Third Five-Year Review Report
Cortese Landfill Superfund Site
Sullivan County
Town of Tusten, New York

Prepared by:

United States Environmental Protection Agency
Region 2
New York, New York

July 2011

Table of Contents

FIGURE

TABLES

Acronyms Used in this Document	
ARAR	Applicable or Relevant and Appropriate Requirement
EPA	United States Environmental Protection Agency
FS	Feasibility Study
ISCO	*In-Situ* Chemical Oxidation
MCLs	Maximum Contaminant Levels
µg/l	Micrograms per Liter
NAPL	Non-Aqueous Phase Liquid
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation & Maintenance
PRP	Potentially Responsible Party
RD	Remedial Design
RI	Remedial Investigation
RAO	Remedial Action Objective
ROD	Record of Decision
RPM	Remedial Project Manager
VOCs	Volatile Organic Compounds
WQSGV	Water Quality Standards and Guidance Values

EXECUTIVE SUMMARY

This is the third five-year review for the Cortese Landfill Superfund site. The site is located in the Town of Tusten, Sullivan County, New York. Currently, the landfill remedy is functioning as intended by the decision documents and is protecting human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site Name *(from WasteLAN)*: Cortese Landfill site

EPA ID *(from WasteLAN)*: NYD980528475

Region: 2	**State:** NY	**City/County:** Town of Tusten/Sullivan County

SITE STATUS

NPL Status: ■ Final ☐ Deleted ☐ Other (specify)

Remediation Status (choose all that apply): ■ Under Construction ■ Operating ☐ Complete

Multiple OUs? ■ YES ☐ NO	**Construction completion date:** N/A

Are portions of the site in use or suitable for reuse? ☐ YES ■ NO ☐ N/A

REVIEW STATUS

Lead agency: ■ EPA ☐ State ☐ Tribe ☐ Other Federal Agency

Author name: Mark Granger

Author title: Remedial Project Manager	**Author affiliation:** EPA

Review period: 08/18/2006 - 07/8/2011

Date(s) of site inspection: February 3, 2011

Type of review:
☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead
☐ Regional Discretion ☐ Policy ■ Statutory

Review number: ☐ 1 (first) ☐ 2 (second) ■ 3 (third) ☐ Other (specify)

Triggering action:
☐ Actual RA Onsite Construction at OU #1 ☐ Actual RA Start at OU #
☐ Construction Completion ■ Previous Five-Year Review Report
☐ Other (specify)

Triggering action date *(from WasteLAN)*: 08/21/2001

Due date ***(five years after triggering action date)***: 08/21/2011

Does the report include recommendation(s) and follow-up action(s)? ■ yes ☐ no
Acres in use or suitable for use: **restricted:** 0 **unrestricted:** 0

Five-Year Review Summary Form (continued)

Issues, Recommendations, and Follow-Up Actions

The source-area and groundwater remedies selected in a September 2010 Record of Decision (ROD)/ROD Amendment have not been implemented. In addition, on-property institutional controls to restrict activities that could affect the integrity of the cap need to be implemented.

Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls

This site has ongoing operation, maintenance, and monitoring activities as part of the remedy. As was anticipated by the decision documents, these activities are subject to routine modification and adjustment.

New York State requires annual certifications that remedy-related operation and maintenance (O&M) is being performed. Annual confirmation that the institutional controls that are required by the RODs remain in place and that remedy-related O&M is being performed is included in the potentially responsible parties' annual O&M report. The potentially responsible parties have verified that institutional controls are in place and that remedy-related O&M is being performed. Annual confirmations related to the institutional controls that are to be finalized in the future will be included in subsequent O&M reports.

Protectiveness Statement

The Operable Unit 2 (cap) remedy currently protects human health and the environment because the storm-water diversion trench has been constructed to reduce infiltration into the landfill and the cap has been constructed which reduces contaminant migration to groundwater and prevents direct contact with contaminants. However, in order for the on-site remedy to be protective in the long term, the on-property institutional controls need to be implemented.

I. Introduction

This five-year review for the Cortese Landfill site, located in the Town of Tusten, Sullivan County, New York, was conducted by United States Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Mark E. Granger. The review 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 in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001)(the five-year review guidance). 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 the Section 1.3.3 of the five-year review guidance, a subsequent five-year review is triggered by the signature date of the last review. The trigger for this third five-year review is August 18, 2006, the approval date of the last review. This third five-year review provides background information, covers the site history, discusses past data-collection efforts along with information collected in the past five years, re-evaluates risk and remedy protectiveness based on updated assumptions, and makes recommendations for follow-up actions.

The work at the site has been divided into four operable units. Operable Unit 1, which was completed in 1996, addressed the removal of more than 5,000 drums and associated contaminated soil from the landfill. Operable Unit 2, which involved the capping of the landfill, was completed in 1998. Operable Unit 3 involves the groundwater contamination at and downgradient of the landfill. Operable Unit 4 addresses the source contamination present below the water table beneath the former drum-disposal areas. Operable Units 3 and 4 have not been implemented.

This five-year review found that the implemented components of the 1994 remedy are functioning as intended and continue to protect human health and the environment.

II. Site Chronology

Table 1 (attached) summarizes the site-related events from discovery to the present.

III. Background

Site Location

The Cortese Landfill site, located within the Town of Tusten (Hamlet of Narrowsburg), Sullivan County, New York, is bounded to the northeast by a steep bedrock escarpment and to the southwest by the Norfolk Southern railroad embankment. The Delaware River is located approximately 400 feet west of the landfill. The property encompasses

approximately 3.75 acres of land owned by the John Cortese Construction Corp. and another 1.53-acre parcel along the northern margin of the Cortese property owned by the Town of Tusten, which purchased the property from Mr. Cortese in 1973. Figure 1 (attached) presents the site layout.

Physical Characteristics

On the landfill-side of the railroad embankment, areas to the southeast, east, and northeast are wooded. Areas south of the landfill are seasonally flooded as a result of perched water conditions. In addition, there are several small wetlands in the immediate area of the landfill. Along the western perimeter of the landfill is an unpaved road and a railroad embankment. The unpaved road, which is between the landfill and the railroad embankment, is used by Norfolk Southern employees for access to the railroad tracks.

Six residences are located between the railroad embankment and the Delaware River. The residences are connected to the Narrowsburg public water supply. The water supply is currently provided by three wells, one of which is located approximately 750 feet northwest of the landfill. These wells are hydraulically upgradient or sidegradient of the site and are, thus, not affected by site-related contamination.

The National Park Service classifies the Delaware River in the vicinity of the site as a "Wild and Scenic River." The river in this area is used primarily for recreational boating and fishing.

Site Geology/Hydrogeology

The site lies on alluvial deposits within the Delaware River valley. These alluvial deposits are predominantly sand and gravel overlain by fine-grained floodplain deposits that cause perched groundwater conditions and surficial ponding of water in areas of poor drainage. Throughout the entire thickness of unconsolidated sediments, water occurs under water-table conditions. The saturated aquifer thickness is approximately 80 feet. Discontinuous lenses of fine-grained deposits occur locally in the sand and gravel, but the sequence of overburden sediments can be considered to be one unconfined hydrogeologic unit. Bedrock forms a second, deeper hydrogeologic unit. Bedrock escarpments rise approximately 400 feet above both sides of the river. Groundwater flows through fractures in the bedrock from these topographic highs to the topographic low (the river) through the overburden sediments. The Delaware River is, therefore, the discharge boundary for the valley. Groundwater flow in the overburden sediments in the site vicinity is predominantly horizontal to the southwest (*i.e.*, toward the river) at an average velocity of about 25 feet per year (maximum 75 feet per year).

The upper sand and gravel unit is a preferential pathway for groundwater flow from the site to the Delaware River because it is located just below the water table and has a hydraulic

conductivity seven times higher than the geometric mean for the entire aquifer as a whole, yielding a calculated flow velocity of 167 feet per year (500 feet per year maximum).

Land and Resource Use

The area surrounding the site is rural. As noted above, six residences are located between the railroad embankment and the Delaware River. Steep woodlands and the Delaware River are the prominent features in the general area of the site. The railroad right-of-way separates the woodlands from the river in the vicinity of the site. With the steep woodlands upgradient and sidegradient, the large railroad embankment downgradient, the cap covering most of the property in between, and the remote location, it is very unlikely that any development will be considered either on the site property or in the immediate environs in the near or distant future.

With respect to water use, most of the Narrowsburg public water supply is currently provided by a well located approximately one mile east of the landfill. Two secondary wells in this system are located approximately 750 feet northwest and approximately one-half mile north-northwest of the landfill. All three wells are hydraulically upgradient or sidegradient of the site and are, thus, not affected by site-related contamination. All six of the homes located between the site and the Delaware River have their drinking water provided by the public supply.

History of Contamination

The 3.5-acre landfill portion of the site, which was initially called the Tusten Landfill, received municipal waste at an estimated rate of 3,000 cubic yards per year from 1970 to 1981. Prior to 1970, the property that the landfill now occupies was undeveloped. Disposal practices at the landfill were poorly documented, hence records regarding the types and volume of waste received are essentially nonexistent. For a six-month period in 1973, however, drummed industrial wastes were apparently received at the landfill, most of which were transported by Gaess Environmental Services, Inc. These wastes apparently included drums containing paint thinners and sludge, solvents, dyes, waste oil, and other petroleum waste products. Disposal included the burial and/or emptying of drums in trenches and the emptying of tanker trucks into one of two lagoons located on-site south of the landfill. The other lagoon was allegedly used exclusively for the disposal of residential septage sludge.

Initial Response

A Draft Environmental Impact Statement for the Tusten Landfill was submitted to the New York State Department of Environmental Conservation (NYSDEC) in 1979 in order to fulfill part of the requirements necessary to complete a permit filed by the John Cortese Construction Corp. in order to continue to operate the landfill. The report concluded that a need existed for the continued operation of the landfill, and it recommended groundwater

monitoring to determine potential adverse effects from previous disposal practices. Subsequent groundwater monitoring revealed elevated concentrations of volatile and semi-volatile compounds. Based on the results of this monitoring, the site was placed on the National Priorities List (NPL) in June 1986.

Basis for Taking Action

Following the listing of the site on the NPL, NYSDEC performed a remedial investigation (RI) from 1987-1989. The results revealed numerous volatile organic compounds (VOCs), most notably toluene; semi-volatile organic compounds (primarily polycyclic aromatic hydrocarbons); and metals detected at varying concentrations in site media.

In April 1990, after NYSDEC and a potentially responsible party (PRP), SCA Services, Inc., which had transported wastes to the site, were unable to agree upon appropriate investigative actions, NYSDEC formally transferred the lead to EPA. EPA subsequently oversaw the PRP's completion of a test pit program (March 1991), an ecological assessment (May 1992), RI field work, including the sampling of surface soil, subsurface soil, sediment, surface water, and ground water (June 1993), a final RI report (March 1994), a baseline human health and ecological risk assessment (June 1994), and a feasibility study (FS) report (September 1994).

The baseline human health risk assessment concluded that an unacceptable risk existed for future residents' consumption of groundwater; this was primarily driven by vinyl chloride and arsenic levels in groundwater. While the results of extensive bioassessment studies have revealed no impact on aquatic life, the ecological assessment concluded that future exposure to ecological receptors remains a possibility if the site is not remediated; this was primarily driven by 1,4-dichlorobenzene and arsenic levels in surface water and sediment.

IV. Remedial Actions

Remedy Selection

A Record of Decision (ROD) was signed in September 1994 (1994 ROD). The remedial action objectives (RAOs) specified in the 1994 ROD include:

- to restore the aquifer as a potential source of drinking water by reducing contaminant levels downgradient of the landfill to MCLs;

- to reduce or eliminate the potential for migration of contaminants downgradient of the landfill;

- to reduce or eliminate the potential for vadose-zone source areas to release hazardous compounds to groundwater;

- to reduce or eliminate any site-related contaminant load on the Delaware River; and

- to reduce or eliminate site-related contaminant seeps along the bank of the Delaware River.

To address these RAOs, the 1994 ROD called for:

- the removal and off-site treatment and/or disposal of drums and contaminated soil associated with the drums;

- construction of a low permeability cover system over the landfill meeting the requirements of 6 NYCRR Part 360;

- regrading and storm-water management improvements at the landfill;

- extraction and treatment of contaminated groundwater at the site;

- discharge of treated groundwater to the existing Town of Tusten wastewater treatment plant outfall, Delaware River, or reinjection to groundwater;

- long-term groundwater and surface-water monitoring;

- implementation of institutional controls to protect the integrity of the landfill cover system and to reduce the potential future use of groundwater within the plume area;

- implementation of long-term maintenance of the landfill cap and operation and maintenance of the groundwater extraction and treatment system; and

- natural attenuation of the groundwater contamination downgradient from the landfill perimeter.

A ROD/ROD Amendment was signed in October 2010 (2010 ROD/ROD Amendment). The RAOs specified in the 2010 ROD/ROD Amendment include:

- to reduce or eliminate the potential for saturated source areas to release contaminants to groundwater;

- to restore the aquifer downgradient of the landfill as a potential source of drinking water by reducing contaminant levels to the federal and State MCLs; and

- to reduce or eliminate the potential for migration of contaminants downgradient of the landfill.

To address these RAOs, the selected source area remedy and the modified groundwater remedy include the following components:

- air sparging (AS) of the source areas for approximately seven years to remove a significant quantity of the petroleum hydrocarbons and other VOCs;

- collection and discharge to the atmosphere after aboveground treatment, if necessary, of the extracted vapors from the air sparge wells using soil-vapor extraction (SVE) wells;

- amendment additions, such as ozone, to the air sparging/SVE system for the final phase of the air sparge/SVE period;

- employment of a subsurface-stabilization period for up to five years after the air-sparging program has been completed;

- subsequent application of *in-situ* chemical oxidation (ISCO), if necessary, potentially including a surfactant enhancement, to address the remaining more recalcitrant source materials;

- monitored natural attenuation of the groundwater contamination downgradient from the landfill perimeter; and

- long-term monitoring.

The effectiveness of the 2010 selected remedy is to be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.*, attainment of monitored natural attenuation [MNA] performance monitoring standards, reduction in constituent concentrations and/or mass flux, *etc.*). Should the selected remedy fail to attain these standards and goals or should its implementation prove impracticable, then "Groundwater Extraction and Treatment and Downgradient MNA," the groundwater remedy selected in the 1994 ROD, will be evaluated as the contingency remedy.

Remedy Implementation

Consent Decree negotiations between EPA and a group of twenty-eight PRPs to carry out the remedial design (RD) and construction of the 1994-selected remedy were successfully completed in September 1995; the Consent Decree was entered in U.S. District Court in May 1996.

From November 1995 through January 1996, concurrent with the initiation of the RD, the Town of Tusten conducted a removal action (pursuant to a removal order with EPA) whereby contaminated soils from the two lagoons were excavated and disposed of off-site and a 1,200-foot storm-water diversion channel was constructed along the eastern perimeter of the landfill. The storm-water diversion channel diverts most of the storm water toward the wetlands, thereby reducing infiltration into the landfill and, thus, leachate production.

In early 1996, 300 drums filled with hazardous liquids, solids, and sludges were excavated from an area adjacent to the lagoons and disposed of off-site. The broader drum removal component of the selected remedy, which was performed later in 1996, resulted in the excavation and removal of more than 5,000 drums, three tractor-trailer loads of hazardous sludge, and 50 dump trucks of contaminated soil.

The design of the cap component of the remedy was completed in May 1997. On September 23, 1998, a final inspection of the landfill-closure-system construction was conducted; the Remedial Action Report associated with the landfill closure was approved on October 15, 1998.

The objective of capping the landfill and constructing a storm-water diversion channel was to reduce the infiltration of water, thereby reducing the generation of leachate and contaminated groundwater. The purpose of excavating and removing the drums and excavating contaminated soils and sludges down to the water table was to remove potential sources of groundwater contamination and a direct contact threat.

While the release of additional contaminants to the groundwater has been reduced by these actions, post-closure groundwater monitoring data indicated that site-related contaminants were still present in the groundwater. Although continued monitoring showed a demonstrable decline in contaminants over time, and, more importantly, significant declines with distance from the landfill, monitoring also showed that this decline had leveled off at contaminant values in groundwater significantly above standards (predominantly for VOCs).

In scoping out the design of the groundwater extraction-and-treatment system, it was determined that there were logistical problems associated with construction of this aspect of the 1994 ROD. This included space constraints related to siting the groundwater management system's infrastructure, as well as difficulties related to transmitting the treated effluent either beneath the railroad embankment to the Delaware River or to groundwater. In response to these concerns, after the completion of the cap considerable efforts were devoted to discerning remedial approaches that would reduce the reliance on the full-scale groundwater extraction-and-treatment system contemplated in the 1994 ROD. These efforts took the form of investigations, studies, and bench- and field-scale pilot treatability testing.

Early in the reassessment process, it became increasingly clear that there were additional, previously-unidentified sources of chlorinated and non-chlorinated VOC non-aqueous phase liquid (NAPL) contamination in soils below the water table beneath the former drum-disposal areas (a primary area located beneath the landfill drum-disposal area and a small, secondary drum-disposal area located south of the landfill adjacent to the septage lagoons). The results of a 2001 shallow groundwater hot-spot investigation conducted along the downgradient perimeter of the landfill indicated the potential presence of these source areas. This effort served to refine further the conceptual site model for shallow groundwater migration pathways and was instrumental in refining the understanding of the lateral plume configuration and in beginning to understand the effect of the previously unknown source areas on the plume. Data from a source-area investigation performed in 2004 showed an area in the soils beneath the primary former drum-disposal area containing previously undocumented sorbed-phase and residual-phase (*i.e.*, NAPL) VOC contamination. Additional source characterization was conducted in October 2007 to better evaluate the horizontal and vertical extent of this chlorinated- and non-chlorinated-VOC and petroleum-hydrocarbon source area and to provide data to support the selection and design of potential in-situ source-area treatment technologies. Additional samples of soil, groundwater, and NAPL were collected in February 2009 for the purpose of conducting ISCO bench-scale treatability testing.

Periodic monitoring of the groundwater, conducted three times per year since 1996, has aided in the understanding of the effects on groundwater of the landfill source area, as well as the smaller source area near the septage lagoons. The identification of the two source areas helped to modify the conceptual site model. The 1994 ROD estimated that capping the landfill in combination with groundwater extraction and treatment at the landfill and downgradient natural attenuation would result in achieving the cleanup goals in the groundwater in 14 years.

With the confirmed presence of two large NAPL source areas, the cleanup time-frame estimate for the groundwater remedy increased to 150 years. For this reason, new remedial alternatives were assessed in the document entitled *Former Source Areas Feasibility Study Report, Cortese Landfill Site, Narrowsburg, New York*, Geosyntec Consultants, September 2010 (2010 FS). The 2010 ROD/ROD Amendment was approved on October 5, 2010. The remedial design of the 2010 selected remedy is currently underway, as are negotiations for amending the aforementioned Consent Decree.

EPA approved the groundwater extraction and treatment contingency remedy remedial design on December 17, 2010.

Institutional Controls Implementation

The 1994 ROD called for the implementation of institutional controls to prevent the use of contaminated groundwater at and downgradient from the landfill and to protect the integrity

of the Part 360 cap. With respect to groundwater, the entire town, including the affected downgradient area, has drinking water provided by public supplies. Institutional controls in the form of local ordinances have been put in place that restrict the withdrawal of groundwater for any purpose and prohibit the installation of private wells. Specifically, Local Law #1 restricts groundwater use near the site and Local Law #4 requires public water supply connections anywhere within the Narrowsburg Sewer and Water District, including properties located downgradient from the site.

With respect to on-property institutional controls, a draft easement and restrictive covenant to protect the integrity of the cap has been submitted by the PRPs and is currently under review by EPA.

Operation and Maintenance

The Operation and Maintenance (O&M) Manual for the site contains the procedures for inspecting and evaluating the landfill cap, maintaining the groundwater and soil-vapor monitoring network, and long-term monitoring of groundwater. Repairs are to be made to the cap, drainage systems, and monitoring network, as necessary, to control the effects of settling, subsidence, erosion, vectors, or other events that might interfere with the performance of the remedy.

The site is inspected annually as follows:

- the landfill cap is inspected for signs of erosion, excessive settlement, surface water ponding, seedling growth, and stressed vegetation;
- the surface water drainage system is inspected for signs of erosion and/or siltation, seedling growth, *etc.*, in the swales, constructed wetlands, and ditches;
- the landfill gas venting system is inspected for any damage to the vents;
- the site is inspected for any vectors and damage is reported;
- groundwater monitoring wells are inspected for ease of locating, operation of locks, damage/vandalism, and the condition of the surface seals;
- soil-vapor wells are inspected for ease of locating and damage/vandalism;
- the site access gates and fence are inspected for operational locks, vandalism, and damage; and
- the site is inspected for debris, litter, and/or waste.

In addition, confirmation that the institutional controls that are required by the RODs remain in place and that remedy-related O&M is being performed is included in the annual O&M report. This annual confirmation commenced with the 2009 O&M report for the site and will continue annually. Annual confirmations related to the institutional controls that are to be finalized in the future will be included in subsequent O&M reports.

V. Progress Since the Last Five-Year Report

The second five-year review for this site, which was approved on August 18, 2006, recommended that institutional controls be put into place to restrict activities which could affect the integrity of the cap, the initial soil-vapor intrusion evaluation be updated, and the ongoing assessment of alternative groundwater treatment approaches be completed and a remedy implemented.

With respect to the institutional controls recommendation, a draft easement and restrictive covenant to protect the integrity of the cap has been submitted by the PRP Group; it is currently under review by EPA.

The update of the initial soil-vapor intrusion evaluation was completed on September 22, 2009 after two rounds of sampling. The conclusion of the evaluation was that no further action was required to address this pathway.

With regard to the assessment of alternative groundwater treatment approaches, as was noted above, new remedial alternatives were evaluated in the 2010 FS report. Based upon EPA's review of this report, remedies to address the source area and groundwater were selected in the 2010 ROD/ROD Amendment, thereby addressing this recommendation. The remedial design of the source area remedy is currently underway and a monitored natural attenuation plan is being prepared. It is anticipated that the remedial design and monitored natural attenuation plan will be completed in fall 2011.

VI. Five-Year Review Process

Administrative Components

The five-year review team consisted of Mark Granger (RPM), Nicole Bujalski (hydrogeologist), and Lora Smith (human health and ecological risk assessor).

Community Involvement

The EPA Community Involvement Coordinator for the Cortese Landfill site, Cecilia Echols, published a notice in the *Sullivan County Democrat*, a local newspaper, on November 9, 2010, notifying the community of the initiation of the five-year review process. The notice

indicated that EPA would be conducting a five-year review of the site to ensure that the site is protective of public health and the environment and that the implemented components of the remedy are functioning as designed. It also indicated that once the five-year review is completed, the results would be made available in the local site repository. In addition, the notice included the RPM's address and telephone number for questions related to the five-year review process or the Cortese Landfill site.

Document Review

The documents, data, and information that were reviewed in completing the five-year review are summarized in Table 2 (attached).

Data Review

Groundwater monitoring data have been collected on a triannual schedule since 1997. Groundwater monitoring data from this five-year review period exceeded NYSDEC Water Quality Standards and Guidance Values (TOGS 1.1.1)(WQSGV) or EPA Maximum Contaminant Levels (MCLs)[1] for a number of contaminants in a number of groundwater monitoring wells.

Specifically, the data show that the number of VOCs detected and their concentrations have stabilized at lower levels than previously reported during the RI. This decrease is attributable to the successful completion of the storm-water diversion system, the unsaturated-zone source removal (drum and septage lagoon excavation and disposal), and the capping components of the remedy. Currently, while values remain stable, the data from the four affected landfill-perimeter monitoring wells (from north to south, MW-10; MW-1b, and MW-1c; and MW-9) show that the degree of contamination in groundwater remains well above standards. The data from the six affected downgradient monitoring wells (*i.e.*, those along Delaware Drive across the railroad embankment from the landfill; also from north to south, MW-6a and MW-6b; MW-7a and MW-7b; and MW-2a and MW-2b) show stable values as well and values much lower than those in the landfill-perimeter wells; nevertheless some of these downgradient values remain above standards.

A supplemental groundwater investigation using geoprobe points aligned along the downgradient perimeter of the landfill was performed in 2001. This effort served to confirm the conceptual site model and was instrumental in refining the understanding of the lateral and vertical plume configuration. Data from a source-area investigation performed in 2004 showed an area beneath the former drum trench containing previously undocumented high levels of residual VOC contamination. This effort, along with the follow-up 2008 source-characterization effort, documented the presence of a large, previously unknown NAPL

[1] WQSGVs and MCLs are the highest levels of a contaminant that are allowed in drinking water. They are promulgated standards that apply to public water systems and are intended to protect human health by limiting the levels of contaminants in drinking water.

source area beneath the former drum trenches. This finding explained the persistent nature of the contamination plume and provided information that directly led to the 2010 ROD/ROD Amendment to address the source material and its affect on the groundwater plume.

Samples collected from the public drinking-water supply well located closest to the site continue to show that site-related contamination is not affecting this well.

Site Inspection

On February 3, 2011, a five-year review-related site inspection was conducted by EPA RPM Mark Granger, along with technical-team members Nicole Bujalski and Lora Smith. Nothing of note was observed during the inspection.

Interviews

No interviews were conducted during the review period.

Institutional Controls Verification

Institutional controls in the form of local ordinances have been put in place that restrict the withdrawal of groundwater for any purpose and prohibit the installation of private wells.

With respect to on-property institutional controls, a draft easement and restrictive covenant to protect the integrity of the cap has been submitted by the PRPs; it is currently under review by EPA.

Other Comments on Operation, Maintenance, and Institutional Controls

There are no other comments or suggestions related to operation, maintenance, and institutional controls.

VII. Technical Assessment

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

The 1994 ROD called for, among other things, the construction of storm-water management improvements, excavation, and disposal of the drum trenches and septage lagoons, installation of a Part 360 cap, and groundwater extraction and treatment. The purpose of the drum and septage lagoon excavation was to reduce the risk to human health and the environment due to contaminants leaching from the landfill. The purpose of capping of the landfill was to minimize the infiltration of rainfall and snowmelt into the landfill, thereby reducing the potential for contaminants leaching from the landfill into the groundwater and negatively impacting groundwater and surface-water quality. Capping

was also intended to prevent direct contact exposure to contaminants. Although the groundwater portion of the remedy has not been implemented, the other aspects of the remedy have been successfully completed and have been appropriately maintained. Thus, the implemented remedy is protective by eliminating all potentially complete and most hypothetical future exposure pathways as intended by the 1994 ROD.

The 1994 ROD identified a restoration goal for the aquifer. The purpose of extracting and treating the contaminated groundwater was to control its migration and assure that groundwater beyond the site boundary met Applicable or Relevant and Appropriate Requirements (ARARs) within a reasonable time frame. The 2008 Source Characterization Report revealed that an area beneath the drum trench contained previously unknown high concentrations of VOCs. This investigation aided in refining the conceptual site model, specifically updating the source area geology, horizontal and vertical extent of the source area, and deep soil and groundwater quality within the source area.

As is discussed the "Data Review" section, above, subsurface soil and groundwater data collected after the 1994 ROD indicate a substantial modification of the conceptual site model. Specifically, this data identifies the presence of a large, previously unknown NAPL source area beneath the former drum trenches. The 1994 ROD estimated that with implementation of the groundwater remedy (groundwater extraction and treatment at the landfill with downgradient MNA), the cleanup goals would be met in approximately 14 years. With the confirmed presence of this large NAPL source area, the cleanup time-frame estimate for the 1994-ROD's groundwater remedy is now estimated at 150 years. For this reason, new remedial alternatives were assessed in the 2010 FS. Based upon the results of the 2010 FS and considering the selected remedy which directly addresses the source areas, the groundwater portion of the 1994 ROD (groundwater extraction and treatment at the landfill with downgradient MNA) was amended in the 2010 ROD/ROD Amendment. The ROD/ROD Amendment chose AS/SVE, addition of ozone sparging and/or other amendments, in-situ chemical oxidation, as necessary, monitored natural attenuation, and long-term monitoring. It is anticipated that groundwater ARARs will be met through the implementation of the source-area remedy, thus effecting restoration of groundwater as a resource in a reasonable period of time. An AS/SVE pilot test has been completed and the design of the remedy is currently underway.

Samples collected from the nearest public drinking water supply have not been affected by site contamination. Institutional controls in the form of local ordinances have been put in place that restrict the withdrawal of groundwater downgradient from the landfill for any purpose and prohibit the installation of private wells. On-property institutional controls to protect the integrity of the landfill cap have been submitted to EPA for review, but are not yet approved and in place. Since no direct contact threat currently exists and the drinking-water supply is not impacted, the remedy remains protective of human health and the environment.

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

While a new source area has been defined, there have been no physical changes to the site that would adversely affect the protectiveness of the remedy.

Land use assumptions, exposure assumptions and pathways, cleanup levels and remedial action objectives considered in the decision documents remain valid. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used remains valid.

The primary objectives of the 1994-ROD remedy were to control the source of contamination at the site and to reduce and minimize the migration of contaminants into site media, thereby minimizing any health and environmental impacts. The specific RAOs identified in the 1994 ROD include restoring the aquifer as a potential source of drinking water by reducing contaminant levels downgradient of the landfill to the federal and state MCLs, reducing or eliminating the potential for migration of contaminants downgradient of the landfill, reducing or eliminating the potential for source areas to release hazardous compounds to groundwater, reducing or eliminating any site-related contaminant load on the Delaware River, the embayment, and White's Pond, and reducing or eliminating site-related contaminant seeps along the eastern bank of the Delaware River. The specific remedial action objectives identified in the 2010 ROD/ROD Amendment include reducing or eliminating the potential for source areas to release contaminants to groundwater, restoring the aquifer downgradient of the landfill as a potential source of drinking water by reducing contaminant levels to the federal and State MCLs, and reducing or eliminating the potential for migration of contaminants downgradient of the landfill. While the remedy called for in the 2010 ROD/ROD Amendment has not yet been implemented, it is expected to attain the RAOs in a reasonable period of time.

The baseline human health risk assessment concluded that an unacceptable risk existed for future residents' consumption of groundwater. Implementation of the remedial measures detailed in the 2010 ROD/ROD Amendment is expected to provide for restoration of the downgradient aquifer to drinking-water standards. The ecological risk assessment identified several small, isolated areas of surface water and sediments as the primary exposure points that may potentially impact local species and sensitive environments. Since the areas that posed such risks were addressed by the remedial actions that have already been taken at the site, the site no longer poses an ecological risk.

Soil vapor intrusion (SVI) is evaluated when soils and/or groundwater are known or suspected to contain VOCs. Two SVI investigations were conducted at three properties between the landfill and the Delaware River. Ambient air, subslab, and indoor-air samples were collected and analyzed. While one home had an indoor air detection of ethylbenzene that was slightly above the 10^{-5} action level, ethylbenzene was not detected in the subslab of this home during the same round of sampling nor was it detected in the underlying shallow groundwater. Therefore, it was concluded that a complete SVI pathway does not

exist in any of the homes that were sampled.

According to recent groundwater results reported in the 2010 Operation and Maintenance Report, total VOC concentrations remain elevated downgradient of the landfill. While there are no completed exposure pathways at the site, continued evaluation of groundwater downgradient of the landfill will ensure protectiveness is monitored until the groundwater cleanup goals are attained.

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

No.

Technical Assessment Summary

Based upon the results of the five-year review, it has been concluded that:

- the cap and vegetative cover are intact and in good condition;
- the landfill gas system is operating properly;
- the monitoring wells are securely locked and functional;
- the storm water management system is in good repair;
- there is no evidence of trespassing or vandalism;
- the remedy has prevented residents from drinking contaminated groundwater; and
- no additional measures are needed to protect public health.

VIII. Recommendations and Follow-Up Actions

Table 3 (attached) summarizes a recommendation and follow-up action stemming from this five-year review.

IX. Protectiveness Statement

The Operable Unit 2 (cap) remedy currently protects human health and the environment because the storm-water diversion trench has been constructed to reduce infiltration into the landfill and the cap has been constructed which reduces contaminant migration to groundwater and prevents direct contact with contaminants. However, in order for the on-

site remedy to be protective in the long term, the on-property institutional controls need to be implemented.

X. Next Review

Since hazardous substances, pollutants or contaminants remain at the Cortese Landfill site which do not allow for unlimited use or unrestricted exposure, in accordance with 40 CFR 300.430 (f) (4) (ii), the remedial action for the site shall be reviewed no less often than every five years. EPA will conduct another five-year review on or before July 2016.

Approved:

Walter E. Mugdan, Director
Emergency and Remedial Response Division

July 11, 2011
Date

FIGURE 1

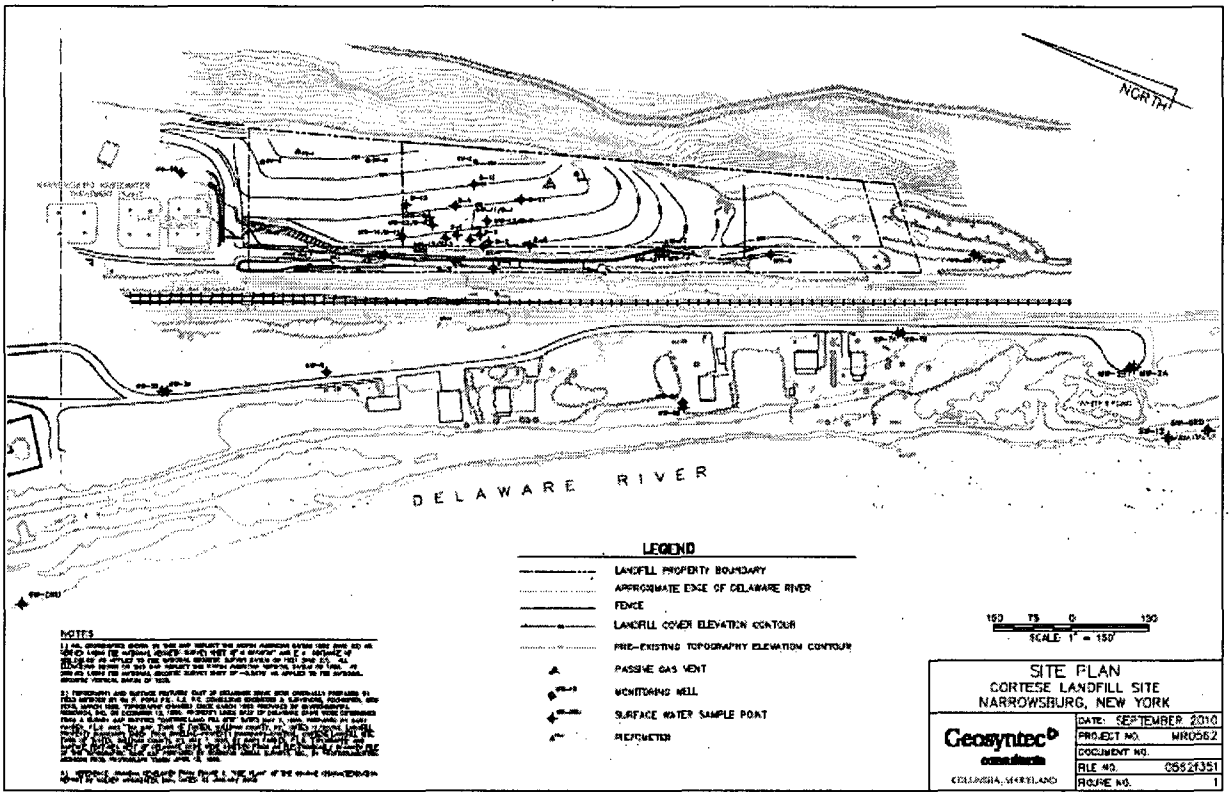
NORTH
DELAWARE RIVER
LEGEND
LANDFILL PROPERTY BOUNDARY
APPROXIMATE EDGE OF DELAWARE RIVER
FENCE
LANDFILL COVER ELEVATION CONTOUR
PRE-EXISTING TOPOGRAPHY ELEVATION CONTOUR
PASSIVE GAS VENT
MONITORING WELL
SURFACE WATER SAMPLE POINT
PIEZOMETER
NOTES
150 75 0 150
SCALE: 1" = 150'
SITE PLAN
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK
Geosyntec consultants
COLUMBIA, MARYLAND
DATE: SEPTEMBER 2010
PROJECT NO. WR0562
DOCUMENT NO.
FILE NO. 0562f351
FIGURE NO. 1

Table 1: Chronology of Site Events	
Event	**Date(s)**
Start of landfill operation	1970-1981
Landfill accepts bulk loads of drummed hazardous waste	1973
NYSDEC orders that all further drum disposal cease	1973
NYSDEC Environmental Impact Statement	1979
End of landfill operation	1981
Site placed on National Priorities List	1986
NYSDEC Remedial Investigation/Feasibility Study	1987-1989
NYSDEC requests EPA to take lead	1990
EPA Remedial Investigation and Feasibility Study Administrative Order on Consent with PRP	1990
EPA Remedial Investigation/Feasibility Study	1991-1994
1994 Record of Decision (ROD)	1994
Removal Action Administrative Order on Consent with Town of Tusten	1994
Removal Action (drainage swale construction, septage lagoon excavation, and removal of drums from southern trench)	1995-1996
Remedial Design (RD)/Remedial Action Consent Decree	1996
Drum removal	1996
Initiation of triannual groundwater monitoring	1997
Part 360 cap installation	1997-1998
Supplemental groundwater investigation	2001
Phase I groundwater bench- and pilot scale testing	2002-2003
Supplemental source-area investigation	2004
Phase II groundwater bench- and pilot-scale testing	2005
Groundwater RD (30%)	2006
Soil-vapor intrusion investigation	2007-2009
Source characterization	2008-2009
Groundwater contingency remedy RD (100%)	2010
Source area feasibility study	2010
2010 ROD/ROD Amendment	2010

Table 2: Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Submittal Date**
Phase I Remedial Investigation/Feasibility Study (NYSDEC)	1987
Phase II Remedial Investigation/Feasibility Study (NYSDEC)	1989
Phase III Remedial Investigation/Feasibility Study (Golder Associates)	1993
Baseline Risk Assessment (Tetra Tech, Inc.)	1994
Ecological Risk Assessment (Tetra Tech)	1994
Vapor-Intrusion Assessment (Golder)	1994
Record of Decision (EPA)	1994
Removal Action Final Report (CDM)	1995
RD/RA Consent Decree (EPA)	1996
Remedial Construction Report (Cap) (Golder)	1998
Supplemental Groundwater Report (Golder)	2001
Supplemental Source-Area Investigation Report (Golder)	2004
Vapor-Intrusion Assessment (Golder)	2004
Source Characterization Report (Golder)	2008
Vapor-Intrusion Investigation Report (EPA)	2009
Cortese Landfill Annual O&M Reports (Golder/Geosyntec)	1998-2010
Feasibility Study (Geosyntec)	2010
Record of Decision/Record of Decision Amendment (EPA)	2010
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.	

Table 3: Issues, Recommendations, and Follow-Up Actions						
Issue	**Recommendations and Follow-Up Actions**	**Party Responsible**	**Over-sight Agency**	**Mile-stone Date**	**Affects Protectiveness (Y/N)**	
					Current	**Future**
Institutional controls to restrict activities that could affect the integrity of the cap need to be put into place.	A draft easement and restrictive covenant has been submitted by the PRP Group for the on-property institutional controls; it is currently under review by EPA. These controls need to be formalized.	EPA, PRPs	EPA	12/11	N	Y