Third Five-Year Review Report

Endicott Wellfield Superfund Site

Broome County
Endicott, New York

Prepared by:

U.S. Environmental Protection Agency
Region 2
New York, New York

September 2011

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List of Acronyms

AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
CAA	Controlled Activity Area
CD	Consent Decree
COPC	Contaminant of Potential Concern
DCE	Dichloroethene
DCA	Dichloroethane
EJ	Endicott Johnson Corporation
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FAA	Federal Aviation Administration
GPM	Gallons per Minute
IBM	International Business Machines Corporation
IRM	Interim Remedial Measure
HI	Hazard Index
MCLs	Maximum Contaminant Levels
NCP	National Contingency Plan
NPL	National Priorities List
NYSDOH	New York State Department of Health
NYSDEC	New York State Department of Environmental Conservation
NYCRR	New York Code of Rules and Regulations

O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PCBs	Polychlorinated biphenyls
PRP	Potentially Responsible Party
PVC	Polyvinyl chloride
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SPW	Supplemental Purge Well
STP	Sewage Treatment Plant
TCE	Trichloroethene
VOC	Volatile Organic Compound
WQS	Water Quality Standards

EXECUTIVE SUMMARY

The remedy for the Endicott Wellfield Superfund Site located in the Village of Endicott, Broome County, New York includes a landfill area, the public supply Ranney well, supplemental purge well (SPW) and on- and off-property ground water monitoring wells. The trigger for this five-year review was the previous five-year review conducted in September 2006.

Based upon reviews of the three Records of Decision, the Explanation of Significant Differences (ESD), Semi-Annual Ground Water Sampling Results, Annual Operation & Maintenance Reports, Site Inspection Reports by the Village of Endicott, and a Site visit by United States Environmental Protection Agency (EPA) personnel in August 2011, it has been concluded that the remedy is functioning as intended by the decision documents and is protecting human health and the environment.

This is the third Five-Year Review for the Endicott Wellfield Superfund Site.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name *(from WasteLAN)*: Endicott Wellfield Superfund site		
EPA ID *(from WasteLAN)*: NYD980780746		
Region: 2	**State:** NY	**City/County:** Endicott/Broome
SITE STATUS		
NPL Status: ■ Final ☐ Deleted ☐ Other (specify)		
Remediation Status: ☐ Under Construction ■ Operating ☐ Construction Complete		
Multiple OUs? ■ YES ☐ NO	**Construction completion date:** 09/26/97	
Are portions of this Site and/or investigated adjacent properties in use or suitable for reuse? yes		
REVIEW STATUS		
Lead agency: ■ EPA ☐ State ☐ Tribe ☐ Other Federal Agency		
Author name: Sherrel D. Henry		
Author title: Remedial Project Manager	**Author affiliation:** EPA	
Review period:** 9/29/2006 to 9/29/2011		
Date(s) of Site inspection: 08/17/2011		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion ■ Statutory		
Review number: ☐1 (first) ☐ 2 (second) ■ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA On-site Construction at OU #1 ☐ Actual RA Start at OU#1 ☐ Construction Completion ■ Previous Five-Year Review ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: 9/29/2006		
Due date *(five years after triggering action date)*: 9/29/2011		
Does the report include recommendation(s) and follow-up action(s)? ■ yes ☐ no **Is human exposure under control?** ■ yes ☐ no **Acres in use or available for use:** **restricted:** 14 **unrestricted:**		

Five-Year Review Summary Form (Continued)

Remedy Assessment Summary

Based on the data reviewed and the Site inspection, the remedy is functioning as intended by the three Records of Decision (RODs) and one ESD. The cap is effectively limiting the infiltration of water into and through the landfill materials, and it appears to have positive impacts on the ground water conditions. The cap also prevents direct contact exposure to the waste. In addition, the results of ground water sampling indicate that the plume is shrinking and that the supplemental purge well (SPW) is achieving the desired result. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

Issues, Recommendations, and Follow-Up Actions

The Site has ongoing operation, maintenance and monitoring activities as part of the selected remedy. This report includes suggestions for improving, modifying, and/or adjusting the operations and maintenance plan (see Table 7). It finds that the ground water remedy prevents impacts on the Ranney well which is used as a drinking water supply; thus, the remedy protects against human exposure to contaminated ground water. Landfill subsidence was found in one area and should be corrected. This report did not identify any issue(s) or make any recommendation(s) for the protection of public health or the environment which was not included or anticipated by the Site decision documents.

Protectiveness Statement

The remedy for the Site protects human health and the environment. There are no completed exposure pathways that could result in unacceptable risks, and none are expected as long as the Site ownership and use do not change and engineered and institutional controls currently in place continue to be properly operated, monitored and maintained.

I. INTRODUCTION

This third five-year review for the Endicott Wellfield Superfund Site (the Site), located in the Village of Endicott (the Village), Broome County, New York, was conducted by the EPA Remedial Project Manager (RPM) Sherrel Henry. It was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. 9601 *et seq.* and 40 CFR 300.430(f)(4)(ii) and done in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of five-year reviews is to ensure that implemented remedies protect public health and the environment and that they function as intended by the Site decision documents. This report will become part of the Site file.

In accordance with Section 1.3.1 of the five-year review guidance, this third five-year review is triggered by the signing date of the previous five-year review report. The five-year review is required 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 previous five-year review report was signed on September 29, 2006. To expedite actions at the Site, EPA addressed the contamination in three separate phases called operable units (OUs), all of which are addressed in this five-year review. OU1 addresses cleanup of the public drinking water supply. OU2 focuses on the identification and remediation of the source of contamination to the ground water. OU3 addresses the remediation of the ground water to expedite cleanup of the aquifer and to reduce the potential threat to the Ranney well, as necessary.

II. SITE CHRONOLOGY

Table 1, which is attached, summarizes the site-related events running from the disposal of hazardous wastes at the Site through the cleanup process.

III. BACKGROUND

Site Location

The Site is located on South Grippen Street at the western end of the Village of Endicott, New York (Figure 1). It consists of the Ranney well, which is a municipal drinking water supply well, and its zone of influence on area ground water. The boundaries of this area have been generally delineated by Main Street to the north, the eastern boundary of the En-Joie Golf Course to the east, the Susquehanna River to the south, and the Tri-Cities Airport and Airport Road to the west.

Land and Resource Use

Most of the Site is on land owned by the Village (En-Joie Golf Course, Endicott Landfill, Sewage Treatment Plant (STP) and Tri-Cities Airport) and is zoned industrial. The Site is composed primarily of flat to gently rolling open land associated with the En-Joie Golf Course, facilities of the Village's STP, and the Endicott Landfill. A portion of the landfill adjacent to the Tri-Cities Airport extends into an approximately 8-acre area designated by the Federal Aviation Administration (FAA) as the Controlled Activity Area (CAA), which includes the Runway Object Free Area. A 6-acre parcel on the landfill near the entrance to the STP is currently permitted for use by the Village to compost yard waste; approximately two acres of the composting area are paved. Private homes are not located within the Site. These or similar uses are expected to continue well into the future.

History of Contamination

The Endicott Landfill accepted municipal refuse and industrial waste from approximately the late 1950's until 1977. The Ranney well operated without major problems until May 1981, when during a routine inspection, EPA detected vinyl chloride and trace amounts of other volatile organic compounds (VOCs) in the Ranney well, which provides approximately 47 percent of the total water supply to the Village's Municipal system. Subsequent sampling by EPA and the New York State Department of Health (NYSDOH) confirmed EPA's initial findings and, as a result, four of the lateral supply lines to the well were closed and diffused air aeration equipment was installed to reduce the levels of VOCs.

Initial Response

Beginning in April 1983, additional studies were undertaken by the New York State Department of Environmental Conservation (NYSDEC) Division of Water. The first study included the installation of nine monitoring wells and the sampling and analysis of ground water from selected wells. A pump test was also performed in September 1983 by turning off the Ranney well for a period of 24 hours and measuring recovery rates in nearby monitoring wells. The results of this study indicated that the source of contamination was located either west or northwest of the Ranney well.

Based on the results of these investigations, in July 1984, a purge well (existing purge well) designed to pump approximately 600 gallons per minute (gpm) and three additional monitoring wells were installed on the En-Joie Golf Course to intercept and monitor ground water contamination before it reached the Ranney well. Water from this purge well is pumped to the golf course pond system where it is aerated before it is ultimately discharged to Nanticoke Creek. The Site was proposed for inclusion on EPA's National Priorities List (NPL) on October 15,1984 and was added to the NPL on June 10, 1986.

Basis for Taking Action

After listing on the NPL, in July 1987, contractors for NYSDEC, pursuant to a cooperative agreement with EPA, completed the OU1 Remedial Investigation and Feasibility Study (RI/FS) at the Site that was intended to define the nature and extent of contamination and to identify the source(s) of contamination to the Ranney well. The RI indicated that the most probable source was the Endicott Landfill. However, additional data were required to evaluate further contaminant distribution and conclusively identify the source. Trichloroethene (TCE), 1,2-dichloroethene (DCE), vinyl chloride, and chloroethane were identified as the primary contaminants of concern in ground water. The FS evaluated alternatives for supplying potable water (i.e. treatment of the existing well by air stripping and a new surface water supply).

The second RI was conducted in two phases. Phase I included air sampling, a surface geophysical investigation, a soil gas survey, drilling and installation of monitoring wells, and sampling and analysis of leachate, surface water, sediments, and ground water. Phase II included the drilling of eight soil borings, the installation of 12 additional monitoring wells and five monitoring points, excavation of six test pits, drum sampling, and leachate and ground water sampling.

The results of the Phase II RI indicated that ingestion of contaminated ground water at the Site is the primary pathway of concern. The carcinogenic risk to adult residents from ingestion of contaminated ground water is greater than EPA's acceptable risk range. The excess risk at the Site is primarily due to vinyl chloride, carcinogenic polynuclear aromatic hydrocarbon (PAHs), total polychlorinated biphenyls (PCBs), and the metals arsenic and beryllium.

IV. REMEDIAL ACTIONS

OU1-Ranney well

Remedy Selection

On March 31, 1987, EPA issued a ROD for OU1 selecting a remedial action for the Site. The goal of the remedial action was to provide a safe and reliable supply of drinking water by requiring the installation of an air stripper at the Ranney well to prevent ingestion of contaminated ground water.

The major components of the selected remedy consist of the following:

- Constructing an air stripper at the Ranney well designed to treat the current use flow rate of approximately 3,700 gpm;
- Treatment of the contaminated Ranney well water to drinking water quality standards (i.e., Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act);

- Continuing operation of the existing purge well system;
- Continuing the monitoring program designed to detect the presence of VOCs in the Ranney well water[1]; and
- Performing a supplemental RI/FS to further investigate the nature and extent of contamination in suspected source areas, to evaluate possible source control measures for such areas, and to evaluate further the extent of aquifer contamination together with alternatives for aquifer restoration.

Remedy Implementation

In 1988, EPA concluded consent decree (CD) negotiations with the Town of Union (the Town) and the Village of Endicott related to the performance of the remedial design (RD), remedial construction, operation, maintenance, and monitoring of the remedy selected in the OU1 ROD. On January 10, 1989, the CD was entered in United States District Court (approved by the Judge) for the Northern District of New York.

The remedial action (RA) was formally initiated on December 10, 1989 when the Village awarded the RA contract. The remedy was implemented in a manner consistent with the 1987 ROD and in accordance with the plans and specifications of the remedial design. Construction of the air stripping unit at the Ranney well was completed by the Village in the Fall of 1991 and the air stripper has been in continuous operation since that time.

In a letter dated September 26, 1996, the Village requested that EPA allow it to discontinue operation of the air stripper. After a review of all available data, EPA determined that water from the Ranney well was meeting MCLs prior to treatment. Therefore, EPA gave permission to discontinue operation of the air stripper with the understanding that the Village will maintain the air stripper so that it can be restarted immediately in the event that MCLs are exceeded in the future. However, as a precautionary measure, the air stripper is still being operated by the Village.

OU3-Ground Water: Supplemental Purge Well

Remedy Selection

As noted above, the RI/FS for OU1 did not determine the source(s) of the VOCs in the ground water at the Ranney well. Therefore, in accordance with the 1987 ROD, a supplemental RI/FS was initiated to investigate further the nature and extent of contamination in suspected source areas and to evaluate possible source control measures.

On September 19, 1988, EPA, the International Business Machines Corporation (IBM), the Village and the Town signed an Administrative Order on Consent (AOC) for performance of the

[1] The Village presently samples the Ranney well for VOCs on a weekly basis.

supplemental RI/FS. The supplemental RI/FS activities were undertaken in two phases and were performed by IBM through its consultants, Lozier/Ground Water Associates, Inc.

The RI Report for the Phase I study was approved by EPA in November 1990. The results of Phase I indicated that additional remedial measures were needed to control the plume of contaminated ground water emanating from the Endicott Landfill. Two Interim Remedial Measures (IRMs) were identified to protect public health and the environment. The appropriateness of these IRMs, which were designated as OU3, was evaluated under the nine remedy selection criteria of the National Contingency Plan (NCP) in a Technical Memorandum, dated January 1991.

On March 29, 1991, a ROD for an interim action was issued selecting the following remedy for OU3:

- Upgrading the existing purge well system with the installation of a supplemental purge well (SPW);
- Implementing a SPW monitoring program;
- Continuing operation and maintenance of the existing purge well system; and
- Conducting an aquifer pump test to determine treatment requirements.

The intent of the remedy is to expedite cleanup of the ground water aquifer and to reduce the potential threat to the Ranney well.

Remedy Implementation

Pursuant to a second CD entered in United States District Court (approved by the Judge) for the Northern District of New York on March 25, 1992, the Village, the Town, Endicott Johnson Corporation (EJ), IBM and George Industries, Inc. agreed to perform the OU3 RD/RA.

To determine if the water pumped from the SPW could be treated by the STP, a temporary SPW pumping system and a discharge pipeline were constructed. Pumping of the SPW, with discharge to the STP, was initiated in August 1993. The permanent hook-up to the STP was completed in June 1995. EPA and NYSDEC determined that the remedy was implemented in a manner consistent with the 1991 ROD and in accordance with the plans and specifications of the RD. The monitoring results indicate that the SPW is performing as designed. Ground water level monitoring demonstrates that the SPW system is achieving containment and capture of contaminated ground water. As a result, EPA issued an ESD on December 11, 1995 which allowed for discontinuing the operation of the original purge well.

The SPW Monitoring Plan was approved by EPA in March 1993. The approved monitoring plan includes flow readings and sampling and analyses of effluent from the SPW along with water elevation measurements in 25 monitoring wells to document the capture zone of the SPW.

OU2-Endicott Landfill

Remedy Selection

EPA designated Phase II of the supplemental RI/FS work and the resulting source control measures identified for the Endicott Landfill as OU2. The purpose of the Phase II activities was to address the data gaps that were identified in the Phase I investigation, and to characterize potential contaminant sources areas which were identified in the Phase I RI Report. The environmental characterization is described in the February 1992 RI Report for the Site. The evaluation of remedial alternatives for OU2 is contained in the February 1992 FS Report.

The Phase II RI report concluded that ground water was the only significantly impacted media, with impacts limited to VOCs. Additionally, it was concluded that the combined influence developed by the Ranney well and the purge wells (approximately 4,300 gpm) extended beyond the limits of the Endicott Landfill, the source of contamination to the Ranney well. As a result, contaminants entering the ground water from the Endicott Landfill will migrate to those wells.

In September 1992, EPA issued a ROD for OU2 selecting the following remedy:

- Capping the majority of the landfill surface with a low permeability barrier cap;
- Capping with bituminous (asphalt) the 6-acre parcel of the landfill where the Village has a permitted yard waste composting facility and the 8-acre CAA of the Tri-Cities Airport regulated by the FAA;
- Performing an explosive gas investigation and installing a passive gas-venting system;
- Collecting, treating, and disposing of the leachate seep;
- Recommending that institutional controls in the form of deed restrictions be established on future uses of the landfill;
- Implementing site access restrictions;
- Performing long-term operation and maintenance of the landfill cap, gas-venting, and leachate systems;
- Performing long-term air and water quality monitoring;
- Continuing operation and maintenance of the ground water collection and treatment measures already selected for the Site; and
- Continue ground water monitoring.

The OU2 ROD identified federal MCLs and the New York State Water Quality Standards (WQS) as the ground water standards for the Site. Specifically, the chemical-specific applicable or relevant and appropriate requirements (ARARs) for ground water were identified as follows: 5 μg/l (micro grams per liter) for TCE; 2 μg/l for vinyl chloride; 7 μg/l for 1,1-DCE; and 50 μg/l for 1,2-DCE.

The following remedial action objectives were established for OU2:

- Ground water control to prevent migration of the VOC-contaminated plume;
- Remediation of contaminated ground water emanating from the Endicott Landfill to drinkable levels;
- Landfill waste containment and control of associated landfill gas;
- Control and treatment of the leachate seep to levels acceptable for proper disposal[2].

Remedy Implementation

Pursuant to a third CD entered in United States District Court (approved by the Judge) for the Northern District of New York on January 18, 1994, EJ, the Village, the Town and IBM (together, the potentially responsible parties (PRPs)) agreed to perform the OU2 RD/RA.

Landfill Cover

In August 1995, the final Remedial Design Report was submitted to EPA. This report established the design criteria and schedule for the remediation including the requirements for long-term ground water monitoring once the remediation was completed.

Tug Hill Construction, Inc. was selected by the PRPs to implement the approved remedial activities at the Site. The notice to proceed was issued to the contractor on October 17, 1995. During construction, the extent of the waste was discovered to be outside of the landfill's designed cap limits in several areas. It was decided to extend the landfill cap system in two areas, place a low-permeability layer over the waste in one area, and relocate the waste under the cap in another area. The soil cap extensions and low-permeability layer installation included areas totaling approximately 2.25 acres, which brought the total area capped to 72.25 acres. The approximate amount of waste relocated under the cap was 5,000 in-place cubic yards.

The purpose of the cover system is to reduce the vertical migration of water through the landfill, to minimize the potential for leaching of Site contaminants into the ground water. Two types of covers were constructed on the landfill. A low-permeability soil cover was installed on about 62 acres of the landfill which lie predominantly within 1,000 feet of the Susquehanna River. The soil cover system consists of the following:

- A 6-inch intermediate cover layer
- A 12-inch gas collection layer with a minimum permeability of $1x10^{-3}$ cm/sec
- A geotextile separation fabric layer

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[2] After installation of the cap, leachate seeps were no longer present at the Site. Therefore, collection of leachate was not warranted.

- A 12-inch barrier layer with a minimum permeability of $1x10^{-5}$ cm/sec
- A 6-inch topsoil layer

The general goal of the design was to grade the landfill to create a series of ridges oriented roughly perpendicular to the Susquehanna River. The ridges are separated by drainage swales which slope toward the Susquehanna River.

A bituminous cover was installed on approximately 10 acres of the landfill which lie primarily in the FAA controlled Activities Area and beneath the Village of Endicott's yard waste composting facility. To promote runoff, in accordance with the 1992 ROD, the CAA was designed with a slope of 2%, and the compositing area was design with a slope of 1%. The bituminous cover consists of the following:

- A 6-inch intermediate cover layer
- A 12-inch gas collection layer with a minimum permeability of $1x10^{-3}$ cm/sec
- A geotextile stabilization fabric layer
- A 12-inch subbase layer
- A 3-inch bituminous base course
- A 1-inch bituminous top course

Once the waste materials were consolidated under the cap, a final cover system was installed in conformance with a variance of 6NYCRR Part 360 regulations.

Gas Venting

An investigation to identify the presence of explosive landfill gases was conducted during the Pre-Remedial Design activities. Gases were identified at various locations in the interior of the landfill, and in some areas along the perimeter of the landfill.

To address potential post-closure issues associated with the presence of landfill gases, including the possibility of migration, a passive gas collection and venting system was installed at the Site. The gas collection system is comprised of a 12-inch layer of sand and gravel with a permeability of 1×10^{-3} cm/sec. The passive venting was installed beneath the barrier material and asphalt cap over the entire extent of the landfill. The purpose of the gas vent layer is to prevent the local buildup and migration of landfill gasses, by conveying them to a venting location.

Landfill gases are being vented to the atmosphere following collection by passive gas vents, distributed throughout the landfill at a minimum frequency of one per acre. The vents passively conduct collected gases through 20-foot long horizontal and 5-foot vertical perforated polyvinyl chloride (PVC) laterals to vertical risers. These goose-necked risers protrude through the cover and discharge to the atmosphere. The primary component of the remedy for OU2 is a low-permeability cover installed on the landfill. The remedy was implemented in a manner consistent with the 1992 ROD and in accordance with the plans and specifications of the RD.

Leachate Seeps

During the design of the remedy, it was noted that the leachate seep was down to a trickle, which would have made it impossible to collect any of the leachate. Therefore, it was decided that a ground water interceptor trench would be built so that the seep would be captured by the supplemental purge well for treatment at the Village of Endicott Wastewater Treatment Plant (WWTP). A ground water interception trench measuring 100-feet long by 20 feet wide by 28 feet deep was installed five feet west of the leachate seep limit along the Susquehanna River bank. A 44-foot wide by 100-foot long, factory-seamed barrier of geomembrane was installed into the trench. The contractor took the necessary precautions to protect the geomembrane from damage during construction.

However, once the cap was installed, no more leachate was being generated. Therefore, this portion of the remedy was never implemented. The remedial action has been fully implemented and is functioning as designed.

Long- term O&M

The O&M plan was approved by EPA in August 1995. The O&M plan provides for long-term maintenance of the landfill cap and gas venting system.

Site Completion

The Site achieved construction completion status with the signing of the Preliminary Close-Out Report on September 26, 1997.

Explanation of Significant Differences (ESD)

Remedy Selection

All three RODs selected the continued operation of the existing purge well as a component of the remedies. Once the OU3 ROD was implemented, an aquifer pump test was conducted. Based on the results of the aquifer pump test, the Village notified EPA that it believed that the SPW alone, without the existing purge well, could achieve containment and capture of contaminated ground water.

Subsequently, EPA gave approval to the Village to perform a pilot study to evaluate if pumping of the existing purge well could be discontinued when the SPW was fully operational. Pumping of the SPW, with discharge to the WWTP, was initiated in August 1993 at an initial rate of 400 gpm. To determine if the water pumped from this well could be treated by the adjacent WWTP, a temporary SPW pumping system and a discharge pipeline were constructed. Pumping of the SPW, with discharge to the WWPT, was initiated in August 1993.

Based on the analytical results of bi-monthly testing for various compounds, the WWTP appeared to successfully be treating and removing the Site contaminants from the SPW discharge during the four-month period, as documented in the First Interim Report dated December 31, 1993. The permanent hook up to the WWTP was completed in June 1995. The interim report also documented that pumping the SPW at a rate of approximately 400 gpm was an effective means for capturing the contaminated ground water beneath and adjacent to the Endicott Landfill. This result was obtained without the existing purge well pumping.

Remedy Implementation

Based on the results of the pilot study, EPA issued an ESD on December 11, 1995 which allowed for discontinuing the operation of the existing purge well. EPA gave permission to the Village to discontinue operation of the existing purge well on December 15, 1995.

Systems Operation/Operation and Maintenance (O&M)

Pursuant to the three RODs, as amended by the ESD and as otherwise approved by EPA, the necessary O&M activities currently include:

- Ground water quality monitoring at the SPW to determine if the levels of contamination are at or below MCLs;
- Sampling of effluent from the SPW;
- Ground water elevation monitoring at 27 monitoring wells to determine if changes occur in the direction of ground water flow;
- Inspection of the landfill to insure that no erosion damage has occurred; and
- Submittal of quarterly reports.

The O&M program also include routine inspections of the capped area and maintenance of the established vegetation cover within the capped area.

Table 2 provides an estimate of annual monitoring costs.

Institutional Controls Implementation

The OU2 ROD recommended that the Village implement institutional controls in the form of deed restrictions on future uses of the landfill, and EPA has recommended that the Village do so. EPA believes that the Village's ownership may be substantially equivalent to the deed restrictions recommended in the ROD. The Village is legally required by the CD to regularly maintain the landfill in accordance with the O&M Plan, to regularly report to EPA on the status of its work under the CD, and to advise EPA of any changes in any conditions, including ownership. The landfill is also independently regulated by the NYSDEC's programs. In addition, the landfill's status as an NPL site is information which is publicly available and accessible by means more broadly accessible than the deed restrictions. Current state and county

requirements prevent the installation of wells at a hazardous waste site. Finally, access restrictions including fencing and signs exist at the landfill.

V. PROGRESS SINCE LAST FIVE-YEAR REPORT

The second five-year review for this Site was signed on September 29, 2006. The five-year review concluded that the remedies selected in the three RODs and ESD continued to be protective of human health and the environment. There were no relevant issues and recommendations.

Since the second five-year review was completed, the only activities that have occurred include long-term monitoring of ground water and operation and maintenance of the landfill cap. A review of water-quality data collected from the SPW shows that benzene, chloroethane, cis-1,2-DCE and vinyl chloride continued to exceed the federal or state MCLs (described below).

VI. FIVE-YEAR REVIEW PROGRESS

Administrative Components

The five-year review team consisted of Sherrel Henry (Remedial Project Manager), Peter Mannino (Western New York Remediation Section Chief), Dr. Marian Olsen (Risk Assessor), Grant Anderson (Hydrogeologist), Brian Carr (Attorney) and Cecilia Echols (Community Involvement Coordinator).

Community Involvement

On November 9, 2010, the EPA Community Involvement Coordinator for the Site, Cecilia Echols, published a notice in the *Binghamton Press and Sun Bulletin.* The notice indicated that EPA would be conducting a five-year review to ensure that the remedies implemented at the Site remain protective of public health and are functioning as designed. It also indicated that once the five-year review is completed, it will be made available in the local Site repository.

In addition, the notice included the RPM's mailing addresses and telephone number in the event the public had any comments or questions. No comments were received.

The Site remedy was discussed with representatives for the PRP. There were no interviews with local officials or community representatives.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data identified in Table 3.

Data Review

Containment

The objective of the ground water elevation monitoring program is to access whether changes have occurred in the direction of ground water flow and document the capture zone of the SPW. Since water levels within the aquifer fluctuate seasonally, the program includes quarterly data collection from 27 monitoring wells. The results of the ground water level elevation monitoring indicate that the direction of ground water flow has not changed since the RI and that there is containment of the ground water plume from the Endicott Landfill.

Containment is also demonstrated by weekly ground water-quality monitoring results, taken by the Village at the Ranney well, which continued to show readings below MCLs prior to treatment by the air stripper.

Restoration

Long-term ground water monitoring at the Site has been conducted since 1997. The objective of the long-term monitoring of the SPW is to determine if the levels of contamination are at or below MCLs. Long-term monitoring data indicate that VOC concentrations in the SPW, which is downgradient of the landfill, have been declining since 1995, and have generally stabilized over the last two years. Data continue to show either non-detect or low-level concentrations below the MCLs for most VOCs analyzed, except for the four compounds identified in Table 4.

Although not part of the sampling activities currently required at the Site, for this five-year review, a select grouping of wells were sampled to determine to what extent the ground water VOC plume had receded compared to the plume identified in the RI/FS . The data demonstrated that the chlorinated plume which used to extend from the landfill to the Ranney well has receded significantly. However, this sampling event showed that there are still low levels of daughter products (cis-1,2-DCE) being observed in ground water monitoring well B-13, considered the outer edge of the remaining plume. Furthermore, the data now provide negative control points that constrain the plume geometry, and show that the plume has receded since the last round of analyses. Therefore, the composite effect of the combined remedies indicates that the remedies are performing to contain the plume and continues to move towards the restoration goal.

Landfill Cap Inspection

For inspections of the landfill, NYSDEC and EPA rely on the checklist post-closure reports which are submitted by the Village on a quarterly basis. Over the years, both NYSDEC and EPA have found these reports to be factually accurate. The Village's most recent quarterly checklist, dated August 2011, indicated that several of the paved areas of the landfill cap have settled and pooling of water has occurred.

Site Inspection

A Site visit related to this five-year review was conducted on August 17, 2011. EPA representatives, Sherrel Henry and Marian Olsen, were accompanied by Philip Grayson, project manager for the Village on behalf of the PRPs. During the Site inspection, the EPA representatives did not observe any problems or deviations from the ongoing operation and maintenance activities being implemented at the Site. The cap appeared fully vegetated with no bare spots and no evidence of erosion. However, several areas of the paved landfill cap have settled, allowing pooling to occur. Some of these areas are associated with truck traffic and some are associated with the end of the 8-acre area designated by the FAA as the CAA, which includes the Runway Object Free Area.

VII. TECHNICAL ASSESSMENT

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

The primary objectives of the implemented remedies are to control the source of contamination at the Site, to minimize the migration of contaminants into the ground water and surface water, to minimize any potential human health and ecological impacts resulting from the exposure to contamination at the Site, and restoration of the aquifer beyond the containment area. These objectives were accomplished by, among other things, the installation of an air stripper (OU1) for the protection of the public water supply system, installation of a landfill cap (OU2), and treatment of the ground water plume (OU3) by the SPW.

Ground water data collected shows that ground water concentrations in the SPW and monitoring wells continue to show no detections of most VOCs or low detections below the ARARs, except for four compounds which remain above MCLs and NYSWQS but continue to decrease. (see Table 4). The subject monitoring shows that benzene, chloroethane, cis-1,2-DCE and vinyl chloride exceeded the federal or state MCLs. Ground water level monitoring demonstrates that the extraction well is generally effective in containing the VOC plume.

In general the landfill cap is well-maintained, mowed, and operating as designed. Several areas of the paved landfill cap, however, have settled, allowing pooling to occur. Some of these areas are associated with truck traffic and some are associated with the end of the 8-acre area designated by the FAA as the CAA, which include the Runaway Object Free Area.

To evaluate the ground water plume size and attainment of the restoration objective, potential modifications to the existing sampling program will be evaluated to collect ground water quality data from monitoring wells located between the landfill and the Ranney well.

An important element of the ground water remedy involves operation of the SPW to capture the VOC plume as it leaves the Village property. The SPW was operating when EPA personnel

visited the Site in August of 2011. Contouring of ground water elevation data performed by the PRPs indicate that a cone of depression (capture) is being created around the SPW.

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

There have been no changes in the physical conditions of the Site over the past five years that would change the protectiveness of the remedy. The Site has limited access based on its location within an industrial area, fencing, the presence of the Tri-Cities Airport and Airport Road that borders the Site to the west, the eastern boundary of the En-Joie Golf Course to the east, and the Susquehanna River to the South.

Soil and ground water use at the Site did not change during the past five years, the period of time considered in this review. Changes in the land use are not expected to change during the next five years. The risk assessment in 1987 identified ingestion of ground water by area residents as the principle route of exposure. The main contaminants of concern identified at the Site included: TCE, cis 1,2-DCE, vinyl chloride, and chloroethane in ground water.

The land use considerations and potential exposure pathways considered in the baseline human health risk assessment are consistent with the current land use.

The ROD for OU1 called for an air stripper to provide potable water. The ROD for OU2 included source control measures for the landfill including the implementation of a low permeability barrier cap and site access restrictions. The ROD for OU3 called for upgrading the existing purge well system for the further reduction of contaminated ground water and to address the potential threat to the Ranney well.

The implementation of the RODs for OU1 and OU3 address ground water contamination related to the VOCs listed above through air stripping and operating and maintaining the existing purge well system. The OU2 ROD called for the capping of the majority of the surface of the landfill with a barrier cap which would interrupt direct contact including potential ingestion of soil as well as minimize contaminant migration. These actions interrupted exposures and the remedy remains protective.

The ROD established the MCLs as the cleanup criteria for the contaminants of concern identified above. The toxicity values for 1,2-DCE, chloroethane, and TCE are currently being updated as part of the Integrated Risk Information System, EPA's consensus toxicity database. The selected MCLs remain protective. Comparison of the maximum detected concentrations of COCs to the MCLs is presented in Table 4. Table 5 is a comparison of the cleanup goals established for the Site specific indicators to the New York State Department of Environmental Conservation Technical and. Administrative Guidance Memorandum (TAGM) and the EPA Region 9 Preliminary Remediation Goals (PRGs) -Residential.

Comparison of the 2011 ground water data collected from eight monitoring wells located

between the landfill and the Ranney well indicate the highest detections of the following chemicals: benzene (7.8 ug/l); chloroethane (50 ug/l); cis-1,2-DCE (5.3 ug/l); chlorobenzene (12 ug/l); and vinyl chloride (2 ug/l). The associated MCLs for these chemicals are: 5 ug/l MCL and 1 ug/l NYSDEC WQS for benzene; 70 ug/l federal MCL and 5 ug/l NYSDEC WQS for cis-1,2-DCE; 100 ug/l for the federal MCL and 5 ug/l for the NYSDEC WQS for chlorobenzene; and 2 ug/l for both federal MCL and NYSDEC WQS for vinyl chloride. There is currently no MCL value available for chloroethane under the federal MCL and the NYSDEC WQS is 5 ug/l based on a generic value. The concentration for benzene exceeds the MCL. The concentrations of DCE and chloroethane were detected above the NYSDEC WQS.

In addition, based on the presence of 1,1,1-trichloroethane in the ground water additional sampling was conducted for the presence of 1,4-dioxane. The results of the data indicate that 1,4-dioxane was non-detect at the detection limit of 100 ug/l.

Soil vapor intrusion based on ground water concentrations was also evaluated. This evaluation was based on comparing the maximum concentrations found during the 2011 sampling event for non-SPW wells to the residential values identified in the 2001 OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway for Ground water and Soil. Overall, the concentrations are below screening levels in ground water used to determine potential vapor intrusion. Overall, based on the past remedial action and continuing monitoring at the Site, the remedies remain protective. Table 6 is a comparison of the maximum detected concentrations of COPCs detected in the monitoring wells to their respective vapor intrusion screening criteria.

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

No human health or ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has come to light that could call into question the protectiveness of the remedy.

Technical Assessment Summary

Based upon the results of the five-year review, it has been concluded that the remedy is functioning as intended by the Site remedial decision documents. The specific points are as follows:

- The cap is intact and in generally good condition;
- The fence around the landfill is intact and in good repair;
- The contaminant levels in the SPW have been reduced and results of sampling indicates a reduction in the size of the plume.
- Ground water within the plume is not being used for drinking water purposes;
- The monitoring wells required for O&M are securely locked and functional; and
- There is no evidence of trespassing or that vandalism has occurred.

VIII. ISSUES, RECOMMENDATIONS AND FOLLOW-UP ACTIONS

This Site has ongoing operation, maintenance and monitoring activities as part of the selected remedy. This report includes suggestions for improving, modifying, and/or adjusting some of these activities (see Table 7). This report finds the ground water remedy protects against human exposure to contaminated ground water, but may benefit from an improved presentation of potentiometric data in the form of contouring. Landfill subsidence should be corrected. This report did not identify any issue or make any recommendation for the protection of public health or the environment which was not included or anticipated by the Site decision documents.

IX. PROTECTIVENESS STATEMENT

Operable Unit 1:

The implemented action for the drinking water supply protects human health and the environment. There are no exposure pathways that could result in unacceptable risks and none are expected, as long as the Site use does not change and the implemented engineered and institutional controls are properly operated, monitored, and maintained.

Operable Unit 2:

The implemented actions for source control (landfill) protect human health and the environment. There are no exposure pathways that could result in unacceptable risks and none are expected, as long as the Site use does not change and the implemented engineered and institutional controls are properly operated, monitored, and maintained.

Operable Unit 3:

The implemented action for ground water containment protects human health and the environment. There are no exposure pathways that could result in unacceptable risks and none are expected, as long as the Site use does not change and the implemented engineered and institutional controls are properly operated, monitored, and maintained.

X. NEXT REVIEW

Since hazardous substances, pollutants or contaminants remain at the Endicott Wellfield Superfund Site, the next five-year review for the Site should be completed within five years of the signature date below.

Approved by:

Walter E. Mugdan, Director
Emergency and Remedial Response Division
EPA – Region 2

Sept. 29, 2011
Date

Table 1: Chronology of Site Events

DATES	EVENTS
OU1-RANNEY WELL	
June 1986	Site listed on the National Priorities List
July 1987	RI/FS completed by contractors for NYSDEC
September 1987	ROD signed by EPA
January 1989	Consent Decree signed with EPA and the PRPs
September 1991	Construction of the OU1 remedy completed
OU3-SUPPLEMENTAL PURGE WELL	
September 1988	Administrative Order signed for RI/FS
September 1990	Interim RI approved
January 1991	Technical Memorandum issued
March 1991	ROD signed by EPA
March 1992	Consent Decree signed with EPA and the PRPs
June 1995	Construction of the OU3 remedy completed
December 1995	Explanation of Significant Differences issued
OU2-ENDICOTT LANDFILL	
February 1992	Final RI submitted by PRPs
January 1991	Final FS submitted by PRPs
September 1992	ROD signed by the EPA
January 1994	Consent Decree signed with EPA and the PRPs
May 1997	Construction of the OU2 remedy completed
September 2001	First Five-Year Review Report issued by EPA
September 2006	Second Five-Year Review Report issued by EPA

Table 2: Estimated Annual Monitoring Costs

Sampling and Analysis	$3,500
Site Inspection and Maintenance	$3,700
Total Estimated Annual Monitoring Costs	$7,200

Table 3. List of Documents Reviewed in Completing the Five-Year Review

The following documents were reviewed in completing the third Five-Year Review:

- Remedial Investigation, Final Report, January 1991;
- Record of Decision for OU3 (Supplemental Purge Well), March 1991;
- Explanation of Significant Differences, December 1995;
- Record of Decision for OU2 (Endicott Landfill), September 1992;
- OU2 Consent Decree, January1994;
- Annual Operation and Maintenance Report for 2006;
- Annual Operation and Maintenance Report for 2007;
- Annual Operation and Maintenance Report for 2008;
- Annual Operation and Maintenance Report for 2009;
- Annual Operation and Maintenance Report for 2010; and,
- EPA Guidance for conducting Five-Year Reviews.

Table 4. Comparison of the maximum detected concentrations of contaminants of concern detected in the on-site monitoring wells to their respective human health risk based screening criteria (Preliminary Remediation Goals, Primary Drinking Water Standards (Maximum Contaminant Levels) and New York Department of Environmental Conservation Water Quality Regulations (NYSDEC WQRs).

Chemicals of Concern	Maximum Detected Concentration (ug/l)	Regional Screening Level (Cancer Risk = 10^{-6}) (ug/l)	Regional Screening Level (Non-Cancer HI = 1) (ug/l)	Primary Drinking Water Standard (MCL) (ug/l)	NYSDEC WQS (ug/l)	Location
Benzene	7.8	0.41	44	5.0	1.0	EW-8
Chloroethane	50				5.0	EW-8
Cis-1,2-dichloroethane	5.3		73	70	5	MW-13
Trichloroethylene	ND	0.028		5	5	EW-8
Vinyl Chloride	2(j)	0.016	72	2	2	EW-8

Table 5: Comparison of the cleanup goals established for site-specific indicators to the New York State Department of Environmental Conservation Soil Cleanup Objectives and the EPA Region 9 PRGs - Residential.

COPC	Cleanup Goal established in the ROD (mg/kg)	NYSDEC Soil Cleanup Objective (mg/kg)	NYSDEC Protection of Ground Water Objective (mg/kg)	EPA Region 9 PRG - Residential (mg/kg)
Chloroethane	15	280	28,000	
Cis-1,2-dichloroethene	21	2.1	210	
Trichloroethylene		0.053	5.3	600 (nc)
Vinyl chloride	22	0.25	25	3.4 ©

Footnotes:
©: Value is based on a Cancer endpoint
(nc): Value is based on a Non-cancer endpoint

Table 6. Comparison of the maximum detected concentrations of contaminants of concern detected in the on-site monitoring wells to their respective Screening Levels for Soil Vapor Intrusion Based on the 2001 OSWER Draft Guidance Values for Cancer Risk and Non-Cancer Health Hazards for Evaluating Exposure to Indoor Air Vapors Based on Ground water Concentrations.

Chemicals of Concern	Maximum Detected Concentration (ug/l)	Targeted Ground Water Concentration Associated with Indoor Air Concentration Associated with Cancer Risk = 10-4 (ug/l)	Targeted Ground Water Concentration Associated with Indoor Air Concentration Associated with Non-Cancer HI = 1) (ug/l)	Location
Benzene	7.8	140		EW-8
Chloroethane	50		390	EW-8
cis-1,2-dichloroethene	5.3	230		MW-13
Trichloroethylene	ND	5.3		EW-8
Vinyl Chloride	2(j)	25		EW-8

Footnotes:
Source: Vapor Intrusion Screening Values are used for screening purposes. Refer to: http://www.epa.gov/correctiveaction/eis/vapor.htm

Table 7: Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls

Comment	Suggestion
Potentiometric data are being collected but are not being contoured.	For at least one water level sampling event per year, potentiometric data should be contoured to confirm that there is hydraulic containment.
The ground water monitoring has not been re-evaluated since the landfill closure was completed.	At least one synoptic analytical sampling event should be performed prior to the next five-year review. EPA and the Village will meet to discuss potential modifications to the existing sampling program.
There are potholes and subsidence in the paved areas.	EPA will notify the PRPs to repair the potholes and subsided areas to prevent pooling of surface water.

Figure 1: Site Location