

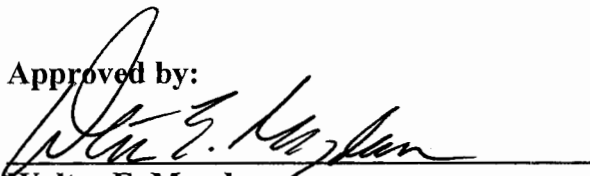
**Fourth Five-Year Review Report  
Ludlow Sand & Gravel Superfund Site  
Oneida County, New York**



**Prepared by:**

**United States Environmental Protection Agency  
Region 2  
New York, New York  
September 2014**

**Approved by:**

  
Walter E. Mugdan

**Director  
Emergency and Remedial Response Division**

**Date:**

*Sept. 23, 2014*

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## Executive Summary

This is the fourth five-year review for the Ludlow Sand & Gravel Superfund site, located in the Town of Paris, Oneida County, New York. The purpose of this five-year review is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory five-year review is the completion date of the previous five-year review, dated July 1, 2009.

The third five-year review for the site recommended that institutional controls should be implemented on both Operable Unit 1 and Operable Unit 2. This recommendation was completed with the execution of the Declaration of Covenants and Restrictions & Environmental Easement on August 9, 2013.

All appropriate response actions at the site have been successfully implemented in accordance with the 1988 and 2003 Records of Decision. A Final Close-Out Report documenting this determination was signed on September 6, 2013. A Notice of Intent to Delete and a Notice of Deletion for the Ludlow Sand & Gravel Superfund site were published in the *Federal Register* on October 2, 2013. The public comment period ended on November 1, 2013, without any significant comments received. The site was deleted from the National Priorities List on December 2, 2013.

Based upon the results of this review, the U.S. Environmental Protection Agency concludes that the remedies implemented at this site adequately control exposures of site contaminants to human and environment receptors to the extent necessary for the protection of human health and the environment. There are no exposure pathways that could result in unacceptable risks and none expected as long as the engineered and institutional controls currently in place continue to be properly operated, monitored and maintained.

## Five-Year Review Summary Form

### SITE IDENTIFICATION

<b>Site Name:</b> Ludlow Sand and Gravel		
<b>EPA ID:</b> NYD013468939		
<b>Region:</b> 2	<b>State:</b> NY	<b>City/County:</b> Town of Paris/Oneida County

### SITE STATUS

<b>NPL Status:</b> Deleted	
<b>Multiple OUs?</b> Yes	<b>Has the site achieved construction completion?</b> Yes

### REVIEW STATUS

<b>Lead agency:</b> EPA
<b>Author name (Federal or State Project Manager):</b> Isabel R. Rodrigues
<b>Author affiliation:</b> EPA
<b>Review period:</b> 7/1/2009 – 6/30/2014
<b>Date of site inspection:</b> 6/4/2014
<b>Type of review:</b> Statutory
<b>Review number:</b> 4
<b>Triggering action date:</b> 7/1/2009
<b>Due date (five years after triggering action date):</b> 7/1/2014

### Issues/Recommendations

<b>OU(s) without Issues/Recommendations Identified in the Five-Year Review:</b>
OU-1 and OU-2

**Protectiveness Statement(s)**

<i>Operable Unit:</i> OU-1	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> N/A
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*Protectiveness Statement:*  
The remedy for the site protects human health and the environment.

**Protectiveness Statement(s)**

<i>Operable Unit:</i> OU-2	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> N/A
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*Protectiveness Statement:*  
The remedy for the site protects human health and the environment.

**Site-wide Protectiveness Statement**

<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> N/A
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*Protectiveness Statement:*  
The remedies for the site protects human health and the environment.

## **Introduction**

The purpose of a five-year review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment and is functioning as intended by the decision documents. The methods, findings, and conclusions of reviews are documented in the five-year review. In addition, five-year review reports identify issues found during the review, if any, and document recommendations to address them.

This is the fourth five-year review for the Ludlow Sand & Gravel site (site), located in the Town of Paris, Oneida County, New York. This five-year review was conducted by United States Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Isabel R. Rodrigues. The review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. §9601 *et seq.* and 40 CFR 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). This report will become part of the site file.

The triggering action for this statutory review is the date of the previous five-year review, which is July 1, 2009. A five-year review is required at this site due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. The site consists of two operable units, both of which are addressed in this five-year review.

## **Site Chronology**

See Table 1 for the site chronology.

## **Background**

### *Physical Characteristics*

The site is located in the Town of Paris, Oneida County, New York, approximately six miles south of Utica. The Ludlow Sand & Gravel property encompasses approximately 130 acres with landfill activities confined to approximately 18 acres. The landfill area is fenced on the western boundary along Holman City Road. The south and east sides of the landfill are bounded by a designated wetland and an unnamed stream, while to the north, the landfill is bounded by a gravel pit which is also part of the site.

### *Site Geology/Hydrogeology*

The landfill is in a groundwater recharge zone to the principal aquifer along Sauquoit Creek. The Creek serves as a major discharge point for groundwater flowing from uplands. Soils in the overburden aquifer underlying the site have been characterized as a complex sequence of unconsolidated glacial sediments that vary in composition. Three types of glacial sediments have been identified at this site: till, glaciofluvial deposits, and lacustrine deposits. To the east and south of the site, the glacial deposits are overlain by deposits from a marsh which consist of silts,

clay and peat. The bedrock aquifer underlying the glacially deposited overburden consists of limestone dolomite and shale.

Water supplies in the area are mainly used for domestic and agricultural purposes with two municipally-owned public water supplies within two miles of the site. The Sauquoit Valley Water District is a spring source located approximately one mile upgradient of the site's groundwater flow patterns. The Village of Clayville's water system is located about three-quarters of a mile northwest of the landfill. This system consists of a supply well 81 feet deep that has a capacity of 70 gallons per minute. The only individual water supply wells within 1,000 feet of the landfill are three homeowner wells along Mohawk Street which are located upgradient to groundwater flow around the landfill. Eight additional homeowner wells exist between 1,000 and 3,000 feet from the landfill.

### *Land and Resource Use*

The site includes a gravel pit and landfill on a 130-acre property. Adjacent to the landfill is an extensive gravel pit that surrounds the property that is rural residential and agricultural land. Single family homes are located along Holman City Road. The site also includes a New York State designated wetland south and east of the landfill. The owner continues operating the gravel pit and some consideration to potential reuse or redevelopment scenarios for the site within restrictions described in the institutional controls (ICs) have been considered. The wetland is considered by EPA to be an area currently in use as an environmental resource.

### *History of Contamination*

The landfill began receiving municipal refuse from surrounding communities in the 1960s. The landfill also received bulk liquid, including septage, waste oils, coolants, and sludge containing metals. The bulk liquids were disposed of at the landfill by surface application. The on-site gravel pit, known as the North Gravel Pit (NGP), located to the north of the landfill, was also periodically used for the disposal of bulk waste oils. Drummed liquid wastes were reportedly not disposed of in the landfill. Drummed liquids were bulked using a vacuum truck and were applied to the landfill in a manner similar to the bulk liquids previously described. The landfill continued to accept waste until it was shut down by court order in 1988.

### *Initial Response*

As early as 1966, New York State cited the owner/operator, Mr. Ludlow, for improper or illegal waste disposal practices. A variety of legal actions were taken against Mr. Ludlow in response to legal complaints made by the New York State Department of Law.

Preliminary site investigations conducted by the New York State Department of Environmental Conservation (NYSDEC) in 1982 identified the presence of polychlorinated biphenyls (PCBs) in leachate seeps emanating from the landfill. Reports from the community and site inspections conducted by the NYSDEC indicated that the site warranted proposal for the National Priorities List (NPL). In December 1982, the site was proposed to the NPL (47 FR 58476). In September 1983, the site was placed on the NPL (48 FR 40658). EPA, in consultation with the State, divided

the site into two operable units (OUs). OU-1 addressed the landfill proper and OU-2 addressed contamination in off-site groundwater, the on-site wetlands, and the NGP.

### *Basis for Taking Action*

Special Metals Corporation of Utica, New York, a potentially responsible party (PRP), agreed to perform a remedial investigation/feasibility study (RI/FS) for the site in an Administrative Consent Order with the State that was signed on September 10, 1984. The completed RI/FS was submitted to the State in 1986 and included a recommendation for landfill closure as the remedy for the site. The FS recommended alternatives for remediating the landfill that were less stringent than the federal and state requirements. Subsequently, Mr. Ludlow, another PRP, engaged a contractor to perform additional investigations to supplement the initial investigation and prepare a closure plan. A second investigation report with a final closure plan was submitted to the State for review. In July 1987, a Federal District Court Judge in the District Court of Binghamton ordered the landfill to close by February 15, 1988, pursuant to federal and state regulation and ordered the partial payment of response costs to the State. Concurrent with the PRP's additional investigations, the EPA tasked a contractor to perform a supplemental RI/FS in response to the State's request for assistance in evaluating the cost of the alternatives. The supplemental RI/FS was released to the public for comments in August 1988.

A supplemental investigation of the drinking water supply contamination was also conducted. The three closest residential wells and the Clayville public water supply were sampled for organics and metals. The results indicated that all off-site residential and public water supplies met federal and state drinking water standards.

In 1994, the PRPs proposed a work plan for a supplemental RI/FS to address OU2. As some removal of contaminated material had occurred as part of the implementation of the OU1 remedy, the PRPs believed that sufficient work was done to address the contamination at the NGP and that any further remedial action was unnecessary. The EPA and NYSDEC disagreed and the dispute was taken to court. Subsequently, the work plan was approved for implementation under a Consent Judgment, by order of the court, dated August 3, 1996. The purpose of the supplemental RI was to characterize the extent of groundwater contamination further and to define the nature and extent of residual contamination at the NGP. The supplemental RI was conducted between November 1996 and January 1998.

The OU-1 ROD indicates the lifetime risks from dermal exposure to PCBs in soil and consumption of groundwater were within the risk range.

EPA's baseline risk assessment for OU-2 addressed the potential risks to human health by identifying several potential exposure pathways by which the public and workers may be exposed to PCBs at the site under current and future land-use conditions. The risk range and goal of protection of an HI=1 was exceeded for exposures surface soils by current/future on site worker ( $7.4 \times 10^{-4}$  and HI=52), shallow soil by on-site worker ( $5.4 \times 10^{-4}$  and HI=37), and adolescent trespassers exposed to surface soil (HQ=16) and shallow soil (HQ=11) and the construction worker exposed to shallow soil (HQ=92) under the Reasonable Maximum Exposure (RME) assumptions.



Aroclor 1254 in surface soil, shallow core samples, and subsurface soil is the main cancer risk and non-cancer health hazard driver for unacceptable risks and hazards to the industrial/commercial worker, the trespasser (for non-cancer only), and construction worker (for non-cancer only).

## **Remedial Actions**

### *Remedy Selection*

Remedial action objectives (RAOs) were developed for the site as a result of data collected during the remedial design (RD) to aid in the development and screening of remedial alternatives. They are: (1) minimize the potential for PCBs to migrate from soils into groundwater; and (2) eliminate any direct contact, ingestion, or inhalation threat associated with contaminated soil.

Based upon the results of the RI/FS, EPA signed a Record of Decision (ROD) on September 30, 1988. The remedial measures identified in the 1988 OU-1 ROD were as follows:

- Consolidate approximately 10,000 cubic yards of contaminated soil and sediment located adjacent to the landfill and dispose of it in the landfill and then place either a clay or synthetic cover over it to prevent rain water from coming into contact with the buried materials;
- Collect leachate from seepage areas;
- Dewater the landfill, if necessary, by using either a passive drain system or groundwater extraction wells;
- Implement upgradient groundwater controls to lower the water table to prevent groundwater from coming into contact with the waste material;
- Treat the contaminated leachate and groundwater at an on-site facility, or if the volume of water were small, transport the water and leachate to an approved disposal facility;
- Install a perimeter fence around the site, including the wetlands;
- Recommend that institutional controls be established in the form of deed restrictions on future uses of the site; and
- Monitor the groundwater, private wells, and surface water to ensure that remediation of the landfill is effective.

In addition, the ROD called for implementation of a soil/sediment sampling program to fully define the volume and extent of contaminated soils to be consolidated under the cap. New York State and the PRPs entered into a Consent Judgment in the Northern District of New York for the implementation of an Approved Remedial Plan (ARP). The ARP addressed the elements of the 1988 ROD. The ARP also included elements that were to be addressed as part of OU2, including the excavation and consolidation of contaminated sediments from the wetlands and PCB-contaminated soil from the NGP into the landfill. It also included a supplemental groundwater study that was completed by the PRPs in January 1990.

Many soil and groundwater samples were collected at the site to characterize the nature and extent of contamination as part of the supplemental RI. These and other data indicated that PCBs were the principal contaminants which exceeded soil cleanup values. These PCB concentrations remained at depth in the NGP because of the limitations of the excavation equipment which was

used when the NGP was excavated as part of the OU-1 remedial activities. In addition, low levels of volatile organic compounds (VOCs) and inorganic compounds (metals) were also detected in soil and groundwater samples on a sporadic and limited basis. During the supplemental RI quarterly groundwater sampling was performed at five wells around the perimeter of the NGP from September 1997 until March 1999 for a total of seven sampling events. Monitoring well MW11-R had detectable concentrations of PCBs (0.13 parts per billion (ppb) and 0.24 ppb) in the unfiltered samples during two of the seven sampling events (September 1997 and June 1998). All other wells sampled and all filtered samples did not demonstrate detectable concentrations. This indicated that PCB contamination is not migrating in groundwater and is confined to the pit area. Based upon these data, it was determined that no further remedial action was necessary for the groundwater, with the assumption that the residual PCB contamination remaining below the water table in the NGP would be addressed as part of the OU-2 remedy.

The remedy for OU-2, specified in a ROD issued by NYSDEC on March 31, 2003, primarily addressed residual PCB contamination at depth in the NGP. The RAO for the NGP portion of the site (OU-2) was to remediate the PCB contaminated soils above 10 parts per million (ppm). The ROD specifically called for:

- Solidifying soil at depth with PCB concentrations above 10 ppm;
- Implementing a pre-design delineation sampling program to determine the area to be treated;
- Implementing soil bench-scale testing to determine the grout characteristics;
- Backfilling the NGP to its original elevation, covering the area with clean soil to raise the surface elevation to its original grade, and applying a vegetative cover;
- Limiting site access and issuing a deed restriction to prohibit groundwater usage and limiting the land use to nonresidential purposes;
- Installing at least two downgradient deep groundwater monitoring wells to ensure that PCB migration in the groundwater is not occurring; and
- Implementing a groundwater monitoring program.

### *Remedy Implementation*

The remedial action for OU-1 was conducted by the PRPs pursuant to the Consent Judgment with the State. During the remedial design, the soil contamination in the wetlands areas and NGP were delineated. The Remedial Design Report was approved by the NYSDEC in June 1990.

Remedial action activities for OU-1 started in 1990 and were performed under the oversight of the NYSDEC. Sediment from the wetlands was excavated to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 94-HWR-4046 surface soil guidance value of 1 ppm for PCBs and consolidated into the landfill prior to the cap completion. Approximately 40 cubic yards of sediment with PCB concentrations greater than 500 ppm were disposed of off-site at an approved disposal facility. Approximately 60,000 cubic yards of soil were excavated from the NGP, of which approximately 40,000 cubic yards were found to be contaminated with PCBs and were consolidated into the landfill prior to completion of the cap. The other 20,000 cubic yards of material had nondetectable levels of PCBs and were placed on the bank of the NGP. The total amount of soil that was excavated from the NGP was greater than anticipated and the

excavation using conventional excavation equipment became difficult when groundwater was encountered. Topsoil and seeding were placed over the entire capped area which was enclosed within a chain link fence. A leachate collection system, a leachate treatment system, gas collection/lateral drainage layer and gas venting systems were also installed. Monitoring wells were installed downgradient from the landfill. Construction was completed in 1992.

A report documenting the cleanup efforts, *Construction Document Report*, was submitted by the PRPs and approved by the NYSDEC in May 1995.

The United States Army Corps of Engineers (USACE) prepared the remedial design plans and specifications for OU-2 through an interagency agreement with the EPA. The 2003 ROD identified pressure grouting as the method to be used to solidify the PCB-impacted soils in the NGP. The EPA performed a value engineering assessment between the proposed pressure grouting technology and soil mixing technology. In-situ soil mixing (ISSM), sometimes referred to as in-situ solidification/stabilization (ISS), was identified as having the potential to complete the project at a lower cost and in a shorter time frame. As a result the EPA decided to use this technology to address the PCB contamination above 10 ppm in the NGP. The EPA Region 2 removal program staff directed and oversaw construction activities.

From May 21 to June 8, 2007, the contractor mobilized at the site to prepare the site for construction activities. Also during this period of time, ponded water within the proposed work area was pumped into four 22,000-gallon frac tanks where it was stored until laboratory results indicated that it was acceptable to discharge.

Following on-site mobilization in June 2007, construction activities were conducted in two phases. Phase I of the remedial action included ISSM of PCB-contaminated soils and installation of groundwater monitoring wells. Phase II included backfilling the pit with clean fill to its original elevation, seeding the area to provide a vegetative cover, and installing culverts, swales, and a retention basin for storm water runoff.

On July 17, 2007 the ISSM contractor mobilized equipment to begin the field demonstration activities. Three sets of two 8.5-foot diameter overlapping grouted columns were advanced in a noncontaminated area of the NGP. The center of the columns were placed 7.36 feet apart to ensure column overlap. The columns were advanced to 15 feet below ground surface (bgs). Each set was made with a different mixture of Portland cement. A few days later these columns were exposed and samples were collected for physical testing to ensure the desired specs were met. Based on the results of the testing, a 7 percent Portland cement mixture was selected and full production was initiated. By August 22, 2007, a total of 582 columns were completed resulting in approximately 17,000 cubic yards of solidified soil.

On September 25, 2007, a final inspection was conducted by EPA and NYSDEC for OU-2. Subsequently, on April 30, 2009, a site-wide inspection was conducted by EPA and NYSDEC in conjunction with the second five-year review conducted for the site. Based on the result of these inspections, it was determined that construction for the entire site had been completed, that the remedy had been implemented consistent with the RODs, and is functioning as intended by the decision documents.

### *Institutional Controls Implementation*

The 2003 ROD required the imposition of institutional controls to prohibit groundwater usage and limit the land use at the site to nonresidential purposes, and any activities that could affect the integrity of the landfill cover, including without limitation, excavation, digging, and construction activities. A Declaration of Covenants and Restrictions & Environmental Easement effecting such restrictions were executed on August 9, 2013.

### *System Operations/Operation and Maintenance*

The Long-Term Monitoring (LTM) Program for the site commenced in 2000. This program consists of the following activities:

- Monthly inspections are performed to visually assess and document the condition of the landfill perimeter fence and access road, leachate management system building, gas collection system, monitoring wells and manholes, and overall integrity of the cover;
- Water level measurements are obtained from designated monitoring wells at the landfill to assess seasonal water levels fluctuations and evaluate groundwater flow direction;
- Groundwater samples are collected from 17 monitoring wells, three residential wells and one public supply well during the monitoring events and analyzed for PCBs and VOCs;
- Surface water is sampled annually from the culvert where the ponded wetland discharges beneath Holman City Road to monitor PCBs;
- Annual methane monitoring at the landfill gas vents, manholes and monitoring wells is conducted; and
- Leachate collected from the landfill is pumped through the on-site leachate treatment facility prior to discharge in accordance with the Operation, Maintenance and Monitoring Manual (O&M Manual). Operation of the leachate collection and treatment system was discontinued in 2008 after it was determined that there was minimal potential for the capped landfill to impact the downgradient water supply wells and groundwater.

No operation or maintenance for the stabilized soils is necessary for OU-2. The area covering the solidified columns was backfilled to the former existing grade. This covered the columns with up to 30 feet of clean soil. In accordance with the OU-2 ROD, a groundwater monitoring program was implemented. Five new wells installed during the OU-2 remediation were sampled to establish a baseline. The monitoring of these wells is subject to the OU-1 LTM Program for the site. Monitoring and maintenance continues to be performed by MACTEC Engineering and Consulting, P.C., under contract with NYSDEC.

The following is a summary of the operation, maintenance and monitoring activities conducted at the site.

Groundwater Elevation Monitoring: During the groundwater monitoring events, which are generally conducted every 15 months, water level measurements are obtained from 24 monitoring wells at the landfill to assess seasonal water level fluctuations and evaluate groundwater flow direction. The groundwater flow directions in the shallow and deep aquifers have been generally consistent during the long-term program. That is,

groundwater in both the shallow and deep aquifers flows west – southwest, while the groundwater in the deeper aquifer has a more southerly flow component southwest of the landfill.

Groundwater Quality Monitoring: During the groundwater monitoring events, samples for laboratory analysis are collected from monitoring wells, residential wells and a public supply well and are analyzed for VOCs, PCBs, phenolics and metals to ensure detection of potential threats to human health. While PCBs are the primary contaminant of concern at the site, VOCs, phenolics, and metals are present within the landfill, but only have been sporadically and infrequently detected in groundwater.

Groundwater quality analytical data has not revealed PCBs above the federal maximum contaminant level (MCL) of 0.5 ppb. No other contaminants were detected above New York State Class GA Water Quality Standards. Neither the residential wells nor the public supply well sampled as part of the groundwater quality monitoring program have revealed any site-related contamination.

PCBs have not been detected in groundwater downgradient of the landfill or the NGP. Therefore, it is concluded that the stabilization and capping activities have effectively immobilized all PCB contaminants in soils. Groundwater monitoring will continue to verify that the containment activities are effective.

Surface Water Monitoring: Surface water is sampled every 15 months from the culvert where the ponded wetland discharges beneath Holman City Road to monitor for PCBs. Sample results have not revealed PCBs in the surface water.

Landfill Gas Monitoring: Methane monitoring at the landfill gas vents, manholes and monitoring wells is conducted on an annual basis. Results have demonstrated that the landfill gas venting system is operating well.

Leachate System Monitoring: Leachate collected from the landfill had been pumped through the on-site leachate treatment facility prior to discharge in accordance with the O&M Manual. Sampling and analysis of the parameters outlined in the O&M Manual is conducted on a semi-annual basis for PCBs and once every 15 months for the remaining monitoring parameters (VOCs, metals and phenolics). An evaluation of leachate and groundwater data conducted in 2007 concluded that operation of the treatment system was not necessary. As a result, the leachate collection system was shut down in June 2008. Groundwater elevation measurements and water quality samples are collected on a semi-annual basis as part of a shutdown analysis. If the analysis indicates that operation of the system is important for the protection of downgradient supplies and groundwater operation of the system could be resumed, if appropriate.

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

## **Progress since Last Five-Year Review**

The third five-year review was completed on July 1, 2009. The FYR concluded that:

“The actions implemented at the site are protective of human health and the environment and are expected to remain protective in the short term based on current use; however, in order for the site to be protective in the long term, institutional controls need to be implemented. No exposure pathways currently exists that could result in unacceptable risks and non are expected, as long as site use does not change and the engineered and access controls in place continue to be properly operated, monitored, and maintained.” The institutional control issue identified in the previous five-year review was addressed and completed with the execution of the Declaration of Covenants and Restrictions & Environmental Easement on August 9, 2013.

In addition, after the institutional controls were implemented, a Final Close-Out Report documenting this determination was signed on September 6, 2013. A Notice of Intent to Delete and a Notice of Deletion of the site were published in the *Federal Register* on October 2, 2013. The public comment period ended on November 1, 2013 without any significant comments received. The site was deleted from the NPL on December 2, 2013.

## **Five-Year Review Process**

### *Administrative Components*

The five-year review team consisted of Isabel R. Rodrigues (EPA-RPM), Ed Modica (EPA-hydrologist), Marian Olsen (EPA-Human Health Risk Assessor), Charles Nace (EPA- Ecological Risk Assessor), and Larisa Romanowski (EPA- Community Involvement Coordinator). This is a PRP and fund-lead site.

### *Community Involvement*

The EPA Community Involvement Coordinator (CIC) for the site, Larissa Romanowski, notified the community that the five-year review is being conducted. The public notice indicated that EPA would be conducting a five-year review of the remedy for the site to ensure that the implemented remedy remains protective of human health and the environment and is functioning as designed. It was also indicated that once the review is completed, the results will be made available in the local repository. In addition, the notice included the RPM and the CIC’s addresses and telephone numbers for questions related to the five-year review process or the site.

### *Document Review*

The documents, data and information which were reviewed in completing this five-year review are summarized in Table 2.

### *Data Review*

Following the completion of the OU-1 remedial action, a long-term monitoring program was implemented to monitor the effectiveness of the cap and leachate collection system. Results indicated that the system was effective. During the last FYR review, a decision was made to

discontinue the operation of the leachate collection and treatment system operation while continuing the monitoring program for groundwater, water supplies and leachate. The leachate treatment system was shut down on June 10, 2008. Now only groundwater data is being collected and analyzed to evaluate the landfill cap performance.

During the most recent leachate monitoring event in December 2013, results were similar to pre-shutdown concentrations. Water level measurements were also consistent with the levels measured pre-shutdown. Water quality analytical data indicated that PCBs continued to be below method reporting limits, and data for other contaminants were similar to previous results with the exception of two contaminants, total phenols and antimony, which exceeded state ambient water quality criteria for the first time. Concentrations of total phenolics are, however, less than the required discharge limit of 8 ppb. Elevated antimony, along with continued elevated iron and manganese concentrations in leachate water, are attributed to the release of these metals from soils due to the reducing conditions within the leachate and groundwater beneath the landfill and are not landfill-related contaminants of concern. Groundwater monitoring results show that site related contaminants are not impacting groundwater down gradient of the landfill.

During the most recent site inspection, the landfill cover and other site features, including manholes, fencing, roads, site building and monitoring wells were generally noted to be in good condition and the presence of seeps was not observed. Therefore, the landfill cover system appears to be operating effectively to limit or prevent concentrations of site contaminants from exceeding groundwater criteria off-site.

#### *Site Inspection*

The inspection of the site was conducted on June 4, 2014. In attendance were EPA-RPMs Tom Mongelli and Isabel R. Rodrigues, Chuck Nace, EPA Ecological Risk Assessor, as well as Kevin Sarnowicz, Sue Edwards, and Will Welling from NYSDEC.

During the site inspection, it was noticed that minor cap maintenance is needed because settling of the waste over time has caused the slope angles to change and there is now some ponding of water on the landfill cap. The slopes of the landfill will be restored to the design specifications so water will run off. These repairs will be addressed through the existing OM&M program. No other problems or deviations from the ongoing operation and maintenance activities being implemented at the site were observed.

#### *Interviews*

No interviews were conducted as part of this five-year review.

#### *Institutional Controls Verification*

As previously mentioned, the 2003 ROD required the imposition of institutional controls to prohibit groundwater usage and limit the land use, at the site, to nonresidential purposes. A Declaration of Covenants and Restrictions & Environmental Easement effecting such restrictions was executed on August 9, 2013, and recorded by the Oneida County Clerk on October 7, 2013.

## Technical Assessment

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

Based on evaluation of the RODs and the most recent LTM and O&M data for the site, all components of the remedy have been successfully implemented and are functioning as intended by the decision documents:

The OU-1 ROD called for source control of contaminated soil, sediment, and leachate seeps in the landfill proper portion of the site, as well as for control of groundwater in contact with wastes. During the remedial action phase for OU-1 (commencing in 1990), approximately 40,000 cubic yards of contaminated soil/sediment from the wetland and the NGP areas were consolidated on the landfill. An impermeable RCRA compliant cap was installed over an 18-acre area to control infiltration/runoff. A leachate collection system, which consists of gravity drains served by 15 manholes and two pumping stations, was put into place to collect seepage from areas formed from the landfill. An on-site water treatment facility was constructed to treat influent. Effluent was discharged to the intermittent stream in the past but the leachate collection system was shut down in 2008. Monitoring wells were installed down-gradient of the landfill to monitor groundwater migrating from the landfill. A perimeter fence was also installed around the landfill and wetland area. Construction for this portion of the remedy was effectively completed in 1992.

The OU-2 focused on the remediation of soils in the NGP area of the site and the potential contamination of groundwater migrating off-site. The ROD called for in-situ solidification of PCB-contaminated soil below water table in the NGP area where PCBs concentrations exceed 10 ppm by use of ISSM. ISSM was implemented in 2007. Subsequent to solidification, the gravel pit was backfilled and covered with clean soil to raise surface elevation to the original grade and a vegetative cover was applied to prevent erosion. Culverts, swales, and a retention basin were also installed for storm-water control.

Monitoring wells screened in the deep aquifer were installed down-gradient of the NGP to monitor groundwater quality and insure that gravel-pit soils did not contaminate groundwater migrating down-gradient. Institutional controls in the form of deed restriction were established to prohibit groundwater use and limit land use to non-residential purposes. A long-term water quality monitoring plan was established for on-and off-site groundwater, surface water, and portable water supply wells; the monitoring plan included air-quality monitoring.

### Monitoring, O&M activities, and results from latest sampling

An O&M program was developed to manage the LTM activities, implement the operation of the leachate collection system, and maintain the landfill cap and the drainage system. Monthly inspections are performed to visually assess the integrity of the cap, perimeter fence, gas collection system, monitoring wells/manholes, leachate building, and access road. According to the 2013 Semiannual O&M Report, there were no significant issues with integrity of equipment and structures at the site, except for some damage to well casings and gas pipe risers, which will be repaired. The cap is in good repair except for some minor ruts and pooling, which are scheduled for repair. Landfill gas vents, wells, and manholes are monitored annually for methane. In the latest report, readings for all gas vents and manhole standpipes were reported as less than 100



percent of the lower exposure limit (LEL) for methane. No operation or maintenance for the stabilized soil is necessary for the OU-2 component of the remedy.

Water-quality samples are collected at 17 monitoring wells, 3 residential wells, and a public supply well to evaluate PCBs, VOCs, phenolics, and metals. According to the 2013 LTM Report for the site, PCBs were not detected in groundwater samples collected. VOCs were detected at six of the monitoring locations; however, concentrations were below the Class GA NYS Water Quality Standards. The results for Target Analyte List (TALs) indicate that iron, magnesium, manganese, and sodium exceed the standards. The exceedances of TALs reported for this period are consistent with results reported in previous sampling events.

Surface water is sampled every 15 months from a culvert where ponded wetland water discharges (beneath Holman City Road) in order to monitor PCBs. No PCBs were detected on all of the sampling events for the FYR review period. Water levels are measured at 24 landfill monitoring wells every 15 months to assess seasonal fluctuations and groundwater flow direction. The latest measurements show that the groundwater flow direction is to the west and southwest, and is consistent with flow patterns in the past. The seasonal fluctuation of water levels have varied over the last few years, likely a reflection of the atypical pattern of storm events that have occurred over the same period.

An evaluation of influent and groundwater samples in 2007 indicated that water contamination was negligible and that operation of the leachate collection and treatment system was not necessary. Consequently, the operation of the leachate collection system was suspended in 2008. Based on analysis of groundwater samples and water-level measurements collected semi-annually, an evaluation is continuously made as to whether down-gradient groundwater remains protected and whether operation of the collection system should remain in suspension. Results for the past several years show the PCBs have not been detected in groundwater downgradient of landfill and NGP and that stabilization and capping appear to be effective in immobilizing PCB contamination in site soils.

***Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?***

### **Exposure Assumptions**

There have been no changes in the physical conditions of the site, or land use that would affect the exposure assumptions or the protectiveness of the remedy for human health. The property zoning is not expected to change in the next five years.

The remedy components, landfill capping; groundwater containment; and solidification of PCB soil located below the water table, are designed to prevent exposure to contaminants in soil and groundwater. These actions are protective of human health.

Soil: The exposure assumptions used to estimate the potential cancer risks and non-cancer health hazards in the risk assessment supporting the OU-1 ROD followed the Superfund Public Health Evaluation Manual, and the exposure assumptions used in the OU-2 ROD for human health followed EPA's Risk Assessment Guidance for Superfund. The processes that were used in the

human health risk assessments are still valid. In addition, given that soils have been capped, the human health exposure pathways have been interrupted and exposures are not anticipated.

Groundwater: The evaluation of the groundwater focused on direct ingestion of groundwater as a potable water source and the possibility of vapor intrusion if buildings were to be constructed over the plume. The evaluation of the direct contact pathway showed that all nearby residents are using well water. The 2011 and 2012 Annual Site O&M Reports, and summary of 2013 data indicated concentrations of PCBs (measured utilizing Method 8082 with a detection limit of 0.076 ppb) were non-detects. The PCB concentrations are below the federal and state Ambient Water Quality Standards, and the current MCL of 0.5 ppb. As in previous years, PCBs and VOCs were not detected in the samples collected from the homeowner wells sampled or the Clayville supply well.

Vapor Intrusion (VI): The previous FYR soil VI evaluation found that TCE and PCE were not detected in groundwater and VI was not a concern. Groundwater monitoring over the past five years shows no TCE or PCE. Therefore, this pathway is not a concern.

### **Toxicity values**

The main contaminant of concern identified at this site were PCBs. At the current time, the IRIS program is re-evaluating the non-cancer toxicity of PCBs and any potential changes in the toxicity values will need to be evaluated in the next five-year review.

The remedy for OU-1 was a source control remedy for soils, sediments, leachate seeps and groundwater in contact with wastes. The remedial actions have interrupted potential exposures.

The remediation goal of 10 ppm for PCBs in soil identified in the 2003 ROD is consistent with values for industrial properties identified under the Toxic Substances Control Act (TSCA). The industrial remediation goal of 10 ppm includes the currently available toxicity and this value is also protective.

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

There is no additional information that would call into question the protectiveness of the remedy.

### ***Technical Assessment Summary***

Based upon a review of the data, relevant documents, and a site inspection, the following site conditions relating to the implementation of the remedy have been achieved:

- The cap and vegetative cover are intact and in good condition;
- The fence around the site is intact and in good repair;
- The groundwater long-term monitoring wells are functional;
- There is no evidence of trespassing, vandalism or damage (to the cap and vegetative cover, long-term monitoring wells, or fence); and
- The wetlands have been reestablished.

## Issues, Recommendations and Follow-Up Actions

There are no recommendations to improve the remedy at this site as a result of this five-year review.

### Protectiveness Statement

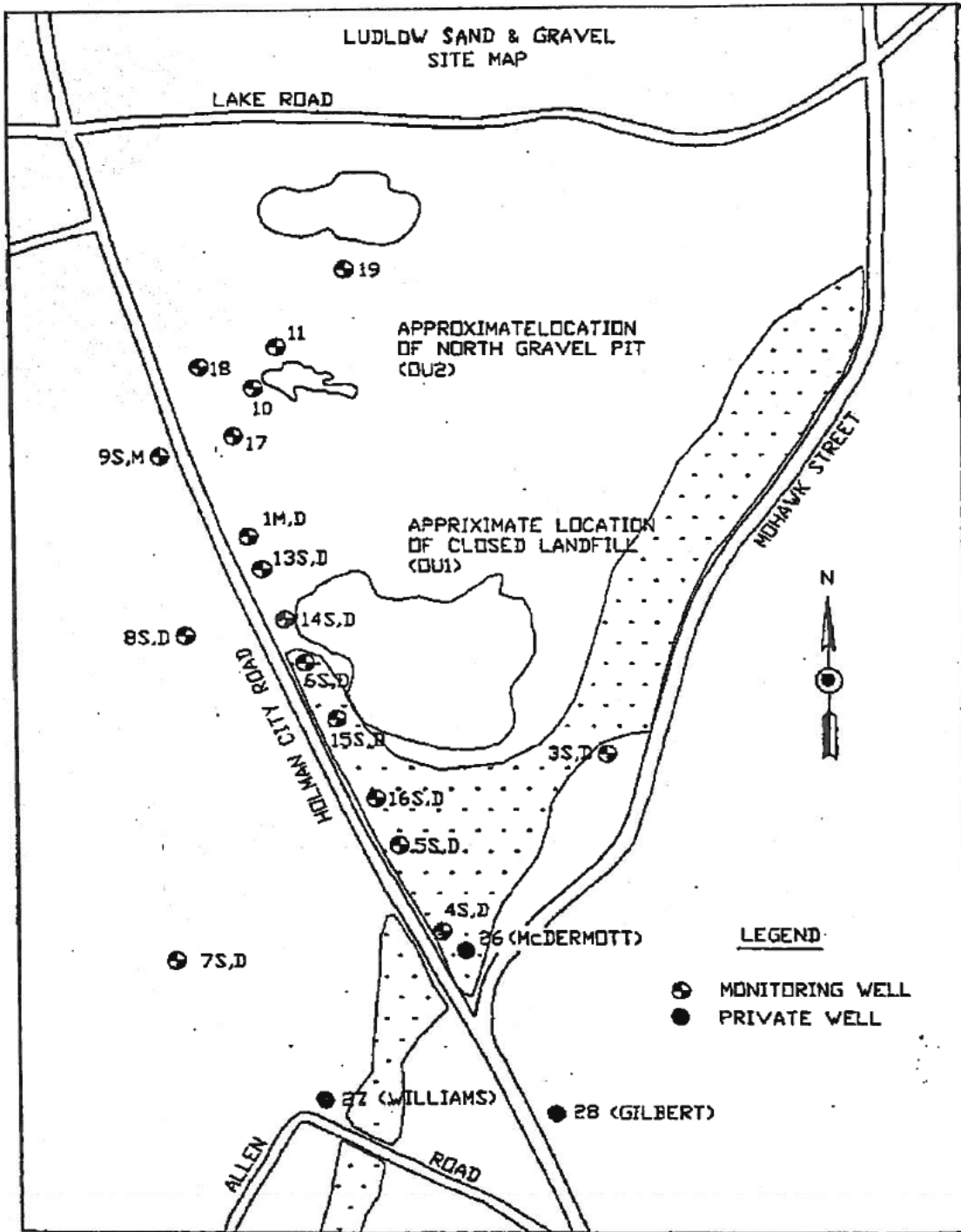
Protectiveness Statement(s)		
<i>Operable Unit:</i> OU-1	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> N/A
<i>Protectiveness Statement:</i> The remedy for the site protects human health and the environment.		

Protectiveness Statement(s)		
<i>Operable Unit:</i> OU-2	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> N/A
<i>Protectiveness Statement:</i> The remedy for the site protects human health and the environment.		

### Next Review

The next five-year review report for the Ludlow Sand and Gravel Superfund site is required five years from the completion of this review.

Figure 1: Ludlow Sand and Gravel Site Map



<b>Table 1: Chronology of Site Events</b>	
<b>Event</b>	<b>Date(s)</b>
Pre-NPL responses	1982
Final NPL listing	1983
Remedial Investigation/Feasibility Study completed	1988
Record of Decision – OU1 (landfill capping, leachate collection and treatment, groundwater controls)	1988
Consent Judgment for the performance of the OU-1 Remedial design and remedial Action	1989
OU-1 Remedial Design performed by the PRP	1990
OU-1 Remedial Action performed by the PRP	1990-1996
First Five-Year Review conducted by EPA	1990
Record Decision – OU2 (gravel pit , solidification of PCBs)	2003
First Five-Year Review conducted by EPA	2004
OU-2 Remedial Design performed by EPA	2006
OU-2 Remedial Action performed by PRP	2007
Second Five-Year review conducted by EPA	2009
Deletion from NPL	2013

**Table 2: Documents, Data and Information Reviewed in Completing the Five-Year Review**

<b>Event</b>	<b>Date(s)</b>
Record of Decision	1988-2003
First five-year review	7/1/1999
Second five-year review	7/1/2004
Third five-year review	7/1/2009
Quarterly Monitoring and Maintenance Reports	2009-13
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.	