NM – Herkimer Smith Street MGP Site

HERKIMER COUNTY, NEW YORK

Final Engineering Report

NYSDEC Site Number: V00471-6

Prepared for:

Niagara Mohawk Power Corporation (dba National Grid)

300 Erie Boulevard West

Syracuse, New York 13202

Prepared by:

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MAY 2015

CERTIFICATIONS

I, Stephen W. Anagnost, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Design construction was implemented and that all construction activities were completed in substantial conformance with the Department-approved documents:

- Remedial Action Work Plan (RAWP), Herkimer Former MGP Site, West Smith Street, Herkimer New York, Site No. V00471-6 (O'Brien & Gere, October 2011)
- Technical Specifications, NM (Niagara Mohawk) – Herkimer Smith Street MGP Site, Site No. V00471-6 (O'Brien & Gere, December 2013)
- Design Drawings, Former Herkimer MGP Site, Herkimer County, NY, Site No. V00471-6, Remedial Design (O'Brien & Gere, April 2012)
- Contract Changes developed during construction

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the RAWP and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established for the remedy.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site and that such plan has been approved by the Department.

I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Stephen W. Anagnost, of O'Brien & Gere Engineers, Inc., have been authorized and designated by the site owner to sign this certification for the Site.

Stephen W. Anagnost, P.E.
Senior Managing Engineer
O'BRIEN & GERE ENGINEERS, INC. **Stamp**

No. 068269	_____	_____
NYS Professional Engineer #	Date	Signature

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LIST OF ACRONYMS

Acronym	Definition
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CAMP	Community Air Monitoring Plan
CO	Change Order
CQCP	Construction Quality Control Plan
CWP	Construction Work Plan
CY	Cubic Yards
DPW	Department of Public Works
ESCP	Erosion and Sediment Control Plan
FER	Final Engineering Report
HASP	Health and Safety Plan
HAZMAT	hazardous material
IRM	Interim Remedial Measure
ISS	*In-situ* Stabilization
LRI	Land Remediation, Inc.
LTTD	Low-Temperature Thermal Desorption
MGP	Manufactured Gas Plant
msl	mean sea level
MW	Monitoring Well
NAPL	Non-Aqueous Phase Liquid
NM	Niagara Mohawk
NMPC	Niagara Mohawk Power Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
OMP	Optical Monitoring Points
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated biphenyls
PID	Photo Ionization Detector
PPV	Peak Particle Velocity
POTW	Publicly Owned Treatment Works
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RD	Remedial Decision
RI	Remedial Investigation
SCOs	Soil Cleanup Objectives
SMP	Site Management Plan
SVOC	Semi-Volatile Organic Compounds
SWPPP	Stormwater Pollution Prevention Plan
TAL	Target Analyte List
VCO	Voluntary Consent Order
VOC	Volatile Organic Compounds

1. FINAL ENGINEERING REPORT INTRODUCTION

1.1 BACKGROUND AND SITE DESCRIPTION

Niagara Mohawk Power Corporation (NMPC), now part of National Grid, entered into a multi-site Voluntary Consent Order (VCO) Index No. D0-0001-0011 with the New York State Department of Environmental Conservation (NYSDEC) in 2002 to investigate and remediate (among other sites) the NM (Niagara Mohawk)-Herkimer Smith Street Manufactured Gas Plant (MGP) Site (the Site) located in the Village of Herkimer, Herkimer County, New York (Figure 1). The Remedial Action (RA) construction was completed in substantial conformance with the NYSDEC approved Technical Specifications and Contract Drawings prepared by O'Brien & Gere Engineers, Inc. and dated November 2, 2012 (O'Brien & Gere, 2012), as amended by the work plan prepared by Land Remediation, Inc. (LRI) dated April 22, 2014 (see Appendix C).

The Site occupies approximately 0.4 acres of an approximately 0.6-acre parcel in a mixed residential/commercial neighborhood in the Village of Herkimer, New York. The Site is bordered to the north by West Smith Street, to the east by William Street and to the west and south by residential properties. The current Site zoning is commercial and the area is served by public water and sewer systems.

The Site is currently owned by an adjacent resident and is vacant and not fenced. Surficial structures related to the former MGP are no longer present on site. Remnants of concrete pads and a sidewalk were visible at the surface in the center of the parcel before the RA. In addition, an octagonal holder foundation with a conical base was present on the west side of the Site prior to the RA. Two areas of impacted soils were delineated at the Site: the Petroleum Area and the Holder Area. The Petroleum Area is located near the center of the Site where former fuel oil tanks and the MGP facility were located, and the Holder Area is located on the western side of the parcel in the vicinity of the former octagonal holder (Figure 2).

The Site is relatively flat with elevations ranging between approximately 386 ft mean sea level (msl) and 384 ft msl. The southwestern portion of the Site is elevated approximately 4 ft with respect to the two adjacent properties to the south. Drainage occurs by overland flow generally from the northeast toward the southwest. Prior to remediation, the majority of the Site was grass with limited areas of asphalt and remnants of concrete foundations.

2. SUMMARY OF SITE REMEDY

2.1 REMEDIAL ACTION OBJECTIVES

There were no remedial action objectives established in the Decision Document (NYSDEC, 2011) for the Site, but the goal of the 6 NYCRR Part 375 remedial program is to restore sites to pre-disposal conditions to the extent feasible. At a minimum, the remedial program goal for a site is to eliminate or mitigate significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

TRC from Windsor, Connecticut conducted the Remedial Investigation (RI) and subsequently issued the report in June 2009. O'Brien & Gere Engineers, Inc. conducted the Pre-Design Investigations (O'Brien & Gere, 2010) and prepared the Remedial Action Work Plan (RAWP) in October 2011 (O'Brien & Gere, 2011), subsequently approved by the NYSDEC on December 19, 2011.

2.2 DESCRIPTION OF SITE REMEDY

As presented in the Decision Document (NYSDEC, 2011) the following elements for the remedy were established based on information presented in the RAWP:

- Contaminated subsurface soils located within the Petroleum and Holder Areas of the Site will be excavated and disposed off site at a permitted facility. To accomplish this removal, the former Holder structure will be demolished and removed; all visible tar, oil and/or non-aqueous phase liquid (NAPL) encountered will be removed; and all soil containing greater than 500 ppm total polycyclic aromatic hydrocarbons (PAHs) will be excavated. The excavation will extend to approximately 12 ft bgs in the Holder Area and 16 ft bgs in the Petroleum Area, respectively. Excavations will be dewatered to permit soil removal and transport, unless otherwise approved by the Department. The contaminated groundwater will be removed, treated and sent off site for disposal in a storm sewer or Publicly Owned Treatment Works (POTW). Soil and fill material overlying this contaminated soil that does not exceed the removal criteria (approximately 4 to 6 ft) will be excavated, stockpiled on site and evaluated for use in backfilling the deeper excavations. Contaminated soil and NAPL will be transported off site and treated or disposed in accordance with applicable regulations. Clean fill will then be brought in to replace the excavated soil and establish the designed grades at the Site.
- A site cover will be required to allow for restricted-residential use of the Site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the Site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted-residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the Site will meet the requirements for the identified Site use as set forth in 6 NYCRR Part 375-6.7(d).
- Imposition of an institutional control in the form of an environmental easement for the controlled property that:
  - Requires compliance with the Department approved Site Management Plan (SMP);
  - The SMP requires the Remedial Party to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
  - Allows the use and development of the controlled property for restricted-residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
  - Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or County Department of Health (DOH); and
  - Prohibits agriculture or vegetable gardens on the controlled property.
- An SMP is required, which includes the following:

- An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the Site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:
  - Institutional Controls: The Environmental Easement; and
  - Engineering Controls: The soil cover.
  - This plan includes, but may not be limited to:
    - An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
    - Descriptions of the provisions of the environmental easement including any land use or groundwater use restrictions;
    - A provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the Site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion:
    - Provisions for the management and inspection of the identified engineering controls;
    - Maintaining Site access controls and Department notification; and
    - The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.
- A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
  - Monitoring of groundwater to assess the performance and effectiveness of the remedy;
  - A schedule of monitoring and frequency of submittals to the Department; and
  - Monitoring for vapor intrusion for any buildings developed on the Site, as may be required by the Institutional and Engineering Control Plan discussed above.
- An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
  - Compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
  - Maintaining Site access controls and Department notification; and
  - Providing the Department access to the Site and O&M records.

3. INTERIM REMEDIAL MEASURES, OPERABLE UNITS AND CONTRACTS

3.1 GENERAL

The remedy for the Site was performed as a single project, and no interim remedial measures (IRM) or separate construction contracts were implemented.

4. DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RAWP for the Herkimer Former MGP Site (October 2011). Deviations from the RAWP are noted below in Section 4.9.

4.1 GOVERNING DOCUMENTS

The following documents constituted integral parts of the Agreement executed between National Grid and LRI for construction of the Site RA, the whole collectively known and referred to as the Contract Documents or the Contract.

- Technical Specifications (O'Brien & Gere, 2013)
- Design Drawings (O'Brien & Gere, 2012)

In accordance with the Contract, LRI also prepared and submitted certain required work plans for review and approval, including:

- Health and safety plan (HASP)
- Community air monitoring plan (CAMP)
- Construction work plan (CWP)
- *In-situ* stabilization (ISS) work plan
- Erosion and sediment control plan (ESCP)
- Construction quality control plan (CQCP)
- Construction water management plan
- Waste transportation and disposal plan
- Traffic control plan
- Noise monitoring and minimization plan
- Odor control plan
- Vibration monitoring plan
- Optical and settlement monitoring plan

Summaries of the various construction contractor work plans are provided in the following sections.

4.1.1 Health and safety plan

LRI prepared and implemented a Site-specific Health and Safety Plan (HASP) as required by the Contract Documents. All remedial work performed under this RA was in compliance with governmental requirements, including Site and worker safety requirements mandated by the Federal Occupational Safety and Health Administration (OSHA). Remedial and invasive work performed at the Site complied with the HASP requirements.

LRI identified the nature of the wastes to be encountered to include coal tar impacted soils, NAPL contaminated groundwater, concrete, brick, and wood.

Soils and groundwater were identified as being impacted by coal tar containing various concentrations of semi-volatile organic compounds (SVOCs) such as PAHs, volatile organic compounds (VOCs) such as benzene, toluene, ethyl benzene, and xylenes (BTEX), metals, and cyanide.

The primary route of exposure for the contaminants would be ingestion or inhalation. Based upon the contaminants, the reported concentrations, and the potential for worker exposure above occupational limits, work space monitoring was conducted to provide for the safety of the workers and monitor their exposure to dust and organic vapors (if any). A copy of the HASP is provided in Appendix A.

4.1.2 Community air monitoring plan

LRI prepared and implemented a Perimeter Air Monitoring and Dust Control Plan or Community Air Monitoring Program (CAMP) to assess the migration of potential contaminants to off-site receptors as a result of Site activities and for the protection of the surrounding community. The CAMP required real-time air monitoring for total VOCs and particulate matter less than 10 microns in diameter (PM10) at one upwind and three downwind locations at the perimeter of the Site. Monitoring locations were periodically relocated as the work progressed.

Real-time data and visual observations dictated if engineering controls, protocols, or emergency procedures needed to be implemented to control VOC and PM10 emissions from the Site. Real-time monitoring for total VOCs was accomplished using a Photo Ionization Detector (PID) with a 10.6-eV lamp and a resolution of 0.1 to 1.0ppm. Each of the PIDs continuously logged data (15 minute time weighted average) during daily operations and was programmed to alarm if an action level is exceeded. Each PID was calibrated daily with a 100 ppm isobutylene air standard. Monitoring at each station was accomplished by pointing the intake tube of the PID toward the likely emission source, generally at the height of the breathing zone (4 to 6 feet). The instrument was monitored during the course of the day and data downloaded at the end of each work day.

Real time monitoring for respirable dust (PM10) was conducted using the Dust Trak II-Model 8530 (or equivalent). Four respirable dust monitors were used, with one of the four being placed in the upwind position. The purpose of this monitoring location was to determine the background level of respirable dust. The other three were located in the downwind position.

Real time monitoring instruments were placed in the field a minimum of 15 minutes prior to the start of intrusive work and collected from the field after intrusive work had been concluded for at least 15 minutes.

A direct reading action level of 0.100 mg/m^3 was established for the particulate dust for the RA. If exceedance conditions persisted for over 15 minutes (continuous) or if visible dust was present, the CAMP work plan required the dust control measures to be increased or work activities to be modified or stopped to remedy the condition.

The CAMP readings and monitoring equipment locations were documented each workday to become a part of the daily air monitoring report. The results were summarized in a weekly report that was provided to O'Brien & Gere, *de maximis, inc.,* NYSDEC, and NYSDOH for project records. Two CAMP exceedances occurred during this project, described in Section 4.2.5. Copies of the CAMP and Weekly CAMP Reports are provided in Appendix B.

4.1.3 Construction work plan

LRI prepared a Construction Work Plan (CWP) to outline the means and methods it intended to utilize to implement and manage the RA construction activities. The CWP describes the approach for Site preparation tasks, excavation and management of soil, waste handling and disposal, and backfill and restoration of the Site. A copy of the CWP is provided in Appendix C.

4.1.4 *In-situ* stabilization work plan

In accordance with the RD, LRI installed excavation support around the Holder and the Petroleum Areas consisting of steel sheet piling with interlocks sealed using a water swelling sealant on the interlocks. The sheet piling was installed to an approximate depth of 30 feet below grade in the Holder Area and 40 feet below grade in the Petroleum Area following the removal of the upper 2 feet of soil from the Petroleum and Holder Areas. Following installation of the excavation support system, material from 2 to 6 feet bgs was shipped off site to the Ontario County Landfill due to lack of available on-site stockpiling area.

To improve the effectiveness of removing the impacted soils from the former Holder Area and Petroleum Area, LRI implemented an *In-Situ* Stabilization (ISS) Work Plan. The ISS method minimized the infiltration of groundwater into the excavations avoiding working with wet soils and requiring on-site construction water treatment. The ISS Work Plan is included in the CWP, provided in Appendix C. The subsequent ISS process is summarized as follows:

In the Petroleum Area, with the limits of excavation extending down to a depth of 16 ft below grade, soil was mixed in place with Portland Cement and Ground Blast Furnace Slag down to a depth of 24 feet below grade. This provided an 8 foot thick stabilized mass that would serve as a hydraulic barrier to control upwelling of

water below the 16 foot excavation depth. This approach homogenized the soil and eliminated the need to send material off-site as a hazardous waste. Once the mixture solidified, the interior of the stabilized area was excavated down to a depth of 16 feet below grade, leaving the exterior walls and an eight foot stabilized mass below the excavation.

Within the Holder Area the limits of excavation extending down to a depth of 12 ft below grade, soil was mixed in place with Portland Cement and Ground Blast Furnace Slag down to a depth of 17 feet below grade. This provided a 5 foot thick stabilized mass that would serve as a hydraulic barrier to control upwelling of water below the 12 foot excavation depth. Once the mixture solidified, the interior of the stabilized area was excavated down to a depth of 12 feet below grade, leaving the exterior walls and a five foot stabilized mass below the excavation.

Following excavation of the Petroleum Area and the Holder Area, the stabilized material was direct-loaded into trucks and shipped off-site for disposal. The excavated area was then backfilled in accordance with the contract documents.

4.1.5 Erosion and sediment control plan

The overall goal of the Erosion and Sediment Control Plan (ESCP) was to minimize soil erosion due to construction activities. Because the Site is less than one acre in size, a Stormwater Pollution Prevention Plan was not required. Erosion and sediment control measures were maintained and repaired as needed. A copy of the ESCP is provided in Appendix D.

4.1.6 Construction quality control plan

The Construction Quality Control Plan (CQCP) was prepared to manage performance of the RA tasks through designed and documented Quality Assurance/Quality Control (QA/QC) methodologies applied in the field and in the lab. The CQCP provided a detailed description of the observation and testing activities that were used to monitor construction quality and document that remedial construction was in conformance with the remediation objectives and specifications. A copy of the CQCP is provided in Appendix E.

4.1.7 Construction water management plan

The Construction Water Management Plan was prepared and implemented by LRI to:

- Prevent/limit non-impacted surface water from contacting waste materials; and
- Segregate and contain water generated within, or contacting, waste areas for treatment and approved discharge/disposal.

A copy of the Construction Water Management Plan is included in Appendix F.

4.1.8 Waste transportation and disposal plan

LRI prepared a Waste Transportation and Disposal Plan that described how contaminated and non-contaminated material would be handled, staged, loaded and transported, and how equipment would be decontaminated. The Waste Transportation and Disposal Plan is provided in Appendix G.

4.1.9 Traffic control plan

LRI provided a Traffic Control Plan that described how LRI would implement logistic procedures to transport waste from the Site and transport-approved fill materials to the Site. A copy of the Traffic Control Plan is provided in Appendix H.

4.2 REMEDIAL PROGRAM ELEMENTS

4.2.1 Contractors and consultants

National Grid retained multiple contractors and consultants to implement the RA:

- O'Brien & Gere Engineers, Inc. prepared the RAWP, conducted the pre-design investigation and prepared the Remedial Design Technical Specifications and Design Drawings. O'Brien & Gere also provided engineering

during construction and on-site construction observation to monitor the Contractor's performance for general compliance with the Contract Documents.

- *de maximis, inc.* provided construction management and represented National Grid during construction activities.
- LRI was selected by National Grid to implement the Site RA construction activities. In performing the Site RA construction, LRI retained several subcontractors for various tasks, as follows:
  - Colden Corporation was retained to prepare and implement the HASP and CAMP;
  - NMB Land Surveying provided survey information and as-built drawings;
  - Winn Construction, Inc. provided the steel sheet piling design;
  - Brady Fence Co. provided fence and gate installation services;
  - Edward Horn, P.E. conducted the structural inspections as a structural engineer;
  - Longhorn Trucking Company, Inc. and Ron Allen Trucking, Inc. provided transport of contaminated soil to the off-site disposal facility;
  - Poland Sand and Gravel provided transport of imported fill and topsoil;
  - Atlantic Testing Labs conducted sampling of imported fill and topsoil;
  - Con-Test Analytical Laboratory conducted soil characterization sampling; and
  - Parratt-Wolff, Inc. was retained to decommission three existing and two additional groundwater monitoring wells.

4.2.2 Site preparation

After mobilization to the Site, LRI completed Site preparation tasks before initiating the Site RA construction. In summary, the Site preparation tasks included:

- Installing temporary fencing around the work area;
- A NYSDEC-approved project sign was erected at the project entrance and remained in place during all phases of the RA;
- Constructing temporary access roads, traffic control, and setting up work zones (including staging pads and decontamination zones);
- Installing construction field offices and an Equipment Decontamination Facility within the Support Zone;
- Hiring an electrician to bring temporary power into the trailer complex for heating, cooling and lighting;
- Installing erosion and environmental controls, clearing and grubbing;
- Establishing dust and odor control measures; and
- Protection of monitoring wells outside the limits of excavation but inside the limits of work.

A pre-construction meeting was held with the NYSDEC, LRI, NYSDOH, O'Brien & Gere, and *de maximis*, *inc.* on April 3, 2014.

4.2.3 General site controls

The following general Site controls were performed over the course of the project:

- Site security – Gates were locked following completion of construction on a daily basis.
- Job Site record keeping – A field book was used by each of the on-site O'Brien & Gere full-time resident engineer and the *de maximis, inc.* construction manager to record specific dates and activities that took place during construction

- Meeting minutes – Weekly meetings were conducted by *de maximis*, *inc.* to record the project's progress and future work.
- Air monitoring records and waste disposal records – These records were prepared by LRI to document air monitoring results and to quantify and track the waste transported off site.
- Imported materials tracking – The quantity of common fill and topsoil imported to the Site was tracked

4.2.4 Nuisance controls

LRI prepared plans for traffic, noise and odor nuisances. Plans were also developed for vibration minimization and settlement monitoring.

The Traffic Control Plan was prepared by LRI to minimize road blockage and allow worksite trucks to enter and exit the Site safely by designating traffic patterns. During the project, a section of West Smith Street was damaged as a result of equipment exiting the Site. LRI fixed the street with a sealer per the City of Herkimer Department of Public Works (DPW) instruction. During the week of July 31, 2014, a truck delivering the frac tank for construction water storage drove onto the grass along the Wellington property on William Street. No repairs were required.

The Noise Monitoring and Minimization Plan developed by LRI identified that the primary source of noise disturbances would be construction equipment related. Noise levels were monitored with a hand held sound level meter and the readings were recorded accordingly. Methods that LRI used to alleviate noise issues are listed in Appendix I, and included, among other items, using a variable moment hammer during sheet piling to reduce resulting noise and not allowing equipment to idle for extended periods of time. LRI generally adhered to local ordinances as they related to hours of operation and noise generation, except in instances where an activity had commenced that had to be completed on the same day. LRI made efforts to minimize noises caused by construction equipment operation without compromising any safety features. All equipment was equipped with factory mufflers.

There were four noise complaints and one vibration complaint during the course of this project:

- On July 7, 2014, and again early in the week of July 17, 2014, the Site property owner complained to LRI and National Grid about the noise because activities went beyond the typical hours of operation.
- During the week of July 17, 2014, a neighbor contacted the NYSDEC and NYSDOH about the noise and vibration from construction activities going beyond the typical hours of operation.
- On July 21, 2014, a vibration complaint was made during ISS.
- During the week of July 24, 2014 a neighboring property owner complained about the noise during ISS.

The Odor Control Plan prepared by LRI was implemented in conjunction with the HASP and the CAMP. The primary odor control methods used were the utilization of RUSMAR Odor Foam (AC-645) and Bio-Solve, in combination with covering excavations and stockpiles with polyethylene sheeting. A copy of related daily records is included in Appendix B. The Odor Control Plan also involved the NYSDOH and/or the NYSDEC to confirm, track, and resolve complaints. The Odor Control Plan is provided in Appendix J.

There were four odor complaints during the course of project:

- On July 14, 2014, a neighboring property owner contacted the NYSDOH about the strong odors during ISS.
- During the week of July 17, 2014, an odor complaint was made to the NYSDOH during ISS activities.
- On July 21, 2014, an odor complaint was made to the NYSDOH due to Bio-Solve application. Subsequently, Bio-Solve was used in conjunction with RUSMAR foam to control odors.
- During the week of July 24, 2014, there were two odor complaints during ISS from property owners neighboring the Site.

LRI prepared a Vibration Minimization and Monitoring Plan to minimize the vibrations and associated damage to adjacent structures as a result of sheet pile installation. The Vibration Minimization and Monitoring Plan is

provided in Appendix K. As part of the Plan, a structural engineer was retained by LRI to perform a Pre-Construction Inspection to document the existing conditions of adjacent structures and a Post-Construction Inspection to document the conditions of the structures following construction. Crack monitors were installed on adjacent properties to quantify structural damage during the construction activities. The Netti property on William St. and the southern Site boundary had no significant change from the Pre-Construction Inspection, while the Armistead/Westbrook residence on West Smith St. and to the west of the Site had several structural issues related to the construction. The Post Construction Inspection documented subsidence under the back porch and back corner of the foundation, and detached fence posts along the property boundary. The Post-Construction Inspection recommended that foundation cracks resulting from construction be caulked/grouted to avoid water penetration. National Grid made arrangements to have the homeowner repair the damage. The Pre- and Post-Construction Inspections are provided in Appendix K.

The Vibration Monitoring Reports detailed the observed vibrations that occurred on site due to construction activities by using a three-component seismograph. The vibration monitors' alarms were set to trigger at a peak particle velocity (PPV) of 0.5 in/sec. According to the Vibration Minimization and Monitoring Plan, LRI would notify *de maximis*, *inc.* and O'Brien & Gere for direction at an action level of 1.5 in/sec PPV without halting operations. At 2.0 in/sec PPV, operations would be immediately halted, with further direction provided by O'Brien & Gere and *de maximis*, *inc*.

The initial 0.5 in/sec PPV vibration alarms were triggered during sheeting activities on the following dates:

- May 20, 2014;
- May 23, 2014;
- May 30, 2014; and
- September 16, 2014.

In addition to the alarms listed above, there was a false alarm triggered on May 30, 2014 during a break period.

On June 13, 2014, the monitoring point 6 ft from the Netti residence triggered a PPV of 1.675 in/sec. In all instances, surrounding structures were closely monitored for disturbances related to the vibrations. At no time was the 2.0 in/sec action level exceeded. The Vibration Monitoring Reports are provided in Appendix K.

LRI developed an Optical and Settlement Monitoring Plan following observed soil settlement and movement of cracks on adjacent structures during the pre-drilling and sheet pile installation, in particular near the Armistead/Westbrook residence. To quantify the soil settlement that occurred, LRI placed five Optical Monitoring Points (OMPs) on the adjacent building foundations and four Settlement Monitoring Points near the building foundations. The Optical and Settlement Monitoring Plan is provided in Appendix L.

There was movement of some of the monitoring points observed during the course of the project:

- On May 29, 2014, the crack monitor on the Netti residence expanded to less than 1 millimeter. Based on subsequent observations, it was believed to have resulted from temperature variance.
- Between June 2, 2014 and July 28, 2014, during sheeting installation and ISS activities, Crack Monitor 18 on the south wall in the Westbrook residence basement gradually increased to a 2 millimeter horizontal spread and also moved down 1 millimeter.
- On June 9, 2014, the exterior crack under the deck of the Westbrook residence expanded and an approximately 2 inch-by-2 inch piece of the parge fell off.

4.2.5 CAMP results

Colden Corporation conducted the community air monitoring for LRI while intrusive activities were underway at the Site. The CAMP readings and monitoring equipment locations were documented each workday to become a part of the daily air monitoring report. On a weekly basis the results were summarized that was provided to O'Brien & Gere, *de maximis*, *inc.,* NYSDEC, and NYSDOH for project records. Copies of the CAMP and Weekly CAMP Reports are provided in Appendix B.

The reports demonstrate that LRI completed the RA construction in compliance with the air monitoring requirements of the Contract Documents, and that the level of dust and organic vapor (if any) was within the criteria established for safe operations and community protection. During the project one minor short term exceedance did occur. On July 9, 2014, Fane Trucking was on-site clearing the lines of their cement/slag hopper truck, resulting in a short-term dust exceedance of 297 ug/m^3 (172 ug/m^3 limit; 150 ug/m^3 above background of 22 ug/m^3). This short duration dust release dissipated quickly but was detected by a nearby CAMP Monitoring Station.

During the mulching process on September 26, 2014, an unidentified passerby complained about the dust being created. He contacted local officials, and they in turn arrived at the Site and approved of the landscaper's work. Because the passerby did not leave any contact information and with no way of communicating with him, the issue was determined to be resolved.

4.2.6 Monitoring well abandonment

As called for in the RD, three monitoring wells (KW-01, KW-02, and TW-01) were decommissioned prior to the start of construction activities as shown in Appendix M. During the project, Monitoring Well-2 (MW-2) was removed during excavation of the Holder Area and MW-3 was damaged during construction activities. The NYSDEC approved not replacing MW-2 and MW-3 (NYSDEC, 2014a).

Following the completion of construction, and with the approval of the NYSDEC, groundwater samples were collected from MW-1 and MW-4 and were tested for VOCs and PAHs (see Appendix M). The analytical results for these samples were provided to the NYSDEC in a letter dated October 28, 2014 (O'Brien & Gere, 2014) with a request to decommission MW-1 and MW-4. The NYSDEC approved this request in an e-mail dated October 30, 2014 (NYSDEC, 2014b). On January 12, 2015, the remaining monitoring wells within the limits of excavation were abandoned with the approval of the NYSDEC by Parratt-Wolff. Groundwater monitoring is not required for this Site. The monitoring well abandonment logs and groundwater monitoring results are provided in Appendix M.

4.2.7 Reporting

Weekly construction progress meetings, chaired by *de maximis, inc.,* were conducted during the remedial action with representatives of LRI, O'Brien & Gere, National Grid, the NYSDOH, and the NYSDEC invited. The purpose of the weekly construction meetings was to review the RA construction progress/schedule, future activities, Site safety, community air monitoring, Site security, and to identify any RA difficulties and develop solutions to identified difficulties. All meetings were open to all parties involved with the RA to attend, either on-site or via conference call. Weekly minutes were distributed electronically to all parties prior to the next meeting. When applicable, the progress meeting minutes documented difficulties encountered, corrective actions made, and modifications to the work plans (if any). Copies of the weekly progress meeting minutes are provided as Appendix N.

LRI was responsible for documenting and distributing weekly HASP Summaries, included in Appendix A.

O'Brien & Gere was responsible for observing the work to later certify that the work was completed in substantial compliance with the design documents and approved modifications. Digital photos of the construction are included in electronic format in Appendix O, documenting various stages of the work.

4.3 CONTAMINATED MATERIALS REMOVAL

The Record Drawings provided in Appendix P present the actual limits of excavations made to remove contaminated soil and MGP waste. During pre-trenching prior to sheeting installation, it was discovered that the former Holder foundation was larger than presented in the RI. As a result, the horizontal limits of the Holder Area were expanded beyond that shown in the Design Drawings to the limits shown in the Record Drawings.

An unanticipated amount of swell was encountered due to using ISS within the sheet pile excavation support system. Swell values are typically close to 10% when using ISS without sheeting, and LRI had anticipated 15% swell within sheeting in their bid. In reality, swell values were calculated to be 33% and 32.5% in the Petroleum Area and the Holder Area, respectively.

Based on a comparison of surveyed elevations recorded before and after excavation, it is estimated that approximately 4,350 cubic yards (CY) of soil was excavated. Of this amount, approximately 65% of the soil volume was contaminated and disposed off site, with the total weight disposed equal to 5,531.69 tons. The remaining 35% of soil volume was reused on site for backfill.

4.3.1 Material disposal

Incorporating the increase in Holder Area size and swell due to ISS, the quantity of contaminated material transported to the Ontario County Landfill for disposal was equal to 5,531.69 tons. Completed manifests accompanied all shipments. Manifests and waste tracking data are summarized in Appendix Q.

Water that accumulated in the Petroleum Area was pumped to an on-site frac tank. A sample of the water was collected from which a waste profile was developed, included in Appendix Q. Based on the analytic results the collected water was approved for off-site disposal. A total of 20,535 gallons of water was transported off-site for disposal at Industrial Oil Tank Service Corp. in Oriskany, NY.

On July 10, 2014, while moving material within the Petroleum Area, a fitting on the front-end loader broke, subsequently losing less that 1.0 gallon of hydraulic fluid to the soil surface on the east side of the Site. A fitting on an excavator broke during some repairs and spilled approximately 1.5 gallons of hydraulic fluid on July 10, 2014 and broke again, releasing another half-gallon on July 11, 2014. In all three instances, the minor amounts of oil were contained within the excavated areas and were excavated, containerized, and transported off site for disposal with the ISS waste material. The total weight disposed was equal to 16.5 pounds. The disposal details are provided in Appendix Q. NYSDEC was notified of each spill and no additional cleanup was required.

4.3.2 On-site reuse material

Soil from the upper 6 feet of the Site was the only material reused on site during the implementation of the remedy. Approximately 1525 CY of soil from the upper 6 feet was re-used as backfill.

4.4 REMEDIAL PERFORMANCE/CHARACTERIZATION SAMPLING

Soil characterization samples were collected by LRI for approval of the soils for either disposal at the Ontario County Landfill or for on-site re-use at a frequency in accordance with LRI's Construction Work Plan. Characterization samples were analyzed for the following:

- VOCs;
- SVOCs;
- PCBs (Polychlorinated biphenyl);
- Metals;
- Cyanide;
- PAHs; and
- BTEX.

The results were compared to the Restricted-Residential Use Soil Cleanup Objectives established by 6 NYCRR 375.6. Based on the results of sampling, the soils from the upper 6 feet of the Site were approved for re-use on site and were also approved for acceptance at the Ontario County Landfill.

4.5 IMPORTED BACKFILL

To replace the volume of soil removed from the Site, 2,894 CY of soil was imported from off site. The imported material included common fill and topsoil.

Based on surveying the Site before and after excavation, 2,447 CY of common fill and based on weight tickets, 705.50 tons of topsoil was imported to the Site. The common fill and topsoil was obtained from Poland Sand and Gravel, LLC located in Poland, NY. Prior to bringing the soil onsite, LRI collected soil samples for chemical analyses including:

- Target Analyte List (TAL) VOCs;
- TAL SVOCs;
- TAL metals;
- Cyanide (total and amenable);
- PCBs/Pesticides (in accordance with DER-10); and
- Physical properties (e.g. gradation).

All topsoil and common fill was compliant with the commercial use standards listed in NYCRR PART 375 and satisfy the Protection of Groundwater Soil Cleanup Objectives Part 375-6.7(d)(1)(ii)(b). The results from the Topsoil and Common Fill Submittals and chemical analyses are provided under the Imported Materials Documentation in Appendix R.

Final Site grades are shown on the Record Drawings included as Appendix P.

4.6 CONTAMINATION REMAINING AT THE SITE

The RA removed impacted material to the limits and depths required by the Decision Document, as modified by approved deviations due to conditions encountered during construction (*i.e.* expansion of the size of the Holder Area) and the approval to utilize ISS as the means and method. As described in the RAWP, soils with constituents exceeding 6NYCRR Restricted Residential Use SCOs remain on site. In accordance with the Decision Document and the RD, soils exceeding the SCOs were covered with a demarcation layer and a minimum of 2 feet of soil meeting the SCOs for cover material set forth in 6NYCRR Part 375-6.7(d) for restricted residential use.

4.7 ACCESS CONTROL

A temporary chain link fence was installed around the Site during the construction and removed following the completion of construction and establishment of vegetation.

4.8 INSTITUTIONAL CONTROLS

The Site remedy requires that an environmental easement be placed on the property to:

- Implement, maintain and monitor the Engineering Controls;
- Prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination;
- Limit the use and development of the Site to restricted residential, commercial or industrial uses only (depending on local zoning approval); and
- Restrict the use of groundwater as a source of potable water, without necessary water quality treatment as determined by NYSDOH.

The environmental easement for the Site was executed by the Department on [date], and filed with the Herkimer County Clerk on [date]. The County Recording Identifier number for this filing is [number]. A copy of the easement and proof of filing is provided in Appendix S.

4.9 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

There were no deviations from the requirements of the RAWP and Decision Document (NYSDEC, 2011). As required, the MGP contaminated soil was excavated and removed from the Site.

There were several Change Orders (COs) over the course of the project resulting from unanticipated field conditions:

- Pre-Drilling (CO-01): Because Site soils were denser than anticipated, LRI requested a contract change to drill 92 holes to 25-35 feet below grade to mitigate the effects of the vibrations during sheet pile driving and the potential for associated damage to adjacent structures.

- Optical Monitoring (CO-02): Monitoring points on adjacent building foundations and soil settlement points along the associated building foundations were placed to monitor impacts of vibrations. Additional optical monitoring was also utilized to monitor soil settlement during sheet pile removal.
- Increase in Area Size Due to Holder Location (CO-03): During pre-trenching operations, the location and size of the former gas Holder pad was discovered to be different from that developed during the RI. LRI requested an increase in the size of the Holder Area and additional sheeting to surround and facilitate removal of the entirety of the pad. This size increase further changed the resulting ISS, excavation and common fill volumes.
- Additional Odor Control Measures (CO-04): A more robust odor control plan was developed that required full-time application of RUSMAR foam during intrusive work (excavating and loading operations) in response to neighbor complaints during the excavation of the former gas Holder Area.
- Leave Sheeting in Place (CO-05): Observed soil settlement adjacent to and movement of cracks on the Armistead/Westbrook residence necessitated leaving an approximate length of 77.47 feet of sheeting cut 2 feet below grade on site on the western side of the Holder Area and partially on the north side to minimize further damage to the property. The location of the remaining sheeting is shown on the Record Drawings included in Appendix P.
- Reconciliation of Quantities (CO-06): The Contract Amount needed to be adjusted to represent actual quantities of materials and efforts utilized in completing the scheduled work.

REFERENCES

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