were well below concentrations reported in the RI for Wetlands A and C and the West Flume, and remain well

below the acute and chronic aquatic standards (of 1,400 ng/L and 770 ng/L respectively). While Wetland A dissolved mercury concentrations are decreasing, they exceed the total mercury wildlife standard of 2.6 ng/L. Wetland A also has the highest concentration of total mercury in sediment. Due to elevated results at sediment location LCP-SW-68, supplemental sampling was conducted at additional locations in Wetland A and the West Ditch in 2018. The data indicates that additional sediment and surface-water sampling should be conducted in Wetland A.

Average mercury concentrations in prey fish collected from the West Flume during this review period were generally lower than values observed during the previous review period, and remained below baseline concentrations. As documented in the 2nd FYR (2014), biota collection (small mammals, earthworms, and macroinvertebrates) from Wetlands A and B and the West Flume was discontinued after 2012 due to stabilized concentrations (Wetland C was not restored until 2012). The low mercury concentrations observed do not currently warrant additional biological investigation. However, if trends in Wetland A remain elevated, the resumption of biota sampling may be considered. The wetlands restoration is successful and provides a diverse habitat for a thriving community of plant and animal species.

QUESTION B: *Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

There are no changes in the physical conditions of the LCP subsite or land uses that would affect the protectiveness of the selected remedy. Contaminated soils and sediments identified during the RI, as well as supplementally-excavated materials, have been consolidated under the final Part 360 cap. Groundwater, which is designated by New York State as potable, is being controlled by an extraction and treatment system in the soil/sediment containment area and no potable wells are impacted by LCP subsite-related contamination.

The exposure assumptions and toxicity values that were used to estimate the potential risk and hazards to human health and ecological receptors from exposure to LCP subsite contaminants followed the general practice at the time that the risk assessment was performed. Although specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practices and the need for a remedial action remains valid.

For groundwater, the remedy identified in the ROD includes containment of groundwater inside the soil/sediment containment area at the subsite in both the shallow and the deep aquifers and ICs in the form of deed restrictions to prohibit the use of groundwater, and restoration of groundwater quality outside the soil/sediment containment area to levels which meet state and federal standards. Shallow soils associated with unacceptable risks were excavated, treated, and relocated to the on-site soil/sediment containment area. The most significant risk driver in the shallow soils was mercury, therefore a cap was placed over shallow soils with mercury concentrations exceeding 0.1 mg/kg, which was determined to be protective of human health and the environment for any foreseeable future activity at this Site. Surface soils contaminated with PCBs above 1 mg/kg were excavated and disposed of off-site. Subsurface soils contaminated with PCBs above 10 mg/kg were excavated and disposed of off-site. These levels remain protective of human health, based on the commercial/industrial exposures that are expected to occur at this subsite.

The potential for vapor intrusion was evaluated during the 2009 FYR. During that evaluation, groundwater concentrations were compared to health-based screening criteria provided in the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*. This guidance provides concentrations of chemicals in groundwater associated with indoor air concentrations at acceptable levels of cancer risk and noncancer hazard using residential exposure assumptions. At the time, no occupied buildings were above the contaminated groundwater and the FYR recommended that future FYRs should continue to evaluate this pathway if the buildings become occupied or if new buildings are constructed over the contaminated groundwater. As of this third FYR, no buildings have become occupied over the contaminated groundwater, no new buildings have been constructed over the contaminated groundwater, and there are no plans in either case prior to the next FYR.

The RAOs and goals established at the time of the ROD are still valid for ecological receptors. The excavation of contaminated soils and sediments was intended to remove contaminant pathways to ecological receptors. Post-remediation monitoring has been conducted in all areas where contaminated soils and sediments have been excavated. Surface-water data indicate that mercury concentrations in the surface water have declined over time (see **Figure 7**). The acute and chronic surface-water values identified (1,400 ng/L and 770 ng/L, respectively) are still valid. The sediment cleanup value of 0.2 mg/kg reflects the July 2014 NYSDEC *Screening and Assessment of Contaminated Sediment* guidance which identifies 0.2 mg/kg as a concentration where sediments are considered to be of low risk to aquatic life (*i.e.*, Class A values). This value is also equivalent to the site-specific total mercury background concentration identified within sediments from the West Flume at locations upstream of the site. Sediment data (**Figure 8**) show that sediments in Wetlands B and C meet the ROD goal of 0.2 mg/kg. Mercury concentrations in sediment from the West Flume have continued to decline to levels below the ROD goal during each year of this review period, with the most recent result of 0.12 mg/kg in 2018. Sediment mercury concentrations in Wetland A remain above 0.2 mg/kg, with the average concentrations ranging from 0.9 mg/kg to 2.8 mg/kg during the review period. Consequently, supplemental sediment sampling was conducted to further evaluate the mercury exceedences in Wetland A. This sampling resulted in 13 out of the 21 samples exceeding the mercury cleanup value. Five of these samples also exceeded the NYSDEC Class C value for mercury in sediment (1 mg/kg), which indicates potential risks to aquatic life. Sediment monitoring will continue in order to ensure that there is a continued downward trend over time in the West Flume and to assess whether elevated concentrations persist in Wetland A.

QUESTION C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

No other information has come to light that would call into question the protectiveness of the remedy.om&m

VI. ISSUES/RECOMMENDATIONS

Table 5, below, presents the recommendations and follow-up actions for this FYR.

Table 5: Issues/Recommendations

Issues/Recommendations				
OU(s) without Issues/Recommendations Identified in the Five-Year Review:				
None				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): OU5 **(Inside Groundwater)**	**Issue Category:** Operations and Maintenance			
	Issue: The deep zone requires further evaluation with respect to sustained inward gradients.			
	Recommendation: The piezometer data from the deep zone and the need for potential additional optimization measures to achieve inward gradients should be evaluated.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	State	9/30/2021
OU(s): OU5 **(Sediment)**	**Issue Category:** Operations and Maintenance			
	Issue: Mercury levels in Wetland A sediment and surface water are above the cleanup goals.			
	Recommendation: Sediment and surface water data should continue to be collected from Wetland A and compared to the cleanup goals established by the ROD and historical benchmarks to evaluate what actions, if any, may be necessary to address the elevated contaminant concentrations identified in sediment there.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	State	12/31/2021

Other Findings

The following are suggestions that may improve management of OM&M, but do not affect current and/or future protectiveness:

- Consideration should be given to sampling piezometer clusters PZ-6B and PZ-7B as part of the groundwater sampling program;
- Continued sample collection from the West Flume is recommended to ensure that the decreasing contamination trends observed there are sustained;
- As groundwater quality outside the eastern side of the soil/sediment containment area lacks definition, the three PZ-5B piezometers should be added to the quarterly groundwater-monitoring schedule; and

- Based on an evaluation of the data to be collected from Wetland A, consideration should be given to the resumption of biota sampling there.

VII. PROTECTIVENESS STATEMENT

Table 6, below, presents the OU and Sitewide protectiveness statements.

Table 6: Protectiveness Statements

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
OU5 (LCP Bridge Street subsite)	**Short-term Protective**
Protectiveness Statement: The remedy for OU5 is protective of human health and the environment in the short-term since exposure routes have been eliminated and biota data suggests that tissue concentrations are below baseline levels. To be protective in the long-term, the inward gradient in the deep zone needs to be evaluated for additional optimization measures and sediment and surface water data from Wetland A needs to be further assessed to evaluate what actions, if any, may be necessary to address the elevated contaminant concentrations there.	
Sitewide Protectiveness Statement	
Protectiveness Determination: **Short-term Protective**	
Protectiveness Statement: The sitewide remedy for this subsite is protective of human health and the environment in the short-term since exposure routes have been eliminated and biota data suggests that tissue concentrations are below baseline levels. To be protective in the long-term, the inward gradient in the deep zone needs to be evaluated for additional optimization measures and sediment and surface water data from Wetland A needs to be further assessed to evaluate what actions, if any, may be necessary to address the elevated contaminant concentrations there.	

VIII. NEXT REVIEW

The next FYR report for the LCP subsite is required five years from the completion date of this review.

APPENDIX A: DOCUMENTS, DATA, AND INFORMATION REVIEWED IN COMPLETING THE FIVE-YEAR REVIEW

Document Title, Author	Submittal or Signed Date
Record of Decision, Site Number 7-34-049 LCP Bridge Street Subsite, Subsite to the Onondaga Lake NPL Site, New York State Department of Environmental Conservation	September 2000
Final (100%) Design Report for the LCP Bridge Street Site (OU-1), Parsons	September 2004
Operation, Maintenance, and Monitoring Plan for the LCP Bridge Street Site, Parsons	January 2009
Monthly OM&M Reports	September 2014 thru August 2019
First 5-year Review Report, EPA	October 2009
Remedial Action Report, Parsons	November 2009
Remedial Action Report Addendum for the Supplemental Excavation of Soil and Sediment, EPA	November 2012
2014 Annual Operation, Maintenance and Monitoring Report, Parsons	January 2016
2015 Annual Operation, Maintenance and Monitoring Report, Parsons	October 2018
2016 Annual Operation, Maintenance and Monitoring Report, Parsons	October 2017
2017 Annual Operation, Maintenance and Monitoring Report, Parsons	August 2018
2018 Draft Annual Operation, Maintenance and Monitoring Report, Parsons	August 2019
100% Design Report, Final Cover Construction, Parsons	March 2014
First 5-year Review Report, EPA	October 2014
2014-2018 Draft Operation, Maintenance and Monitoring Report, Parsons	May 2019
EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since EPA issued the ROD.	

APPENDIX B--SITE'S TOPOGRAPHY, HYDROLOGY, AND GEOLOGY/HYDROGEOLOGY

The West Flume, a man-made drainage channel, runs east-west through the northern portion of the LCP subsite. The West Flume typically ranges in width from 5 to 10 feet. In addition to runoff from the main subsite, the West Flume conveys storm water from a portion of the Village of Solvay. The West Flume is a New York State Class C water body. The West Flume converges with Geddes Brook under Interstate 695, approximately 4,500 feet west of the subsite. Geddes Brook flows into Ninemile Creek, which eventually discharges into Onondaga Lake.

Immediately north of the West Flume is an area that received material from historical West-Flume dredging efforts. This area is known as the Dredge Spoils area.

Two wetlands, Wetlands A and B, are located to the west of the LCP facility. These wetlands are part of the New York State regulated wetland complex SYW-14. Wetland A is located immediately west of the LCP facility and is approximately 1.3 acres in size. It includes a portion of the West Ditch, a shallow man-made ditch that conveys surface water from the western portion of the LCP facility and other upstream areas to the main body of Wetland A. Surface water discharges from Wetland A to Wetland B via a spillway that was constructed during the Remedial Action (RA).

Wetland B is approximately 7.6 acres in size. The main body of Wetland B is located several hundred feet west of Wetland A. Wetland B discharges to the West Flume downstream of the LCP facility.

The East Ditch is a shallow, man-made ditch located along the east side of the facility. The East Ditch transports surface water runoff from the eastern portion of the subsite and from upstream areas to the West Flume.

Groundwater generally occurs from three to eight feet below ground surface. There are three distinctive saturated units separated by two aquitards (a layer of low permeability) at the LCP subsite. The uppermost saturated unit is comprised of fill and clay (fill/clay), while the underlying saturated unit is made up of silt, clay and fine sand (silt/clay/fine sand). A shallow clay layer separates the fill/clay from the silt/clay/fine sand. The bedrock (Vernon shale) is the lowest saturated unit beneath the subsite. Bedrock is separated from the silt/clay/fine sand by a dense, low-permeability till aquitard.

FIGURES

Figure 1: Subsite Location

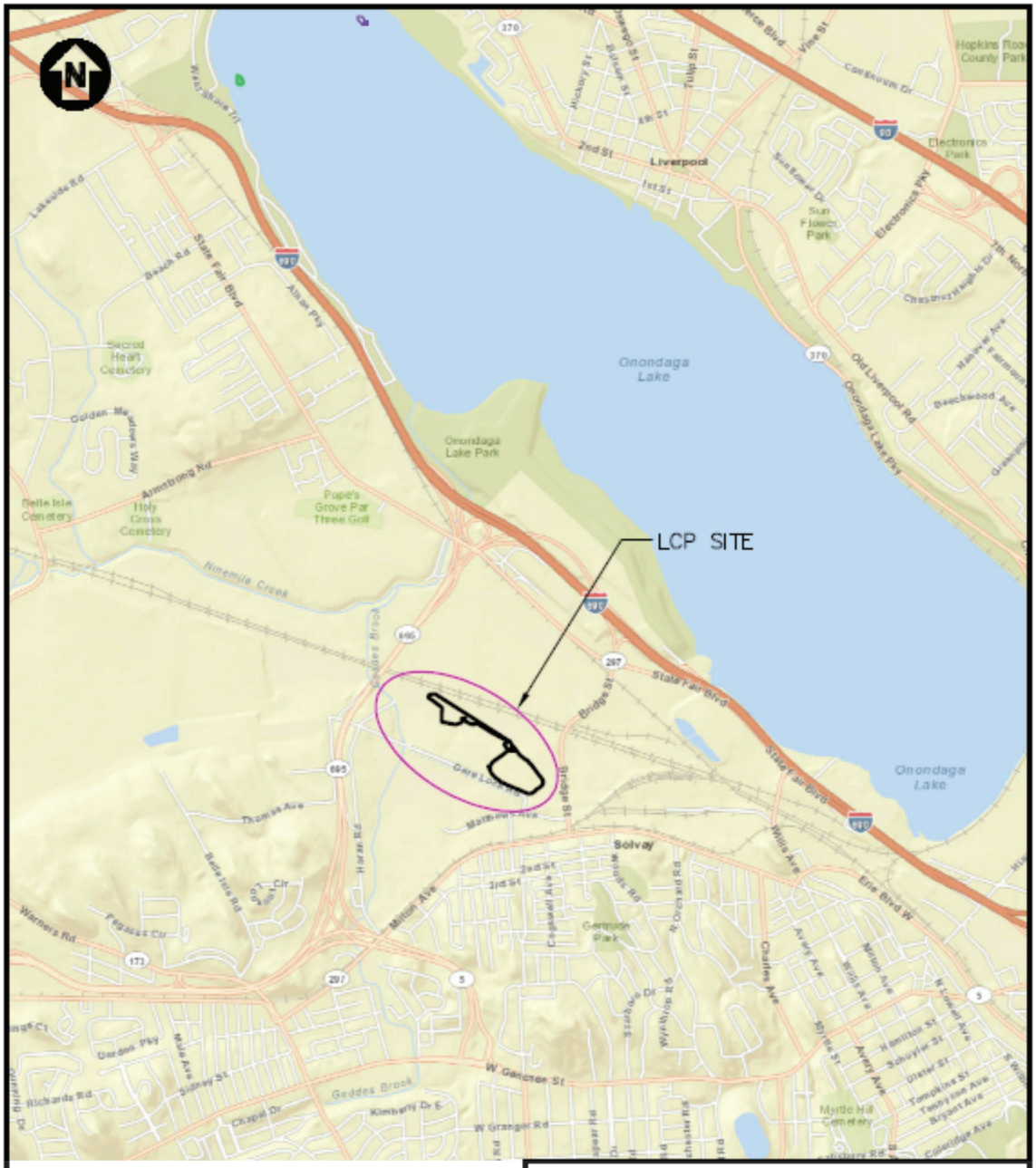

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Figure 2: Subsite Plan

Figure 3: 2010-2012 Additional Soil/Sediment Removals

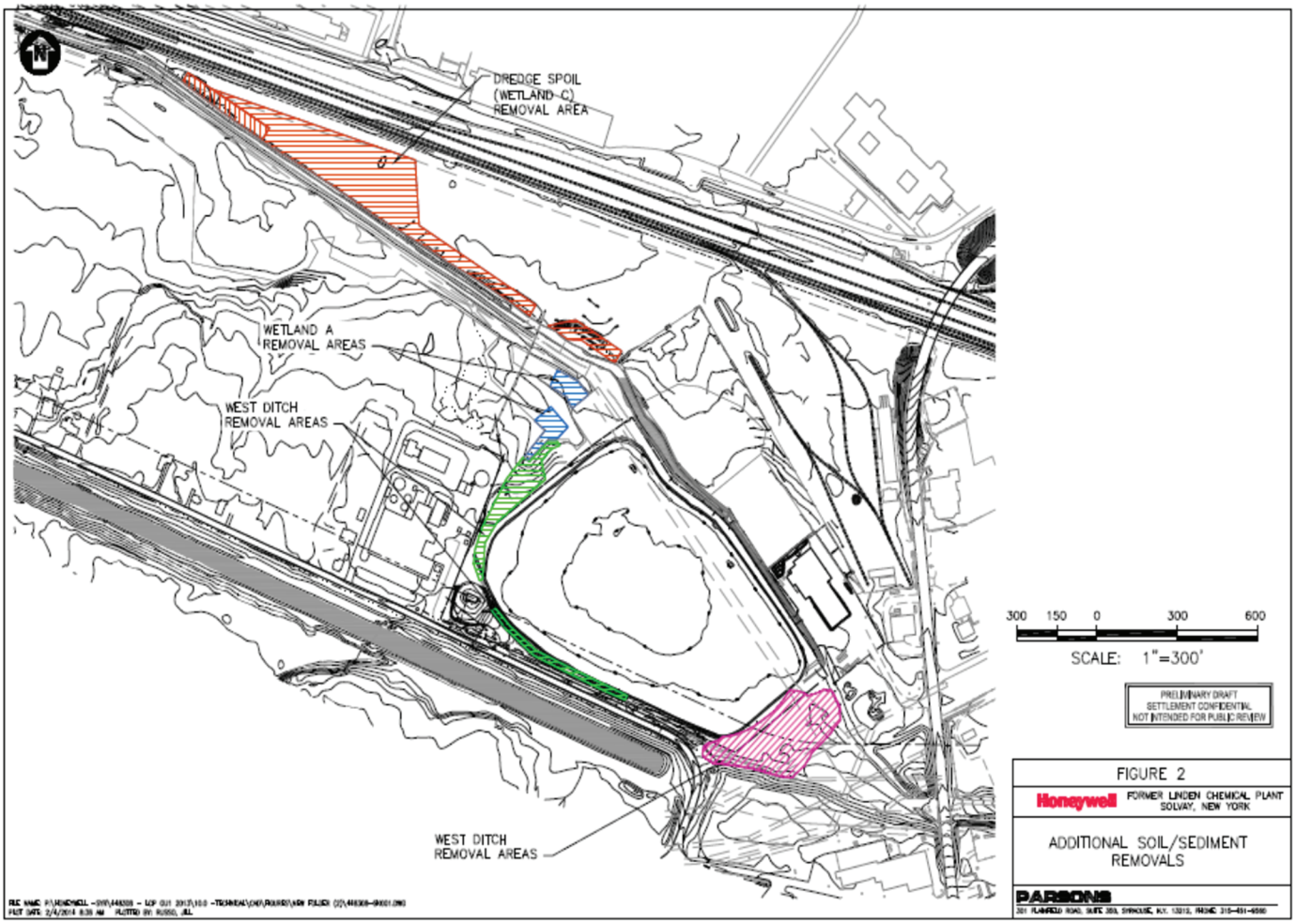


Figure 4: Piezometer/Monitoring Well Locations

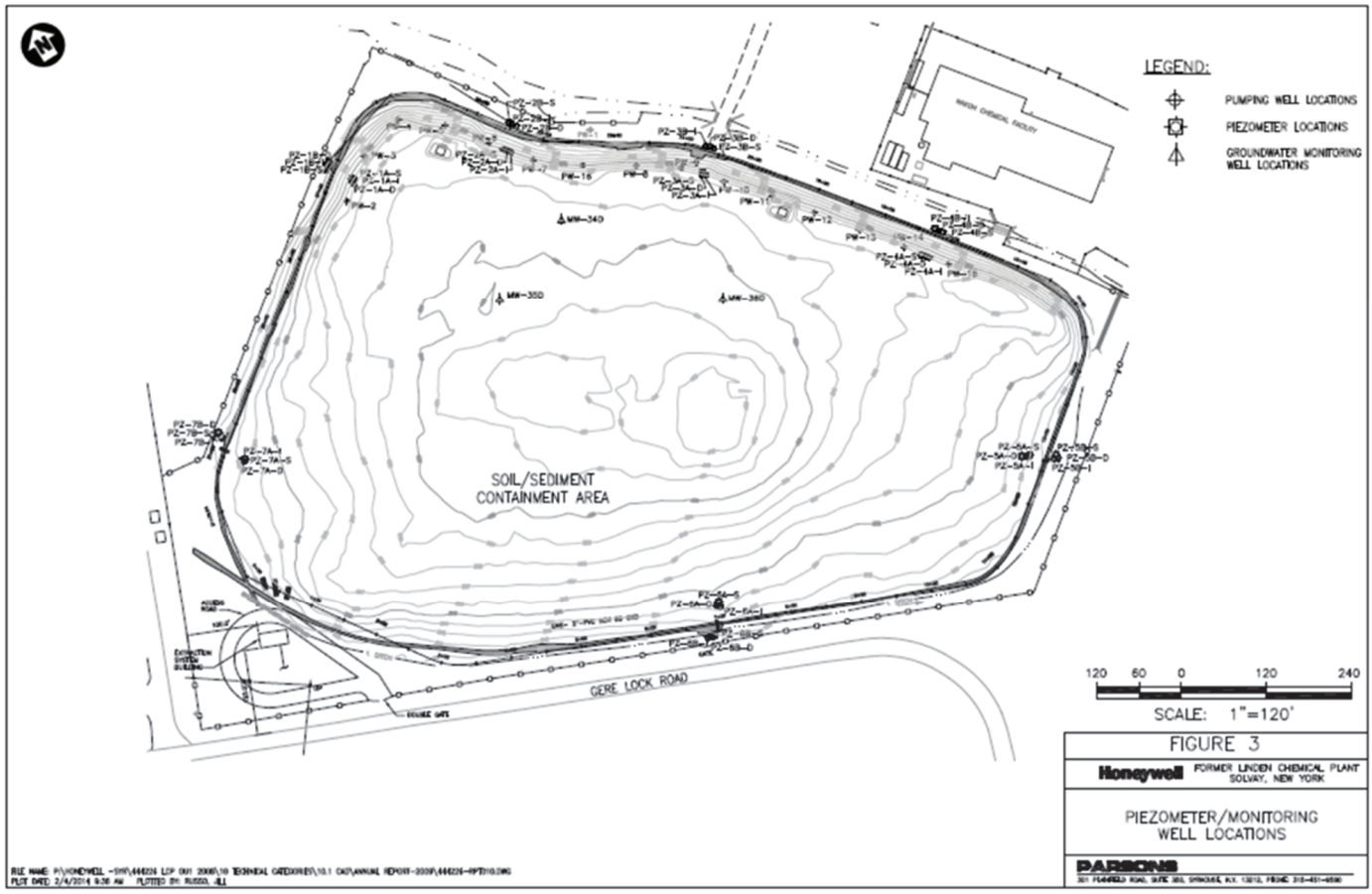
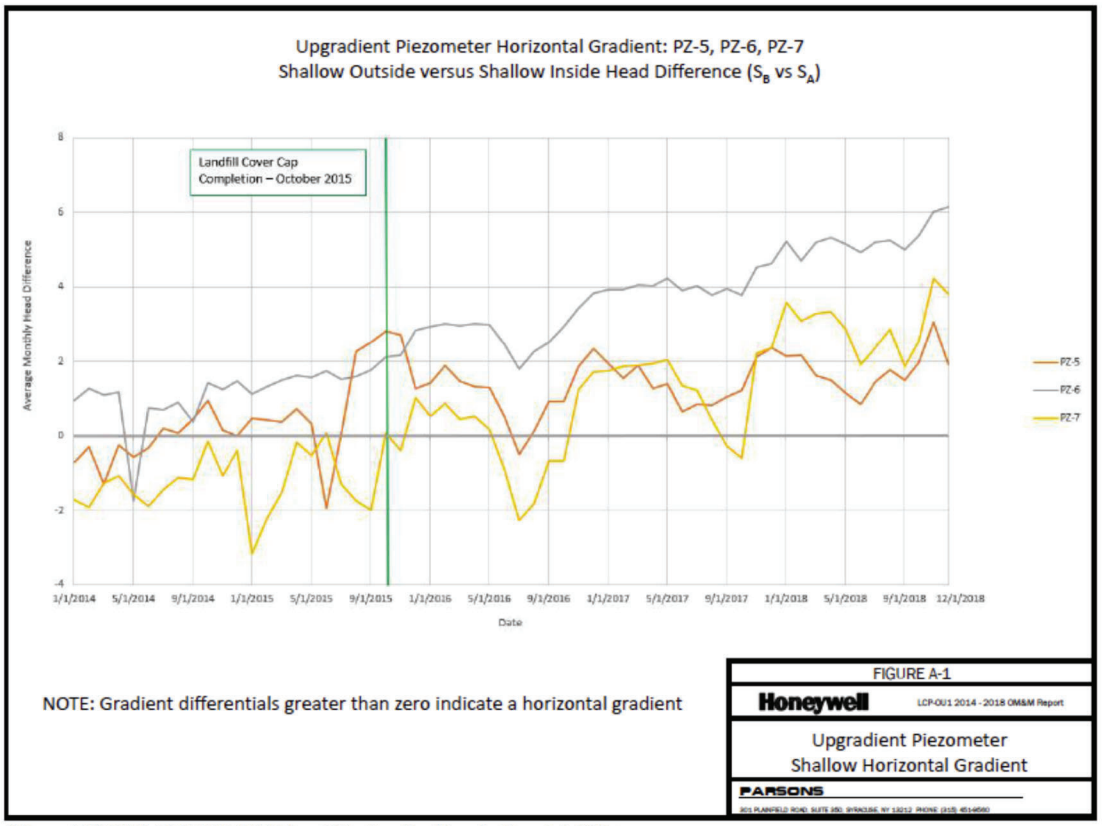


Figure 5a: LCP Shallow Horizontal Gradients



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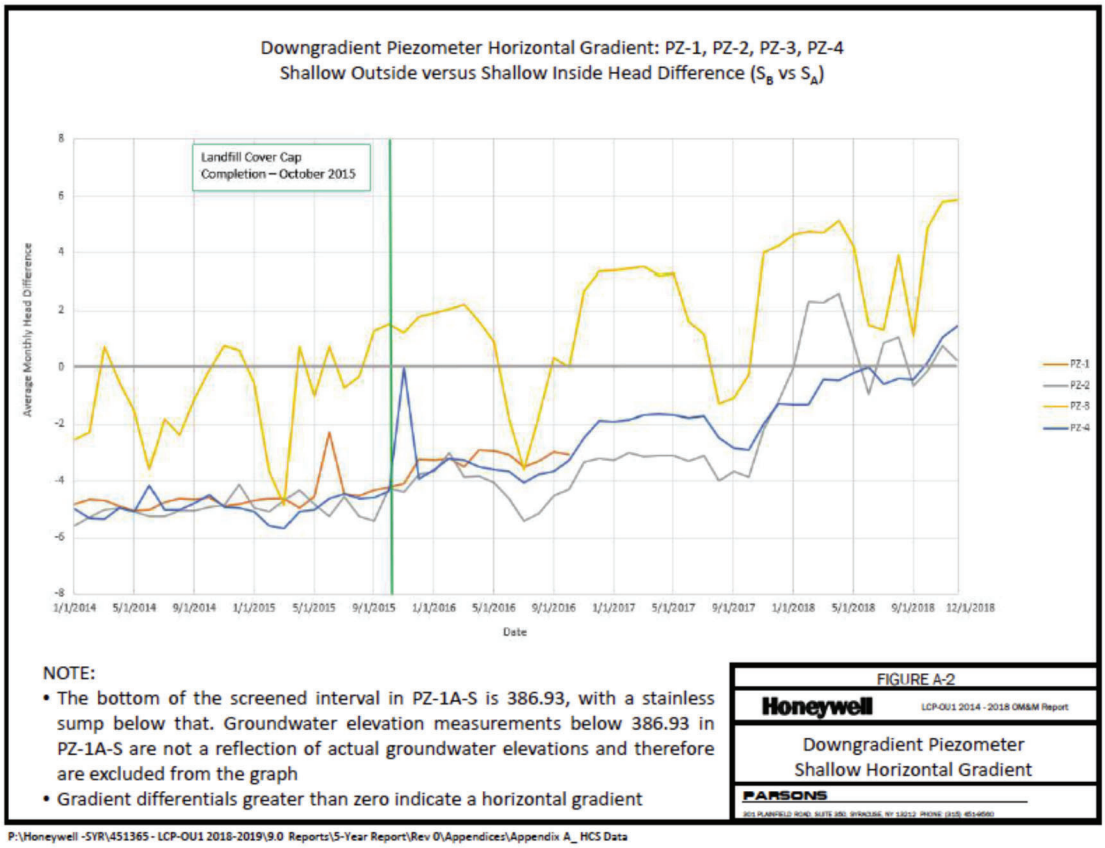

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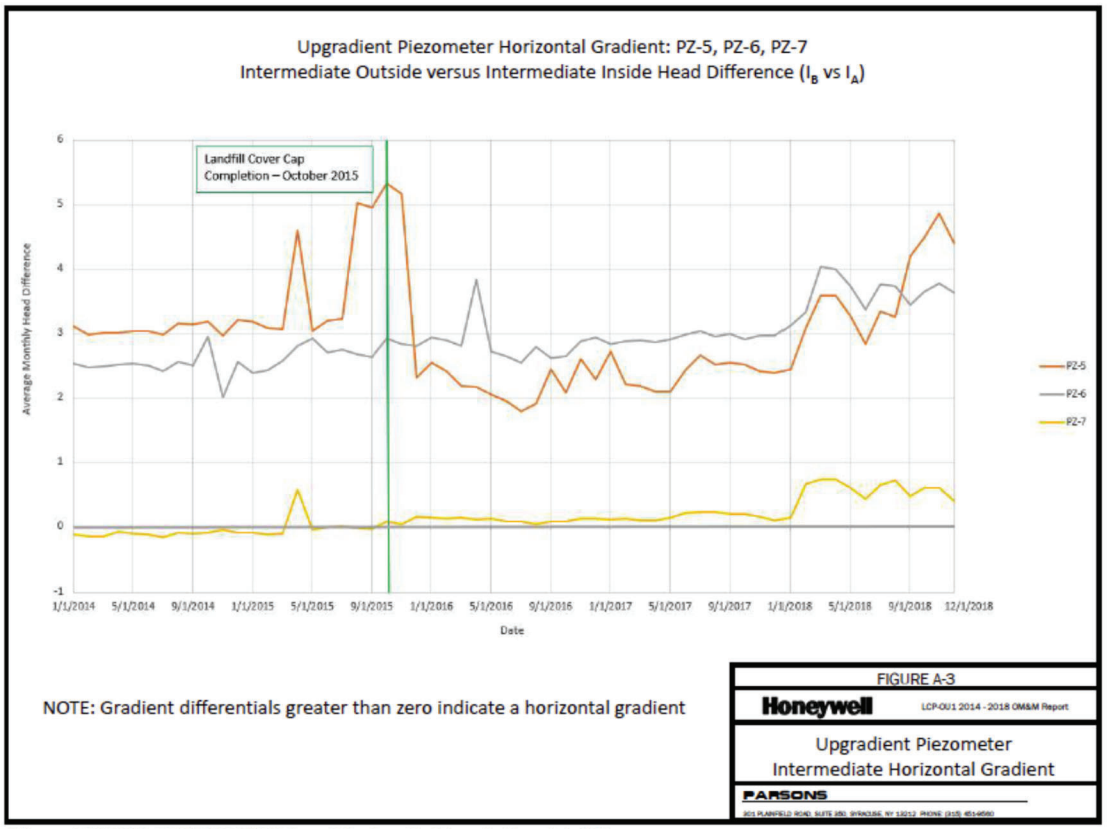
Figure 5b: LCP Intermediate Horizontal Gradients



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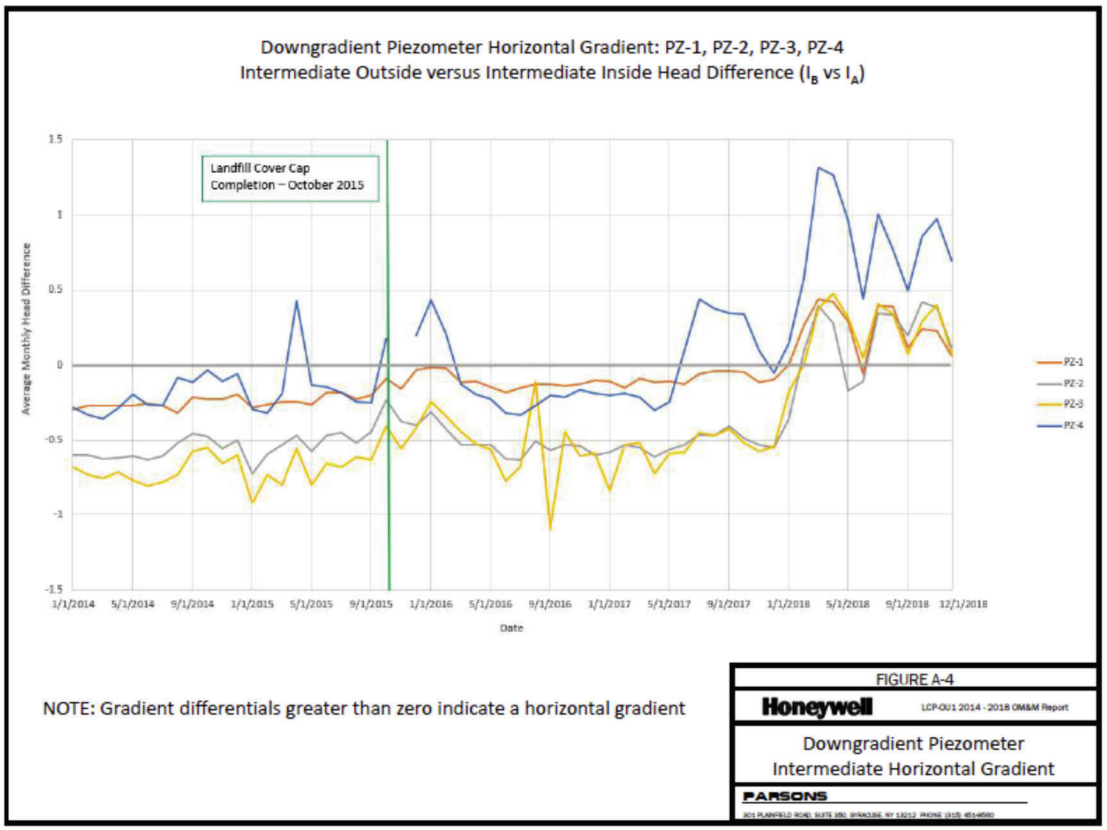

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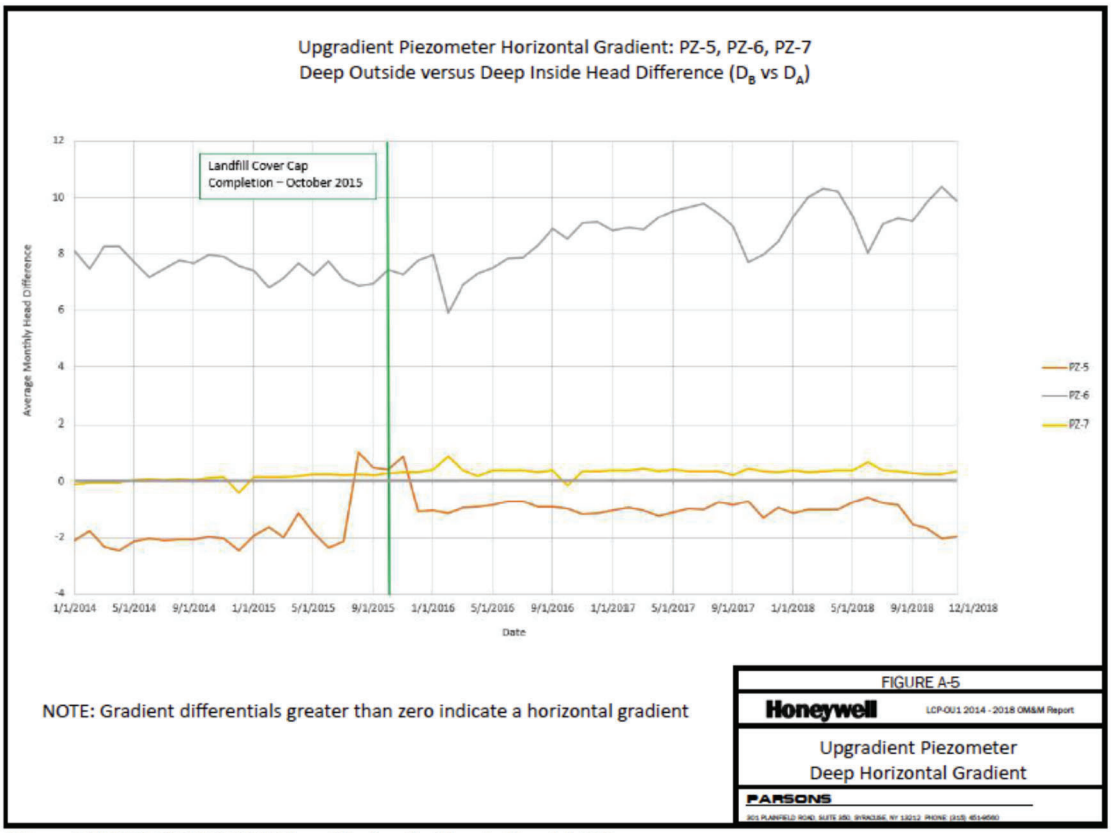
Figure 5c: LCP Deep Horizontal Gradients



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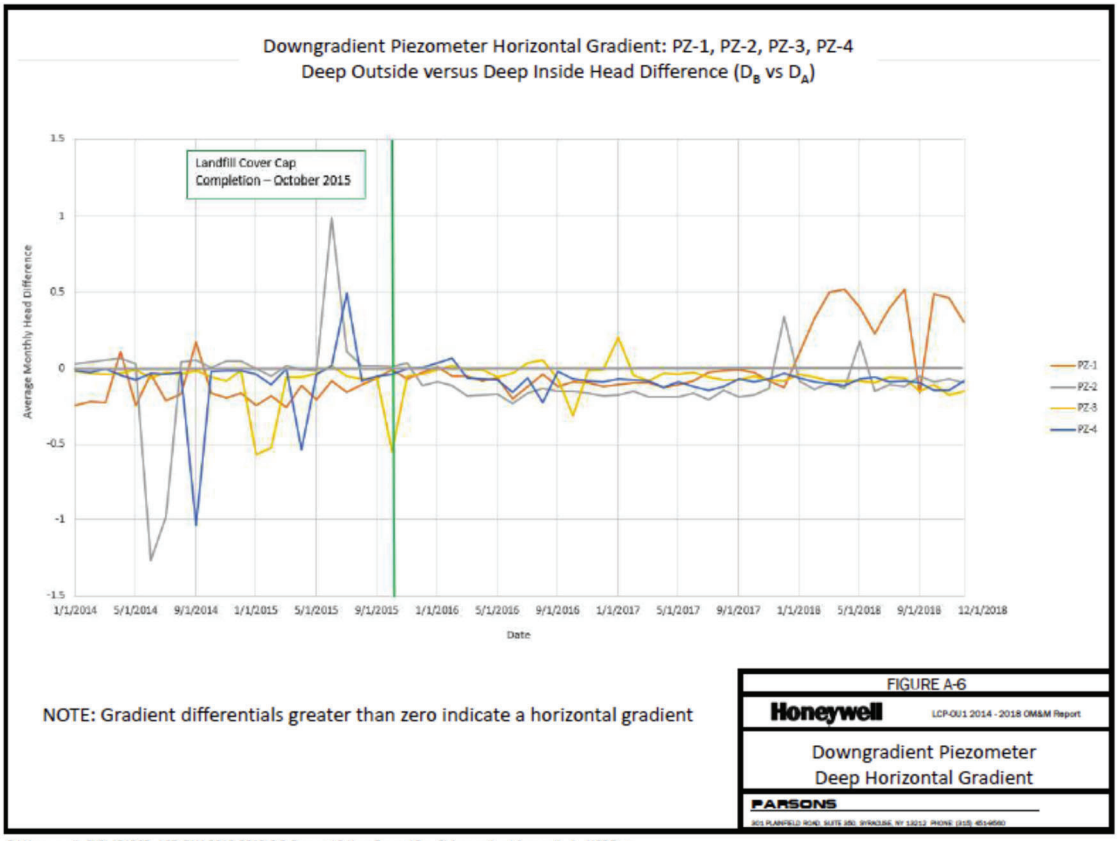

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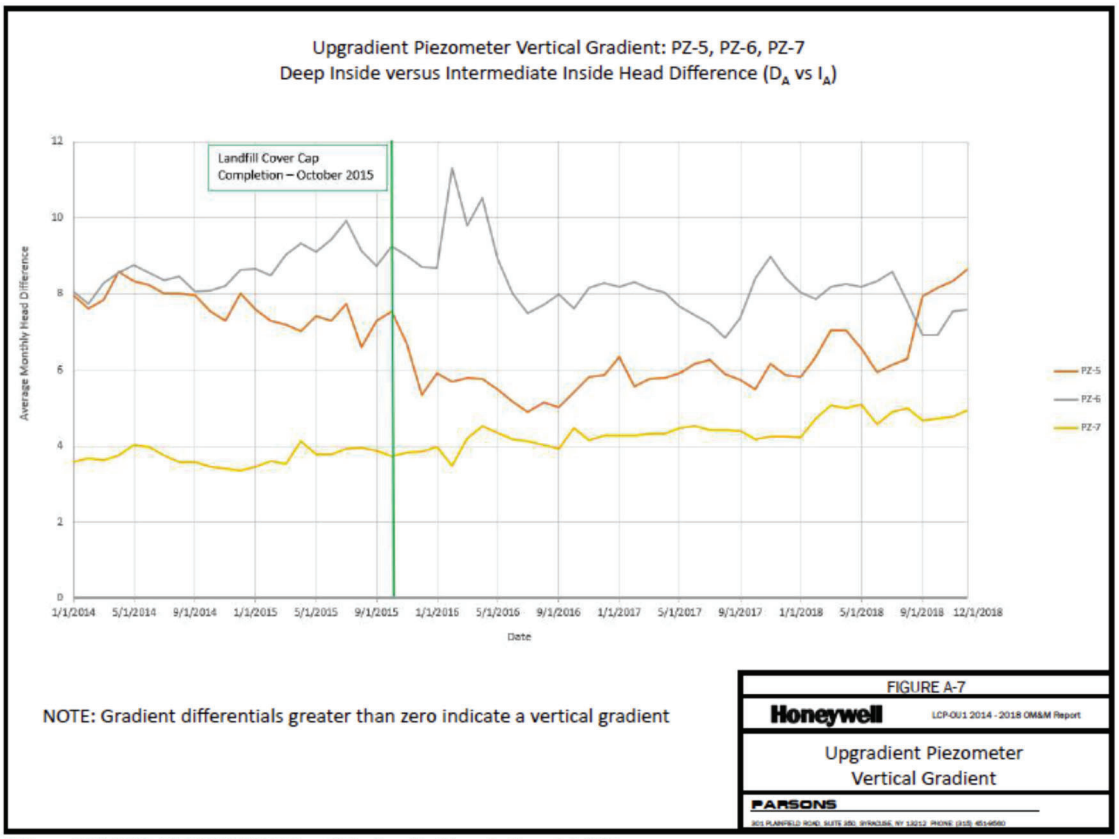
Figure 5d: LCP Vertical Gradients (Intermediate/Deep)



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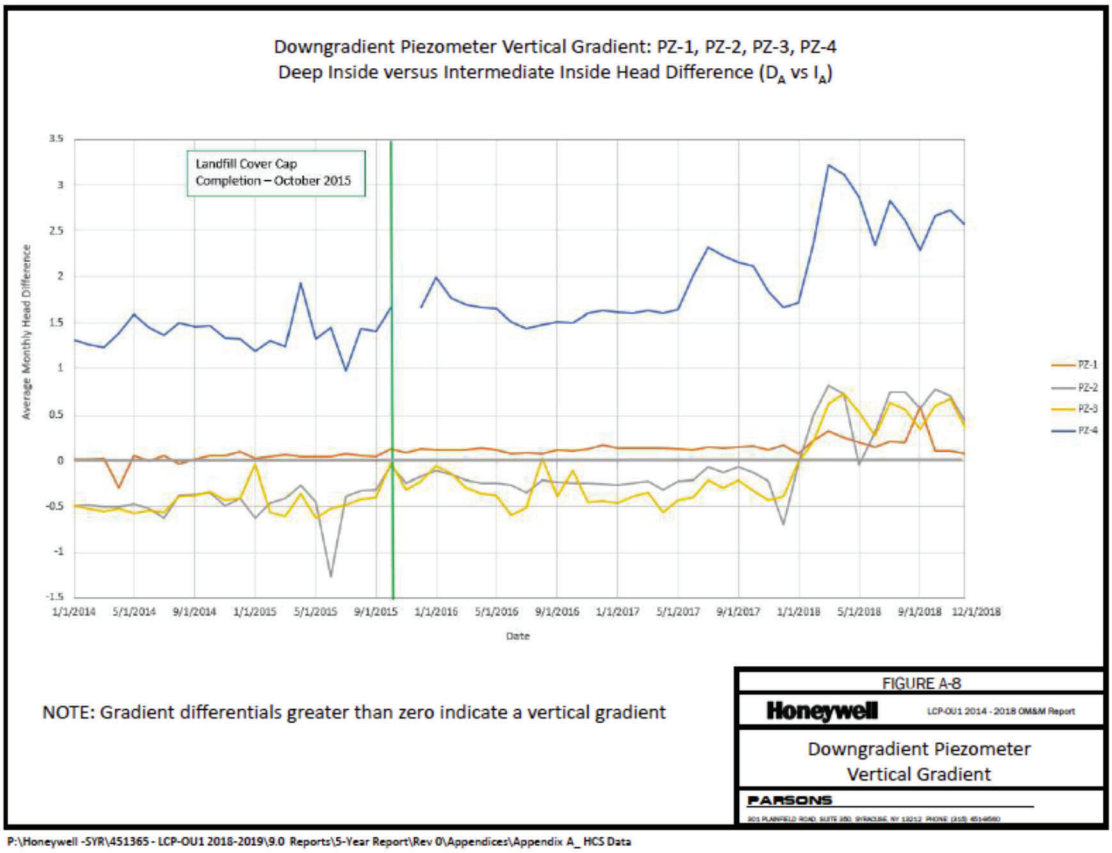

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Figure 6: LCP Annual Surface Water/Sediment Sampling Locations

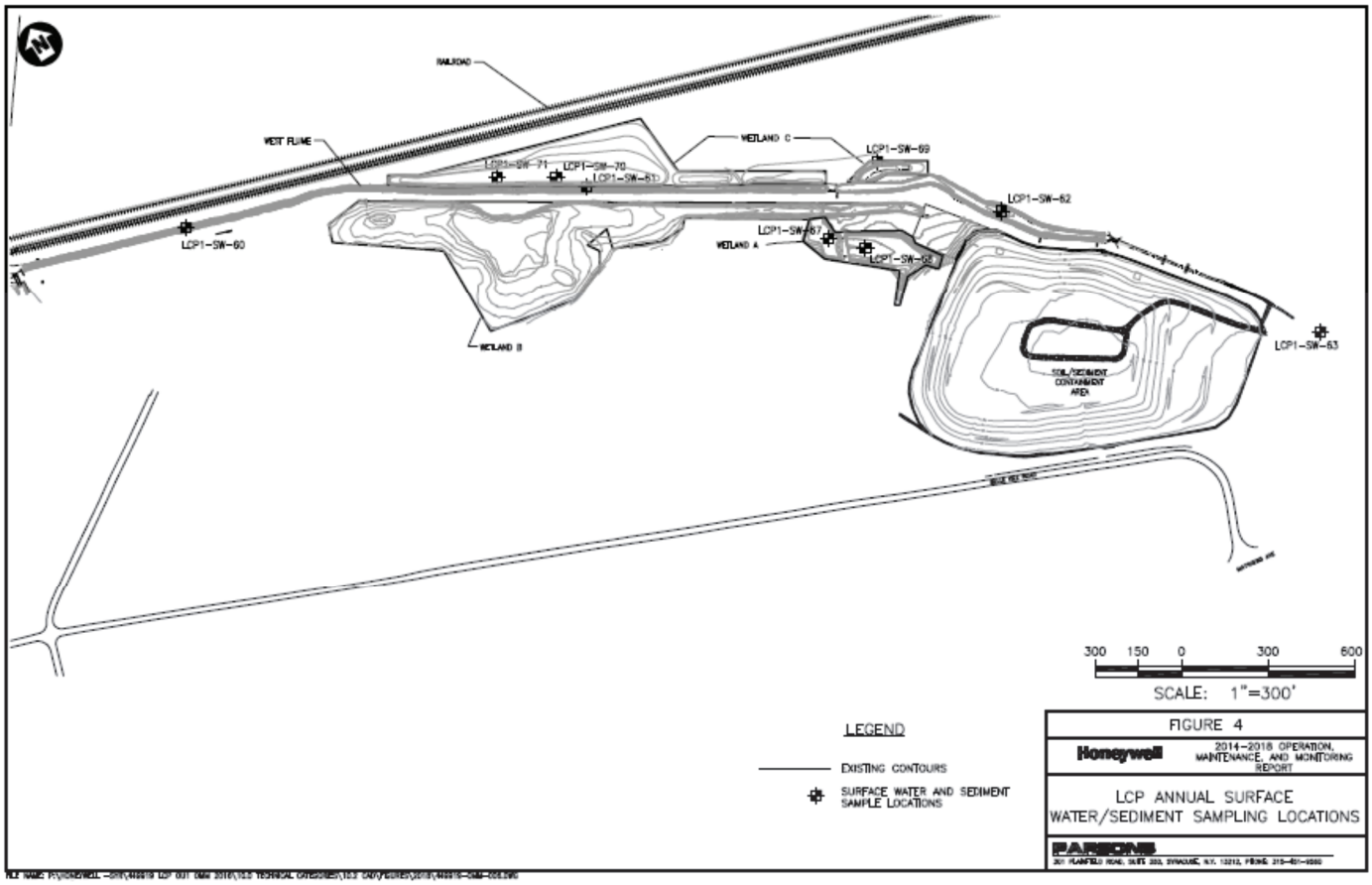

Figure 7: LCP Summary of Surface-water Sampling Results

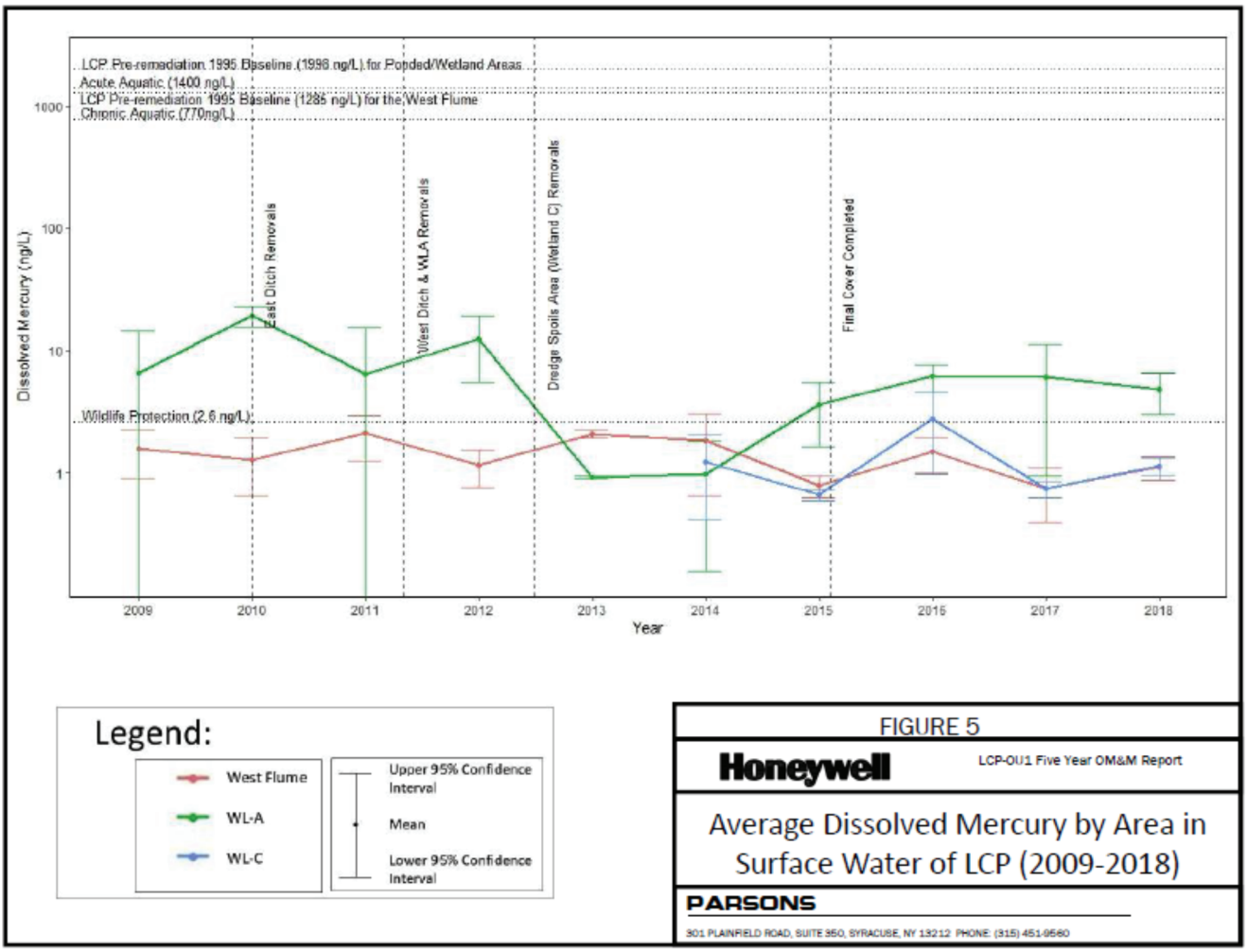

Figure 8: LCP Summary of Sediment Sampling Results