RECORD OF DECISION
AMENDMENT TO THE RECORD OF DECISION

Cortese Landfill Superfund Site
Town of Tusten, Sullivan County, New York

United States Environmental Protection Agency
Region II
New York, New York
October 2010

DECLARATION FOR THE RECORD OF DECISION AND AMENDMENT TO THE RECORD OF DECISION

SITE NAME AND LOCATION

Cortese Landfill Superfund Site
Tusten, Sullivan County, New York

Superfund Site Identification Number: NYD980528475
Operable Units: 03 and 04

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) and amendment to the 1994 ROD documents the U.S. Environmental Protection Agency's selection of a source-area remedy and a modified groundwater remedy, respectively, for the Cortese Landfill Superfund Site (Site), chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. Section 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300. This decision document explains the factual and legal basis for selecting a remedy to address the source areas and contaminated groundwater at the Site. The attached index (see Appendix III) identifies the items that comprise the Administrative Record upon which the selected remedy and amended 1994 remedy is based.

The New York State Department of Environmental Conservation (NYSDEC) was consulted on the proposed remedy and proposed modified remedy in accordance with CERCLA Section 121(f), 42 U.S.C. Section 9621(f), and it concurs with the selected remedy and amended 1994 remedy (see Appendix IV).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD/ROD amendment, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy and amended 1994 remedy, which address the source areas and contaminated groundwater, include the following components:

- Air sparging of the source areas for approximately seven years to remove a

significant quantity of the petroleum hydrocarbons and other volatile organic compounds;

- 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);

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

- Subsurface-stabilization period for up to five years after the air-sparging program has been completed;

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

- Monitored natural attenuation (MNA)[1] of the groundwater downgradient from the landfill perimeter; and

- Long-term monitoring.

Pilot-scale testing will be performed to determine the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data will be used in the system-design evaluation. In addition, the extracted vapors may need to be treated before being vented to the atmosphere. Any treatment residuals will have to be appropriately handled (*e.g.*, off-Site treatment/disposal).

The effectiveness of the selected remedy will be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.*, attainment of 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 (and amended herein), will be evaluated as the contingency remedy. The major components of the contingency remedy that would be evaluated are:

- Extraction of contaminated groundwater from the landfill through a series of wells aligned along the western (downgradient) perimeter of the landfill until Maximum Contaminant Levels are achieved in the aquifer downgradient of the landfill or until technical impracticability is demonstrated. The conceptual treatment process for the groundwater includes clarification/filtration, aqueous-phase granular activated

[1] Natural attenuation is a variety of *in-situ* processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

carbon, and air stripping. The exact number, depth, pumping rates, and location of extraction wells would be determined during design;

- Discharge of treated groundwater to the existing Town of Tusten wastewater treatment plant outfall, the Delaware River, or a reinjection network. The specific discharge point will be determined during design; and

- Implementation of long-term operation and maintenance of the groundwater extraction/treatment system.

The environmental benefits of the selected remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with Region 2's Clean and Green policy[2]. This will include consideration of green remediation technologies and practices.

Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. Institutional controls on the landfill property precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy are expected to be in place in late 2010. The institutional controls already in place for areas downgradient of the landfill, as well as those expected to be in place in late 2010 for the former landfill property, will be verified as remaining in effect periodically as part of the long-term monitoring effort.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy and the amended 1994 remedy (*i.e.,* the contingency remedy) both meet the requirements for remedial actions set forth in CERCLA Section 121, 42 U.S.C. Section 9621, because they: 1) are protective of human health and the environment; 2) meet a level or standard of control of the hazardous substances, pollutants, and contaminants which at least attains the legally applicable or relevant and appropriate requirements under federal and state laws; 3) are cost-effective; and 4) utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. In keeping with the statutory preference for treatment that reduces toxicity, mobility, or volume of contaminated media as a principal element of the remedy, the contaminated soil and groundwater will be treated by implementing the selected remedy. Data from a source-area investigation showed locations beneath the former drum-disposal trenches which are acting as large non-aqueous phase liquid source areas. These source areas, which are a significant reservoir for the migration of contamination to groundwater (and therefore constitute a “principal threat waste”) will be addressed by the selected remedy and would be contained should the contingency remedy be required.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a

[2] See http://epa.gov/region2/superfund/green_remediation.

statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The ROD/ROD amendment contains the remedy selection information noted below. More details may be found in the Administrative Record file for this Site.

- Contaminants of concern and their respective concentrations (see ROD, pages 6-8 and Appendix II, Table 3);
- Baseline risk represented by the contaminants of concern (see ROD, pages 9-12);
- Cleanup levels established for contaminants of concern and the basis for these levels (see ROD, Appendix II, Table 6);
- Manner of addressing source materials constituting principal threats (see ROD, page iii and page 21);
- Current and reasonably-anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (see ROD, pages 8-9);
- Potential land and groundwater use that will be available at the Site as a result of the selected remedy (see ROD, pages 24);
- Estimated capital, annual operation and maintenance, and present-worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (see ROD, pages 27 and Appendix II, Table 7); and
- Key factors used in selecting the remedy (*i.e.*, how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision)(see ROD, pages 22-24).

AUTHORIZING SIGNATURE

Walter E. Mugdan, Director
Emergency and Remedial Response Division

OCT. 5, 2010
Date

RECORD OF DECISION FACT SHEET
EPA REGION II

Site

Site name:	Cortese Landfill Site
Site location:	Town of Tusten, Sullivan County, New York
HRS score:	32.11
Listed on the NPL:	June 1, 1986

Record of Decision

Date signed:	October 5, 2010
Selected remedy:	Air sparging/soil vapor extraction, addition of ozone sparging and/or other amendments, stabilization period, in-situ chemical oxidation, as necessary, to address remaining recalcitrant source materials (potentially including surfactant enhancement), and long-term monitoring.
Capital cost:	$5.2 million
Operation, maintenance, and Monitoring cost:	$419,000
Present-worth cost:	$8.1 million
Lead	EPA
Primary Contact:	Mark Granger, Remedial Project Manager, (212) 637-3351
Secondary Contact:	Joel Singerman, Chief, Central New York Remediation Section, (212) 637-4258
Main PRPs	Allied-Signal, Inc.; Cellu-Craft Inc.; Consolidated Edison Company of New York, Inc.; Continental Holdings Inc.; Cortese Construction Corporation; Custom Chemical Company, Inc.; E. I. DuPont de Nemours & Company; Falstrom Company; Flexabar Corporation, Inc.; Ganes Chemicals, Inc.; Halocarbon Products Corporation; Huls America Inc.; Lei Americas Inc.; Inmont Corporation; Inx Printing Ink Corp.; Keuffel & Esser Company; Marisol, Inc.; National Starch and Chemical Corporation; Nicholas Enterprises, Inc.; Occidental Chemical Corp.; Okonite Company; Pacquet Oneida, Inc.; Radiac Research Corporation; Rhone-Poulenc Inc.; R&R Sanitation; SCA Services, Inc.; Stepan Chemical; Town of Tusten

Waste

Waste type:	Organics
Waste origin:	On-Site waste disposal activities
Contaminated media:	Soil and groundwater

DECISION SUMMARY

Cortese Landfill Superfund Site
Town of Tusten, Sullivan County, New York

United States Environmental Protection Agency
Region II
New York, New York
October 2010

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ATTACHMENTS

SITE NAME, LOCATION, AND DESCRIPTION

The Cortese Landfill Site[1] (Site) is located within the hamlet of Narrowsburg, New York. It is bound to the northeast by a steep bedrock escarpment and to the southwest by the CSX railroad embankment. The northern edge of the Site lies approximately 70 feet south of the Narrowsburg Waste Water Treatment Plant. A small borrow pit (White's Pond) and a small backwater area (the embayment) along the eastern shoreline of the Delaware River are located about 800 feet southwest of the former landfill. The former landfill property boundary 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.

On the landfill side of the railroad embankment, areas to the southeast, east, and northeast of the former landfill are predominantly wooded and used for hunting. Areas on and south of the former landfill are seasonally flooded because of perched water conditions. In addition, there are several small wetland areas in the immediate area of the former landfill. An unpaved road between the landfill and the embankment is used by CSX employees for access to the railroad tracks.

Six residences are located on the 200-250 foot wide strip of land to the west of the former landfill between the embankment and the Delaware River. These properties are accessed by Delaware Drive, a paved road which dead ends toward the south at a cul-de-sac. 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. A Site layout map is provided on **Figure 1**. All of the residences on Delaware Drive are served by publicly-supplied water.

The Tusten public water supply is primarily supplied by a well (Town Well #3) located approximately one mile east of the former landfill. Two secondary wells in this system are located approximately 750 feet northwest and approximately one-half mile north-northwest of the former landfill (Town Well #1 and #2, respectively). Town Wells #1 and #2 are currently used to supplement the public water supply provided by Well #3. All three wells are hydraulically upgradient of the Site, and are, thus, not affected by Site-related contamination.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The 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 approximately

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[1] The Site’s Superfund Site Identification Number is NYD980528475. The U.S. Environmental Protection Agency (EPA) is the lead agency; the New York State Department of Environmental Conservation (NYSDEC) is the support agency.

July 1970 to July 1981. 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 brought to the Site. Most of these wastes were transported by Gaess Environmental Services, Inc. (purchased thereafter by SCA Services, Inc. or SCA). These wastes apparently included drums containing paint thinners and sludge, solvents, dyes, waste oil, and petroleum products. Disposal is believed to have included the burial and/or emptying of drums in trenches and the emptying of tanker trucks into one of the two septage lagoons located immediately to the south of the landfill. The other lagoon was used strictly for the disposal of residential septage sludge.

A Draft Environmental Impact Statement for the Tusten Landfill (Fink, 1979) was submitted to NYSDEC in order to fulfill part of the data requirements necessary to complete a permit application filed by the Cortese Construction Corp. so that it could 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.

In 1985, SCA voluntarily entered into a stipulation agreement with NYSDEC to conduct a remedial investigation (RI)[2] at the Site. Subsequent groundwater monitoring revealed the presence of elevated concentrations of volatile and semi-volatile organic compounds. Based on these sample results, the Site was placed on the National Priorities List (NPL) in June 1986. A Phase I RI report was completed in July 1987, followed by a Phase II RI report which was completed in August 1988. In April 1990, NYSDEC formally transferred the lead role for the Site to EPA. SCA entered into an Administrative Order on Consent (AOC) to complete an RI and feasibility study (FS)[3] with EPA in September 1990. A final RI report (March 1994), risk assessment (June 1994), and FS report (June 1994) were performed under the AOC. A Record of Decision was issued on September 30, 1994 (1994 ROD), calling for, among other things, removal of drums and associated soils, capping the former landfill, groundwater extraction and treatment, institutional controls, and natural attenuation of contaminants in downgradient areas.

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[2] The purpose of the RI was to determine the nature and extent of the contamination at and emanating from the Site and to evaluate the human health and ecological risks.

[3] The purpose of the FS was to identify and evaluate remedial alternatives to address this contamination.

EPA and a group of twenty-eight Potentially Responsible Parties (PRPs) signed a Consent Decree to carry out the remedial design (RD) and construction of the selected remedy 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 consent order with EPA) whereby contaminated soils from the two septage 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 nearby wetlands, thereby reducing infiltration into the waste and, thus, leachate production from the former landfill.

The drum removal component of the 1994 ROD, which was performed in 1995 and 1996, resulted in the excavation and off-Site disposal of more than 5,000 drums, three tractor trailer loads of hazardous sludge, and 50 dump trucks of contaminated soil from the landfill, and an additional 300 drums were removed from an area adjacent to the septage lagoons and disposed off-Site. The design of the cap component of the selected remedy was completed in May 1997. Construction of the cap and restoration of wetlands was completed in 1998. Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. Institutional controls on the landfill property precluding, among other things, potable use of groundwater and activities that will interfere with the protectiveness of the selected remedy, are expected to be in place in late 2010.

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 equipment and infrastructure sharing the same space as the landfill cap, the wastewater treatment facility, and the wetlands, 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 by the PRPs 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 testing. Early in the reassessment process it became increasingly clear that there were additional, previously-unidentified sources of chlorinated and non-chlorinated volatile organic compound (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. A subsequent source-area investigation performed in 2004 clearly showed the location of the primary, previously-undocumented

source area. Characterization of the horizontal and vertical extent of this source area was conducted in 2007. The two source areas are delineated on **Figure 2**.

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 is now estimated at 150 years. For this reason, new remedial alternatives were assessed in *Former Source Areas Feasibility Study Report, Cortese Landfill Site, Narrowsburg, New York*, Geosyntec Consultants, July 2010 (2010 FS).

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The 2010 FS report and the Proposed Plan for the source-area remedy/groundwater amendment for the Site were released to the public for comment on August 13, 2010. These documents were made available to the public at information repositories maintained at the Tusten-Cochecton Library in Narrowsburg, New York and the EPA Region II Office in New York City. The notice of availability for the above-referenced documents was published in the *Sullivan County Democrat* on August 13, 2010. The public comment period ran from August 13, 2010 to September 12, 2010. On August 23, 2010, EPA conducted a public meeting at the Tusten Town Hall to inform local officials and interested citizens about the Superfund process, to present the Proposed Plan for the Site, including the preferred source-area and groundwater alternative, and to respond to questions and comments from the approximately 20 attendees. Responses to the questions and comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (see **Appendix V**).

SCOPE AND ROLE OF THE OPERABLE UNIT

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), at 40 CFR Section 300.5, defines an operable unit as a discrete action that comprises an incremental step toward comprehensively addressing Site problems. A discrete portion of a remedial response eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the Site.

In order to implement the remedy selected in the 1994 ROD, the work at the Site was divided into three 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, which involves the groundwater contamination at and downgradient of the landfill, and a newly identified Operable Unit 4, which addresses the

source contamination present below the water table beneath the former drum-disposal areas, are the subject of this ROD/ROD amendment. That is, this decision document amends the 1994 ROD for the groundwater (Operable Unit 3) and selects a final remedy for the source-area contamination (Operable Unit 4).

The primary objectives of this action are to remediate the sources of groundwater contamination at the Site, restore groundwater quality downgradient of the landfill, and minimize any potential future health and environmental impacts from the groundwater.

SUMMARY OF SITE CHARACTERISTICS

The data collected during the RI and other sampling efforts provided EPA with specifics related to Site characteristics, as well as information to perform a Risk Assessment. RI-related sampling of groundwater, surface and subsurface soil, surface water, sediment, and soil gas on and around the Site was conducted in three phases from 1987 to 1993. In addition, groundwater has been sampled three times per year since the fall of 1996 and several other subsurface-soil, source-area, and groundwater investigations have been conducted since that time. The actions taken as a result of the 1994 ROD have successfully addressed surface and subsurface soil, surface water, sediment, and soil vapor intrusion.

This ROD/ROD Amendment addresses source areas beneath the former disposal trenches and the groundwater, the characteristics of which are summarized in this section and the “Summary of Site Risks” section, below. The results of the vapor-intrusion investigation, conducted after the RI, are also detailed below.

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 which 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. Hydrogeologic cross sections are provided in **Figures 3A and 3B**. 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 overall average velocity throughout the entire saturated thickness of overburden of about 25 feet per year (maximum 75 feet per year). Illustrations of groundwater flow are included in **Figures 4A, 4B, and 4C**.

The upper sand and gravel unit is likely a preferential pathway for groundwater flow from the former landfill 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).

Groundwater

Groundwater samples were collected from up to twenty-six monitoring wells and Town Well #1 during the three phases of the RI and monitoring wells have been sampled three times per year since the 1994 ROD. Data from groundwater samples collected at and downgradient of the former landfill revealed levels of VOCs, semi-volatile organic compounds (SVOCs), and metals exceeding the current Federal Safe Drinking Water Act and/or New York State Public Water Supplies Maximum Contaminant Levels (MCLs). The widest range of constituents and the highest concentrations were detected at monitoring wells S-1, S-2, EX-1, MW-12, MW-13, and MW-15, all of which are located in or near the landfill source area. The highest concentration of contaminants was detected at monitoring well S-2 (total chlorinated and non-chlorinated VOCs of 291,000 micrograms per liter [ug/l] and total SVOCs at 5,466 ug/l) during the April 2008 monitoring event. Total VOC concentration trends for source-area wells for all sampling rounds since 1987 are illustrated on **Figure 5**. Site-wide groundwater detections for October 2007 are shown on **Figure 6**. **Table 1A** presents the Site-wide VOC data for October 2007.

Groundwater data indicate that the plume of Site-related contaminants is approximately 1,300 feet wide. Groundwater impacts are found in shallow zones adjacent to the western edge of the landfill and in both shallow and deeper zones downgradient. From the landfill, the plume passes beneath the railroad embankment, Delaware Drive, and the previously-noted six residences and discharges to the Delaware River (see **Figure 1**). Although contaminant concentrations at individual wells do not show strongly declining trends over time, declining concentrations along groundwater migration pathways from the landfill toward the Delaware River have been documented since the late 1980s. The majority of the groundwater contamination was detected in monitoring wells located within, or immediately adjacent to, the landfill. By comparison, levels in monitoring wells located within the plume area approximately 200 feet downgradient (west of the railroad embankment) were generally one-tenth or less than those in the landfill monitoring wells.

Analysis of natural-attenuation parameters in groundwater, performed as part of long-term monitoring since 1995, has confirmed the strong presence of several natural-attenuation indicators. Specifically, indirect lines of evidence (geochemical footprints) of anaerobic biodegradation processes have been documented in groundwater at the Site, including daughter products vinyl chloride and cis-1,2-dichloroethene (cDCE) from tetrachloroethene and trichloroethene parent compounds; 1,1-dichloroethane and chloroethane from the 1,1,1-trichloroethane parent compound; chlorobenzene from the trichlorobenzene- and dichlorobenzene-isomer parent compounds; and chloroform and

methylene chloride from the carbon-tetrachloride parent compounds. This is further supported by the relatively high concentrations of ethane and ethene in groundwater samples, indicators of complete reductive dechlorination, as well as the low concentrations of benzene, toluene, ethylbenzene, and xylene and total-organic-carbon electron donors downgradient of the landfill as compared to near the source area. Evidence of active anaerobic microbial processes in groundwater downgradient from the landfill were indicated by the reduced concentrations of electron acceptors such as dissolved oxygen, nitrate, and sulfate and increased concentrations of electron acceptors such as ammonia, iron, manganese, sulfide, and methane. Finally, the 16R gene of *Dehalococcoides* has been detected in samples of aquifer solids from the S-1 and S-2 boreholes, which provides direct evidence of the presence of bacteria with the ability to accomplish complete reductive dechlorination of chlorinated ethenes.

Vapor Intrusion

The vapor intrusion pathway was also evaluated for several homes in the vicinity of the Site. Both subslab and indoor-air samples were collected from these homes. This effort was conducted from 2007 to 2009. The concentrations of the detected compounds were found to be below the levels of concern.

Source Areas

As noted above, after the 1994 ROD, a shallow groundwater hot-spot investigation along the downgradient perimeter of the former landfill was performed. This effort, conducted in 2001, served to further refine 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. The total groundwater VOC profile from this effort is illustrated on **Figure 7**. 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. Source-area groundwater data for October 2007 are shown on **Figure 8** and presented in **Table 1B**. **Table 1C** presents the Site-wide and source-area total-VOC groundwater data for October 2007, further illustrating the source characterization. **Table 2** presents the source-area soil VOC data for this effort. **Figure 1** shows the locations of the source-area soil samples. The source area is illustrated in cross section on **Figure 9**. Additional samples of soil, groundwater, and NAPL were collected in February 2009 for the purpose of in-situ chemical oxidation (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 source areas are shown on **Figure 2**.

Contamination Fate and Transport

Historically, rainwater and snowmelt infiltrated the uncapped landfill, drum-filled trenches, and the septage lagoons where liquid hazardous substances were disposed, resulting in contaminant releases to the groundwater. The drum-filled trenches and septage lagoons have been excavated to the water table and the landfill has been capped. Presently, there is a primary source area located beneath the landfill drum-disposal trench and a second source area beneath the smaller southern drum-disposal trench and septage lagoons which continue to release contaminants to the groundwater. **Figures 10A and 10B** depict the current conceptual Site model[4].

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land Use

As noted above, the Site is a remote five-acre former landfill located in a depression formed between a steep bedrock escarpment and a railroad embankment. The landfill shares this depression with the Narrowsburg sewage-treatment facility. Aside from the sewage-treatment facility, land use in areas on the landfill side of the railroad embankment (areas to the southeast, east, and northeast) are predominantly wooded and are used for hunting and hiking. Land use in the narrow strip of land to the west between the railroad embankment and the Delaware River is residential. Six residences are located on this strip of land. The area beyond the residences is both floodplain and railroad right-of-way and gradually pinches out between the railroad embankment and the Delaware River. All six residences on Delaware Drive are located on the western bank of the Delaware River. The National Park Service classifies the Delaware River in the vicinity of the Site as a Wild and Scenic River and the river in this area is used primarily for recreational boating and fishing.

The Site itself is expected to remain a landfill site. Institutional controls on the landfill property precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy are expected to be in place in late 2010. Due to the steep topography and the fact that the former landfill and the sewage-treatment facility occupy adjacent spaces along a railroad embankment, no significant changes in surrounding land use (*i.e.,* hunting, recreation) are anticipated. In addition, the Town of Tusten has recently updated and finalized its master plan which indicates that the residential area along the Delaware River is to remain zoned for residential use.

[4] A conceptual site model illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors.

Groundwater Use

All of the residences on Delaware Drive are served by publicly-supplied water and it has been confirmed that there is no current groundwater use downgradient of the Site. There are institutional controls precluding the withdrawal of groundwater downgradient of the landfill for any purpose other than environmental testing. While the portion of the aquifer located downgradient of the landfill does have a potential beneficial use for drinking water, it is not currently used as a drinking water source and there is no anticipation that it will be used as such in the future.

SUMMARY OF SITE RISKS

A baseline risk assessment is an analysis of the potential adverse human health effects caused by the release of hazardous substances from a site in the absence of any actions to control or mitigate these under current and anticipated future land uses. EPA's baseline risk assessment for this Site, which was part of the 1994 RI/FS report and was discussed in the 1994 ROD, focused on contaminants in the surface soil, subsurface soil, groundwater, surface water, and sediments which were likely to pose significant risks to human health and the environment. The risk assessment for this Site, entitled *Human Health Baseline Risk Assessment for the Cortese Landfill Site, Sullivan County, New York*, prepared by Tetra Tech, Inc. for Golder Associates Inc., May 16, 1994, is available in the Administrative Record.

Human Health Risk Assessment

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance exposure from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the Site in various media (*i.e.*, soil, groundwater, surface water, sediment, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of, inhalation of, and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations to which people may be exposed and the potential frequency and duration of exposure. Using these factors, a “reasonable maximum

exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with contaminant exposures and the relationship between magnitude of exposure and severity of adverse health effects are determined. Potential health effects are contaminant-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some contaminants are capable of causing both cancer and noncancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or, stated another way, one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime site-related excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For noncancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which noncancer health effects are not expected to occur.

While the original risk assessment considered ingestion, inhalation, and dermal contact with groundwater; ingestion and dermal contact with surface soil and sediment; and inhalation of ambient air for the exposure of hypothetical residents. The response activities performed to date at the Site, including the excavation and removal from the landfill of more than 5,000 drums and the installation of the landfill cap, have addressed non-groundwater-related risks. The potential Site-related human health risks related to groundwater at the Site that were identified in the 1994 ROD have not substantially changed. The human health risk assessment, which is part of the 1994 RI/FS report and was discussed in the 1994 ROD, determined that hypothetical future use of the groundwater at the Site would pose an unacceptable risk to human health. The hypothetical carcinogenic risk for exposure to groundwater by future residents was estimated to be 2×10^{-3}. This risk number means that 2 additional persons out of 1,000 would potentially be at risk of developing cancer if groundwater were to be used for potable purposes and the Site is not remediated. The Hazard Index was estimated to be 140. A summary of the contaminants of concern (COCs) and groundwater exposure point concentrations is listed in **Table 3**. Cancer and non-cancer toxicity data for the groundwater COCs is presented in **Tables 4A and 4B**. The cancer and non-cancer risk-characterization summary for the groundwater COCs is presented in **Tables 5A and 5B.**

As mentioned above, the vapor-intrusion pathway was evaluated and determined not to constitute a significant risk to human health or the environment. EPA sampled three homes for soil-vapor intrusion risk over two data collection efforts (2007 and 2009). No samples exceeded the screening level for indoor air quality.

Ecological Risk Assessment

Potential risks to environmental receptors associated with the Site were identified in the ecological risk assessment (entitled *Environmental Evaluation Report for the Cortese Landfill Site, Sullivan County, New York*, prepared by Tetra Tech, Inc. for Golder Associates Inc., May 16, 1994). This document is also available in the Administrative Record. The media for which relevant ecological exposure pathways were analyzed included sediment, surface soil, and surface water. 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. Therefore, ecological risks will not be discussed further in this document.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include the following: environmental chemistry sampling and analysis; environmental parameter measurement; fate and transport modeling; exposure parameter estimation; and toxicological data. Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there can be significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources, including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and the fate and transport models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the Site, and it is highly unlikely to underestimate actual risks related to the Site.

An estimate of central tendency risk can be obtained by substituting average or median values for upper bound values. This is most useful for the exposure pathway which results in the highest estimated carcinogenic or noncarcinogenic risk, i.e., groundwater ingestion.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk Assessment Report.

Summary of Human Health Risks

The greatest potential future carcinogenic risk attributable to the Site is associated with the ingestion of groundwater. The potential cancer risk is based on current levels of groundwater contaminants. If no action is taken with respect to the source areas, the continued release of contaminants into Site groundwater could result in a greater potential cancer risk at some point in the future if groundwater was used for potable purposes. Additionally, significant noncarcinogenic effects from the potential future ingestion of Site groundwater by area residents have also been established in the Risk Assessment.

Basis for Action

Based upon the quantitative human-health risk assessment and ecological evaluation, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the response action selected in this ROD/ROD amendment, may present a current or potential threat to human health and the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and Site-specific risk-based levels.

The following remedial action objectives were established for the source areas and groundwater:

- reduce or eliminate the potential for source areas to release contaminants to groundwater;
- 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
- reduce or eliminate the potential for migration of contaminants downgradient of the landfill.

The cleanup levels for the groundwater COCs and their basis are presented in **Table 6.**

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, comply with ARARs, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains federal and state ARARs, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the source areas and the groundwater can be found in the 2010 FS report.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any PRPs, or procure contracts for design and construction.

The alternatives are:

Alternative 1: No Further Action

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no further action alternative does not include any physical remedial measures (beyond those remedial and removal actions already completed) that address any Site-related media.

Because this alternative would result in contaminants remaining on-Site which exceed acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 2: Groundwater Near-Source Extraction and Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$4.1 million
Annual O&M Cost:	$611,000
Present-Worth Cost:	$11.7 million
Construction Time:	1 year

Under this alternative, five groundwater extraction wells would be installed in the upper sand and gravel unit near the source areas along the downgradient perimeter of the landfill, extending several feet into the underlying silt/sand layer. The conceptual treatment process for the groundwater would include metals precipitation, clarification/filtration, and air stripping. Treated groundwater would likely be discharged to the Delaware River via the existing Town of Tusten wastewater-treatment-facility outfall. The effectiveness of the treatment system would be assessed through long-term groundwater and surface-water monitoring. Monitoring is assumed to be conducted three times per year and would include several surface water sampling stations west of the embankment, a network of groundwater wells, and any treated groundwater effluent discharge. Samples would be analyzed for VOCs, SVOCs, metals, and municipal solid waste leachate indicator parameters. **Figure 11** illustrates the conceptual layout of extraction wells under Alternative 2.

The downgradient groundwater-contaminant plume would be addressed through monitored natural attenuation (MNA)5, a variety of in-situ processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants.

It is estimated that system construction would be completed in one year.

Because this alternative would result in contaminants remaining on-Site which exceed acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

[5] Natural attenuation is a variety of *in-situ* processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

Alternative 3: In-Situ Source-Area Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$5.2 million
Annual O&M Costs:	$419,000
Present-Worth Cost:	$8.1 million
Construction Time:	1 year

This alternative would employ a series of in-situ technologies to treat residual material within the source areas and to accelerate depletion of the contaminant source mass. Initially, peroxide may need to be applied to help in adjusting subsurface conditions for air sparging. Air sparging/soil vapor extraction (SVE) would be used throughout the source areas to remove a significant component of the chlorinated and non-chlorinated VOCs and petroleum hydrocarbons by volatilization. Air sparging consists of injecting air below the water table in order to volatilize dissolved VOCs and partition them into the soil gas above the water table. Air sparging also promotes aerobic degradation processes. The SVE wells would be utilized to collect the vapors released by the air-sparge system. The collected vapors would be discharged to the atmosphere following aboveground treatment, if necessary based on federal and state performance criteria. **Figure 12** illustrates a typical air sparging/SVE system. **Figures 13 and 14** illustrate the conceptual layout of air sparging/SVE wells. The air sparge/SVE system would run until one or more performance measures (*e.g.*, diminished contaminant-removal efficiencies, *etc*.) are attained, at which point amendments such as ozone would be injected into the subsurface in order to aggressively destroy some of the remaining source materials. It is estimated that this system would need to be run for approximately seven years.

At the conclusion of the air sparge/SVE and amendment-addition program, the groundwater would be allowed to stabilize for up to five years. This stabilization period is necessary to, among other things, allow for the active treatment components to subside and for the equilibration of the aqueous subsurface.

After this stabilization period, the groundwater would be treated using ISCO, if necessary, to address the remaining recalcitrant source materials. A surfactant application would be considered to flush stubborn sorbed source materials into the groundwater where an oxidant (such as persulfate) would be deployed to destroy the newly released contaminants.

After the ISCO deployment, if it is determined to be necessary, MNA would be utilized as the final step to attain the cleanup objectives in the groundwater downgradient of the landfill.

The effectiveness of this alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.*, attainment of MNA performance monitoring standards, reduction in mass flux, etc.).

It is estimated that construction related to this effort would be completed in one year.

Under this alternative, pilot-scale testing would be used to determine, among other things, the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data would be used in the system-design evaluation. In addition, the extracted vapors might need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (*e.g.*, off-Site treatment/disposal).

Because this alternative would result in contaminants remaining on-Site which exceed acceptable health-based levels, CERCLA would require that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with ARARs addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, which a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation, maintenance, and monitoring (OM&M) costs, and net present-worth costs.

- State acceptance indicates if, based on its review of the 2010 FS and Proposed Plan, the state concurs with the preferred remedy at the present time.

- Community acceptance refers to the public's general response to the alternatives described in the 2010 FS report and Proposed Plan.

A comparative analysis of these alternatives based upon the evaluation criteria noted above follows.

Overall Protection of Human Health and the Environment

Alternative 1 would result in no active steps to address the source area or to restore groundwater quality to drinking-water standards in areas downgradient of the perimeter of the landfill and would, therefore, not be protective of human health and the environment. Alternatives 2 and 3 are both active remedies that address the source areas through groundwater extraction and in-situ treatment processes, respectively, and will restore groundwater quality downgradient of the landfill perimeter over the long term. Combined with institutional controls, Alternatives 2 and 3 would provide protectiveness of human health and the environment over both the short and long term until groundwater standards are met.

It is estimated that it would take 150 years to restore groundwater quality under Alternative 2, as compared to 15 years for Alternative 3.

Compliance with ARARs

EPA and NYSDEC have promulgated health-based protective MCLs (40 CFR Part 141, and 10 NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). The aquifer is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply. Although the groundwater downgradient of the landfill is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an ARAR, because groundwater

downgradient of the landfill is a potential source of drinking water. Surface water ARARs have been consistently attained in the Delaware River since completion of the 1994 ROD's cap and drum-removal components and are anticipated to continue to be met for all alternatives in the future.

Alternative 1 does not provide for direct remediation of the source area or the affected groundwater and would, therefore, involve no further actions to achieve chemical-specific ARARs in a reasonable period of time. In contrast, Alternatives 2 and 3 would be more effective in reducing the source area and groundwater contaminant concentrations to a level below state and federal groundwater standards.

Emissions from the air stripper under Alternative 2 and the SVE wells under Alternative 3 would be required to comply with the substantive requirements of state and federal air-emission standards.

While both Alternatives 2 and 3 may potentially reach ARARs downgradient of the landfill sooner than Alternative 1, Alternative 3, with more aggressive source treatment, would likely attain ARARs much more expeditiously than Alternative 2. A discharge-permit equivalency (*e.g.,* New York State Pollutant Discharge Elimination System) would be required for Alternative 2.

Other location-specific ARARs relevant to Alternatives 2 and 3 include the Wild and Scenic Rivers Act (36 CFR Section 297.4), Executive Order 11990 (Protection of Wetlands), Executive Order 11988 (Floodplain Management), and the National Historic Preservation Act.

Long-Term Effectiveness and Permanence

Alternative 1 would be expected to have minimal long-term effectiveness, since it would rely solely upon natural attenuation to restore groundwater quality.

Alternatives 2 and 3 would both address the groundwater contamination with active engineered treatment systems, although by different means, and would provide superior long-term effectiveness through removal of potential future contributions to downgradient groundwater contamination. There would be no long-term threat to human health or the environment once the cleanup of the groundwater is completed. It is estimated that Alternative 2 would require 150 years of operation to complete the groundwater cleanup. It is estimated that Alternative 3 would require 15 years to complete the groundwater cleanup

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 would not actively reduce the toxicity, mobility, or volume of contaminants through treatment.

Alternatives 2 and 3 would reduce the toxicity, mobility, or volume of contaminants at the source area and in the downgradient groundwater through treatment, thereby satisfying CERCLA's preference for treatment.

Short-Term Effectiveness

Alternative 1 does not include any additional physical construction measures in any areas of contamination and, therefore, does not present implementation risk to Site workers or the community. Alternatives 2 and 3 could potentially present adverse impacts to remediation workers, since these alternatives both would involve the installation of extraction wells, monitoring wells, and/or air sparge/vapor extraction wells through contaminated soils and groundwater. Difficulties related to space constraints and to the conveyance of treated water beneath the railroad embankment would need to be resolved for Alternative 2. Alternative 3 could pose adverse impacts to Site workers since it would require the installation of significantly more wells and piping, but Alternative 2 could also pose adverse impacts to Site workers because it requires treatment reagents and generates treatment residuals that would be handled by Site workers. While both Alternatives 2 and 3 present some risk to on-Site workers through dermal contact and inhalation of groundwater, treatment reagents/residuals, or soil vapor, these exposures can be minimized by utilizing proper protective equipment.

For Alternatives 2 and 3, the vehicle traffic associated with the construction could impact the local roadway system and nearby residents through increased noise level, as would the off-Site transport of contaminated solids and delivery of potentially hazardous treatment reagents. The groundwater extraction and treatment system under Alternative 2 and the air sparge/SVE system under Alternative 3 would generate noise which could be an annoyance to area residents. Placing the equipment inside a building and/or soundproofing would significantly reduce the noise.

Under Alternatives 2 and 3, disturbance of the land during construction could affect the surface water hydrology of the Site. There is a potential for increased stormwater runoff and erosion during excavation and construction activities that could be properly managed to prevent excessive water and sediment loading to adjacent wetlands.

Alternative 2 would generate treatment residues which would have to be appropriately handled. Alternative 1 would not generate such residues.

Under Alternative 3, the configuration and number of air sparging/SVE wells, characterizing the extracted vapors, the application rates of the various reagents, and determining other operation and performance parameters would need to be determined based on the results of pilot-scale testing. These data would be used in the system design evaluation. Under this alternative, the extracted vapors might need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (*e.g.,* off-Site treatment/disposal).

Because no further actions would be performed under Alternative 1, there would be no implementation time. It is estimated that it would take 1 year to construct both Alternatives 2 and 3.

Based upon estimated time frames for the source areas in contact with groundwater to be depleted, Alternative 2 would achieve cleanup goals in approximately 150 years. It is estimated that Alternative 3 would achieve cleanup goals in approximately 15 years. Therefore, while the potential exposure to workers or nuisance to the public can be managed or addressed in Alternatives 2 and 3, these exposures and nuisances will be for a considerably shorter duration under Alternative 3.

Implementability

Alternative 1 would be the easiest to implement, as there would be no new activities to undertake.

All treatment equipment that would be used in Alternatives 2 and 3 are proven and commercially available. Difficulties related to space constraints and to the conveyance of treated water beneath the railroad embankment would need to be resolved for Alternative 2. Transportation and disposal of treatment residues could be easily implemented using commercially-available equipment. Under these alternatives, sampling for treatment effectiveness and groundwater monitoring would be necessary, but it could be easily implemented.

Cost

The present-worth costs for Alternatives 1 through 3 are calculated using a discount rate of 7 percent; a 30-year time interval was used for Alternatives 1 and 2, and a 15- year time interval for Alternative 3. The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the table below.

Alternative	Capital Cost	Annual O&M Cost	Total Present-Worth Cost
1	$0	$0	$0
2	$4.1 million	$611,000	$11.7 million
3	$5.2 million	$419,000	$8.1 million

As can be seen by the cost estimates, Alternative 1 is the least costly remedy at $0. Alternative 2 is the most costly remedy with a present-worth cost of $11.7 million. The present-worth cost for Alternative 3 is $8.1 million.

State Acceptance

NYSDEC concurs with the selected remedy; a letter of concurrence is attached (see Appendix IV).

Community Acceptance

Comments received during the public comment period indicate that the public generally supports the selected remedy. These comments are summarized and addressed in the Responsiveness Summary, which is attached as Appendix V to this document.

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430 (a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of alternatives, using the remedy-selection criteria which are described below. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

Data from a source-area investigation showed locations beneath the former drum-disposal trenches which are acting as large NAPL source areas. These source areas, which are a significant reservoir for the migration of contamination to groundwater (and therefore constitute a principal threat waste), will be addressed by the selected remedy.

While Alternative 2 would address the source area through groundwater extraction and treatment over an estimated 150 years, Alternative 3 would address the source materials constituting principal threats through treatment in significantly less time. Therefore, Alternatives 2 and 3 both meet the statutory preference for treatment of principal threat waste.

SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 3, in-situ source-area treatment and downgradient MNA, best satisfies the requirements of CERCLA Section 121, 42 U.S.C. §9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, 40 CFR § 300.430(e)(9).

Both Alternatives 2 and 3 are moderately difficult to implement and are energy intensive. Alternative 2 is more difficult to implement in terms of installation and operation of the groundwater treatment process while Alternative 3 is more complex during well installation. While the capital costs of these two alternatives are comparable, operation and maintenance costs are significantly lower for Alternative 3, and it has the potential to achieve cleanup goals in a much shorter period of time (150 years for Alternative 2 versus 15 years for Alternative 3).

EPA and NYSDEC find that the selected remedy is protective of human health and the environment; provides the greatest long-term effectiveness; is able to achieve ARARs more quickly than other alternatives; and is cost-effective. The selected remedy utilizes permanent solutions, alternative treatment technologies, and resource-recovery technologies to the maximum extent practicable. Furthermore, because air sparging/SVE and, if necessary, in-situ chemical oxidation will be performed, the selected remedy meets the statutory preference for the use of treatment as a principal element.

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Description of the Selected Remedy

The selected remedy to address the source areas and contaminated groundwater includes the following components[6]:

- Air sparging 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 SVE wells;
- Amendment additions, such as ozone, to the air sparging/SVE system for the final phase of the air sparge/SVE period;
- Subsurface-stabilization period for up to five years after the air-sparging program has been completed;
- Subsequent application of ISCO, if necessary, potentially including a surfactant enhancement, to address the remaining more recalcitrant source materials;
- MNA of the groundwater downgradient from the landfill perimeter; and

[6] See **Figures 12, 13, and 14** for illustrations of the selected remedy.

- Long-term monitoring.

Pilot-scale testing will be performed to determine the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data will be used in the system-design evaluation. In addition, the extracted vapors may need to be treated before being vented to the atmosphere. Any treatment residuals will have to be appropriately handled (*e.g.,* off-Site treatment/disposal).

The effectiveness of the selected remedy will be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.*, attainment of MNA performance monitoring standards, reduction in constituent concentrations and/or mass flux, *etc*.). Performance standards related to the MNA treatment-process step will be based, in part, on the April 2004 EPA guidance document entitled *Performance Monitoring of MNA Remedies for VOCs in Ground Water* (EPA/600/R-04/027). The cleanup levels for the groundwater COCs and their basis are presented in **Table 6.** After the selected remedy is in place, it is estimated that groundwater in the aquifer downgradient of the landfill will meet the remediation goals in approximately 15 years.

The environmental benefits of the selected remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green policy[7]. This will include consideration of green remediation technologies and practices.

Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. Institutional controls on the former landfill property precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy, are expected to be in place in late 2010. The institutional controls already in place for areas downgradient of the landfill, as well as those expected to be in place in late 2010 for the former landfill property, would be verified as remaining in effect periodically as part of the long-term monitoring effort.

Because this remedy will result in contaminants remaining on-Site which exceed acceptable health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, additional response actions may be implemented.

[7] See http://epa.gov/region2/superfund/green_remediation.

Summary of the Estimated Remedy Costs

The estimated capital, annual O&M, and total present-worth costs (using the federal standard 7% discount rate) for the selected remedy are $5.2 million, $419,000, and $8.1 million, respectively. **Table 7** provides the basis for the cost estimates for Alternative 3.

It should be noted that these cost estimates are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual project cost. These cost estimates are based on the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedy.

Expected Outcomes of the Selected Remedy

The 1994 ROD selected a response action to, among other things, remove drums and contain the landfill. The risk reduction achieved as a result of the implementation of that response action has been completed. Land use associated with the landfill property and with the properties downgradient of the landfill are not anticipated to change as a result of the implementation of the selected remedy.

The current action addresses the subsurface contaminant source areas and the groundwater. The results of the risk assessment indicate that the hypothetical future use of the groundwater at the Site will pose an unacceptable increased future cancer risk and an unacceptable non-cancer hazard risk to human health. Under the selected alternative, a series of in-situ technologies will be used to treat residual material within the source areas and to accelerate depletion of the source mass, thereby reducing the potential for the source materials to release contaminants to groundwater. Addressing the source material in combination with MNA will restore the aquifer downgradient of the landfill as a potential source of drinking water in a reasonable period of time by reducing contaminant levels to the federal and state MCLs. Federal and state MCLs are presented in **Table 8.** Achieving the cleanup levels will restore the aquifer to its beneficial use.

It is estimated that it will take 15 years to achieve the groundwater cleanup objectives under the selected remedy.

AMENDMENT OF 1994 RECORD OF DECISION

As discussed 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) is being amended.

As noted above, the effectiveness of the selected remedy will be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in 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" (Alternative 2), which is also the groundwater remedy selected in the 1994 ROD, would at that time be evaluated as a contingency remedy. The major components of the contingency remedy that would be evaluated are:

- Extraction of contaminated groundwater from the landfill through a series of wells aligned along the western (downgradient) perimeter of the landfill until Maximum Contaminant Levels are achieved in the aquifer downgradient of the landfill or until technical impracticability is demonstrated. The conceptual treatment process for the groundwater includes clarification/filtration, aqueous-phase granular activated carbon, and air stripping. The exact number, depth, pumping rates, and location of extraction wells would be determined during design;

- Discharge of treated groundwater to the existing Town of Tusten wastewater treatment plant outfall, the Delaware River, or a reinjection network. The specific discharge point will be determined during design; and

- Implementation of long-term operation and maintenance of the groundwater extraction/treatment system.

It is anticipated that the decision to implement the Groundwater Extraction and Treatment and Downgradient MNA contingency remedy would be formalized via an Explanation of Significant Differences document.

STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which

employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a Site.

For the reasons discussed below, EPA has determined that both the selected remedy and the amended 1994-ROD groundwater remedy meet these statutory requirements.

Protection of Human Health and the Environment

The results of the risk assessment indicate that, if no action is taken, the hypothetical future use of the groundwater at the Site will pose an unacceptable increased future cancer risk and an unacceptable non-cancer hazard risk to human health. The selected remedy and the amended 1994-ROD groundwater remedy will be protective of human health and the environment in that they will address the source contamination and will restore groundwater quality downgradient of the landfill over the long term. Combined with institutional controls, the selected remedy and the amended 1994-ROD groundwater remedy will provide protectiveness of human health and the environment over both the short and long term.

Compliance with ARARs and Other Environmental Criteria

A summary of the ARARs and "Other Criteria, Advisories, or Guidance TBCs" which will be complied with during implementation of the selected remedy and the amended 1994-ROD groundwater remedy, is presented below.

- Clean Air Act, National Ambient Air Quality Standards (40 CFR 50)
- Groundwater Quality Regulations (6 NYCRR Parts 700-705)
- National Primary Drinking Water Standards (MCLs and non-zero maximum contaminant level goals) (40 CFR 141)
- National Environmental Policy Act (40 CFR 1500 to 1508)
- National Emissions Standards for Hazardous Air Pollutants (40 CFR Parts 51, 52, 60, and 61)
- New York State Department of Health Drinking Water Standards (10 NYCRR Part 5)
- New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200)
- New York State Drinking Water Standards (NYCRR Part 5)
- New York State Air Cleanup Criteria, January 1990
- New York State Department of Environmental Conservation Guidelines for the Control of Toxic Ambient Air Contaminants, DAR-1, November 12, 1997
- New York Air Quality Standards (6 NYCRR Part 257)
- New York State Department of Environmental Conservation, Technical and Operational Guidance Series 1.1.1, November 1991
- Safe Drinking Water Act Proposed MCLs and nonzero MCL Goals

Cost-Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (NCP Section 300.430(f)(1)(ii)(D)). Overall effectiveness is based on the evaluations of: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Based on the comparison of overall effectiveness (discussed above) to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective in that it is the least-cost action alternative and will achieve the remediation goals in a reasonable time frame. While somewhat more costly, the amended 1994-ROD groundwater remedy also meets the statutory requirement in that it is still cost-effective and will achieve the remediation goals in a reasonable time frame.

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital and annual O&M costs were estimated and used to develop present-worth costs. In the present-worth cost analysis, annual O&M costs were calculated for the estimated life of each alternative using a 7% discount rate. The estimated present-worth cost of the selected remedy, using a 15-year time interval, is $8.1 million. The estimated present-worth cost of the amended 1994-ROD groundwater remedy, using a 30-year time interval, is $11.7 million.

While both action alternatives will effectively achieve the groundwater cleanup objectives and provide the same degree of protection of human receptors, the selected alternative is the least-costly action alternative and will result in the restoration of water quality in the aquifer much more quickly than the other action alternative (an estimated 15 years as compared to 150 years, respectively). Therefore, EPA believes that the selected remedy is the most cost effective.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in NCP Section 300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. In addition, the selected remedy provides the greatest protection of human health and the environment, provides the greatest long-term effectiveness, is able to achieve the ARARs more quickly, or as quickly, than the other alternatives, and is cost-effective.

The selected remedy will provide a permanent remedy to reduce the toxicity, mobility, and volume of the contaminants in the source area and the groundwater. The amended 1994-ROD groundwater remedy would also provide a permanent remedy to reduce the toxicity, mobility, and volume of the contaminants in the source area and the groundwater, although these aspects of the cleanup would require substantially more time.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied under the selected remedy and under the amended 1994-ROD groundwater remedy in that the source area and the contaminated groundwater will be treated, and treatment will be used to reduce the toxicity, mobility, and volume of contamination and achieve cleanup levels.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted at least every five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

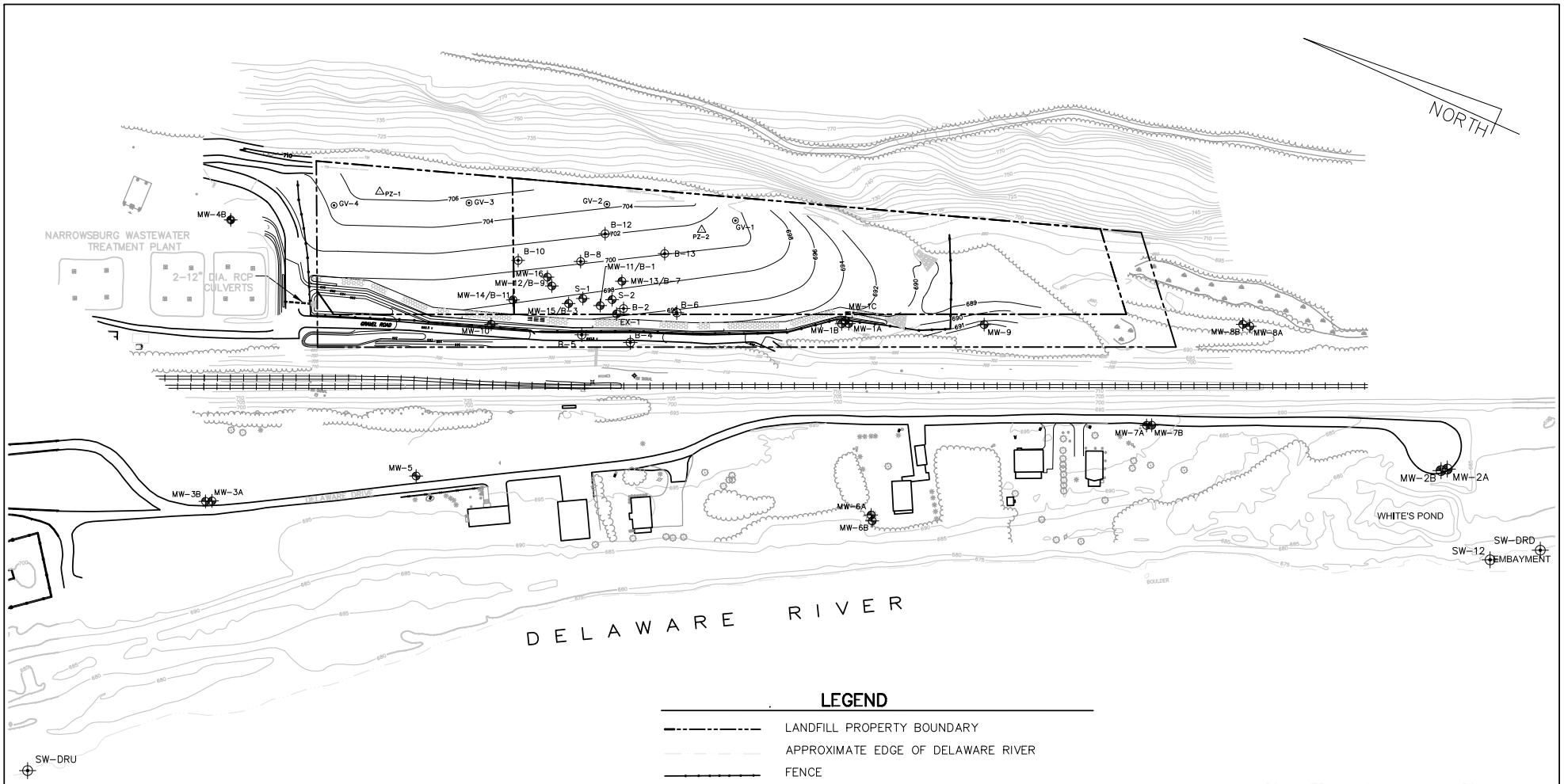
DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan, released for public comment on August 13, 2010, identified Alternative 3, in-situ source-area treatment and downgradient MNA, as the preferred source-area and groundwater remedy. Based upon its review of the written and oral comments submitted during the public comment period, EPA has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary or appropriate.

CORTESE LANDFILL SUPERFUND SITE
2010 ROD/ROD AMENDMENT

APPENDIX I

FIGURES



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

150 75 0 150

SCALE: 1" = 150'

NOTES

1.) ALL COORDINATES SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN DATUM 1983 (NAD 83) AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF N 05°05'25" AND E A DISTANCE OF 426,246.03' AS APPLIED TO THE NATIONAL GEODETIC SURVEY DATUM OF 1927 (NAD 27). ALL ELEVATIONS SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN VERTICAL DATUM OF 1988, AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF -0.5479' AS APPLIED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

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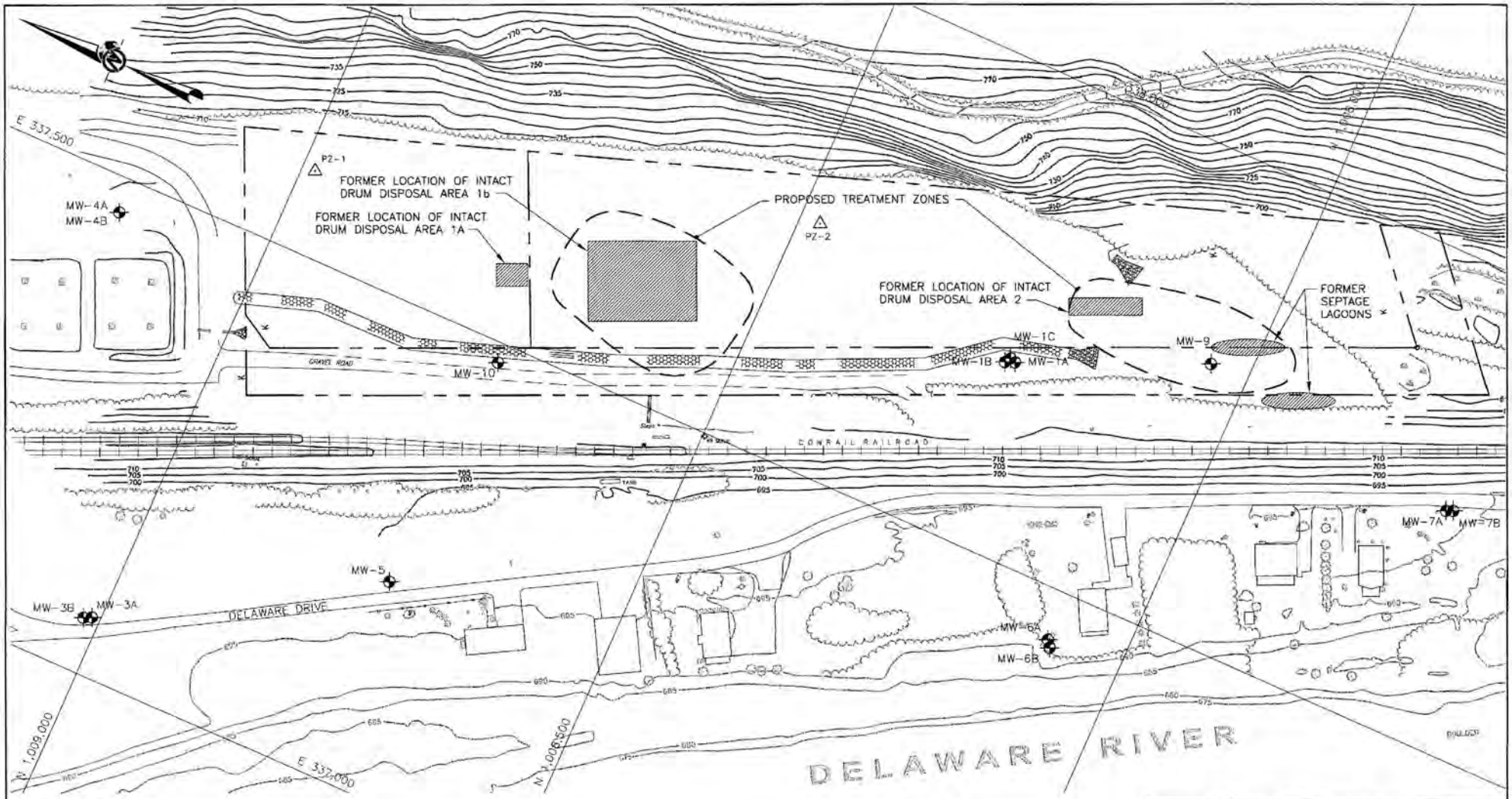
3.) REFERENCE: DRAWING DEVELOPED FROM FIGURE 2, "SITE PLAN" OF THE SOURCE CHARACTERIZATION REPORT BY GOLDER ASSOCIATES, INC., DATED 24 JANUARY 2008.

SITE PLAN
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	SEPTEMBER 2010
PROJECT NO.	MR0562
DOCUMENT NO.	
FILE NO.	0562f351
FIGURE NO.	1



LEGEND

- LANDFILL PROPERTY BOUNDARY
- 750 — TOPOGRAPHIC CONTOUR
- MW-10 — MONITORING WELL
- PZ-1 — PIEZOMETER

100 0 100
SCALE FEET

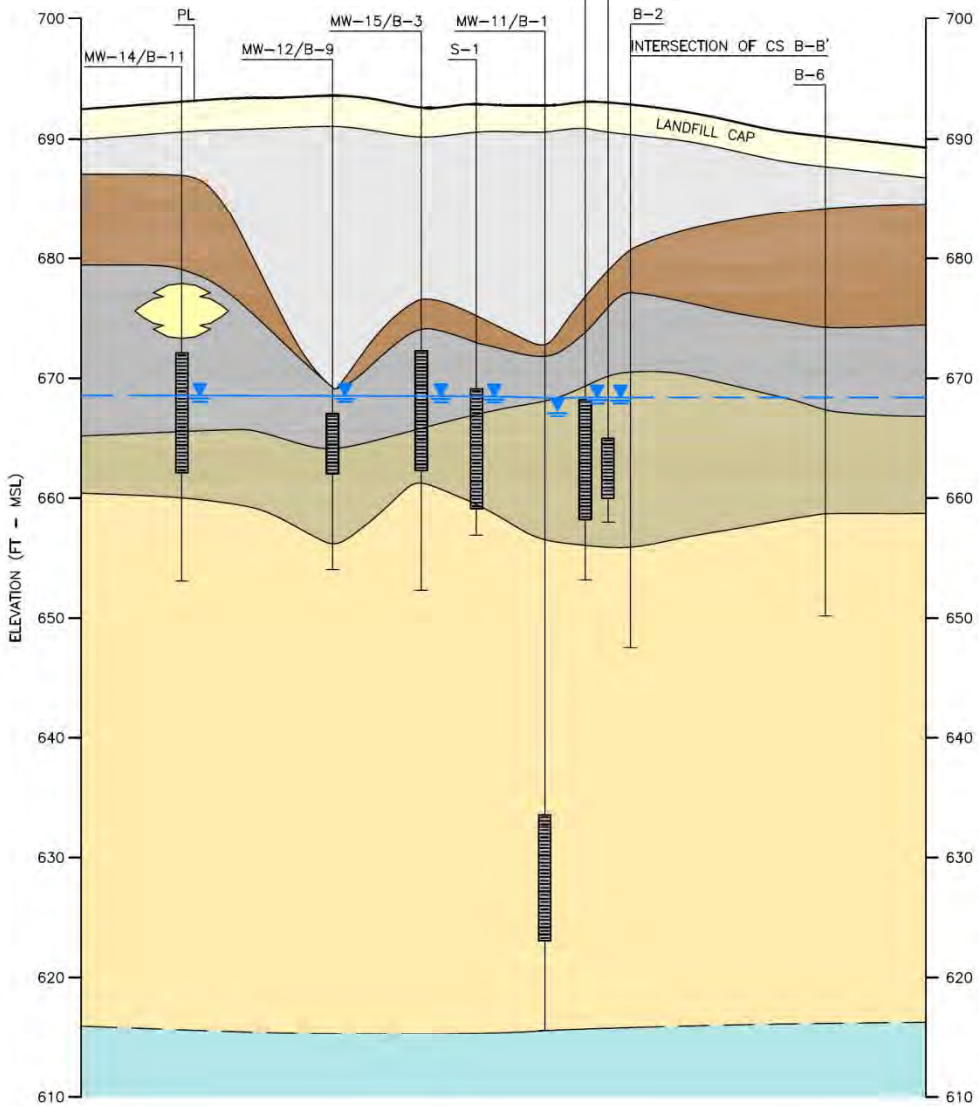
NOTES

REFERENCE: FIGURE DEVELOPED FROM FIGURE 4A OF THE SHALLOW GROUNDWATER HOT SPOT INVESTIGATION, REMEDIAL WORK ELEMENT II, CORTESE LANDFILL SITE, NARROWSBURG, NEW YORK (GOLDER ASSOCIATES, INC.; 2001).

FORMER SOURCE AREAS
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	SEPTEMBER 2010
PROJECT NO.	MR0562
DOCUMENT NO.	
FILE NO.	0562f352 (2)
FIGURE NO.	2



LEGEND

B-6 — BORING/MONITORING WELL IDENTIFICATION

SCREEN INTERVAL

LANDFILL CAP

SAND / SILT FILL
REDDISH-BROWN SILTY FINE SAND AND SILT FILL

WASTE

UPPER SAND AND GRAVEL UNIT

SAND
BROWN TO GRAY SILTY, GRAVELLY, FINE TO COARSE SAND

SILT AND GRAVEL
BROWN TO LIGHT BROWN SANDY SILT AND GRAVEL

SAND AND GRAVEL
BROWN TO GREENISH GRAY SILTY, FINE TO COARSE SAND AND FINE TO COARSE GRAVEL

SAND AND SILT
BROWN TO GREENISH GRAY FINE TO MEDIUM SAND AND SILT. SMALLSCALE, DISCONTINUOUS FACIES OF GRAVEL ARE ALSO PRESENT IN THIS UNIT BUT NOT SHOWN

BEDROCK

GROUNDWATER TABLE (DASHED WHERE INFERRED)

GROUNDWATER ELEVATION IN MONITORING WELLS – OCTOBER 18, 2007 (SEE NOTE 4)

50 0 50
HORIZONTAL SCALE FEET
10 0 10
VERTICAL SCALE FEET
5X = VERTICAL EXAGGERATION

NOTES

1.) EX-1 (INSTALLED AUGUST 2003), S-1 AND S-2 (INSTALLED MAY 2004) WERE ADVANCED USING HOLLOW STEM AUGER DRILLING TECHNIQUES, THE BORING LOGS FOR THESE WELLS WERE NOT USED IN THE DEVELOPMENT OF THE CROSS-SECTION.

2.) ALL OTHER BORINGS/MONITORING WELLS (INSTALLED IN SEPTEMBER 2007) WERE ADVANCED USING ROTO-SONIC DRILLING TECHNIQUES.

3.) ALL EXISTING MONITORING WELLS AND ALL SOIL BORINGS COMPLETED IN SEPTEMBER AND OCTOBER 2007, WERE (RE)SURVEYED BY TECTONIC ENGINEERING OF MOUNTAINVILLE, NY. THESE LOCATIONS AND ELEVATIONS WERE TIED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83) AND NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) UTILIZING GLOBAL POSITIONING SYSTEM (GPS) DATA. MINOR DISCREPANCIES NOTED BETWEEN PREVIOUS SURVEYS NAD 83 DATA AND THE NEW SURVEY NAD 83 DATA WERE RESOLVED BY ADJUSTING KNOWN FIXED POINTS FROM BOTH SETS OF DATA UNTIL THEY WERE ALIGNED. DISCREPANCIES WERE ALSO NOTED BETWEEN PREVIOUS SURVEYS NAVD 88 DATA AND THE NEW SURVEY NAVD 88 DATA. THE NEW SURVEY NAVD 88 DATA WAS USED TO DEVELOP THE GEOLOGIC CROSS SECTIONS IN THIS REPORT.

4.) COMPREHENSIVE GROUNDWATER ELEVATION DATA WILL BE PRESENTED IN THE FORTHCOMING 2007 ANNUAL OPERATIONS AND MAINTENANCE (O & M) REPORT.

N/ Authorization: #24GA2802910

Golder Associates
Philadelphia USA

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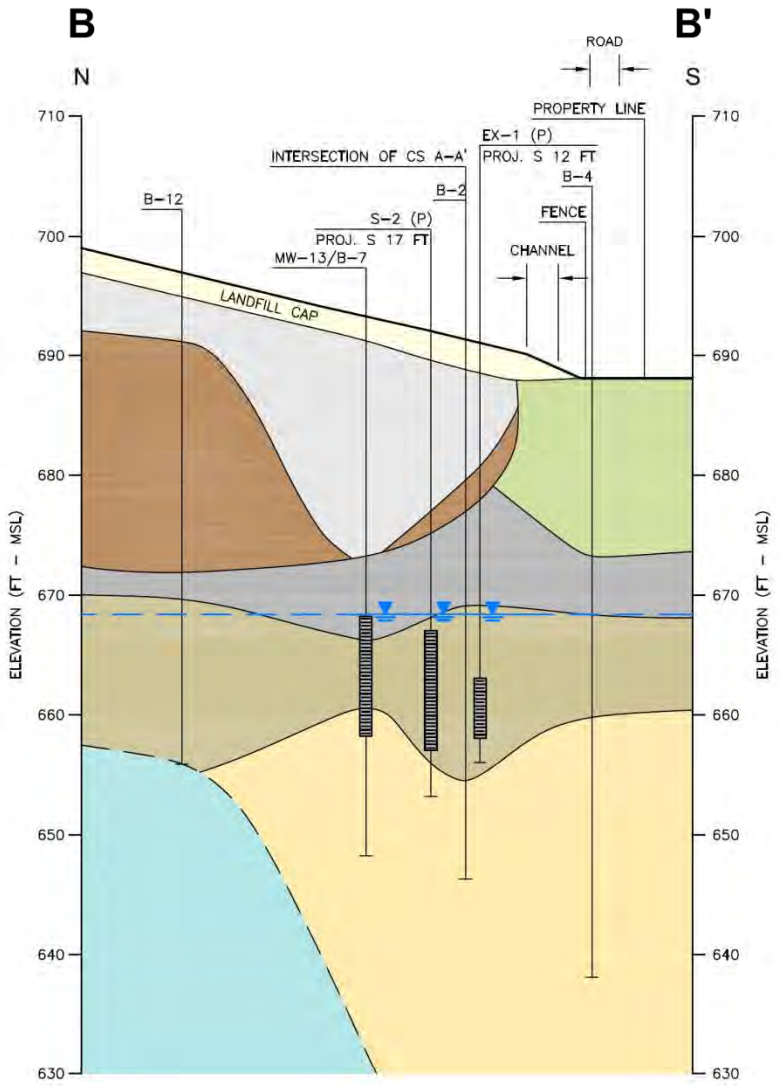
PROJECT No.	953-6252 REV. 0	DATE	01/24/08
		DESIGN	MS
		CADD	AM
		CHECK	KFM
		REVIEW	MMM

TITLE

HYDROGEOLOGIC CROSS SECTION A-A'

CORTESE LANDFILL PRP GROUP

FIGURE 3A



LEGEND

B-6 — BORING/MONITORING WELL IDENTIFICATION

SCREEN INTERVAL

LANDFILL CAP

SAND / SILT FILL
REDDISH-BROWN SILTY FINE SAND AND SILT FILL

WASTE

SILT
REDDISH-BROWN SANDY, CLAYEY SILT

UPPER SAND AND GRAVEL UNIT

SAND
BROWN TO GRAY SILTY, GRAVELLY, FINE TO COARSE SAND

SILT AND GRAVEL
BROWN TO LIGHT BROWN SANDY SILT AND GRAVEL

SAND AND GRAVEL
BROWN TO GREENISH GRAY SILTY, FINE TO COARSE SAND AND FINE TO COARSE GRAVEL

SAND AND SILT
BROWN TO GREENISH GRAY FINE TO MEDIUM SAND AND SILT. SMALLSCALE, DISCONTINUOUS FACIES OF GRAVEL ARE ALSO PRESENT IN THIS UNIT BUT NOT SHOWN

BEDROCK

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GROUNDWATER ELEVATION IN MONITORING WELLS – OCTOBER 18, 2007 (SEE NOTE 4)

50 0 50
HORIZONTAL SCALE FEET

10 0 10
VERTICAL SCALE FEET

5X = VERTICAL EXAGGERATION

NOTES

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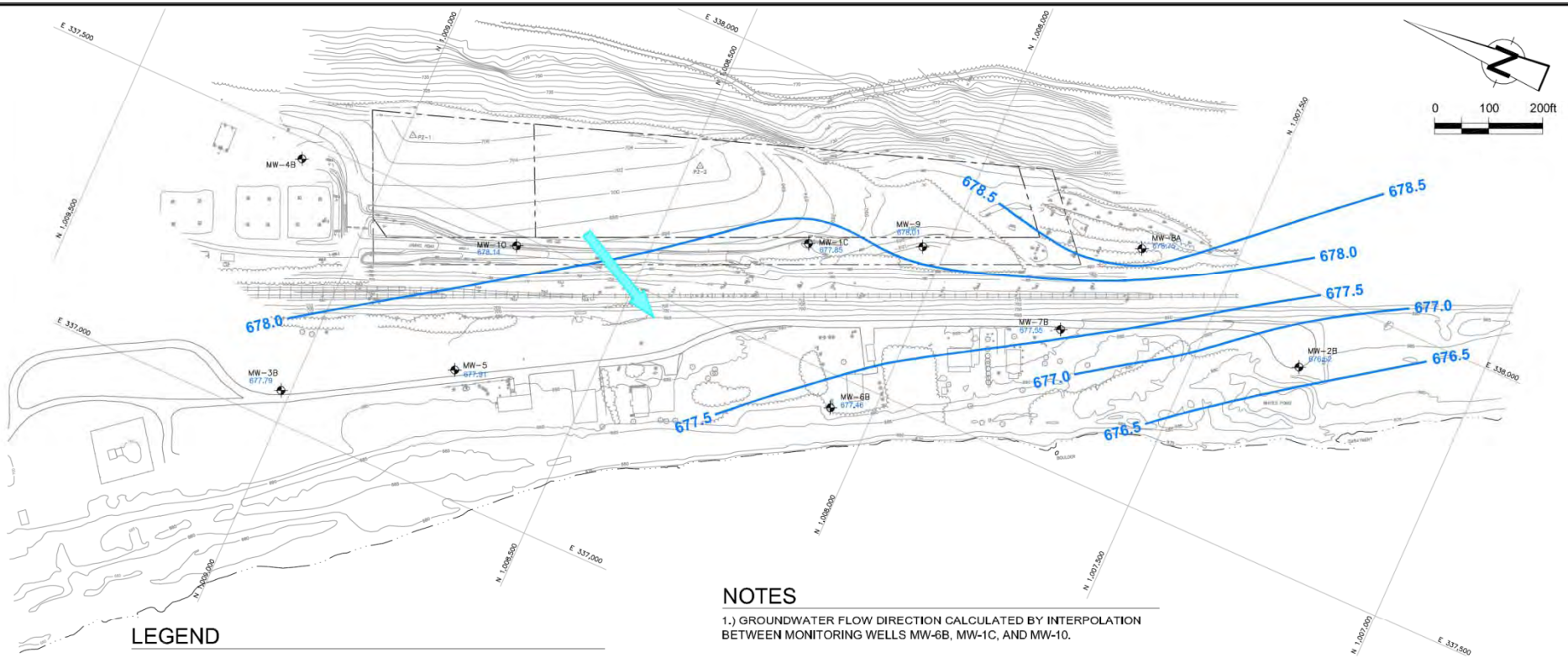

LEGEND

- LANDFILL PROPERTY BOUNDARY
- 704 — TOP OF FINAL COVER CONTOUR
- 750 — EXISTING TOPOGRAPHIC CONTOUR
- APPROXIMATE EDGE OF DELAWARE RIVER
- 675.0 — GROUNDWATER ELEVATION CONTOUR
- 673.9 — MEASURED GROUNDWATER ELEVATION (FEET)
- MW-10 — MONITORING WELL
- PZ-1 — PIEZOMETER
- EXISTING SPOT ELEVATION
- PREDOMINANT DIRECTION OF SHALLOW GROUNDWATER FLOW DOWNGRADIENT FROM FORMER INTACT DRUM DISPOSAL AREA IB (SEE NOTE 1)

NOTES

1.) GROUNDWATER FLOW DIRECTION CALCULATED BY INTERPOLATION BETWEEN MONITORING WELLS MW-6B, MW-1C, AND MW-10.

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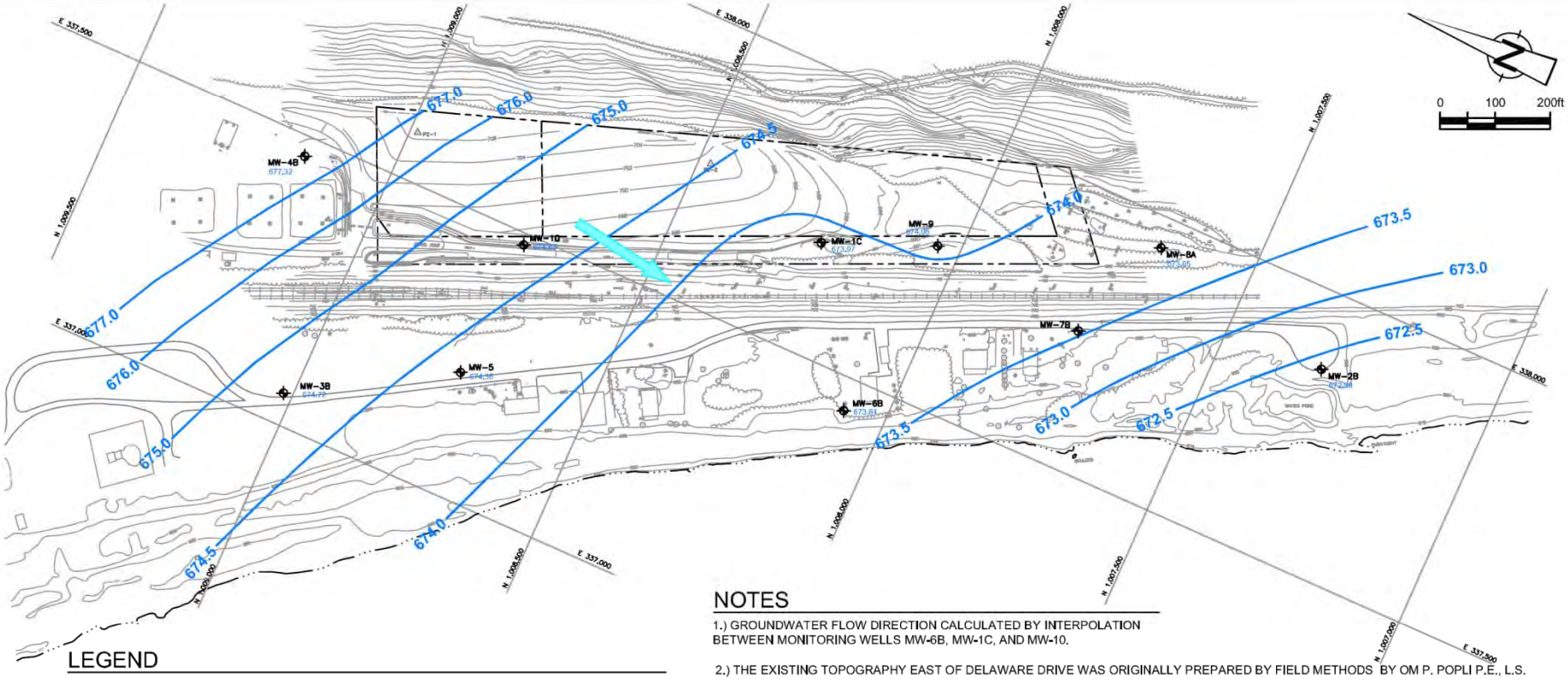
3.) TOPOGRAPHY AND SURFACE FEATURES BETWEEN DELAWARE DRIVE AND THE DELAWARE RIVER WERE DIGITIZED FROM AN ELECTRONICALLY SCANNED FILE OF THE TOPOGRAPHIC BASE MAP PREPARED BY ROBINSON AERIAL SURVEYS, INC., BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPH TAKEN APRIL 18, 1985.

4.) LANDFILL PROPERTY BOUNDARY TAKEN FROM BASELINE-PROPERTY BOUNDARY-CONTROL, CORTESE LANDFILL SITE, TOWN OF TUSTEN, SULLIVAN COUNTY, NY, MAY 7, 1985, BY GARY PARKER, P.L.S.

SOURCES:
GOLDER, PROJECT NO. 953-6252, FILE NO. 9536252A004, 09/07/01.

figure **4A**

APRIL 1997 POST-ROD HIGH GROUNDWATER CONDITIONS
CORTESE LANDFILL
Narrowsburg, New York



LEGEND

- LANDFILL PROPERTY BOUNDARY
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- 750 — EXISTING TOPOGRAPHIC CONTOUR
- APPROXIMATE EDGE OF DELAWARE RIVER
- 675.0 — GROUNDWATER ELEVATION CONTOUR
- 673.9 — MEASURED GROUNDWATER ELEVATION (FEET)
- MW-10 — MONITORING WELL
- PZ-1 — PIEZOMETER
- EXISTING SPOT ELEVATION
- PREDOMINANT DIRECTION OF SHALLOW GROUNDWATER FLOW DOWNGRADIENT FROM FORMER INTACT DRUM DISPOSAL AREA IB (SEE NOTE 1)

NOTES

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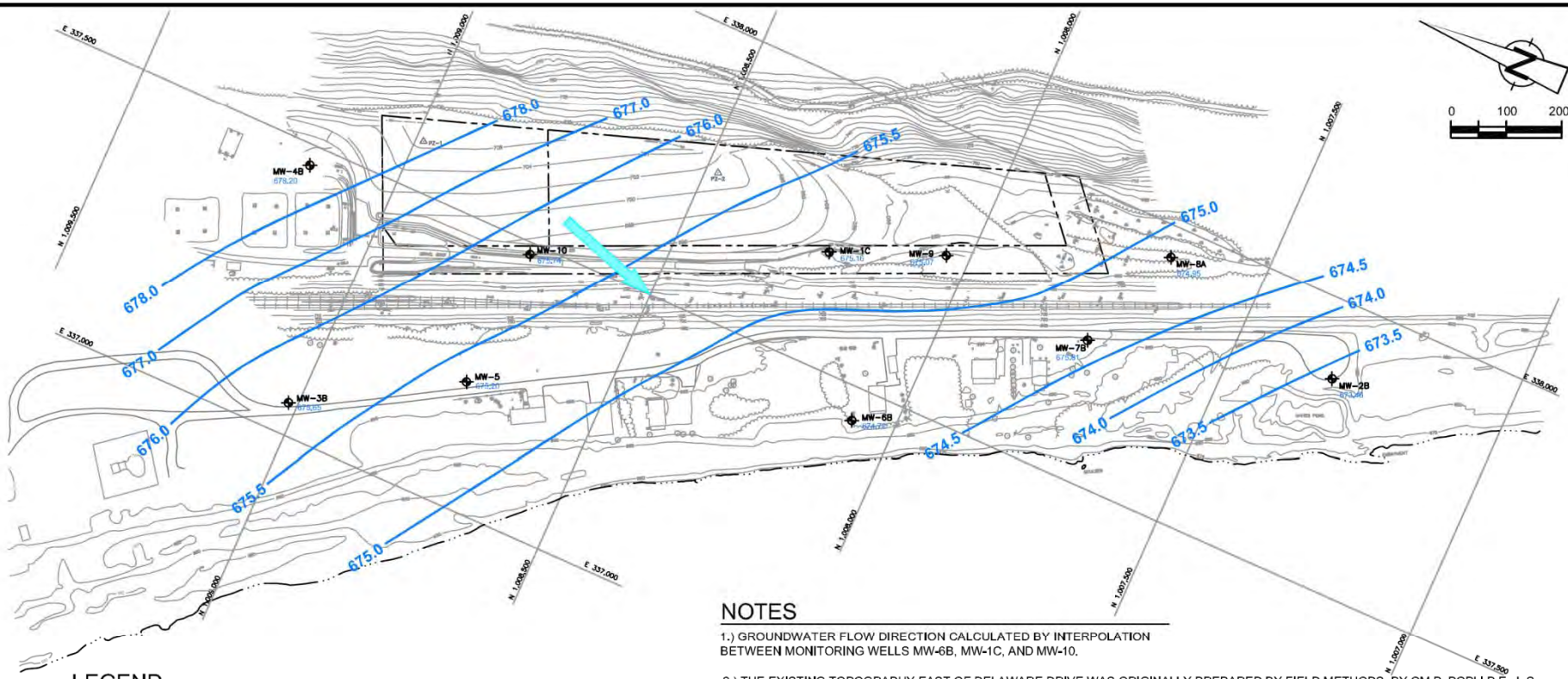
SOURCES:
GOLDER, PROJECT NO. 953-6252, FILE NO. 9536252A004, 09/07/01.

figure **4B**

JULY 2001 POST-ROD LOW GROUNDWATER CONDITIONS
CORTESE LANDFILL
Narrowsburg, New York



LEGEND

- LANDFILL PROPERTY BOUNDARY
- 704 — TOP OF FINAL COVER CONTOUR
- 750 — EXISTING TOPOGRAPHIC CONTOUR
- APPROXIMATE EDGE OF DELAWARE RIVER
- 675.0 — GROUNDWATER ELEVATION CONTOUR
- 673.9 — MEASURED GROUNDWATER ELEVATION (FEET)
- MW-10 — MONITORING WELL
- PZ-1 — PIEZOMETER
- 687.0 — EXISTING SPOT ELEVATION
- PREDOMINANT DIRECTION OF SHALLOW GROUNDWATER FLOW DOWNGRADIENT FROM FORMER INTACT DRUM DISPOSAL AREA IB (SEE NOTE 1)

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SOURCES:
GOLDER, PROJECT NO. 953-6252, FILE NO. 9536252A004, 09/07/01.

figure **4C**

AUGUST 2003 GROUNDWATER TABLE ELEVATION
CORTESE LANDFILL
Narrowsburg, New York

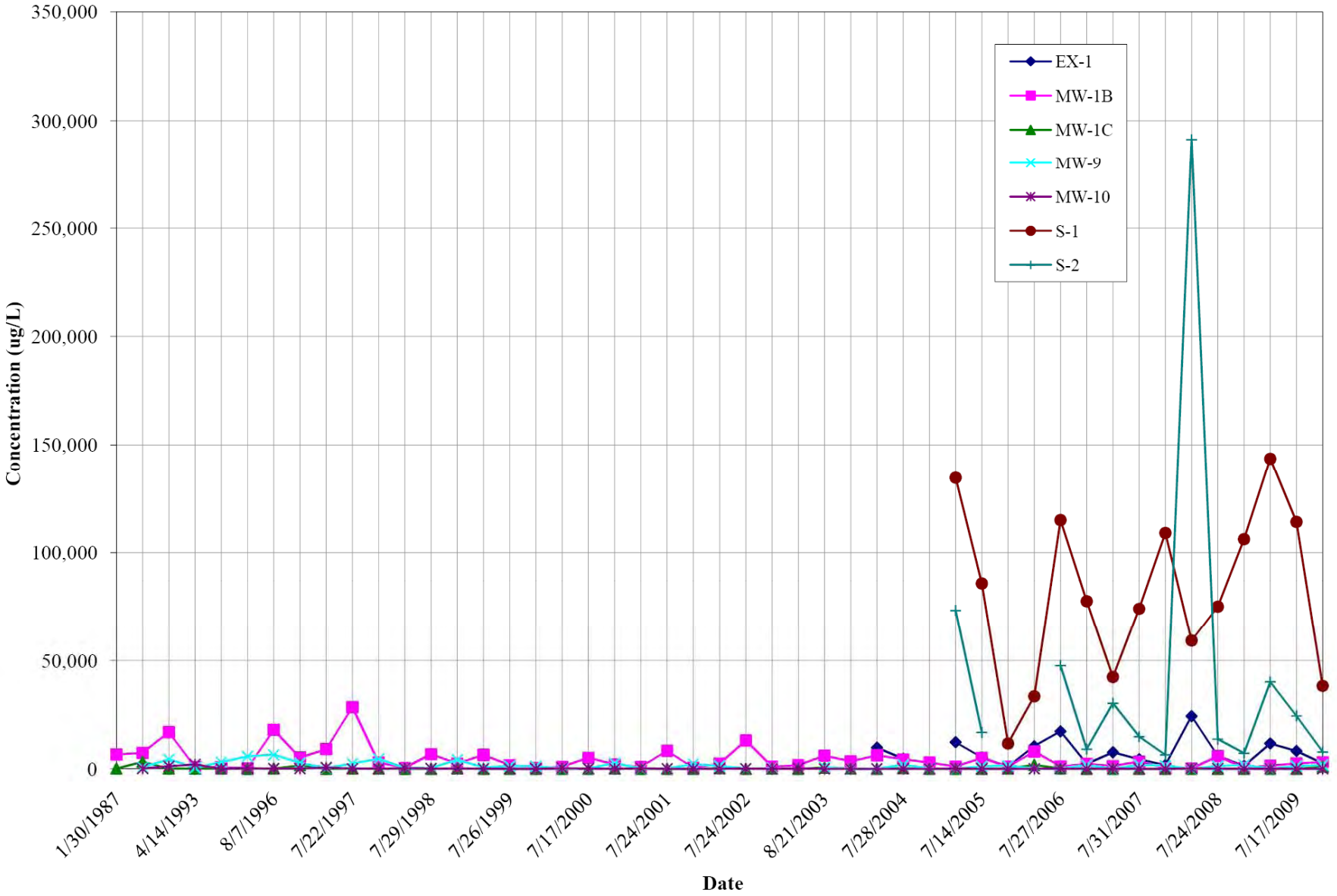
Geosyntec Consultants

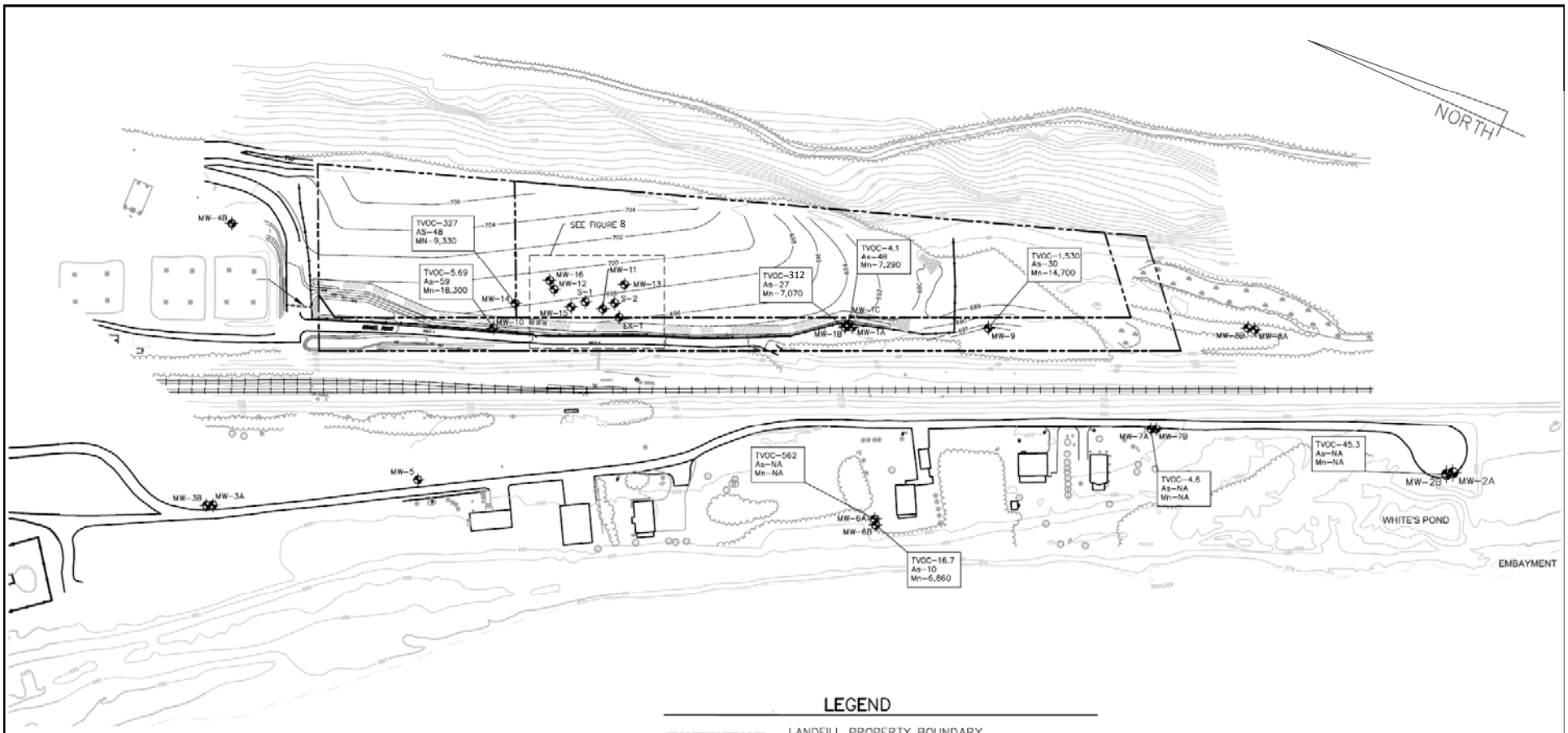
Figure 5

Total VOC Concentration Trends - Source Area Wells

Cortese Landfill Site

Narrowsburg, NY





LEGEND

- LANDFILL PROPERTY BOUNDARY
- APPROXIMATE EDGE OF DELAWARE RIVER
- FENCE
- LANDFILL COVER ELEVATION CONTOUR
- PRE-EXISTING TOPOGRAPHY ELEVATION CONTOUR
- MW-10 MONITORING WELL

150 75 0 150

SCALE: 1" = 150'

NOTES

1.) ALL COORDINATES SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN DATUM 1983 (NAD 83) AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF N 05°05'25" AND E A DISTANCE OF 426,246.03' AS APPLIED TO THE NATIONAL GEODETIC SURVEY DATUM OF 1927 (NAD 27). ALL ELEVATIONS SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN VERTICAL DATUM OF 1988, AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF -0.5479' AS APPLIED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

2.) TOPOGRAPHY AND SURFACE FEATURES EAST OF DELAWARE DRIVE WERE ORIGINALLY PREPARED BY FIELD METHODS BY OM P. POPLI P.E., L.S. P.C. CONSULTING ENGINEERS & SURVEYORS, ROCHESTER, NEW YORK, MARCH 1995. TOPOGRAPHY CHANGES SINCE MARCH 1995 PREPARED BY ENVIRONMENTAL RESEARCH, INC. ON DECEMBER 12, 1996. PROPERTY LINES EAST OF DELAWARE DRIVE WERE DETERMINED FROM A SURVEY MAP ENTITLED "CORTESE LAND FILL SITE" DATED MAY 7, 1985, PREPARED BY GARY PACKER, P.L.S. AND "TAX MAP, TOWN OF TUSTEN, SULLIVAN COUNTY, NY," DATED 11/20/92. LANDFILL PROPERTY BOUNDARY TAKEN FROM BASELINE-PROPERTY BOUNDARY-CONTROL, CORTESE LANDFILL SITE, TOWN OF TUSTEN, SULLIVAN COUNTY, NY, MAY 7, 1985, BY GARY PARKER, P.L.S. TOPOGRAPHY AND SURFACE FEATURES WEST OF DELAWARE DRIVE WERE DIGITIZED FROM AN ELECTRONICALLY SCANNED FILE OF THE TOPOGRAPHIC BASE MAP PREPARED BY ROBINSON AERIAL SURVEYS, INC., BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPH TAKEN APRIL 18, 1985.

3.) REFERENCE: DRAWING DEVELOPED FROM FIGURE 2, "SITE PLAN" OF THE SOURCE CHARACTERIZATION REPORT BY GOLDER ASSOCIATES, INC., DATED 24 JANUARY 2008.

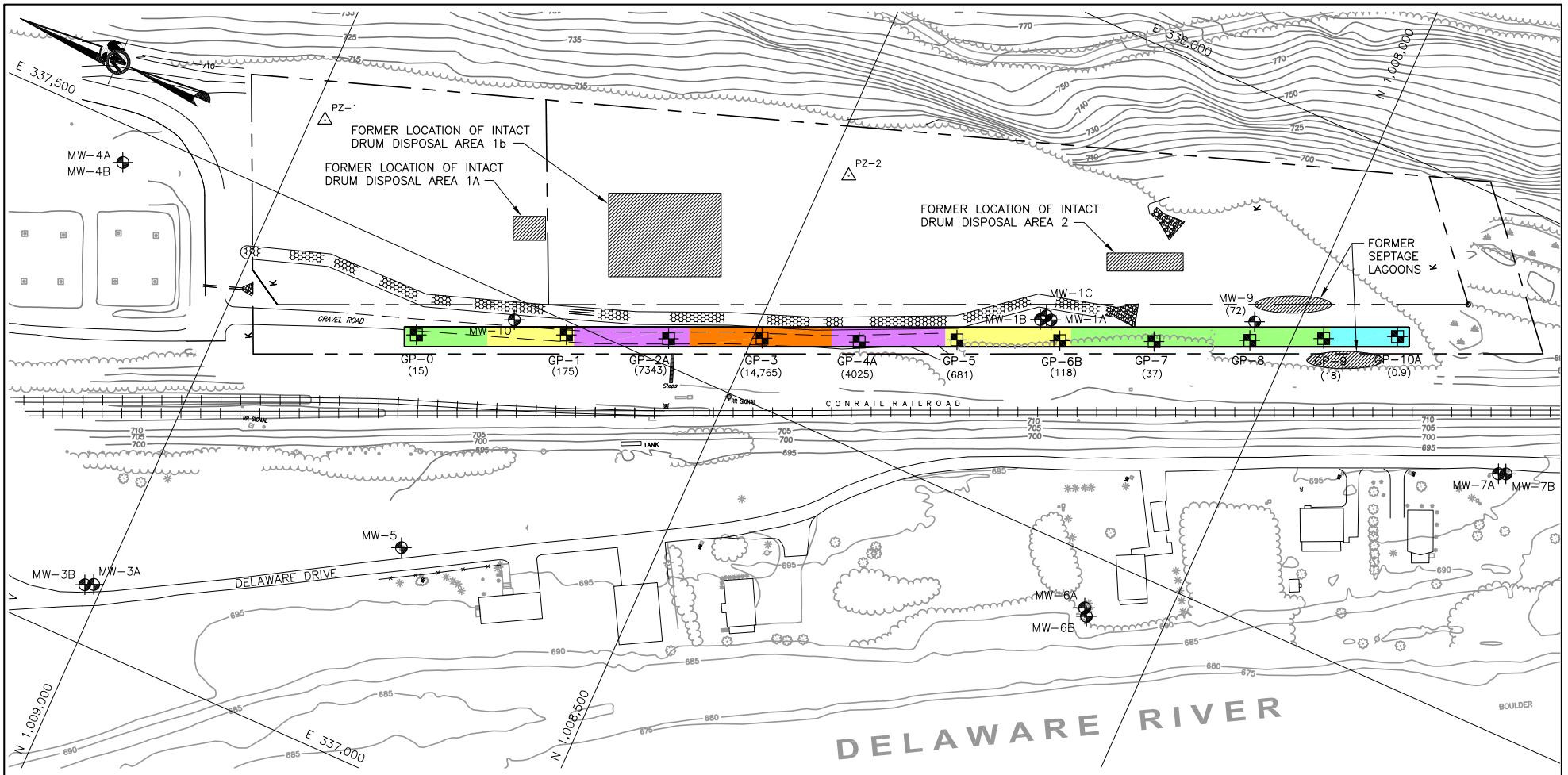
4.) REFERENCE: DATA FROM 2007 ANNUAL OPERATION AND MAINTENANCE REPORT BY GOLDER ASSOCIATES, INC., DATED MAY 2008.

5.) RESULTS ARE IN MICROGRAMS PER LITER (ug/L); TVOC-TOTAL VOLATILE ORGANIC COMPOUNDS; As-ARSENIC; Mn-MANGANESE; NA-NOT ANALYZED.

SITEWIDE GROUNDWATER DETECTIONS-OCTOBER 2007
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	SEPTEMBER 2010
PROJECT NO.	MR0562
DOCUMENT NO.	
FILE NO.	0562f353
FIGURE NO.	6



LEGEND

- LANDFILL PROPERTY BOUNDARY
- 750 TOPOGRAPHIC CONTOUR
- MW-10 MONITORING WELL
- PZ-1 PIEZOMETER
- GP-1 GEOPROBE BOREHOLE
- (15.23) TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATION (µg/L)

- < 10 µg/L
- 11 µg/L to 100 µg/L
- 101 µg/L to 1000 µg/L
- 1001 µg/L to 10,000 µg/L
- > 10,001 µg/L

100 0 100
SCALE FEET

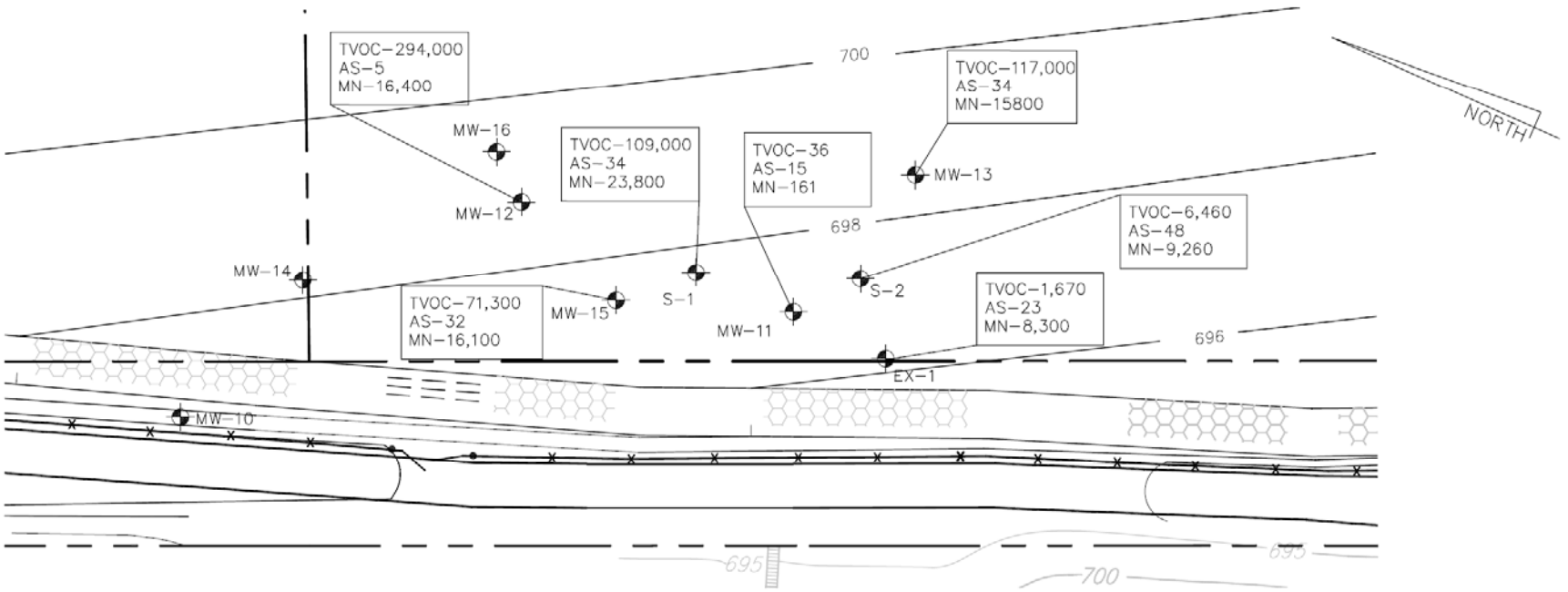
NOTES

REFERENCE: FIGURE TAKEN FROM FIGURE 4A OF THE SHALLOW GROUNDWATER HOT SPOT INVESTIGATION, REMEDIAL WORK ELEMENT II, CORTESE LANDFILL SITE, NARROWSBURG, NEW YORK (GOLDER ASSOCIATES, INC.; 2001).

TOTAL GROUNDWATER VOC PROFILE
SHALLOW/MIDDLE ZONE
UPPER SAND AND GRAVEL UNIT

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	MAY 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f253-7
FIGURE NO.	7



NOTES

1.) ALL COORDINATES SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN DATUM 1983 (NAD 83) AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF N 05°05'25" AND E A DISTANCE OF 426,246.03' AS APPLIED TO THE NATIONAL GEODETIC SURVEY DATUM OF 1927 (NAD 27). ALL ELEVATIONS SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN VERTICAL DATUM OF 1988, AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF –0.5479' AS APPLIED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

2.) TOPOGRAPHY AND SURFACE FEATURES EAST OF DELAWARE DRIVE WERE ORIGINALLY PREPARED BY FIELD METHODS BY OM P. POPLI P.E., L.S. P.C. CONSULTING ENGINEERS & SURVEYORS, ROCHESTER, NEW YORK, MARCH 1995. TOPOGRAPHY CHANGES SINCE MARCH 1995 PREPARED BY ENVIRONMENTAL RESEARCH, INC. ON DECEMBER 12, 1996. PROPERTY LINES EAST OF DELAWARE DRIVE WERE DETERMINED FROM A SURVEY MAP ENTITLED "CORTESE LAND FILL SITE" DATED MAY 7, 1985, PREPARED BY GARY PACKER, P.L.S. AND "TAX MAP, TOWN OF TUSTEN, SULLIVAN COUNTY, NY," DATED 11/20/92. LANDFILL PROPERTY BOUNDARY TAKEN FROM BASELINE–PROPERTY BOUNDARY–CONTROL, CORTESE LANDFILL SITE, TOWN OF TUSTEN, SULLIVAN COUNTY, NY, MAY 7, 1985, BY GARY PARKER, P.L.S. TOPOGRAPHY AND SURFACE FEATURES WEST OF DELAWARE DRIVE WERE DIGITIZED FROM AN ELECTRONICALLY SCANNED FILE OF THE TOPOGRAPHIC BASE MAP PREPARED BY ROBINSON AERIAL SURVEYS, INC., BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPH TAKEN APRIL 18, 1985.

3.) REFERENCE: DRAWING DEVELOPED FROM FIGURE 2, "SITE PLAN" OF THE SOURCE CHARACTERIZATION REPORT BY GOLDER ASSOCIATES, INC., DATED 24 JANUARY 2008.

4.) REFERENCE: DATA FROM 2007 ANNUAL OPERATION AND MAINTENANCE REPORT BY GOLDER ASSOCIATES, INC., DATED MAY 2008.

5.) RESULTS ARE IN MICROGRAMS PER LITER (ug/L); TVOC–TOTAL VOLATILE ORGANIC COMPOUNDS; As–ARSENIC; Mn–MANGANESE.

LEGEND

- LANDFILL PROPERTY BOUNDARY
- APPROXIMATE EDGE OF DELAWARE RIVER
- FENCE
- LANDFILL COVER ELEVATION CONTOUR
- PRE–EXISTING TOPOGRAPHY ELEVATION CONTOUR
- MW–10 MONITORING WELL

150 75 0 150

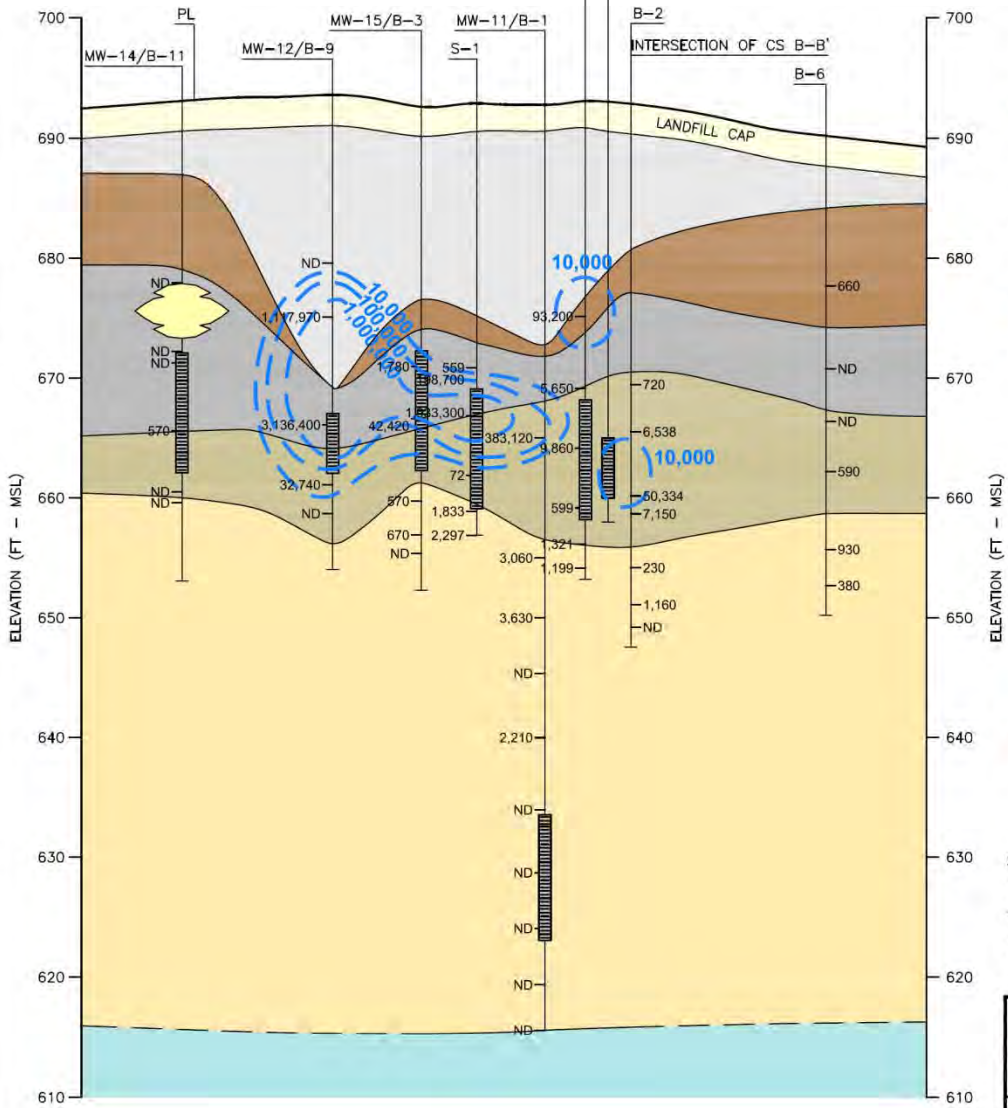
SCALE: 1" = 150'

SOURCE AREA GROUNDWATER DETECTIONS–OCTOBER 2007

CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	SEPTEMBER 2010
PROJECT NO.	MR0562
DOCUMENT NO.	
FILE NO.	0562f354
FIGURE NO.	8



LEGEND

- B-6 — BORING/MONITORING WELL IDENTIFICATION
- SCREEN INTERVAL
- —10,000— TOTAL DETECTED VOCs ISOCONCENTRATION CONTOUR (ug/kg)
- 675.2 TOTAL DETECTED VOCs (ug/kg) – MOBILE LAB RESULTS
- **LANDFILL CAP**
- **SAND / SILT FILL** — REDDISH-BROWN SILTY FINE SAND AND SILT FILL
- **WASTE**

UPPER SAND AND GRAVEL UNIT

- **SAND** — BROWN TO GRAY SILTY, GRAVELLY, FINE TO COARSE SAND
- **SILT AND GRAVEL** — BROWN TO LIGHT BROWN SANDY SILT AND GRAVEL
- **SAND AND GRAVEL** — BROWN TO GREENISH GRAY SILTY, FINE TO COARSE SAND AND FINE TO COARSE GRAVEL
- **SAND AND SILT** — BROWN TO GREENISH GRAY FINE TO MEDIUM SAND AND SILT. SMALLSCALE, DISCONTINUOUS FACIES OF GRAVEL ARE ALSO PRESENT IN THIS UNIT BUT NOT SHOWN
- **BEDROCK**

50 0 50
HORIZONTAL SCALE FEET
10 0 10
VERTICAL SCALE FEET
5X = VERTICAL EXAGGERATION

NOTES

1.) EX-1 (INSTALLED AUGUST 2003), S-1 AND S-2 (INSTALLED MAY 2004) WERE ADVANCED USING HOLLOW STEM AUGER DRILLING TECHNIQUES, THE BORING LOGS FOR THESE WELLS WERE NOT USED IN THE DEVELOPMENT OF THE CROSS-SECTION.

2.) ALL OTHER BORINGS/MONITORING WELLS (INSTALLED IN SEPTEMBER 2007) WERE ADVANCED USING ROTO-SONIC DRILLING TECHNIQUES.

3.) ALL EXISTING MONITORING WELLS AND ALL SOIL BORINGS COMPLETED IN SEPTEMBER AND OCTOBER 2007, WERE (RE)SURVEYED BY TECTONIC ENGINEERING OF MOUNTAINVILLE, NY. THESE LOCATIONS AND ELEVATIONS WERE TIED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83) AND NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) UTILIZING GLOBAL POSITIONING SYSTEM (GPS) DATA. MINOR DISCREPANCIES NOTED BETWEEN PREVIOUS SURVEYS NAD 83 DATA AND THE NEW SURVEY NAD 83 DATA WERE RESOLVED BY ADJUSTING KNOWN FIXED POINTS FROM BOTH SETS OF DATA UNTIL THEY WERE ALIGNED. DISCREPANCIES WERE ALSO NOTED BETWEEN PREVIOUS SURVEYS NAVD 88 DATA AND THE NEW SURVEY NAVD 88 DATA. THE NEW SURVEY NAVD 88 DATA WAS USED TO DEVELOP THE GEOLOGIC CROSS SECTIONS IN THIS REPORT.

Golder Associates
Philadelphia USA
Tel Authorization #24GA28029100

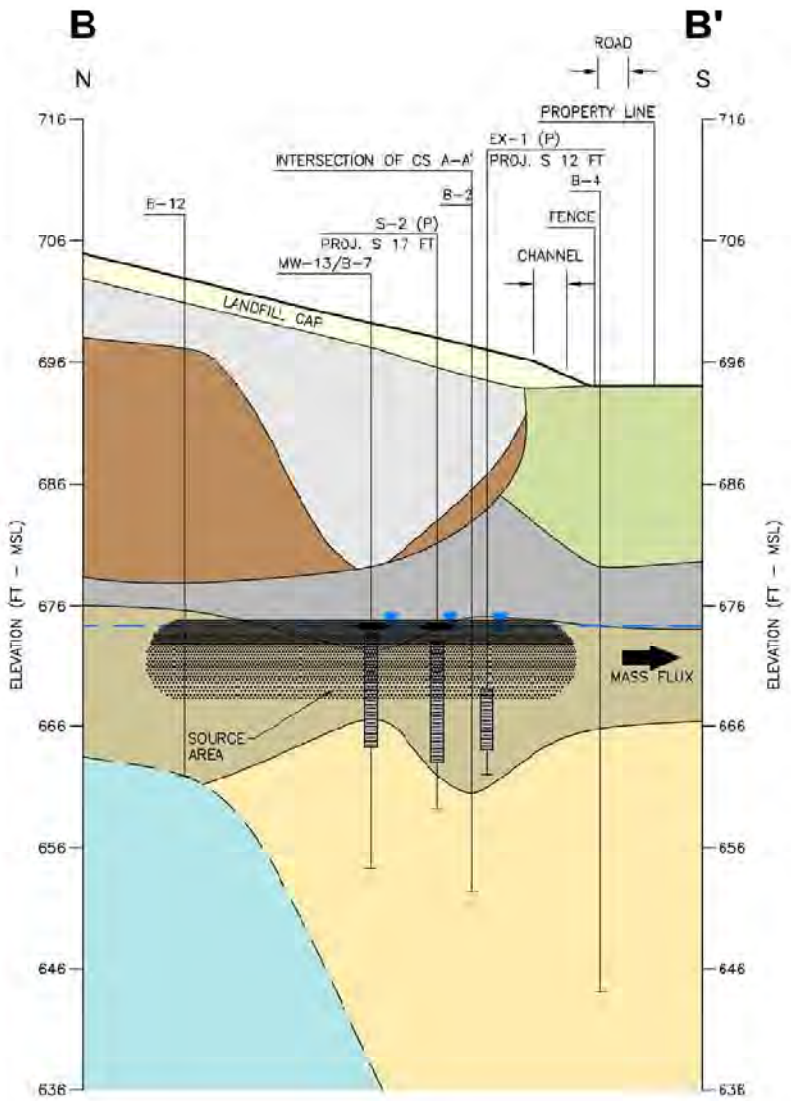
SCALE	AS SHOWN
DATE	01/24/08
DESIGN	MS
CADD	AM
CHECK	KFM
REVIEW	MMM
FILE No.	9536252J002
PROJECT No.	953-6252 REV. 0

TITLE

GEOLOGIC CROSS SECTION A-A' WITH TOTAL DETECTED VOCs

CORTESE LANDFILL PRP GROUP

FIGURE 9



LEGEND

B-6 — BORING/MONITORING WELL IDENTIFICATION

SCREEN INTERVAL

LANDFILL CAP

SAND / SILT FILL
REDDISH-BROWN SILTY FINE SAND AND SILT FILL

WASTE

SILT
REDDISH-BROWN SANDY, CLAYEY SILT

UPPER SAND AND GRAVEL UNIT

SAND
BROWN TO GRAY SILTY, GRAVELLY, FINE TO COARSE SAND

SILT AND GRAVEL
BROWN TO LIGHT BROWN SANDY SILT AND GRAVEL

SAND AND GRAVEL
BROWN TO GREENISH GRAY SILTY, FINE TO COARSE SAND AND FINE TO COARSE GRAVEL

SAND AND SILT
BROWN TO GREENISH GRAY FINE TO MEDIUM SAND AND SILT. SMALLSCALE, DISCONTINUOUS FACIES OF GRAVEL ARE ALSO PRESENT IN THIS UNIT BUT NOT SHOWN

BEDROCK

SMEARZONE ACROSS WATER TABLE SEASONAL HIGH AND LOW

GROUNDWATER TABLE (DASHED WHERE INFERRED)

GROUNDWATER ELEVATION IN MONITORING WELLS – OCTOBER 18, 2007 (SEE NOTE 4)

FT — FEET

MSL — MEAN SEA LEVEL

N — NORTH

S — SOUTH

50 0 50
HORIZONTAL SCALE FEET

10 0 10
VERTICAL SCALE FEET

5X = VERTICAL EXAGGERATION

NOTES

1.) EX-1 (INSTALLED AUGUST 2003), S-1 AND S-2 (INSTALLED MAY 2004) WERE ADVANCED USING HOLLOW STEM AUGER DRILLING TECHNIQUES. THE BORING LOGS FOR THESE WELLS WERE NOT USED IN THE DEVELOPMENT OF THE CROSS-SECTION.

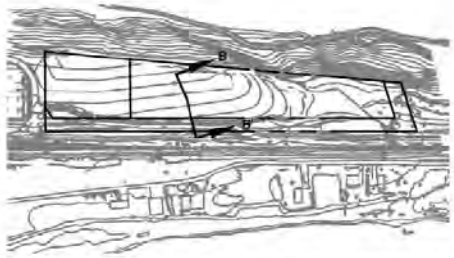
2.) ALL OTHER BORINGS/MONITORING WELLS (INSTALLED IN SEPTEMBER 2007) WERE ADVANCED USING ROTO-SONIC DRILLING TECHNIQUES.

3.) ALL EXISTING MONITORING WELLS AND ALL SOIL BORINGS COMPLETED IN SEPTEMBER AND OCTOBER 2007, WERE (RE)SURVEYED BY TECTONIC ENGINEERING OF MOUNTAINVILLE, NY. THESE LOCATIONS AND ELEVATIONS WERE TIED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83) AND NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) UTILIZING GLOBAL POSITIONING SYSTEM (GPS) DATA. MINOR DISCREPANCIES NOTED BETWEEN PREVIOUS SURVEYS NAD 83 DATA AND THE NEW SURVEY NAD 83 DATA WERE RESOLVED BY ADJUSTING KNOWN FIXED POINTS FROM BOTH SETS OF DATA UNTIL THEY WERE ALIGNED. DISCREPANCIES WERE ALSO NOTED BETWEEN PREVIOUS SURVEYS NAVD 88 DATA AND THE NEW SURVEY NAVD 88 DATA. THE NEW SURVEY NAVD 88 DATA WAS USED TO DEVELOP THE GEOLOGIC CROSS SECTIONS IN THIS REPORT.

4.) REFERENCE: FIGURE TAKEN FROM FIGURE 4B, "HYDROGEOLOGIC CROSS SECTION B-B'," OF THE 2008 SOURCE CHARACTERIZATION REPORT BY GOLDER ASSOCIATES, INC.

5.) VERTICAL AXES WERE ADJUSTED BY 6 FEET DUE TO DISCREPANCIES BETWEEN THE SURVEYED ELEVATIONS AND PREVIOUS SURVEYS DURING THE PHASE III RI INVESTIGATION.

6.) CROSS-SECTION LOCATION SHOWN BELOW

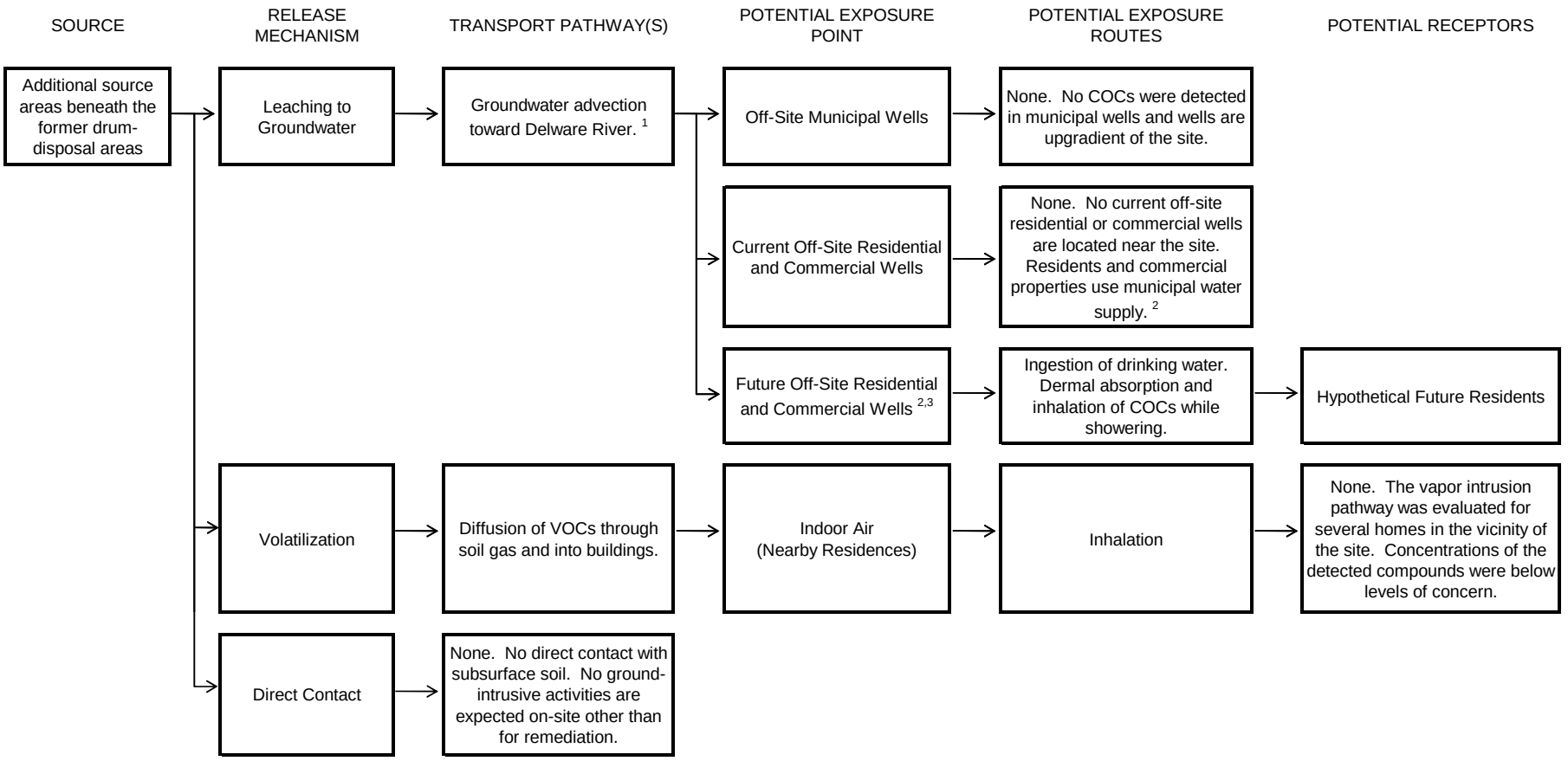


CONCEPTUAL SITE MODEL

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	SEPTEMBER 2010
PROJECT NO.	MR0582
DOCUMENT NO.	
FILE NO.	0582f335
FIGURE NO.	10A

Figure 10B
Conceptual Site Model for Potential Human Exposures
Cortese Landfill Site, Narrowsburg, New York



Notes:

[1] Constituents undergo dilution, dispersion, adsorption, biodegradation, and volatilization along the groundwater transport pathway.

[2] Deed restrictions prohibit drilling and groundwater use for purposes other than environmental monitoring at and downgradient from the landfill; therefore, there are not groundwater exposure points (e.g., supply wells) for current of future nearby residents or commercial properties.

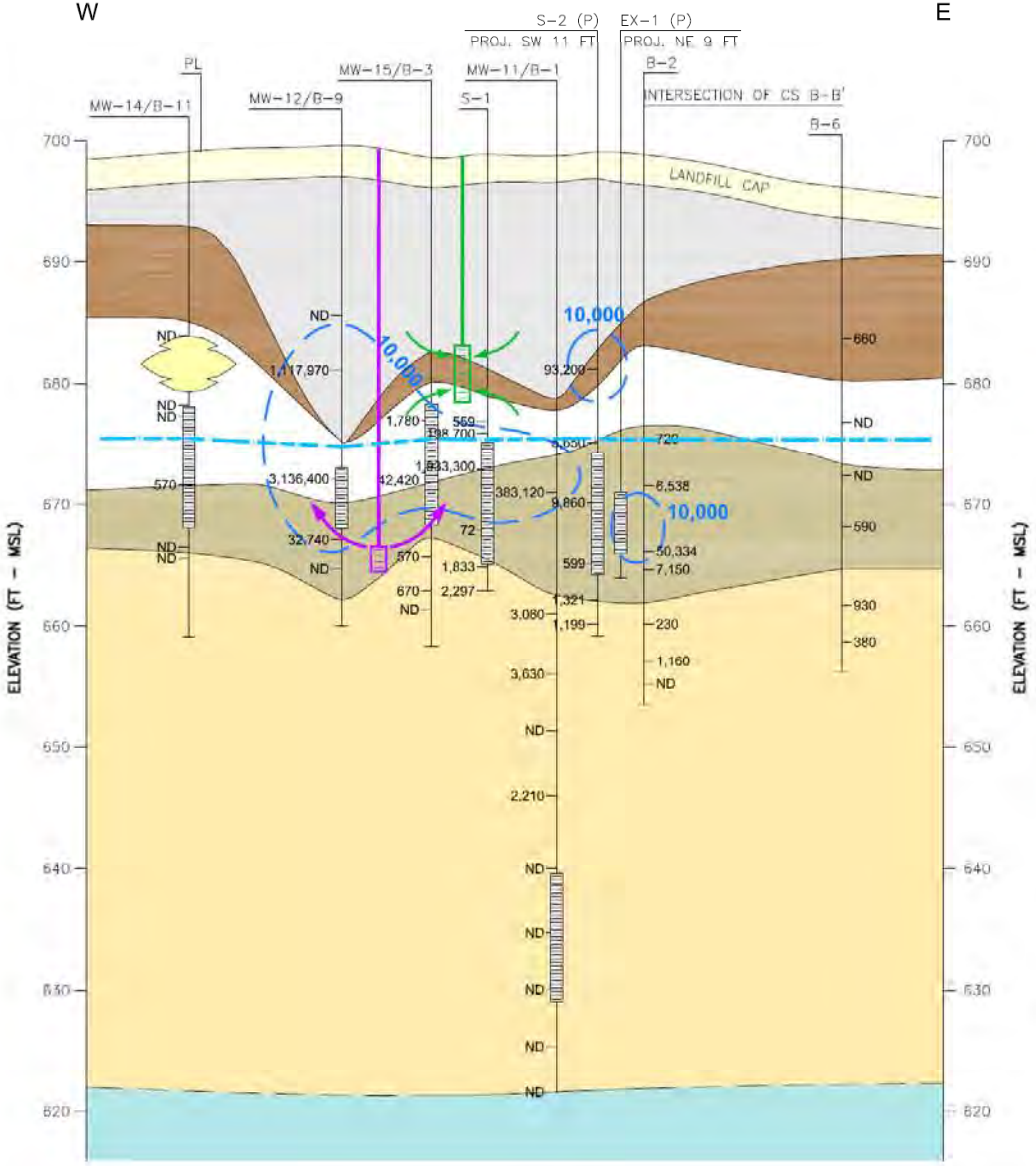
[3] Groundwater is unlikely to be used as a drinking water source in the future given the availability of municipal water.

COC - chemical of concern

figure **11**

ESTIMATED CAPTURE ZONE AND ALIGNMENT OF EXTRACTION WELLS
AVERAGE 2008 GROUNDWATER FLOW CONDITIONS
CORTESE LANDFILL
Narrowsburg, New York

SOURCES:
GEOSYNTEC, PROJECT NO. MR0562, DRAWING NO. F01, MARCH 2008.
GOLDER, PROJECT NO. 953-6252, FILE NO. 9536252A004, 09/07/01.



LEGEND

- B-6 — BORING/MONITORING WELL IDENTIFICATION
- SCREEN INTERVAL
- 10,000 — TOTAL DETECTED VOCs ISOCONCENTRATION CONTOUR (ug/kg)
- 675.2 — TOTAL DETECTED VOCs (ug/kg) – MOBILE LAB RESULTS
- SVE WELL (TYP)
- SPARGE WELL (TYP)
- SOIL GAS FLOW
- AIR FLOW
- OCTOBER 2007 GROUNDWATER TABLE

LANDFILL CAP

SAND / SILT FILL
REDDISH-BROWN SILTY FINE SAND AND SILT FILL

WASTE

UPPER SAND AND GRAVEL UNIT

SAND
BROWN TO GRAY SILTY, GRAVELLY, FINE TO COARSE SAND

SILT AND GRAVEL
BROWN TO LIGHT BROWN SANDY SILT AND GRAVEL

SAND AND GRAVEL
BROWN TO GREENISH GRAY SILTY, FINE TO COARSE SAND AND FINE TO COARSE GRAVEL

SAND AND SILT
BROWN TO GREENISH GRAY FINE TO MEDIUM SAND AND SILT; SMALLSCALE, DISCONTINUOUS FACIES OF GRAVEL ARE ALSO PRESENT IN THIS UNIT BUT NOT SHOWN

BEDROCK

NOTES

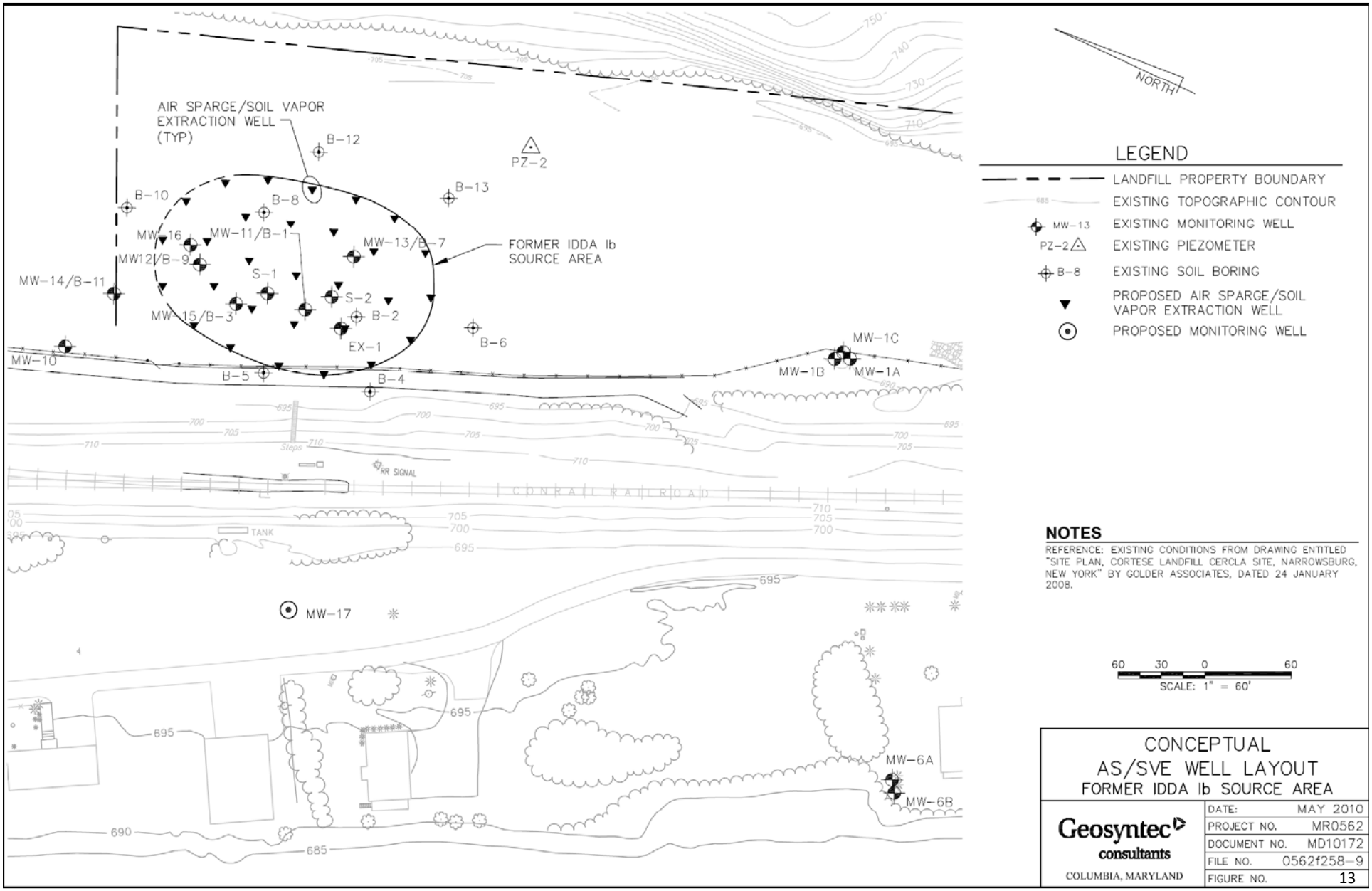
REFERENCE: FIGURE DEVELOPED FROM FIGURE 5A, "GEOLOGIC CROSS SECTION A–A' WITH TOTAL DETECTED VOCs" OF THE 2008 SOURCE CHARACTERIZATION REPORT, CORTESE LANDFILL SITE, NARROWSBURG, NEW YORK BY GOLDER ASSOCIATES AND DATED 14 DECEMBER 2007

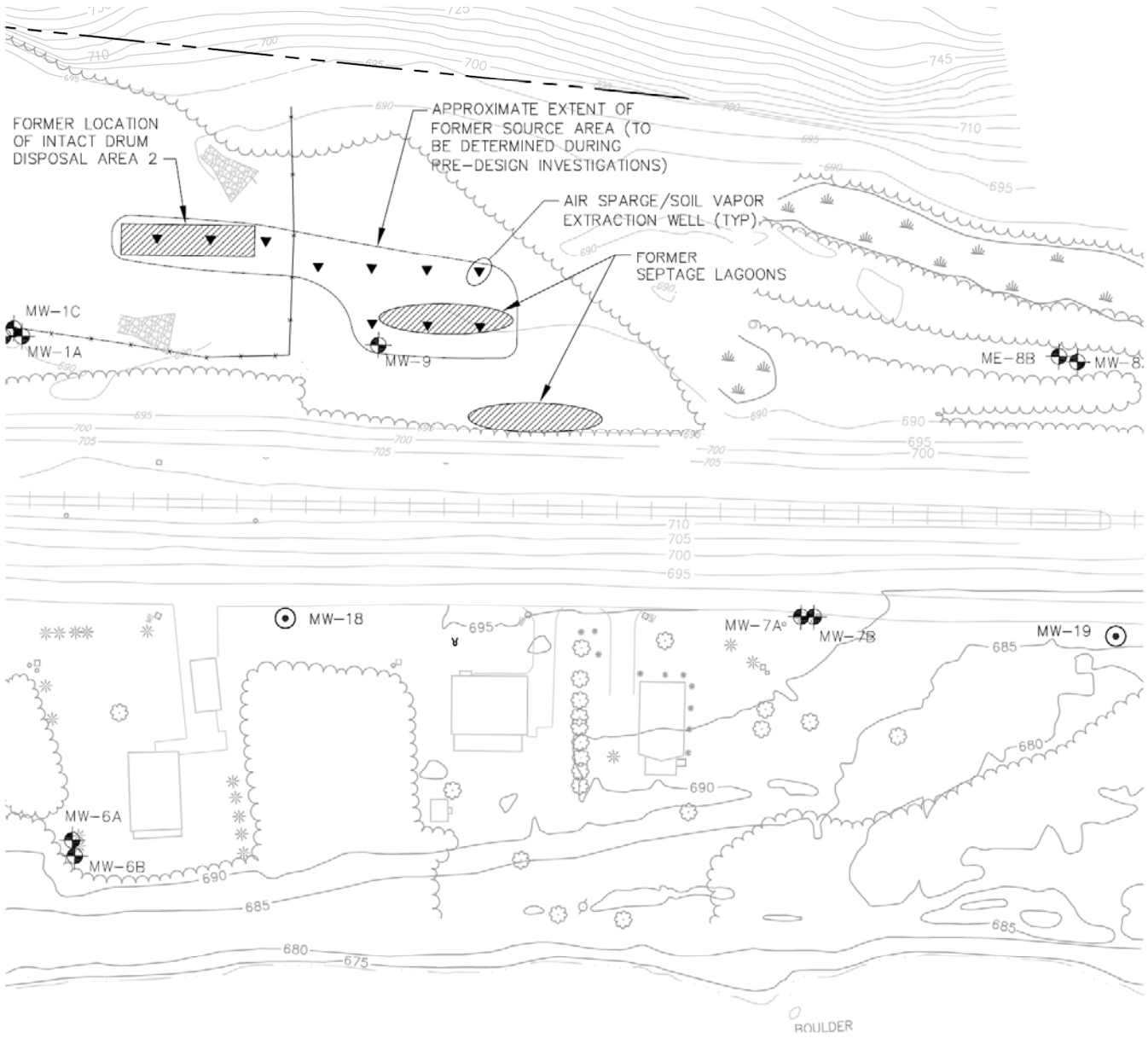
50 0 50
HORIZONTAL SCALE FEET
10 0 10
VERTICAL SCALE FEET
5X = VERTICAL EXAGGERATION

CROSS-SECTION OF CONCEPTUAL AS/SVE WELL INSTALLATION FORMER IDDA Ib SOURCE AREA

Geosyntec consultants
COLUMBIA, MARYLAND

DATE	MAY 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f2510-12
FIGURE NO.	12


AIR SPARGE/SOIL VAPOR EXTRACTION WELL (TYP)
B-12
PZ-2
B-13
B-10
B-8
MW-16
MW-11/B-1
MW-13/B-7
FORMER IDDA Ib SOURCE AREA
MW12/B-9
S-1
MW-14/B-11
S-2
MW-15/B-3
B-2
EX-1
B-6
MW-10
B-5
B-4
MW-1C
MW-1B
MW-1A
Steps
RR SIGNAL
CONRAIL RAILROAD
TANK
MW-17
MW-6A
MW-6B
NORTH
LEGEND
LANDFILL PROPERTY BOUNDARY
EXISTING TOPOGRAPHIC CONTOUR
MW-13 EXISTING MONITORING WELL
PZ-2 EXISTING PIEZOMETER
B-8 EXISTING SOIL BORING
PROPOSED AIR SPARGE/SOIL VAPOR EXTRACTION WELL
PROPOSED MONITORING WELL
NOTES
REFERENCE: EXISTING CONDITIONS FROM DRAWING ENTITLED "SITE PLAN, CORTESE LANDFILL CERCLA SITE, NARROWSBURG, NEW YORK" BY GOLDER ASSOCIATES, DATED 24 JANUARY 2008.
60 30 0 60
SCALE: 1" = 60'
CONCEPTUAL
AS/SVE WELL LAYOUT
FORMER IDDA Ib SOURCE AREA
Geosyntec consultants
COLUMBIA, MARYLAND
DATE: MAY 2010
PROJECT NO. MR0562
DOCUMENT NO. MD10172
FILE NO. 0562f258-9
FIGURE NO. 13



NORTH

LEGEND

- LANDFILL PROPERTY BOUNDARY
- EXISTING TOPOGRAPHIC CONTOUR
- MW-13 EXISTING MONITORING WELL
- PROPOSED AIR SPARGE/SOIL VAPOR EXTRACTION WELL
- PROPOSED MONITORING WELL

NOTES

REFERENCE: EXISTING CONDITIONS FROM DRAWING ENTITLED "SITE PLAN, CORTESE LANDFILL CERCLA SITE, NARROWSBURG, NEW YORK" BY GOLDER ASSOCIATES, DATED 24 JANUARY 2008.

60 30 0 60

SCALE: 1" = 60'

CONCEPTUAL AS/SVE WELL LAYOUT

FORMER SEPTAGE LAGOONS AND IDDA2 SOURCE AREA

Geosyntec consultants

COLUMBIA, MARYLAND

DATE:	MAY 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f258-9
FIGURE NO.	14

CORTESE LANDFILL SUPERFUND SITE
2010 ROD/ROD AMENDMENT

APPENDIX II

TABLES

Table 1A
Sitewide Groundwater Detections – October 2007

Chemical	Concentration (µg/L)								
	MW-1B	MW-1C	MW-2B	MW-6A	MW-6B	MW-7A	MW-9	MW-10	MW-14
Benzene	6.6	-	2.1 J	2.2 J	-	-	13 J	-	7.6
2-Butanone	-	-	-	-	-	-	-	-	2.2 J
Chlorobenzene	24	2.5 J	5.7	18	1.7 J	-	36 J	3.9 J	82
Chloroethane	0.86 J	-	-	84	-	-	-	-	-
Chloroform	-	-	-	3.7 J	-	-	-	-	-
1,1-Dichloroethane	35	-	25	75	4.8 J	4.6 J	100	-	6.2
1,2-Dichloroethane	0.58 J	-	-	2.6 J	-	-	-	-	-
1,1-Dichloroethene	-	-	-	1.1 J	-	-	-	-	-
cis-1,2-Dichloroethene	28	-	0.6 J	78	-	-	-	-	0.67 J
Ethylbenzene	33	-	-	-	-	-	67 J	-	23
Methylene chloride	-	-	-	5.8 J	-	-	28 J	-	-
Tetrachloroethene	-	-	-	5.4	-	-	-	-	-
Toluene	23	-	-	-	-	-	1000	-	83
1,1,1-Trichloroethane	5.7	-	1.2 J	10	-	-	-	-	-
Trichloroethene	0.53 J	-	-	200	-	-	-	-	0.8 J
Vinyl chloride	29	-	0.98 J	34	-	-	-	-	-
Total Xylenes	64	-	-	-	-	-	220	-	85
1,2-Dichlorobenzene	11	-	1.6 J	9.4	1.3 J	-	13 J	0.59 J	9.5
1,3-Dichlorobenzene	5.7	-	1.2 J	3.4	1.3 J	-	-	-	7.3
1,4-Dichlorobenzene	45	1.6 J	6.9	29	7.6	-	53 J	1.2 J	20

Key

- – not detected
µg/L – micrograms per liter

From: 2007 Annual Operation and Maintenance Report, Remedial Work Element I, Cortese Landfill Site, Narrowsburg, New York (Golder Associates, Inc., May 2008).

Table 1B
Source Area Groundwater Detections – October 2007

Chemical	Concentration (µg/L)						
	MW-11	MW-12	MW-13	MW-15	EX-1	S-1	S-2
Acetone	1.6 J	12,000	1,100 J	2,400 J	-	-	-
Benzene	1 J	570 J	150	330 J	19 J	-	29 J
2-Butanone	-	69,000	1,700	13,000	17 J	-	-
Carbon Tetrachloride	-	-	120	-	-	-	-
Chlorobenzene	1.2 J	44	220	190 J	60	-	88 J
Chloroethane	-	24 J	36 J	7.5 J	-	-	
Chloroform	-	1,900 J	1,600 J	320 J	-	500 J	35 J
1,1-Dichloroethane	0.52 J	1,500 J	620 J	600 J	26	660 J	83 J
1,2-Dichloroethane	-	77	16 J	64	-	-	-
1,1-Dichloroethene	-	330	600 J	57	-	-	-
cis-1,2-Dichloroethene	4.3 J	32,000	50,000	20,000	260	50,000	1,200
trans-1,2-Dichloroethene	-	17	-	12	-	-	-
1,2-Dichloropropane	-	-	15 J	1.3 J	-	-	-
Ethylbenzene	1 J	4,300 J	830	1,400	100	920 J	210
2-Hexanone	-	300	-	120	-	-	-
Methylene chloride	-	12,000	3,600 J	890 J	6.2 J	3,000 J	69 J
4-Methyl-2-pentanone	-	12,000	1,500	4,900	16 J	-	-
1,1,2,2-Tetrachloroethane	-	11 J	19 J	11	-	-	-
Tetrachloroethene	0.7 J	860 J	280	70	3.6 J	1,200 J	26 J
Toluene	19 J	54,000	34,000	18,000	430	43,000	2,700
1,1,1-Trichloroethane	-	3,200 J	4,500	500 J	19 J	2,500 J	340
1,1,2-Trichloroethane	-	25	24 J	11	-	-	-
Trichloroethene	1.4 J	67,000	12,000	110	25	1,800 J	400
Vinyl chloride	-	370	520 J	1,100 J	110	-	180 J
Total Xylenes	3.7 J	20,000	3,300	5,800	370	3,700 J	850

Table 1B
Source Area Groundwater Detections – October 2007
(continued)

Chemical	Concentration (µg/L)						
	MW-11	MW-12	MW-13	MW-15	EX-1	S-1	S-2
1,2-Dichlorobenzene	0.51 J	780 J	64 J	350 J	30	600 J	42 J
1,3-Dichlorobenzene	-	79	-	51	12 J	-	-
1,4-Dichlorobenzene	1.1 J	1,400 J	77 J	1,000 J	170	1,200 J	210

Key

- – not detected
µg/L – micrograms per liter

From: 2007 Annual Operation and Maintenance Report, Remedial Work Element I, Cortese Landfill Site, Narrowsburg, New York (Golder Associates, Inc., May 2008).

Table 1C
Summary of Groundwater Detections – October 2007

Well	Groundwater Concentration (µg/L)		
	Total Volatile Organic Compounds	Arsenic	Manganese
MW-1B	312	27	7,070
MW-1C	4.1	48	7,290
MW-2B	45.3	-	-
MW-6A	562	-	-
MW-6B	16.7	10	6,860
MW-7A	4.6	-	-
MW-9	1,530	30	14,700
MW-10	5.69	59	18,300
MW-11	36	15	161
MW-12	294,000	5	16,400
MW-13	117,000	34	15,800
MW-14	327	48	9,330
MW-15	71,300	32	16,100
EX-1	1,670	23	8,300
S-1	109,000	34	23,800
S-2	6,460	48	9,260

Key
- – data not available for this monitoring event
µg/L – micrograms per liter

From: 2007 Annual Operation and Maintenance Report, Remedial Work Element I, Cortese Landfill Site, Narrowsburg, New York (Golder Associates, Inc., May 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-1 (26-29)	B-1 (37.5)	B-1 (42.5)	B-1 (50-55)	B-1 (57.5)	B-1 (62.5)	B-1 (67.5)	B-1 (72.5)	B-2 (10-15)	B-2 (17.7)
Benzene	60	60	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Ethylbenzene	5,500	1,000	**11,000**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	**240**
Isopropylbenzene (Cumene)	NL	NL	**4,000**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	**150**
Naphthalene	13,000	12,000	**13,000**	**380 J**	910 U	**170 J**	670 U	580 U	490 U	530 U	510 U	**1,900**
Styrene (Vinyl Benzene)	NL	NL	**920**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Toluene	1,500	700	**110,000**	**480**	**1,900**	**840**	130 U	120 U	98 U	110 U	**500**	**1,800**
o-Xylene	NL	NL	**15,000**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	**390**
m&p-Xylenes	NL	NL	**40,000**	**220**	**420**	**230**	270 U	230 U	200 U	210 U	200 U	**940**
Total Xylenes	1,200	260	**55,000**	**309**	**600**	**340**	NA	NA	NA	NA	300 U	**1,330**
Chlorobenzene	1,700	1,100	**6,700**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
1,2-Dichlorobenzene	7,900	1,100	**11,000**	450 U	910 U	570 U	670 U	580 U	490 U	530 U	510 U	390 U
1,3-Dichlorobenzene	1,550	2,400	**4,100**	450 U	910 U	570 U	670 U	580 U	490 U	530 U	510 U	390 U
1,4-Dichlorobenzene	8,500	1,800	**27,000**	**250 J**	**260 J**	570 U	670 U	580 U	490 U	530 U	510 U	390 U
1,2,4-Trichlorobenzene	3,400	3,400	**110,000**	**1,500**	**280 J**	**810**	670 U	580 U	490 U	530 U	510 U	**900**
Bromodichloromethane	NL	NL	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Carbon Tetrachloride	600	760	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Chloroform (Trichloromethane)	300	370	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Chloromethane	NL	NL	6,900 U	**230 J**	1,800 U	1,100 U	1,300 U	1,200 U	980 U	1,100 U	1,000 U	780 U
Dibromochloromethane	NL	NL	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Methylene Chloride	100	50	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
1,1-Dichloroethene	400	330	**1,200**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
cis-1,2-Dichloroethene	NL	250	**3,600**	89 U	180 U	**160**	130 U	120 U	98 U	110 U	**220**	78 U
Tetrachloroethene	1,400	1,300	**12,000**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	**88**
Trichloroethene	700	470	**9,700**	89 U	**770**	110 U	130 U	120 U	98 U	110 U	100 U	**130**
Vinyl Chloride	120	20	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
1,1-Dichloroethane	200	270	3,500 U	450 U	910 U	570 U	670 U	580 U	490 U	530 U	510 U	390 U
1,1,1-Trichloroethane	760	680	**3,200**	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
1,1,2-Trichlorotrifluoroethane	6,000	6,000	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Acetone	110	50	17,000 U	2,200 U	4,600 U	2,800 U	3,400 U	2,900 U	2,500 U	2,600 U	2,600 U	2,000 U
2-Butanone (MEK)	300	120	17,000 U	2,200 U	4,600 U	2,800 U	3,400 U	2,900 U	2,500 U	2,600 U	2,600 U	2,000 U
2-Hexanone	NL	NL	17,000 U	2,200 U	4,600 U	2,800 U	3,400 U	2,900 U	2,500 U	2,600 U	2,600 U	2,000 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	17,000 U	2,200 U	4,600 U	2,800 U	3,400 U	2,900 U	2,500 U	2,600 U	2,600 U	2,000 U
Bromoform	NL	NL	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U
Cyclohexane	NL	NL	**700 J**	890 U	1,800 U	1,100 U	1,300 U	1,200 U	980 U	1,100 U	1,000 U	780 U
1,2-Dichloropropane	NL	NL	690 U	89 U	180 U	110 U	130 U	120 U	98 U	110 U	100 U	78 U

Notes:
NY TAGM - New York Technical and Administrative Guidance Memorandum 4046 - soil cleanup objectives to protect groundwater quality
SCO - Soil Cleanup Objective for the Protection of Groundwater (NYCRR, Title 6 Sect. 375-2 through 375-4)
NL - No Level Established
NA - Not Applicable
All values in micrograms per kilogram (µg/kg)
Detections are shown in bold
Detections above 10x SCO are shown in bold and shaded yellow.
Detections above SCO are shown in bold and shaded blue.
B: Analyte detected in method blank,
D: Reported value from a dilution
E: Estimated value above high calibration standard.
J: Estimated value below referenced reporting limit (RL)
U: Analyte not detected above RL
Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-2 (20-25)	B-2 (29)	B-2 (35-40)	B-3 (20-25)	B-3 (26)	B-3 (34)	B-3 (36)	B-4 (10-15)	B-4 (17.5)	B-4 (20-25)	B-4 (27-28)
Benzene	60	60	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Ethylbenzene	5,500	1,000	**1,700**	93 U	110 U	110 U	**370**	110 U	110 U	86 U	84 U	120 U	110 U
Isopropylbenzene (Cumene)	NL	NL	**610**	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Naphthalene	13,000	12,000	**2,600**	**110 J**	560 U	570 U	470 U	570 U	530 U	430 U	420 U	590 U	560 U
Styrene (Vinyl Benzene)	NL	NL	**95**	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Toluene	1,500	700	**27,000**	**120**	**980**	**180**	**6,200**	**450**	**520**	86 U	84 U	120 U	110 U
o-Xylene	NL	NL	**2,300**	93 U	110 U	110 U	**430**	110 U	110 U	86 U	84 U	120 U	110 U
m&p-Xylenes	NL	NL	**5,800**	190 U	**180 J**	230 U	**1,200**	**120 J**	**150 J**	170 U	170 U	230 U	220 U
Total Xylenes	1,200	260	**8,100**	283 U	**290 J**	**340**	**1,630**	**230**	**260**	256 U	254 U	350 U	330 U
Chlorobenzene	1,700	1,100	**89**	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
1,2-Dichlorobenzene	7,900	1,100	**120 J**	470 U	560 U	570 U	**140 J**	570 U	530 U	430 U	420 U	590 U	560 U
1,3-Dichlorobenzene	1,550	2,400	360 U	470 U	560 U	570 U	470 U	570 U	530 U	430 U	420 U	590 U	560 U
1,4-Dichlorobenzene	8,500	1,800	**140 J**	470 U	560 U	570 U	**300 J**	570 U	530 U	430 U	420 U	590 U	560 U
1,2,4-Trichlorobenzene	3,400	3,400	**580**	470 U	560 U	**1,300**	**1,200**	570 U	530 U	430 U	420 U	590 U	560 U
Bromodichloromethane	NL	NL	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Carbon Tetrachloride	600	760	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Chloroform (Trichloromethane)	300	370	73 U	93 U	110 U	110 U	**150**	110 U	110 U	86 U	84 U	120 U	110 U
Chloromethane	NL	NL	730 U	930 U	1,100 U	1,100 U	940 U	1,100 U	1,100 U	860 U	840 U	1,200 U	1,100 U
Dibromochloromethane	NL	NL	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Methylene Chloride	100	50	73 U	93 U	110 U	110 U	**460**	110 U	110 U	86 U	84 U	120 U	110 U
1,1-Dichloroethene	400	330	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
cis-1,2-Dichloroethene	NL	250	**440**	93 U	110 U	**300**	**9,700**	110 U	110 U	86 U	84 U	120 U	110 U
Tetrachloroethene	1,400	1,300	**870**	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Trichloroethene	700	470	**4,800**	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Vinyl Chloride	120	20	73 U	93 U	110 U	110 U	**170**	110 U	110 U	86 U	84 U	120 U	110 U
1,1-Dichloroethane	200	270	360 U	470 U	560 U	570 U	470 U	570 U	530 U	430 U	420 U	590 U	560 U
1,1,1-Trichloroethane	760	680	**2,900**	93 U	110 U	110 U	**270**	110 U	110 U	86 U	84 U	120 U	110 U
1,1,2-Trichlorotrifluoroethane	6,000	6,000	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Acetone	110	50	1,800 U	2,300 U	2,800 U	2,900 U	2,400 U	2,800 U	2,700 U	2,100 U	2,100 U	2,900 U	2,800 U
2-Butanone (MEK)	300	120	1,800 U	2,300 U	2,800 U	2,900 U	**5,600**	2,800 U	2,700 U	2,100 U	2,100 U	2,900 U	2,800 U
2-Hexanone	NL	NL	1,800 U	2,300 U	2,800 U	2,900 U	2,400 U	2,800 U	2,700 U	2,100 U	2,100 U	2,900 U	2,800 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	1,800 U	2,300 U	2,800 U	2,900 U	**1,700 J**	2,800 U	2,700 U	2,100 U	2,100 U	2,900 U	2,800 U
Bromoform	NL	NL	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U
Cyclohexane	NL	NL	**290 J**	930 U	1,100 U	1,100 U	940 U	1,100 U	1,100 U	860 U	840 U	1,200 U	1,100 U
1,2-Dichloropropane	NL	NL	73 U	93 U	110 U	110 U	94 U	110 U	110 U	86 U	84 U	120 U	110 U

Notes:
NY TAGM - New York Technical and Administrative Guidance Memorandum 4046 - soil cleanup objectives to protect groundwater quality
SCO - Soil Cleanup Objective for the Protection of Groundwater (NYCRR, Title 6 Sect. 375-2 through 375-4)
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Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-4 (30-32)	B-4 (35.5)	B-4 (38.5)	B-4 (42.5)	B-4 (47.5)	B-5 (10-15)	B-5 (15-20)	B-5 (20-25)	B-5 (25-30)	B-5 (32.5)	B-5 (39)	B-6 (10-15)
Benzene	60	60	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Ethylbenzene	5,500	1,000	**180**	**210**	**92**	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	**160**
Isopropylbenzene (Cumene)	NL	NL	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Naphthalene	13,000	12,000	490 U	450 U	450 U	380 U	490 U	460 U	470 U	490 U	510 U	550 U	510 U	**290 J**
Styrene (Vinyl Benzene)	NL	NL	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Toluene	1,500	700	**3,900**	**3,600**	**1,200**	76 U	98 U	93 U	94 U	99 U	100 U	**420**	**410**	110 U
o-Xylene	NL	NL	**170**	**200**	**94**	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
m&p-Xylenes	NL	NL	**520**	**600**	**260**	150 U	200 U	190 U	190 U	200 U	200 U	**110 J**	200 U	**210 J**
Total Xylenes	1,200	260	**690**	**800**	**354**	NA	NA	NA	NA	NA	NA	**220**	NA	**320**
Chlorobenzene	1,700	1,100	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
1,2-Dichlorobenzene	7,900	1,100	490 U	450 U	450 U	380 U	490 U	460 U	470 U	490 U	510 U	550 U	510 U	570 U
1,3-Dichlorobenzene	1,550	2,400	490 U	450 U	450 U	380 U	490 U	460 U	470 U	490 U	510 U	550 U	510 U	570 U
1,4-Dichlorobenzene	8,500	1,800	**330 J**	**330 J**	**180 J**	380 U	490 U	460 U	470 U	490 U	510 U	550 U	510 U	570 U
1,2,4-Trichlorobenzene	3,400	3,400	**120 J**	**110 J**	**110 J**	380 U	490 U	460 U	470 U	490 U	510 U	550 U	510 U	570 U
Bromodichloromethane	NL	NL	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Carbon Tetrachloride	600	760	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Chloroform (Trichloromethane)	300	370	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Chloromethane	NL	NL	990 U	890 U	890 U	760 U	980 U	930 U	940 U	990 U	1,000 U	1,100 U	1,000 U	1,100 U
Dibromochloromethane	NL	NL	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Methylene Chloride	100	50	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
1,1-Dichloroethene	400	330	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
cis-1,2-Dichloroethene	NL	250	**180**	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Tetrachloroethene	1,400	1,300	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Trichloroethene	700	470	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Vinyl Chloride	120	20	**890**	**970**	**200**	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
1,1-Dichloroethane	200	270	490 U	**310 J**	**150 J**	380 U	490 U	460 U	470 U	490 U	510 U	550 U	510 U	570 U
1,1,1-Trichloroethane	760	680	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
1,1,2-Trichlorotrifluoroethane	6,000	6,000	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Acetone	110	50	2,500 U	**4,200**	**2,200 J**	1,900 U	2,500 U	2,300 U	2,300 U	2,500 U	2,500 U	2,800 U	2,500 U	2,900 U
2-Butanone (MEK)	300	120	**2,600**	**4,300**	**2,400**	1,900 U	2,500 U	2,300 U	2,300 U	2,500 U	2,500 U	2,800 U	2,500 U	2,900 U
2-Hexanone	NL	NL	2,500 U	2,200 U	2,200 U	1,900 U	2,500 U	2,300 U	2,300 U	2,500 U	2,500 U	2,800 U	2,500 U	2,900 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	**840 J**	**1,200 J**	2,200 U	1,900 U	2,500 U	2,300 U	2,300 U	2,500 U	2,500 U	2,800 U	2,500 U	2,900 U
Bromoform	NL	NL	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U
Cyclohexane	NL	NL	990 U	890 U	890 U	760 U	980 U	930 U	940 U	990 U	1,000 U	1,100 U	1,000 U	1,100 U
1,2-Dichloropropane	NL	NL	99 U	89 U	89 U	76 U	98 U	93 U	94 U	99 U	100 U	110 U	100 U	110 U

Notes:
NY TAGM - New York Technical and Administrative Guidance Memorandum 4046 - soil cleanup objectives to protect groundwater quality
SCO - Soil Cleanup Objective for the Protection of Groundwater (NYCRR, Title 6 Sect. 375-2 through 375-4)
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Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-6 (17.5)	B-6 (28)	B-6 (34-35)	B-6 (37.5)	B-7 (10-15)	B-7 (23.5)	B-7 (27)	B-7 (33)	B-7 (35.5)	B-7 (42.5)	B-8 (10-15)	B-8 (17)
Benzene	60	60	98 U	120 U	110 U	110 U	110 U	**1,300**	**1,100**	100 U	84 U	91 U	110 U	97 U
Ethylbenzene	5,500	1,000	98 U	120 U	110 U	110 U	110 U	**430,000**	**65,000**	**7,000**	84 U	91 U	110 U	97 U
Isopropylbenzene (Cumene)	NL	NL	98 U	120 U	110 U	110 U	110 U	**30,000**	**14,000**	**2,300**	84 U	91 U	110 U	97 U
Naphthalene	13,000	12,000	490 U	**150 J**	530 U	550 U	560 U	**150,000**	**22,000 J**	**5,200**	**210 J**	**1,900**	530 U	490 U
Styrene (Vinyl Benzene)	NL	NL	98 U	120 U	110 U	110 U	110 U	160 U	100 U	100 U	84 U	91 U	110 U	97 U
Toluene	1,500	700	98 U	**310**	**520**	**380**	110 U	**1,900,000**	**930,000**	**68,000**	**650**	**110**	110 U	97 U
o-Xylene	NL	NL	98 U	120 U	110 U	110 U	110 U	**320,000**	**57,000**	**7,000**	84 U	91 U	110 U	97 U
m&p-Xylenes	NL	NL	200 U	**130 J**	**110 J**	220 U	230 U	**1,400,000**	**210,000**	**22,000**	**220**	180 U	210 U	190 U
Total Xylenes	1,200	260	NA	**250**	**220**	NA	NA	**1,720,000**	**267,000**	**29,000**	**304**	NA	NA	NA
Chlorobenzene	1,700	1,100	98 U	120 U	110 U	110 U	110 U	**12,000**	**1,500**	**490**	84 U	91 U	110 U	97 U
1,2-Dichlorobenzene	7,900	1,100	490 U	590 U	530 U	550 U	560 U	**9,300**	**1,500**	**490 J**	420 U	450 U	530 U	490 U
1,3-Dichlorobenzene	1,550	2,400	490 U	590 U	530 U	550 U	560 U	780 U	520 U	520 U	420 U	450 U	530 U	490 U
1,4-Dichlorobenzene	8,500	1,800	490 U	590 U	530 U	550 U	560 U	780 U	**310 J**	**320 J**	420 U	450 U	530 U	490 U
1,2,4-Trichlorobenzene	3,400	3,400	490 U	590 U	530 U	550 U	560 U	**13,000**	**2,800**	**1,400**	**150 J**	**290 J**	530 U	490 U
Bromodichloromethane	NL	NL	98 U	120 U	110 U	110 U	110 U	160 U	100 U	100 U	84 U	91 U	110 U	97 U
Carbon Tetrachloride	600	760	98 U	120 U	110 U	110 U	110 U	160 U	**57,000**	**1,200**	84 U	91 U	110 U	97 U
Chloroform (Trichloromethane)	300	370	98 U	120 U	110 U	110 U	110 U	160 U	**7,600**	100 U	84 U	91 U	110 U	97 U
Chloromethane	NL	NL	980 U	1,200 U	1,100 U	1,100 U	1,100 U	1,600 U	1,000 U	1,000 U	840 U	910 U	1,100 U	970 U
Dibromochloromethane	NL	NL	98 U	120 U	110 U	110 U	110 U	160 U	100 U	**520**	84 U	91 U	110 U	97 U
Methylene Chloride	100	50	98 U	120 U	110 U	110 U	110 U	160 U	100 U	100 U	84 U	91 U	110 U	97 U
1,1-Dichloroethene	400	330	98 U	120 U	110 U	110 U	110 U	**540**	100 U	100 U	84 U	91 U	110 U	97 U
cis-1,2-Dichloroethene	NL	250	98 U	120 U	**160**	110 U	110 U	**5,700**	**6,900**	**7,900**	**230**	91 U	110 U	97 U
Tetrachloroethene	1,400	1,300	98 U	120 U	110 U	110 U	110 U	**54,000**	**19,000**	**5,900**	84 U	91 U	110 U	97 U
Trichloroethene	700	470	98 U	120 U	110 U	110 U	110 U	**310,000**	**150,000**	**29,000**	**480**	91 U	110 U	97 U
Vinyl Chloride	120	20	98 U	120 U	**140**	110 U	110 U	**550**	**560**	100 U	84 U	91 U	110 U	97 U
1,1-Dichloroethane	200	270	490 U	590 U	530 U	550 U	560 U	780 U	520 U	520 U	420 U	450 U	530 U	490 U
1,1,1-Trichloroethane	760	680	98 U	120 U	110 U	110 U	110 U	**170,000**	**68,000**	**5,000**	84 U	91 U	110 U	97 U
1,1,2-Trichlorotrifluoroethane	6,000	6,000	98 U	120 U	110 U	110 U	110 U	**1,600**	**210**	100 U	84 U	91 U	110 U	97 U
Acetone	110	50	2,500 U	2,900 U	2,600 U	2,800 U	2,800 U	3,900 U	2,600 U	2,600 U	2,100 U	2,300 U	2,700 U	2,400 U
2-Butanone (MEK)	300	120	2,500 U	2,900 U	2,600 U	2,800 U	2,800 U	3,900 U	2,600 U	2,600 U	2,100 U	2,300 U	2,700 U	2,400 U
2-Hexanone	NL	NL	2,500 U	2,900 U	2,600 U	2,800 U	2,800 U	3,900 U	2,600 U	2,600 U	2,100 U	2,300 U	2,700 U	2,400 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	2,500 U	2,900 U	2,600 U	2,800 U	2,800 U	3,900 U	2,600 U	2,600 U	2,100 U	2,300 U	2,700 U	2,400 U
Bromoform	NL	NL	98 U	120 U	110 U	110 U	110 U	160 U	100 U	100 U	84 U	91 U	110 U	97 U
Cyclohexane	NL	NL	980 U	1,200 U	1,100 U	1,100 U	1,100 U	**76,000 J**	**7,400**	**1,100**	840 U	910 U	1,100 U	970 U
1,2-Dichloropropane	NL	NL	98 U	120 U	110 U	110 U	110 U	160 U	**530**	100 U	84 U	91 U	110 U	97 U

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Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-8 (26)	B-8 (31)	B-8 (37.5)	B-9 (14)	B-9 (18.5)	B-9 (27.5)	B-9 (30-35)	B-9 (36)
Benzene	60	60	190 U	120 U	860 U	110 U	**330**	**1,200**	76 U	58 U
Ethylbenzene	5,500	1,000	**6,300**	**130**	**12,000**	110 U	**21,000**	**140,000**	**1,900**	58 U
Isopropylbenzene (Cumene)	NL	NL	**960**	120 U	**2,100**	110 U	**2,500**	**14,000**	**190**	58 U
Naphthalene	13,000	12,000	**3,700**	590 U	**4,000 J**	530 U	**5,200**	**41,000**	**430**	290 U
Styrene (Vinyl Benzene)	NL	NL	190 U	120 U	860 U	110 U	**430**	**3,000**	76 U	58 U
Toluene	1,500	700	**31,000**	**1,100**	**64,000**	110 U	**210,000**	**490,000**	**3,100**	58 U
o-Xylene	NL	NL	**5,500**	120 U	**11,000**	110 U	**22,000**	**160,000**	**2,100**	58 U
m&p-Xylenes	NL	NL	**21,000**	**350**	**43,000**	210 U	**87,000**	**450,000**	**6,700**	120 U
Total Xylenes	1,200	260	**26,500**	**470**	**54,000**	NA	**109,000**	**610,000**	**8,800**	NA
Chlorobenzene	1,700	1,100	**600**	120 U	**2,100**	110 U	**170**	1,100 U	76 U	58 U
1,2-Dichlorobenzene	7,900	1,100	**2,100**	590 U	**1,400 J**	530 U	**21,000**	**57,000**	**580**	290 U
1,3-Dichlorobenzene	1,550	2,400	940 U	590 U	4,300 U	530 U	**5,900**	**7,700**	380 U	290 U
1,4-Dichlorobenzene	8,500	1,800	**220 J**	590 U	4,300 U	530 U	**44,000**	**120,000**	**1,300**	290 U
1,2,4-Trichlorobenzene	3,400	3,400	**3,000**	590 U	**4,400**	530 U	**590,000**	**1,200,000**	**12,000**	290 U
Bromodichloromethane	NL	NL	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
Carbon Tetrachloride	600	760	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
Chloroform (Trichloromethane)	300	370	190 U	120 U	860 U	110 U	**240**	**1,500**	76 U	58 U
Chloromethane	NL	NL	1,900 U	1,200 U	8,600 U	1,100 U	1,100 U	11,000 U	760 U	580 U
Dibromochloromethane	NL	NL	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
Methylene Chloride	100	50	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
1,1-Dichloroethene	400	330	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
cis-1,2-Dichloroethene	NL	250	190 U	120 U	**4,600**	110 U	110 U	**10,000**	76 U	58 U
Tetrachloroethene	1,400	1,300	**220**	120 U	**10,000**	110 U	**5,900**	**36,000**	**320**	58 U
Trichloroethene	700	470	190 U	120 U	860 U	110 U	**64,000**	**350,000**	**3,100**	58 U
Vinyl Chloride	120	20	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
1,1-Dichloroethane	200	270	940 U	590 U	4,300 U	530 U	560 U	5,600 U	380 U	290 U
1,1,1-Trichloroethane	760	680	190 U	120 U	860 U	110 U	**1,600**	**15,000**	**120**	58 U
1,1,2-Trichlorotrifluoroethane	6,000	6,000	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
Acetone	110	50	4,700 U	3,000 U	22,000 U	2,700 U	2,800 U	28,000 U	1,900 U	1,500 U
2-Butanone (MEK)	300	120	4,700 U	3,000 U	22,000 U	2,700 U	**20,000**	**24,000 J**	**900 J**	1,500 U
2-Hexanone	NL	NL	4,700 U	3,000 U	22,000 U	2,700 U	**700 J**	28,000 U	1,900 U	1,500 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	4,700 U	3,000 U	22,000 U	2,700 U	**16,000**	**12,000 J**	1,900 U	1,500 U
Bromoform	NL	NL	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U
Cyclohexane	NL	NL	**650 J**	1,200 U	**2,400 J**	1,100 U	1,100 U	**4,000 J**	760 U	580 U
1,2-Dichloropropane	NL	NL	190 U	120 U	860 U	110 U	110 U	1,100 U	76 U	58 U

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Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-10 (18)	B-10 (20-25)	B-10 (27)	B-10 (30-40)	B-10 (49)	B-11 (14.5)	B-11 (19.6)	B-11 (20.5)	B-11 (27.5)	B-11 (32.5)	B-11 (32.7)
Benzene	60	60	**690**	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Ethylbenzene	5,500	1,000	**3,600**	**860**	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Isopropylbenzene (Cumene)	NL	NL	**6,000**	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Naphthalene	13,000	12,000	**320 J**	**700**	**380 J**	490 U	530 U	480 U	530 U	540 U	550 U	520 U	580 U
Styrene (Vinyl Benzene)	NL	NL	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Toluene	1,500	700	**27,000**	**6,800**	**130**	99 U	110 U	95 U	110 U	110 U	**270**	100 U	120 U
o-Xylene	NL	NL	**4,000**	**890**	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
m&p-Xylenes	NL	NL	**12,000**	**2,800**	200 U	200 U	210 U	190 U	210 U	220 U	**180 J**	210 U	230 U
Total Xylenes	1,200	260	**16,000**	**3,690**	NA	NA	NA	NA	NA	NA	**290**	NA	NA
Chlorobenzene	1,700	1,100	**460**	100 U	99 U	99 U	110 U	95 U	110 U	110 U	**120**	100 U	120 U
1,2-Dichlorobenzene	7,900	1,100	**11,000**	**220 J**	500 U	490 U	530 U	480 U	530 U	540 U	550 U	520 U	580 U
1,3-Dichlorobenzene	1,550	2,400	**1,300**	500 U	500 U	490 U	530 U	480 U	530 U	540 U	550 U	520 U	580 U
1,4-Dichlorobenzene	8,500	1,800	**5,100**	500 U	500 U	490 U	530 U	480 U	530 U	540 U	550 U	520 U	580 U
1,2,4-Trichlorobenzene	3,400	3,400	**1,100**	**150 J**	500 U	490 U	530 U	480 U	530 U	540 U	550 U	520 U	580 U
Bromodichloromethane	NL	NL	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Carbon Tetrachloride	600	760	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Chloroform (Trichloromethane)	300	370	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Chloromethane	NL	NL	1,000 U	1,000 U	990 U	990 U	1,100 U	950 U	1,100 U	1,100 U	1,100 U	1,000 U	1,200 U
Dibromochloromethane	NL	NL	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Methylene Chloride	100	50	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
1,1-Dichloroethene	400	330	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
cis-1,2-Dichloroethene	NL	250	**3,100**	**240**	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Tetrachloroethene	1,400	1,300	**2,000**	**510**	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Trichloroethene	700	470	**4,700**	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Vinyl Chloride	120	20	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
1,1-Dichloroethane	200	270	520 U	500 U	500 U	490 U	530 U	480 U	530 U	540 U	550 U	520 U	580 U
1,1,1-Trichloroethane	760	680	**2,100**	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
1,1,2-Trichlorotrifluoroethane	6,000	6,000	**120**	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Acetone	110	50	2,600 U	2,500 U	2,500 U	2,500 U	2,700 U	2,400 U	2,600 U	2,700 U	2,800 U	2,600 U	2,900 U
2-Butanone (MEK)	300	120	**7,600**	**1,400 J**	2,500 U	2,500 U	2,700 U	2,400 U	2,600 U	2,700 U	2,800 U	2,600 U	2,900 U
2-Hexanone	NL	NL	2,600 U	2,500 U	2,500 U	2,500 U	2,700 U	2,400 U	2,600 U	2,700 U	2,800 U	2,600 U	2,900 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	**5,100**	**690 J**	2,500 U	2,500 U	2,700 U	2,400 U	2,600 U	2,700 U	2,800 U	2,600 U	2,900 U
Bromoform	NL	NL	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U
Cyclohexane	NL	NL	**1,600**	1,000 U	990 U	990 U	1,100 U	950 U	1,100 U	1,100 U	1,100 U	1,000 U	1,200 U
1,2-Dichloropropane	NL	NL	100 U	100 U	99 U	99 U	110 U	95 U	110 U	110 U	110 U	100 U	120 U

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TABLE 2
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FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	B-12 (26)	B-12 (28)	B-12 (30-35)	B-12 (37.2)	B-12 (40.5)	B-13 (27.5)	B-13 (30-35)	B-13 (37)	S-1-22	S-1-23	S-1-26
Benzene	60	60	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
Ethylbenzene	5,500	1,000	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**37** -	**7,200** -	**73,000** -
Isopropylbenzene (Cumene)	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	NA	NA	NA
Naphthalene	13,000	12,000	540 U	410 U	640 U	390 U	320 U	530 U	540 U	510 U	NA	NA	NA
Styrene (Vinyl Benzene)	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
Toluene	1,500	700	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**150** -	**93,000** -	**780,000 D**
o-Xylene	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	NA	NA	NA
m&p-Xylenes	NL	NL	**310**	160 U	260 U	160 U	130 U	210 U	220 U	200 U	NA	NA	NA
Total Xylenes	1,200	260	**420**	NA	NA	NA	NA	NA	NA	NA	**240** -	**37,000** -	**340,000** -
Chlorobenzene	1,700	1,100	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**2 J**	4,600 U	**4,200 J**
1,2-Dichlorobenzene	7,900	1,100	540 U	410 U	640 U	390 U	320 U	530 U	540 U	510 U	**24** -	4,600 U	**5,100 J**
1,3-Dichlorobenzene	1,550	2,400	540 U	410 U	640 U	390 U	320 U	530 U	540 U	510 U	7 U	4,600 U	14,000 U
1,4-Dichlorobenzene	8,500	1,800	540 U	410 U	640 U	390 U	320 U	530 U	540 U	510 U	**14** -	4,600 U	14,000 U
1,2,4-Trichlorobenzene	3,400	3,400	**160 J**	410 U	640 U	390 U	320 U	530 U	540 U	510 U	NA	NA	NA
Bromodichloromethane	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
Carbon Tetrachloride	600	760	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
Chloroform (Trichloromethane)	300	370	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	**1,600 J**	**17,000** -
Chloromethane	NL	NL	1,100 U	820 U	1,300 U	780 U	630 U	1,100 U	1,100 U	1,000 U	14 U	9,200 U	28,000 U
Dibromochloromethane	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
Methylene Chloride	100	50	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**7** -	4,600 U	14,000 U
1,1-Dichloroethene	400	330	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
cis-1,2-Dichloroethene	NL	250	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**4 J**	**2,100 J**	**23,000** -
Tetrachloroethene	1,400	1,300	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**11** -	**3,800 J**	**46,000** -
Trichloroethene	700	470	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**31** -	**38,000** -	**380,000 D**
Vinyl Chloride	120	20	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	14 U	9,200 U	28,000 U
1,1-Dichloroethane	200	270	540 U	410 U	640 U	390 U	320 U	530 U	540 U	510 U	7 U	4,600 U	**5,000 J**
1,1,1-Trichloroethane	760	680	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	**14** -	**16,000** -	**260,000** -
1,1,2-Trichlorotrifluoroethane	6,000	6,000	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	NA	NA	NA
Acetone	110	50	2,700 U	2,100 U	3,200 U	1,900 U	1,600 U	2,700 U	2,700 U	2,500 U	**25 J**	23,000 U	70,000 U
2-Butanone (MEK)	300	120	2,700 U	2,100 U	3,200 U	1,900 U	1,600 U	2,700 U	2,700 U	2,500 U	35 U	23,000 U	70,000 U
2-Hexanone	NL	NL	2,700 U	2,100 U	3,200 U	1,900 U	1,600 U	2,700 U	2,700 U	2,500 U	35 U	23,000 U	70,000 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	2,700 U	2,100 U	3,200 U	1,900 U	1,600 U	2,700 U	2,700 U	2,500 U	35 U	23,000 U	70,000 U
Bromoform	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U
Cyclohexane	NL	NL	1,100 U	820 U	1,300 U	780 U	630 U	1,100 U	1,100 U	1,000 U	NA	NA	NA
1,2-Dichloropropane	NL	NL	110 U	82 U	130 U	78 U	63 U	110 U	110 U	100 U	7 U	4,600 U	14,000 U

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D: Reported value from a dilution
E: Estimated value above high calibration standard.
J: Estimated value below referenced reporting limit (RL)
U: Analyte not detected above RL
Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

TABLE 2
ANALYTICAL RESULTS FOR VOCs IN SOIL
FORMER IDDA 1b SOURCE CHARACTERIZATION

Cortese Landfill Site
Narrowsburg, New York

Compound	NY TAGM	SCO	S-1-31	S-1-34	S-1-36	S-2-17	S-2-23	S-2-28	S-2-33	S-2-36	S-2-38
Benzene	60	60	4 U	**8** -	**4** J	1,300 U	660 U	610 U	**1** J	**8** -	**7** -
Ethylbenzene	5,500	1,000	**1** J	**53** -	**32** -	**1,900** -	660 U	610 U	**11** -	**58** -	**47** -
Isopropylbenzene (Cumene)	NL	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	13,000	12,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene (Vinyl Benzene)	NL	NL	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U
Toluene	1,500	700	**9** -	**1,500** D	**1,200** D	**24,000** -	**2,500** -	**4,200** -	**240** DJ	**870** D	**860** D
o-Xylene	NL	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
m&p-Xylenes	NL	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	1,200	260	**4** J	**200** -	**120** -	**8,500** -	2,000 U	**520** J	**39** -	**200** -	**160** -
Chlorobenzene	1,700	1,100	4 U	**9** -	**7** -	**1,100** J	660 U	610 U	**2** J	**9** -	**8** -
1,2-Dichlorobenzene	7,900	1,100	4 U	**6** -	**6** -	**7,600** -	660 U	**260** J	**5** -	**8** -	**5** -
1,3-Dichlorobenzene	1,550	2,400	4 U	**2** J	**3** J	**3,300** -	660 U	610 U	4 U	**2** J	**3** J
1,4-Dichlorobenzene	8,500	1,800	**2** J	**25** -	**24** -	**16,000** -	**190** J	**400** J	**12** -	**29** -	**25** -
1,2,4-Trichlorobenzene	3,400	3,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NL	NL	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U
Carbon Tetrachloride	600	760	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U
Chloroform (Trichloromethane)	300	370	**1** J	**15** -	**17** -	1,300 U	660 U	610 U	**2** J	6 U	5 U
Chloromethane	NL	NL	8 U	11 U	10 U	2,600 U	1,300 U	1,200 U	8 U	13 U	11 U
Dibromochloromethane	NL	NL	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U
Methylene Chloride	100	50	**6** -	**10** -	**13** -	1,300 U	660 U	610 U	470 U	**12** B	670 U
1,1-Dichloroethene	400	330	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U
cis-1,2-Dichloroethene	NL	250	**4** -	**34** -	**24** -	**2,200** -	**1,700** -	**1,900** -	470 U	**4** J	**5** -
Tetrachloroethene	1,400	1,300	4 U	**11** -	**8** -	**26,000** -	**300** J	**680** -	**24** -	**24** -	**4** J
Trichloroethene	700	470	**3** J	**200** -	**180** -	**2,600** -	**960** -	**1,700** -	**28** -	**13** -	**6** -
Vinyl Chloride	120	20	8 U	**6** J	10 U	2,600 U	1,300 U	1,200 U	**22** -	13 U	11 U
1,1-Dichloroethane	200	270	4 U	**31** -	**19** -	1,300 U	660 U	610 U	**10** -	**42** -	**28** -
1,1,1-Trichloroethane	760	680	**4** -	**140** -	**120** -	1,300 U	660 U	**200** J	**13** -	**13** -	**2** J
1,1,2-Trichlorotrifluoroethane	6,000	6,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	110	50	**31** -	**35** -	**37** -	6,400 U	3,300 U	3,000 U	**17** J	**19** J	**14** J
2-Butanone (MEK)	300	120	**7** J	**12** J	**13** J	6,400 U	3,300 U	3,000 U	19 U	**10** J	**9** J
2-Hexanone	NL	NL	20 U	28 U	26 U	6,400 U	3,300 U	3,000 U	19 U	33 U	27 U
4-Methyl-2-pentanone (MIBK)	1,000	1,000	20 U	28 U	**6** J	6,400 U	3,300 U	3,000 U	**5** J	33 U	27 U
Bromoform	NL	NL	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U
Cyclohexane	NL	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NL	NL	4 U	6 U	5 U	1,300 U	660 U	610 U	4 U	6 U	5 U

Notes:
NY TAGM - New York Technical and Administrative Guidance Memorandum 4046 - soil cleanup objectives to protect groundwater quality
SCO - Soil Cleanup Objective for the Protection of Groundwater (NYCRR, Title 6 Sect. 375-2 through 375-4)
NL - No Level Established
NA - Not Applicable
All values in micrograms per kilogram (µg/kg)
Detections are shown in bold
Detections above 10x SCO are shown in bold and shaded yellow.
Detections above SCO are shown in bold and shaded blue.
B: Analyte detected in method blank,
D: Reported value from a dilution
E: Estimated value above high calibration standard.
J: Estimated value below referenced reporting limit (RL)
U: Analyte not detected above RL
Modified from Table 6A, Source Characterization Report, Cortese Landf ill Site (Golder, 2008).

Table 3
Estimated Exposure Point Concentrations for Chemicals of Concern Detected in Groundwater

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Groundwater – future off-site wells	Benzene	3	29	µg/L	6/13	18	µg/L	95% UCL
	1,4-Dichlorobenzene	0.5	37	µg/L	9/15	37	µg/L	MAX
	Tetrachloroethylene	0.9	79	µg/L	2/11	26	µg/L	95% UCL
	Trichloroethylene	0.5	260	µg/L	6/14	240	µg/L	95% UCL
	Vinyl Chloride	16	38	µg/L	2/12	18	µg/L	95% UCL
	Arsenic	4	57.8	µg/L	6/15	57.8	µg/L	MAX
	Manganese	5.7	21,600	µg/L	16/16	21,600	µg/L	MAX

Key
95% UCL - 95% Upper Confidence Limit
MAX – Maximum Concentration
µg/L – micrograms per liter

From: Human Health Baseline Risk Assessment and Environmental Evaluation Report for the Cortese Landfill Site, Sullivan County, New York (Tetra Tech, Inc., 1994).

Table 4A
Cancer Toxicity Data Summary for Groundwater

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date
Benzene	0.029	-	$(mg/kg/day)^{-1}$	A	IRIS	1993
1,4-DCB	0.024	-	$(mg/kg/day)^{-1}$	B2	HEAST	1993
PCE	0.052	-	$(mg/kg/day)^{-1}$	B2/C	ECAO	1993
TCE	0.011	-	$(mg/kg/day)^{-1}$	B2	HEAST (withdrawn)	1993
VC	1.9	-	$(mg/kg/day)^{-1}$	A	HEAST	1993
Arsenic	1.75	-	$(mg/kg/day)^{-1}$	A	IRIS	1993
Manganese	-	-	-	-	-	-

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date
Benzene	-	-	0.0291	$(mg/kg/day)^{-1}$	A	IRIS	1993
1,4-DCB	-	-	-	-	-	-	-
PCE	-	-	0.00203	$(mg/kg/day)^{-1}$	B2/C	ECAO	1993
TCE	-	-	0.0060	$(mg/kg/day)^{-1}$	B2	ECAO	1993
VC	-	-	0.30	$(mg/kg/day)^{-1}$	A	HEAST	1993
Arsenic	-	-	-	-	-	-	-
Manganese	-	-	-	-	-	-	-

Key

- – no information available
1,4-DCB – 1,4-dichlorobenzene
ECAO – Environmental Criteria and Assessment Office, U.S. EPA
HEAST – Health Effects Assessment Summary Tables, U.S. EPA
IRIS – Integrated Risk Information System, U.S. EPA
mg/kg/day – milligrams per kilogram of body weight per day
PCE – tetrachloroethylene
TCE – trichloroethylene
VC – vinyl chloride

EPA Group:

A – Human carcinogen
B1 – Probable human carcinogen - Indicates that limited human data are available
B2 – Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans
C – Possible human carcinogen
D – Not classifiable as a human carcinogen
E – Evidence of noncarcinogenicity

From: Human Health Baseline Risk Assessment and Environmental Evaluation Report for the Cortese Landfill Site, Sullivan County, New York (Tetra Tech, Inc., 1994).

Table 4B
Non-Cancer Toxicity Data Summary for Groundwater

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors [1]	Sources of RfD: Target Organ	Dates of RfD: Target Organ
Benzene	-	-	-	-	-	-	-	-	-
1,4-DCB	-	-	-	-	-	-	-	-	-
PCE	Chronic	1.0×10^{-2}	mg/kg /day	-	-	Liver	UF = 1000 MF = 1	IRIS	1993
TCE	Chronic	6.0×10^{-3}	mg/kg /day	-	-	-	-	ECAO	1993
VC	-	-	-	-	-	-	-	-	-
Arsenic	Chronic	3.0×10^{-4}	mg/kg /day	-	-	Skin	UF = 1 MF = 1	IRIS	1993
Manganese	Chronic	5.0×10^{-3}	mg/kg /day	-	-	CNS	UF = 1 MF = 1	IRIS	1993

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhal-ation RfC	Units	Inhalation RfD	Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC:RfD : Target Organ	Dates
Benzene	Chronic	-	-	5.71×10^{-5}	mg/kg /day	-	-	ECAO	1993
1,4-DCB	Chronic	-	-	2.29×10^{-1}	mg/kg /day	Liver	UF = 100 MF = 1	HEAST	1993
PCE	-	-	-	-	-	-	-	-	-
TCE	-	-	-	-	-	-	-	-	-
VC	-	-	-	-	-	-	-	-	-
Arsenic	-	-	-	-	-	-	-	-	-
Manganese	-	-	-	-	-	-	-	-	-

Key
- – no information available
1,4-DCB – 1,4-dichlorobenzene
CNS – central nervous system
ECAO – Environmental Criteria and Assessment Office, U.S. EPA
HEAST – Health Effects Assessment Summary Tables, U.S. EPA
IRIS – Integrated Risk Information System, U.S. EPA
mg/kg/day – milligrams per kilogram of body weight per day
PCE – tetrachloroethylene
TCE – trichloroethylene
VC – vinyl chloride

[1] Uncertainty factors include adjustments for human sensitivity (10), animal-to-human extrapolation (10), extrapolation from subchronic to chronic no-observable-adverse-effect level (NOAEL), and/or extrapolation from a lowest-observable-adverse-effect level (LOAEL) to a NOAEL. Modifying factors are used to adjust the toxicity criteria based on a semiquantitative evaluation of the quality of the toxicity study.

From: Human Health Baseline Risk Assessment and Environmental Evaluation Report for the Cortese Landfill Site, Sullivan County, New York (Tetra Tech, Inc., 1994).

Table 5A

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation [1]	Dermal [2]	Exposure Routes Total
Ground Water	Ground Water	Drinking water [3]	Benzene	6×10^{-6}	N/A	N/A	6×10^{-6}
			1,4-DCB	1×10^{-5}	N/A	N/A	1×10^{-5}
			PCE	2×10^{-5}	N/A	N/A	2×10^{-5}
			TCE	3×10^{-5}	N/A	N/A	3×10^{-5}
			VC	4×10^{-4}	N/A	N/A	4×10^{-4}
			Arsenic	1×10^{-3}	N/A	N/A	1×10^{-3}
			Manganese	-	N/A	N/A	-
		Shower water [3]	Benzene	N/A	6×10^{-6}	1×10^{-6}	7×10^{-6}
			1,4-DCB	N/A	7×10^{-6}	1×10^{-6}	8×10^{-6}
			PCE	N/A	4×10^{-7}	1×10^{-5}	1×10^{-5}
			TCE	N/A	1×10^{-5}	1×10^{-5}	2×10^{-5}
			VC	N/A	6×10^{-5}	5×10^{-6}	7×10^{-5}
			Arsenic	N/A	-	2×10^{-6}	2×10^{-6}
			Manganese	N/A	-	-	-
						Ground-water risk total=	**2×10^{-3}**
						Total Risk =	**2×10^{-3}**

Key

- - toxicity criteria are not available
1,4-DCB – 1,4-dichlorobenzene
N/A - route of exposure is not applicable to this medium
PCE – tetrachloroethylene
TCE – trichloroethylene
VC – vinyl chloride

[1] No inhalation slope factor was available for 1,4-DCB; therefore, the oral slope factor was used as a surrogate to estimate risk associated with this chemical.
[2] Oral toxicity criteria were used to estimate impacts from the dermal absorption route due to the lack of dermal toxicity studies.
[3] Groundwater is unlikely to be used as a water source in the future given the availability of municipal water and the deed restrictions in place prohibiting drilling and groundwater use for purposes other than environmental monitoring at and downgradient from the landfill.

From: Human Health Baseline Risk Assessment and Environmental Evaluation Report for the Cortese Landfill Site, Sullivan County, New York (Tetra Tech, Inc., 1994).

Table 5B

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation [1]	Dermal [2]	Exposure Routes Total
Ground Water	Ground Water	Drinking water [3]	Benzene	- -	-	N/A	N/A	-
			1,4-DCB	- -	-	N/A	N/A	-
			PCE	Liver	0.07	N/A	N/A	0.07
			TCE	- -	1	N/A	N/A	1
			VC	- -	-	N/A	N/A	-
			Arsenic	Skin	5	N/A	N/A	5
			Manganese	CNS	100	N/A	N/A	100
		Shower water [3]	Benzene	- -	N/A	8	-	8
			1,4-DCB	Liver	N/A	-	-	-
			PCE	Liver	N/A	0.05	0.05	0.1
			TCE	- -	N/A	0.8	0.5	1.3
			VC	- -	N/A	-	-	-
			Arsenic	Skin	N/A	-	0.01	0.01
			Manganese	CNS	N/A	-	0.2	0.2
							Ground-Water Hazard Index Total =	**115**
							Receptor Hazard Index =	**115**
							Liver Hazard Index =	**0.2**
							Skin Hazard Index =	**5**
							CNS Hazard Index =	**100**

Key

- - toxicity criteria are not available
- - - no information available
1,4-DCB – 1,4-dichlorobenzene
CNS – central nervous system
N/A - route of exposure is not applicable to this medium
PCE – tetrachloroethylene
TCE – trichloroethylene
VC – vinyl chloride

[1] No inhalation RfDs were available for PCE or TCE; therefore, the oral RfDs were used as surrogates to estimate hazards associated with these chemicals.
[2] Oral toxicity criteria were used to estimate impacts from the dermal absorption route due to the lack of dermal toxicity studies.
[3] Groundwater is unlikely to be used as a water source in the future given the availability of municipal water and the deed restrictions in place prohibiting drilling and groundwater use for purposes other than environmental monitoring at and downgradient from the landfill.

From: Human Health Baseline Risk Assessment and Environmental Evaluation Report for the Cortese Landfill Site, Sullivan County, New York (Tetra Tech, Inc., 1994).

Table 6
Cleanup Levels for Chemicals of Concern

Media: Groundwater
Site Area: Downgradient of Cortese Landfill
Available Use: Environmental Monitoring
Controls to Ensure Restricted Use (if applicable): Deed restrictions prohibit drilling and groundwater use for purposes other than environmental monitoring at and downgradient from the landfill.

Chemical of Concern	Cleanup Level	Basis for Cleanup Level
Benzene	1 µg/L (ppb)	New York State Water Quality Standards [1]
1,4-Dichlorobenzene	3 µg/L (ppb)	New York State Water Quality Standards [1]
Tetrachloroethylene	5 µg/L (ppb)	Federal MCL
Trichloroethylene	5 µg/L (ppb)	Federal MCL
Vinyl chloride	2 µg/L (ppb)	Federal MCL
Arsenic	10 µg/L (ppb)	Federal MCL
Manganese	300 µg/L (ppb)	New York State Water Quality Standards [1]

Key
MCL – maximum contaminant level, Federal Safe Drinking Water Act
ppb – parts per billion
µg/L – micrograms per liter

[1] New York State Water Quality Standards for Class GA (Groundwater), New York Codes, Rules, and Regulations (NYCRR), Title 6, Part 701-703.

Table 7: Cost Estimate Summary for Alternative 3 – In Situ Source Treatment

Capital Costs for AS/SVE and Ozone Treatment

Description	Quantity	Unit	Unit Cost	Cost
1. Pre-Design Investigation				
Sample Collection	10	EA	$3,467	$34,670
Sample Analysis	35	EA	$510	$17,850
Data Analysis & Report	1	LS	$25,000	$25,000
2. AS/SVE Pilot Study				
Work Plan	1	LS	$25,000	$25,000
Permitting	1	LS	$10,000	$10,000
Mobilization	1	LS	$10,000	$10,000
Drilling	6	EA	$3,800	$22,800
Drilling Oversight, travel, PID	1	wk	$6,975	$6,975
Pilot Test Labor	1	wk	$16,000	$16,000
Data Analysis & Report	1	LS	$25,000	$25,000
3. Full Scale AS/SVE/Ozone Preparation				
Detailed Design & Work Plan	1	LS	$180,000	$180,000
SVE Air Permit Equivalency	1	LS	$15,000	$15,000
Site Mobilization	1	LS	$25,000	$25,000
Waste Handling & Disposal	1	LS	$10,000	$10,000
Baseline Sampling	1	event	$25,000	$25,000
4. Well Installation				
SVE Well Installation	50	EA	$2,700	$135,000
Air/Ozone Sparge Well Installation (smear zone ~25 ft deep)	50	EA	$3,200	$160,000
Air/Ozone Sparge Well Installation (deeper ~35 ft deep)	48	EA	$3,800	$182,400
Monitoring Well Installation	1	LS	$38,200	$38,200
Well Installation Oversight Labor	7.4	wk	$5,000	$37,000
5. System Installation				
Air Sparge Compressor	2	EA	$15,000	$30,000
Ozone Generators	3	EA	$250,000	$750,000
Soil Vapor Extraction Skid w/VGAC	2	EA	$10,400	$20,800
Building, Slab, Site Civil	2	LS	$40,000	$80,000
Piping/Manifolds	2	LS	$141,300	$282,600
Electrical and Instrumentation	1.7	LS	$25,000	$42,500
Misc. Valves, Fittings, Penetrations, etc.	1.7	LS	$5,000	$8,500
Air Flow Monitoring and Controls	1.7	LS	$5,000	$8,500
Liner for SVE in Lagoon Area	1	LS	$50,000	$50,000
Monitoring System/OVA	1	LS	$2,500	$2,500
System Installation Labor	6.8	wk	$11,000	$74,800
Travel	25	wk	$1,475	$36,875
6. System Start-up				
Start-up/Shake-down	6.8	wk	$11,000	$74,800
Initial Hydrogen Peroxide Shock	1	LS	$100,000	$100,000
Subtotal Capital Costs (CC1)				$2,562,800
Contingency Allowances (20% of CC1)				$512,560
Subtotal Capital Costs with Contingency (CC2)				$3,075,400
Procurement (5% of CC2)				$153,770
Project Management (10% of CC2)				$307,540
Construction Management				$134,400
			Total Capital Cost	**$3,671,000**

Table 7: Cost Estimate Summary for Alternative 3 – In Situ Source Treatment (continued)

Future Capital Costs for ISCO Treatment, if needed (Year 8)

Description	Quantity	Unit	Unit Cost	Cost
1. ISCO preparation				
Design Report / Work Plan	1	LS	$75,000	$75,000
Permitting	1	LS	$15,000	$15,000
Waste Handling & Disposal	2	LS	$10,000	$20,000
Baseline Sampling	1	event	$30,000	$30,000
Mobilization / Demobilization	2	LS	$20,000	$40,000
2. ISCO Equipment & Supplies				
Mixing Equipment	33	wk	$2,500	$82,500
Manifold & Piping	1	LS	$15,000	$15,000
Surfactant	63,000	lbm	$3	$189,000
Persulfate	735,000	lbm	$1.25	$918,750
Hydrogen Peroxide	700,000	lbm	$0.35	$245,000
Sodium Hydroxide	49,000	lbm	$3	$147,000
3. ISCO Injection				
Injection Labor	8	wk	$15,000	$120,000
Travel	30	wk	$2,000	$60,000
Subtotal Future Capital Costs (FC1)				$1,957,300
Contingency Allowances (15% of FC2)				$293,600
Subtotal Future Capital Costs with Contingency (FC2)				$2,250,900
Project Management (5% of FC2)				$112,545
Technical Support (10% of FC2)				$225,090
			Total Future Capital Cost	**$2,588,500**

Annual Operation and Maintenance Costs for AS/SVE System (Years 1-7)

Description	Quantity	Unit	Unit Cost
1. Operation Labor	7	Year	$46,800
2. Equipment Maintenance	7	Year	$39,290
3. Activated Carbon Replacement Canisters	7	Year	$15,600
4. Electrical power	7	Year	$94,100
5. Waste Handling & Disposal	7	Year	$26,000
6. Condensate Disposal	7	Year	$1,000
7. Consulting / Annual Review	7	Year	$20,000
Subtotal Annual O&M Cost (OC1)			$242,800
Contingency Allowances (15% of OC1)			$36,420
Subtotal Annual O&M Cost with Contingency (OC2)			$279,220
Project Management (5% of OC2)			$13,960
Technical Support (10% of OC2)			$27,920
Total Annual AS/SVE O&M Cost (Years 1-7)			**$321,100**

Annual Operation and Maintenance Costs for Ozone System (Years 5-7)

Description	Quantity	Unit	Unit Cost
1. Operation Labor	3	Year	$11,700
2. Equipment Maintenance	3	Year	$75,000
4. Electrical Energy	3	Year	$31,500
7. Consulting / Annual Review	3	Year	$5,000
Subtotal Annual O&M Cost (OC3)			$123,200
Contingency Allowances (15% of OC3)			$18,480
Subtotal Annual O&M Cost with Contingency (OC4)			$141,700
Project Management (5% of OC4)			$7,085
Technical Support (10% of OC4)			$14,170
Total Annual Ozone O&M Cost (Years 5-7)			**$163,000**

Table 7: Cost Estimate Summary for Alternative 3 – In Situ Source Treatment (continued)

Annual Monitoring Costs (Years 1-14)

Description	Quantity	Unit	Unit Cost
1. Monitoring	14	Year	$56,250
2. Reporting	14	Year	$25,000
Subtotal Annual Monitoring Cost (OC5)			$81,300
Contingency Allowances (15% of OC5)			$12,195
Subtotal Annual Monitoring Cost with Contingency (OC6)			$93,500
Project Management and Support (5% of OC6)			$4,675
Total Annual Monitoring Cost			**$98,200**

Total Annual OM&M Costs Years 1-4 (AS/SVE O&M and Monitoring) ***$419,300***

Total Annual OM&M Costs Years 5-7 (AS/SVE O&M, Ozone O&M, and Monitoring) ***$582,300***

Total Annual OM&M Costs Years 8-14 (Monitoring) ***$98,200***

Summary of Present Worth Analysis

Total Capital Cost		**$3,671,000**
Future Capital Cost, if needed (Year 8, discounted @ 7%)		**$1,507,000**
Total OM&M Present Worth (Years 1-14, discounted @ 7%)		**$2,916,000**
Present Worth for AS/SVE O&M (Years 1-7)	$1,731,000	
Present Worth for Ozone O&M (Years 5-7)	$326,000	
Present Worth for Monitoring (Years 1-14)	$859,000	
Total Present Worth Cost		**$8,094,000**

Year	Capital Cost	Annual O&M Cost	Total Cost	Discount Factor (7%)	Present Worth
0	$3,671,000		$3,671,000	1.000	$3,671,000
1		$419,300	$419,300	0.935	$391,878
2		$419,300	$419,300	0.873	$366,249
3		$419,300	$419,300	0.816	$342,296
4		$419,300	$419,300	0.763	$319,910
5		$582,300	$582,300	0.713	$415,218
6		$582,300	$582,300	0.666	$388,062
7		$582,300	$582,300	0.623	$362,683
8	$2,588,500*	$98,200	$2,686,700	0.582	$1,563,959
9		$98,200	$98,200	0.544	$53,425
10		$98,200	$98,200	0.508	$49,931
11		$98,200	$98,200	0.475	$46,665
12		$98,200	$98,200	0.444	$43,613
13		$98,200	$98,200	0.415	$40,761
14		$98,200	$98,200	0.388	$38,095
TOTALS	$6,259,500	$4,111,500	$10,371,000		$8,094,000

* if needed

Total Present Worth Cost **$8,094,000**

Table 7: Cost Estimate Summary for Alternative 3 – In Situ Source Treatment (continued)

Notes

Unit costs are for illustration only and should not be used for cost estimating purposes.
AS/SVE/Ozone capital cost estimates are not discounted because the construction work will be performed in the first year. O&M costs are reported as present worth estimates given a 7% discount rate for a 14-year duration. Cost estimates are based on treatment volume estimates and contaminant concentrations, which may be refined when remedy is designed. Cost estimates are within +50 to -30% accuracy expectation. Project management and support should account for the cost of the RD and the administrative/project management costs for the RD/RA and O&M.

AS – air sparging
EA – each
ft – feet
ISCO – in situ chemical oxidation
lbm – pound mass
LS – Lump Sum
mo – month
O&M – operation and maintenance
OM&M – operation, maintenance, and monitoring
OVA – organic vapor analyzer
PID – photoionization detector
RA – remedial action
RD – remedial design
SVE – soil vapor extraction
VGAC – vapor-phase granular activated carbon
wk – week

TABLE 8
CHEMICAL SPECIFIC GROUNDWATER ARARs AND TBCs

Cortese Landfill Site
Narrowsburg, New York

Constituent Information		Federal Safe Drinking Water Act			New York State Water Quality Standards for Class GA (Groundwater)	New York Public Water Supply Regulations	Preliminary Remediation Goal[(1)]	Maximum Concentration Greater than Preliminary Remediation Goal ?
Parameter	**Range of Detections in Groundwater Since 2000**	**MCL**	**SMCL**	**MCLG**	**NYCRR, Title 6 Part 701-703**	**NYCRR, Title 10 Part 5-1**		
VOCs								
1,1,1-Trichloroethane	ND-7300	200		200	5 (POC)	5 (POC)	5	Y
1,1,2,2-Tetrachloroethane	ND-31				5 (POC)	5 (POC)	5	Y
1,1,2-Trichloroethane	ND-28	5		3	1	5 (POC)	1	Y
1,1-Dichloroethane	ND-98000					5 (POC)	5	Y
1,1-Dichloroethene	ND-600	7		7		5 (POC)	5	Y
1,2,4-Trichlorobenzene	ND-8000	70		70	5 (POC)	5 (POC)	5	Y
1,2-Dichlorobenzene	ND-9400	75		75	3	5 (POC)	3	Y
1,2-Dichloroethane	ND-3600	5		zero	0.6	5 (POC)	0.6	Y
1,2-Dichloropropane	ND-1100	5		zero	1	5 (POC)	1	Y
1,3-Dichlorobenzene	ND-4000				3	5 (POC)	3	Y
1,4-Dichlorobenzene	ND-31000	600		600	3	5 (POC)	3	Y
1,4-Dioxane	ND-530					50 (UOC)	50	Y
2-Butanone	ND-69000					50 (UOC)	50	Y
2-Hexanone	ND-300					50 (UOC)	50	Y
4-Methyl-2-pentanone	ND-12000					50 (UOC)	50	Y
Acetone	ND-12000					50 (UOC)	50	Y
Benzene	ND-11000	5		zero	1	5 (POC)	1	Y
Carbon disulfide	ND-21					50 (UOC)	50	Y
Carbon tetrachloride	ND-120	5		zero	5	5 (POC)	5	Y
Chlorobenzene	ND-27000	100		100	5 (POC)	5 (POC)	5	Y
Chloroethane	ND-43000				5 (POC)	5 (POC)	5	Y
Chloroform	ND-3900				7	5 (POC)	5	Y
Chloromethane	ND-1.6				5 (POC)	5 (POC)	5	Y
cis-1,2-Dichloroethene	ND-120000	70		70	5 (POC)	5 (POC)	5	Y
Dichlorobromomethane	ND-5.5					5 (POC)	5	Y
Ethyl benzene	ND-50000	700		700	5 (POC)	5 (POC)	5	Y
Methylene Chloride	ND-12000	5		zero	5 (POC)	5 (POC)	5	Y
Tetrachloroethene	ND-10000	5		zero	5 (POC)	5 (POC)	5	Y

TABLE 8
CHEMICAL SPECIFIC GROUNDWATER ARARs AND TBCs

Cortese Landfill Site
Narrowsburg, New York

Constituent Information		Federal Safe Drinking Water Act			New York State Water Quality Standards for Class GA (Groundwater)	New York Public Water Supply Regulations	Preliminary Remediation Goal[(1)]	Maximum Concentration Greater than Preliminary Remediation Goal ?
Parameter	**Range of Detections in Groundwater Since 2000**	**MCL**	**SMCL**	**MCLG**	**NYCRR, Title 6 Part 701-703**	**NYCRR, Title 10 Part 5-1**		
Toluene	ND-550000	1000		1000	5 (POC)	5 (POC)	5	Y
Total Xylenes	ND-130000	10,000		10,000	5 (POC)	5 (POC)	5	Y
trans-1,2-Dichloroethene	ND-140	100		100	5 (POC)	5 (POC)	5	Y
Trichloroethene	ND-67000	5		zero	5 (POC)	5 (POC)	5	Y
Vinyl chloride	ND-22000	2		zero	2	2	2	Y
SVOCs								
2,4,5-Trichlorophenol	ND-1					5 (POC)	5	N
2,4-Dichlorophenol	ND-1.9				1	5 (POC)	1	Y
2,4-Dimethylphenol	ND-4000				1	5 (POC)	1	Y
2-Chlorophenol	ND-1.2					5 (POC)	5	Y
2-Methylnaphthalene	ND-5000					50 (UOC)	50	Y
2-Methylphenol	ND-3000					50 (UOC)	50	Y
3,3'-Dichlorobenzidine	ND-0.4				5 (POC)	5 (POC)	5	N
4-Chloro-3-methylphenol	ND-800					5 (POC)	5	Y
4-Chloroaniline	ND-10				5 (POC)	5 (POC)	5	Y
4-Methylphenol	ND-4000					50 (UOC)	50	Y
4-Nitroaniline	ND				5 (POC)	5 (POC)	5	N
4-Nitrophenol	ND-1					5 (POC)	5	Y
Acenaphthene	ND-18					50 (UOC)	50	Y
Acenaphthylene	ND-0.3					50 (UOC)	50	N
Anthracene	ND-19					50 (UOC)	50	N
Benzo(a)anthracene	ND-0.47					50 (UOC)	50	N
Benzo(a)pyrene	ND-0.2	0.2		zero	zero	50 (UOC)	0.2	N
Benzo(b)fluoranthene	ND-0.08					50 (UOC)	50	N
Benzo(g,h,i)perylene	ND-0.2					50 (UOC)	50	N
Benzo(k)fluoranthene	ND-0.09					50 (UOC)	50	N
Benzoic acid	ND-2800					50 (UOC)	50	Y
Benzyl alcohol	ND-21					50 (UOC)	50	N

TABLE 8
CHEMICAL SPECIFIC GROUNDWATER ARARs AND TBCs

Cortese Landfill Site
Narrowsburg, New York

Constituent Information		Federal Safe Drinking Water Act			New York State Water Quality Standards for Class GA (Groundwater)	New York Public Water Supply Regulations	Preliminary Remediation Goal[1]	Maximum Concentration Greater than Preliminary Remediation Goal ?
Parameter	**Range of Detections in Groundwater Since 2000**	**MCL**	**SMCL**	**MCLG**	**NYCRR, Title 6 Part 701-703**	**NYCRR, Title 10 Part 5-1**		
bis(2-Chloroethyl) ether	ND-45				1	5 (POC)	1	Y
bis(2-Ethylhexyl) phthalate	ND-82				5	50 (UOC)	5	Y
Carbazole	ND-15					50 (UOC)	50	N
Chrysene	ND-6					50 (UOC)	50	N
Dibenzofuran	ND-5					50 (UOC)	50	N
Diethylphthalate	ND-2000					50 (UOC)	50	Y
Dimethylphthalate	ND-45					50 (UOC)	50	N
Di-n-butylphthalate	ND-10000					50 (UOC)	50	Y
Di-n-octylphthalate	ND-10000					50 (UOC)	50	Y
Fluoranthene	ND-6					50 (UOC)	50	N
Fluorene	ND-8					50 (UOC)	50	N
Hexachlorobenzene	ND-1	1		zero	0.04	1	0.04	Y
Hexachlorobutadiene	ND-2				0.5	5 (POC)	0.5	Y
Isophorone	ND-380					50 (UOC)	50	Y
Naphthalene	ND-17000					50 (UOC)	50	Y
N-Nitrosodiphenylamine/Diphenylamine	ND-2					5 (POC)	5	N
Pentachlorophenol	ND-11	1		zero	1	1	1	Y
Phenanthrene	ND-12					50 (UOC)	50	N
Phenol	ND-110				1	5 (POC)	5	Y
Pyrene	ND-4					50 (UOC)	50	N
Metals								
Arsenic	ND-131	10		zero	25	10	10	Y
Iron	ND-126,000		300[2]		300	300	300	Y
Iron and Manganese	211-135,540				500	500	500	Y
Manganese	161-37,900		50[2]		300	300	300	Y
Wet Chemistry								
Alkalinity	ND-543,000						NA	NA
Ammonia	ND-18,300				2,000		2,000	Y

TABLE 8
CHEMICAL SPECIFIC GROUNDWATER ARARs AND TBCs

Cortese Landfill Site
Narrowsburg, New York

Constituent Information		Federal Safe Drinking Water Act			New York State Water Quality Standards for Class GA (Groundwater)	New York Public Water Supply Regulations	Preliminary Remediation Goal[(1)]	Maximum Concentration Greater than Preliminary Remediation Goal ?
Parameter	**Range of Detections in Groundwater Since 2000**	**MCL**	**SMCL**	**MCLG**	**NYCRR, Title 6 Part 701-703**	**NYCRR, Title 10 Part 5-1**		
Ammonia Nitrogen	ND-13,200				2,000		2,000	Y
Biochemical Oxygen Demand	ND-78,400						NA	NA
Chemical Oxygen Demand	ND-647,000						NA	NA
Chloride	ND-72,500		250,000				NA	NA
Hardness	40,000-270,000						NA	NA
Nitrate	ND-4,100	10,000		10,000	10,000	10,000	10,000	N
Nitrate-Nitrite	ND				10,000	10,000	10,000	N
Sulfate	ND-83,600		250,000		250,000	250,000	250,000	N
Total Dissolved Solids	38,000-265,000		500,000		500,000		500,000	N
Total Organic Carbon (TOC)	ND-105,000						NA	NA
Total Organic Carbon, Dissolved	ND-43,200						NA	NA

Notes:
(1) Preliminary Remediation Goal is the most stringent of the ARARs listed.
(2) Secondary MCLs are non-enforceable guidance to the states in setting state regulations and may be based on criteria other than health risk (such as aesthetics).
ARARs - Applicable or Relevant and Appropriate Requirements All values are given in µg/L.
MCL - maximum contaminant level, Federal standard unless indicated otherwise
MCLG - maximum contaminant level goal
ND - Non-Detect
NYCRR - New York Codes, Rules, and Regulations
POC - principal organic contaminant
SMCL - secondary maximum contaminant level
SVOCs - semi-volatile organic compounds
UOC - unspecified organic contaminant
VOCs - volatile organic compounds
µg/L - micrograms per liter
TBC - to be considered

CORTESE LANDFILL SUPERFUND SITE
2010 ROD/ROD AMENDMENT

APPENDIX III

ADMINISTRATIVE RECORD INDEX

Revised Draft 09/16/10

CORTESE LANDFILL SUPERFUND SITE
OPERABLE UNIT FOUR
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

1.0 SITE IDENTIFICATION

1.5 Previous Operable Unit Information

P. XXXXXX – Index: Cortese Landfill Site, Administrative
XXXXXX Record File, Index of Documents, prepared by U.S. Environmental Protection Agency, Region 2, 1994.

P. XXXXXX – Index: Cortese Landfill Site, Administrative
XXXXXX Record File Update, Index of Documents, prepared by U.S. Environmental Protection Agency, Region 2, 1994.

3.0 REMEDIAL INVESTIGATION

3.4 Remedial Investigation Reports

P. XXXXXX – Report: Shallow Groundwater Hot Spot Investigation,
XXXXXX Remedial Work Element II, Cortese Landfill Site, Narrowsburg, New York, prepared by Golder Associates Inc., prepared for Cortese Landfill Technical Committee, c/o Waste Management, Inc., September 2001.

P. XXXXXX – Report: Results of Soil Boring Investigations at
XXXXXX Former Intact Drum Disposal Area Ib, Cortese Landfill Site, Narrowsburg, New York, prepared by Golder Associates Inc., prepared for Cortese Landfill PRP Group, c/o Waste Management, Inc., October 2004.

P. XXXXXX – Report: Source Characterization Report, Cortese
XXXXXX Landfill Site, Narrowsburg, New York, prepared by Golder Associates Inc., prepared for Cortese Landfill PRP Group, c/o Waste Management, Inc., January 2008.

P. XXXXXX – XXXXXX Report: 2009 Annual Environmental Monitoring Report, Remedial Work Element I, Cortese Landfill Site, Narrowsburg, New York, prepared by Geosyntec Consultants, prepared for Cortese Landfill Technical Committee, c/o Waste Management, April 16, 2010.

4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

P. XXXXXX – XXXXXX Report: Former Source Areas Feasibility Study Report, Cortese Landfill Site, Narrowsburg, New York, prepared by Geosyntec Consultants, prepared for Cortese Landfill Technical Committee, c/o Waste Management, September 2010.

Institutional Control

P. XXXXXX – XXXXXX Facsimile to Mr. Dave Moreira, WMI, from Mr. Bob Glazier, Golder Associates Inc., re: Local Law No. 1 of the year 1996, Concerning Ground Water Extraction South of Well #4, Be it Enacted by the Town Board of the Town of Tusten, Sullivan, New York, undated.

10.0 PUBLIC PARTICIPATION

10.9 Proposed Plan

P. XX.XXXXX- XX.XXXXX Report: Superfund Proposed Plan, U.S. Environmental Protection Agency, Region 2, Cortese Landfill Superfund Site, Sullivan County, New York, prepared by U.S. Environmental Protection Agency, Region 2, August 2010.

CORTESE LANDFILL SUPERFUND SITE
2010 ROD/ROD AMENDMENT

APPENDIX IV

STATE LETTER OF CONCURRENCE

New York State Department of Environmental Conservation
Division of Environmental Remediation
Office of the Director, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **Fax:** (518) 402-9020
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

SEP 3 0 2010

Mr. Walter E. Mugdan, Director
Emergency and Remedial Response Division
USEPA
290 Broadway, 19th Floor
New York, New York 10007-1866

Dear Mr. Mugdan:

Re: Record of Decision (ROD)/ROD Amendment
Cortese Landfill Site (Site ID No. 353001)

The New York State Department of Environmental Conservation, in conjunction with the New York State Department of Health, has reviewed the Record of Decision/ROD Amendment for the groundwater remediation portion of the 1994 Record of Decision for the Cortese Landfill Site and finds it acceptable.

Key aspects of the proposed remedy are:

- Air sparging/SVE of the source areas for approximately seven years to remove a significant component of the petroleum hydrocarbons and other VOCs. SVE wells will be installed to collect the soil vapors and discharge them to the atmosphere after above-ground treatment, if necessary.
- Amendment additions, such as ozone, to the air sparging/SVE for the final phase of the air sparge/SVE period.
- Stabilization of the subsurface for up to five years after active groundwater sparging has been completed.
- Application of In-Situ Chemical Oxidation, if necessary, potentially including a surfactant enhancement, to address the remaining more recalcitrant source materials.
- Monitored natural attenuation will be implemented downgradient from the landfill boundary until attainment of cleanup objectives.
- Long-term monitoring.
- Continuation of the institutional controls required in the 1994 ROD prohibiting potable use of groundwater downgradient from the landfill, along Delaware Drive, and requiring all new construction in the same area to be connected to the public water supply system.

- Continuation of the requirement for on-site institutional controls as stated in the 1994 ROD. These controls prohibit activities that would interfere with the protectiveness of the selected remedy and prohibit potable use of groundwater.

- Periodic reporting on all institutional controls will be performed.

- A review of site conditions will occur at least every five years and, if justified, additional response actions would be implemented.

The Record of Decision/ROD Amendment also states that if implementation of the new remedy proves impracticable, or proves not to be effective, then the groundwater remedy selected in the 1994 ROD (i.e., Pump and Treat), would at that time be evaluated as the contingency remedy.

Please contact Mr. Jonathan Greco at (518) 402-9694 with any questions regarding this matter.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediation

ec: S. Bates (NYSDOH)
M. Van Valkenburg (NYSDOH)
N. Walz (NYSDOH)
J. Singerman (USEPA)
M. Granger (USEPA)
S. Ervolina
R. Cozzy
J. Quinn
J. Greco

CORTESE LANDFILL SUPERFUND SITE
RECORD OF DECISION
AMENDMENT TO THE RECORD OF DECISION

APPENDIX V

RESPONSIVENESS SUMMARY

SUMMARY OF DOCUMENTS

Section V-a: August 2010 Proposed Plan

Section V-b: August 13, 2010 Public Notice

Section V-c: August 23, 2010 Public Meeting Sign-In Sheet

Section V-d: August 23, 2010 Public Meeting Transcript

Section V-e: Correspondence Received During the Comment Period

RESPONSIVENESS SUMMARY
FOR THE
RECORD OF DECISION
AMENDMENT TO THE RECORD OF DECISION
CORTESE LANDFILL SUPERFUND SITE
TUSTEN, SULLIVAN COUNTY, NEW YORK

INTRODUCTION

This Responsiveness Summary provides a summary of citizens' comments and concerns received during the public-comment period related to the Cortese Landfill Superfund Site (Site) source area remedy and a modified groundwater remedy Proposed Plan, and it provides the U.S. Environmental Protection Agency's (EPA's) responses to those comments and concerns. All comments summarized in this document have been considered in EPA's final decision in the selection of a source control and modified groundwater remedy.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

Geosyntec Consultants' July 2010 *Former Source Areas Feasibility Study Report, Cortese Landfill Site, Narrowsburg, New York* and EPA's source control and modified groundwater remedy Proposed Plan for the Site were released to the public for comment on August 13, 2010 (see Appendix V-a for a copy of the Proposed Plan). These documents were made available to the public at information repositories maintained at the Tusten-Cochecton Library in Narrowsburg, New York and the EPA Region II Office in New York City. The notice of availability for the above-referenced documents was published in the *Sullivan County Democrat* on August 13, 2010 (see Appendix V-b for a copy of the notice). The public comment period ran from August 13, 2010 to September 12, 2010. On August 23, 2010, EPA conducted a public meeting at the Tusten Town Hall to inform local officials and interested citizens about the Superfund process, to present the Proposed Plan for the Site, including the preferred source area and modified groundwater alternative, and to respond to questions and comments from the approximately 20 attendees (see Appendix V-c for a copy of the sign-in sheet for the meeting). On the basis of comments received during the public comment period, the public generally supports the selected remedy.

SUMMARY OF COMMENTS AND RESPONSES

Comments were received at the public meeting and in writing via e-mail and letters. Written comments were received from:

- Scott Birney, Superintendent, Narrowsburg Water and Sewer Districts (August 23, 2010 e-mail);

- Harold Roeder, Jr., Chairman, Upper Delaware Council (September 2, 2010 letter);

- Sean J. McGuinness, Superintendent, United States Department of the Interior, National Park Service (September 10, 2010 letter);

- Robert M. Glazier, Project Director, Geosyntec Consultants, submitted on behalf of the Potentially Responsible Parties (September 11, 2010 letter);

The transcript from the public meeting can be found in Appendix V-d.

The written comments submitted during the public comment period can be found in Appendix V-e.

A summary of the comments provided at the public meeting and in writing, as well as EPA's responses to them, are provided below. The comments and responses have been organized into the following topics:

Public comment was related to:

- Air Sparging/Soil Vapor Extraction;

- Groundwater Contamination;

- Potentially Responsible Parties;

- Selected Remedy; and

- Sources of Contamination

Air Sparging/Soil Vapor Extraction

Comment #1: A commentor asked how air sparging/soil vapor extraction (SVE) works. Another commentor asked for specific details relative to the number of air sparge/SVE wells that will be installed and the size of the piping. Another commentor asked what happens to the volatile organic contaminants that are released from the groundwater by the air sparging.

Response #1: Air sparging uses an air compressor to send air through a series of horizontal pipes that are connected to vertical pipes into the ground at and/or below the contaminated groundwater. Air sparging remediates the groundwater by volatilizing contaminants and enhancing biodegradation. It is akin to blowing bubbles from a straw into a bowl of water. As the air bubbles rise, the contaminants are removed from the

groundwater by physical contact with the air (*i.e.,* in-situ stripping) and are carried up into the soil above the water table. An SVE system, which uses a vacuum to create a negative pressure in the unsaturated zone through a series of vertical wells, will collect the vapors. The collected vapors are then treated with carbon, if necessary, and are then vented to the atmosphere.

The specific details related to the air flow rates, sizing of the piping, and spacing of the air sparging and SVE wells will be determined during the design phase. It is, however, estimated that there will be thirty air sparge wells to a maximum depth of fifty feet and forty or fifty SVE wells. The area of the influence of the air sparging wells and SVE wells will overlap so that all of contaminated source material and associated groundwater will come into contact with air and all of the released vapors will be collected, respectively. The pipes, which are typically made out of plastic, are usually 2-3 inch in diameter.

Comment #2: A commentor inquired as to whether air sparging and SVE has been used at other Superfund sites.

Response #2: Air sparge/SVE systems have been used at numerous Superfund sites for over a decade to volatilize and capture contaminants trapped in groundwater.

Comment #3: Since the air sparge/SVE system will run for an estimated seven years, a commentor asked whether the system will be noisy.

Response #3: The air sparge/SVE system will generate noise which, if not abated, could be an annoyance to area residents. Appropriate engineering controls, such as placing the equipment inside a building and/or soundproofing the equipment, will be employed for noise abatement.

Comment #4: A commentor asked whether or not air sparging would address the metals that are present in the groundwater.

Response #4: No. The metals that are present in the groundwater are naturally-occurring constituents in the area's soil that have been mobilized by the contaminants that were released from the municipal waste disposed in the landfill. Specifically, the waste and contaminants have changed the subsurface geochemistry to a reducing environment, characterized by little or no free oxygen. Such an environment allows metals to dissolve into the groundwater. While the air sparging system will not extract the metals, injecting air into the subsurface will change the geochemistry back to an oxidizing environment, which will result in the metals being restored to the soil.

Groundwater Contamination

Comment #5: A commentor asked whether the remedy would address the downgradient groundwater contamination.

Response #5: No. The in-situ treatment of the contamination at the source areas will remove the source of the groundwater contamination. The downgradient groundwater contaminant concentrations will be reduced through natural attenuation, which is a variety of processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. These natural attenuation processes have been determined to be present at and downgradient from the landfill.

Comment #6: A commentor asked how long it would take to remediate the aquifer under the two action alternatives.

Response #6: The 1994 Record of Decision (ROD) estimated that removing the drums and associated hazardous substances located above the water table followed by capping the landfill in combination with groundwater extraction and treatment and downgradient natural attenuation would result in achieving the cleanup goals in the groundwater in 14 years. With the confirmed presence of a large source area beneath the excavated disposal trenches, the cleanup time frame for the 1994 ROD groundwater extraction-and-treatment remedy is now estimated to be 150 years. It is estimated that it would take 15 years to restore groundwater quality downgradient from the landfill under the selected source-area remedy.

Comment #7: A commentor asked if the groundwater would be monitored under the selected remedy.

Response #7: At present, the groundwater is monitored three times a year. Under the selected remedy, initially the groundwater would continue to be monitored three times a year. The monitoring frequency may be decreased in the future as contaminant levels decrease or stabilize.

Comment #8: A commentor asked for details related to the plume of contaminated groundwater and where it is migrating.

Response #8: Groundwater data indicate that the plume of Site-related contaminants is approximately 1,300 feet wide. From the landfill, the plume passes beneath the railroad embankment and discharges to the Delaware River. The majority of the contamination was detected in monitoring wells located within or immediately adjacent to the landfill (*i.e.,* east of the railroad embankment). By comparison, levels in monitoring wells

located within the plume area approximately 200 feet downgradient (west of the embankment) were generally one-tenth or less than those in the monitoring wells east of the embankment. Significantly lower contaminant levels in the downgradient wells indicate that natural attenuation and/or dilution affects the degree of contamination over relatively short distances.

Potentially Responsible Parties

Comment #9: A commentor asked how the project is to be funded. The commentor also asked whether the Town of Tusten has any liability.

Response #9: Most of the investigatory and cleanup work to date at the Site has been funded and performed by several dozen potentially responsible parties (PRPs) under EPA's oversight. It is anticipated that the remedy called for in the ROD/ROD amendment will be implemented by the PRPs, as well.

Since the Town of Tusten owned a portion of the landfill while hazardous waste disposal activities occurred, it is among the group of PRPs and has liability. Through an agreement worked out among the PRPs, the Town of Tusten currently provides in-kind services, such as mowing the grass on the landfill cap and maintaining the fence.

Selected Remedy

Comment #10: A commentor asked about the potential impact that the selected remedy would have on the local roads. Another commentor expressed concern that since the road which provides access to the wastewater treatment facility and the Site is in poor condition, it will likely fail as a result of the increased traffic because of the construction at the Site.

Response #10: Other than increased noise levels for approximately a year, vehicle traffic associated with the construction of the selected remedy would have negligible impact on the local roadway system. Any damage to local roadways that is attributable to implementing the remedy will be repaired.

Comment #11: A commentor asked what would be done if the selected remedy does not achieve the groundwater cleanup objectives.

Response #11: Based upon its knowledge of the Site and the technologies that will be employed, EPA is confident that the selected remedy will result in the groundwater achieving the cleanup objectives in a reasonable time frame. If, however, the selected remedy fails to attain these standards or should its implementation prove impracticable, EPA would consider implementing groundwater extraction and treatment.

Comment #12: A commentor asked why EPA is proposing in-situ treatment as opposed to groundwater extraction and treatment.

Response #12: While both in-situ treatment and groundwater extraction and treatment would effectively address the contaminated groundwater, not only are the costs related to in-situ treatment significantly less than groundwater extraction and treatment, but in-situ treatment has the potential to achieve cleanup goals in a much shorter period of time (an estimated 15 years for in-situ treatment versus 150 years for groundwater extraction and treatment).

Comment #13: A commentor expressed concern that implementing the groundwater remedy might affect a Town water supply well which is located approximately 750 feet northwest of the landfill.

Response #13: The Narrowsburg public water supply is primarily supplied 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 of the supply wells are hydraulically upgradient of the Site and are, thus, not affected by Site-related contamination. Since air sparging and SVE will not likely cause any significant changes to the groundwater flow path, the water supply wells will not be impacted by the selected remedy. Also, since the water supply wells are hydraulically upgradient of the Site, the application of chemical oxidation will also not impact the wells.

Comment #14: A commentor representing the PRPs stated that performance standards that describe decision criteria for transitions in the various steps in the remediation process, such as cessation of active sparging, should be developed and included as part of the new Consent Decree scope of work for the selected remedy. Several suggested possible “lines of evidence” include achieving a defined percentage reduction in the mass flux of contaminants along the groundwater migration pathway, achieving contaminant concentrations in the groundwater that are within a defined multiple of the final cleanup goals, or achieving a decline in mass removal rates to a point that it is comparable to those that would be achieved by natural attenuation processes under pre-remediation conditions. Refinement and/or addition of details to those decision criteria might be appropriate as part of the remedial design. Such criteria might include a multiple lines of evidence decision process. While it is probably premature to specify criteria for deciding whether and when to cease active treatment or resume active treatment after the stabilization period, the PRPs believe that it is appropriate to state the intention that such criteria will be developed during the design of that phase.

Response #14: The ultimate objective of the selected remedy is to achieve groundwater standards at the source areas and downgradient of the landfill. EPA is in agreement

that performance criteria and decision criteria for transitions in the various steps in the remediation process need to be developed. EPA believes that the remedial design is the appropriate phase to develop such criteria.

Comment #15: A commentor representing the PRPs stated that while the Proposed Plan states that groundwater extraction and treatment should be evaluated if the selected remedy fails to meet the performance standards and cleanup goals, given the substantial amount of time contemplated to complete the remedial process, the PRPs believe that such an evaluation should include other technologies that may be available at that time that may be more effective than groundwater extraction and treatment. While the Proposed Plan refers to the application of in-situ chemical oxidation to address any remaining recalcitrant source materials, for the same reasons, the PRPs believe that the same approach should be used in determining how to address any recalcitrant contaminants after the stabilization period.

Response #15: As is demonstrated by EPA's current willingness to modify the groundwater remedy selected in the 1994 ROD based upon new information and available technologies, if appropriate, EPA would be willing to consider refinements and modifications to the remedy in the future.

Comment #16: A commentor representing the PRPs stated that the Proposed Plan indicated that the National Historic Preservation Act (NHPA) is a location-specific Applicable or Relevant and Appropriate Requirement (ARAR). As summarized in the 2010 Feasibility Study, the NHPA was previously identified as a location-specific ARAR in the 1994 ROD, and the PRPs completed a stage two cultural resource investigation at the Site and consulted with the State Historic Preservation Office (SHPO) as part of the pre-design investigations for the landfill closure design. Because of the extensive disturbance at the Site resulting from trench-and-fill landfill operations and the results of the stage-two cultural resource investigation, the SHPO determined that no further action was necessary with respect to NHPA for construction of the landfill source control measures. The disturbances contemplated for the selected remedy are located within the area of the prior stage-two cultural resources investigation and the area of disturbance by the previous source control measures. Therefore, NHPA should not be an ARAR for the selected remedy.

Response #16: While the NHPA is still a location-specific ARAR for the Site, no further actions relative to the NHPA are contemplated at this time.

Sources of Contamination

Comment #17: A commentor asked where the wastes that were disposed of at the Site came from and whether that disposal was legal.

Response #17: The landfill received municipal waste at an estimated rate of 3,000 cubic yards per year from approximately July 1970 to July 1981. 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, drummed industrial wastes were apparently brought to the Site. These wastes apparently included drums containing paint thinners and sludge, solvents, dyes, waste oil, and petroleum products. Disposal is believed to have included the burial and/or emptying of drums in trenches and the emptying of tanker trucks into one of the lagoons located on-Site.

With regard to the legality of the disposal of hazardous substances in a municipal landfill, the passage of the Resource Conservation and Recovery Act by Congress in 1976 made such disposal practices illegal.

Comment #18: A commentor asked why, if a groundwater remedy was selected in 1994, it has taken so long to address the contaminant source areas.

Response #18: In scoping out the design of the groundwater extraction and treatment system selected in the 1994 ROD, it was determined that there were logistical problems associated with space constraints related to equipment and infrastructure sharing the same space as the landfill cap, the wastewater treatment facility, and the wetlands, as well as difficulties related to transmitting the treated effluent from a groundwater treatment facility either beneath the railroad embankment to the Delaware River or to groundwater. In response to these concerns, after the completion of the cap the PRPs devoted considerable effort 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 testing. Early in the reassessment process, it became increasingly clear that there were additional, previously-unidentified sources of chlorinated and non-chlorinated volatile organic compound contamination beneath the former drum-disposal areas (an area located beneath the primary 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. A subsequent source-area investigation performed in 2004 clearly showed the location of the primary previously-undocumented source area. Characterization of the horizontal and vertical extent of this source area was completed in 2008.

The 1994 ROD estimated that removing the drums and associated hazardous substances located above the water table followed by capping the landfill in combination with groundwater extraction and treatment and downgradient natural attenuation would result in achieving the cleanup goals in the groundwater in 14 years.

With the confirmed presence of a large source area, the cleanup time frame for the groundwater extraction and treatment remedy is now estimated at 150 years. For this reason, new remedial alternatives were assessed, and EPA proposed a change to the remedy.

Comment #19: A commentor expressed concerns related to providing electrical, sewer, and water connections for both action alternatives.

Response #19: EPA recognizes the complexity of providing electrical, sewer, and water connections for the selected remedy because of the remote nature of the Site and the presence of the railroad embankment. How such service will be provided will be addressed during the design phase.

RESPONSIVENESS SUMMARY

APPENDIX V-a

AUGUST 2010 PROPOSED PLAN

Superfund Proposed Plan

U.S. Environmental Protection Agency, Region II

Cortese Landfill Superfund Site

Sullivan County, New York

August 2010

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes source-control remedial alternatives considered for the Cortese Landfill Superfund site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the Proposed Plan as part of its public participation responsibilities to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to the remedial alternatives under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §9617(a) and Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This Proposed Plan also proposes changes to the groundwater portion of the remedy selected by EPA for the site in a Record of Decision signed on September 30, 1994 (1994 ROD)[1]. All other aspects of the 1994 remedy have been implemented. In accordance with Section 117(a) of CERCLA and Section 300.435(c)(2)(i) of the NCP, if after the selection of a remedy in a ROD, a component is fundamentally altered, EPA must propose an amendment to the ROD. EPA's proposed changes to the ROD must first be made available for public comment in a Proposed Plan.

The alternatives summarized in the Proposed Plan are described in more detail in *Former Source Areas Feasibility Study Report, Cortese Landfill Site, Narrowsburg, New York*, Geosyntec Consultants, July 2010 report (2010 FS), which should be consulted for a more detailed description of all the alternatives.

This Proposed Plan is being provided as a supplement to the 2010 FS to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative and the proposed amendment to the groundwater portion of the 1994 ROD.

[1] A ROD is a document which formalizes the selection of the remedy at a Superfund site.

MARK YOUR CALENDAR

August 13, 2010 – September 12, 2010: Public comment period related to this Proposed Plan.

August 23, 2010 at 7:00 P.M.: Public meeting at the Tusten Town Hall, 210 Bridge Street, Tusten, New York.

The remedy described in this Proposed Plan is the *preferred* remedy for the site. A change from the preferred remedy selected in a ROD may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. The final decision regarding the changes to the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in the detailed analysis of the 2010 FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the 2010 FS report and this Proposed Plan have been made available to the public for a public comment period which begins on August 13, 2010 and concludes on September 12, 2010.

A public meeting will be held during the public comment period at the Tusten Municipal Building, 210 Bridge Street, Tusten, New York on August 23, 2010 at 7:00 P.M. to summarize the results of supplemental investigations that were undertaken and the evaluation of alternatives in the 2010 FS, to elaborate further on the reasons for recommending the preferred alternative and the proposed amendment to the groundwater portion of the 1994 ROD, and to receive public comments.

INFORMATION REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories:

Tusten-Cochecton Library
198 Bridge Street
Tusten, New York 12764
(845) 252-3360

Hours:

Monday, Wednesday, and Friday
11:30 A.M. - 4:30 P.M.
and
6:30 P.M. - 8:30 P.M.

Saturday
10 A.M. - 1 P.M.

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308

Hours: Monday - Friday, 9:00 A.M. - 5:00 P.M.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the ROD.

Written comments on the Proposed Plan should be addressed to:

Mark Granger
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866

Fax: (212) 637-4251
e-mail: granger.mark@epa.gov

SCOPE AND ROLE OF ACTION

The primary objectives of this action are to remediate the source of groundwater contamination at the site, restore groundwater quality downgradient of the landfill, and minimize any potential future health and environmental impacts.

SITE BACKGROUND

Site Description

The site is located within the hamlet of Narrowsburg, New York. It is bound to the northeast by a steep bedrock escarpment and to the southwest by the CSX railroad embankment. The northern edge of the site lies approximately 70 feet south of the Narrowsburg Waste Water Treatment Plant. A small borrow pit (White's Pond) and a small backwater area (the embayment) along the eastern shoreline of the Delaware River are located about 800 feet southwest of the former landfill. The former landfill property boundary 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.

On the landfill side of the railroad embankment, areas to the southeast, east, and northeast of the former landfill are predominantly wooded and used for hunting. Areas on and south of the former landfill are seasonally flooded due to perched water conditions. In addition, there are several small wetland areas in the immediate area of the former landfill. An unpaved road between the landfill and the embankment is used by CSX employees for access to the railroad tracks.

Six residences are located on the 200-250 foot wide strip of land to the west of the former landfill between the embankment and the Delaware River. These properties are accessed by Delaware Drive, a paved road which dead ends toward the south at a cul-de-sac. 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. A site layout map is provided on Figure 1. All of the residences on Delaware Drive are served by publicly-supplied water.

The Narrowsburg public water supply is primarily supplied by a well (Town Well #3) located approximately one mile east of the former landfill. Two secondary wells in this system are located approximately 750 feet northwest and approximately one-half mile north-northwest of the former landfill (Town Well #1 and #2, respectively). Town Wells #1 and #2 are currently used to supplement the public water supply provided by Well #3. All three wells are hydraulically upgradient of the site, and are, thus, not affected by site-related contamination.

Site History

The landfill portion of the site, which was initially called the "Tusten Landfill," received municipal waste from approximately July 1970 to July 1981. 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 brought to the site. These wastes apparently included drums containing paint thinners and sludge, solvents, dyes, waste oil, and petroleum products. Disposal is believed to have included the burial and/or emptying of drums in trenches and the emptying of tanker trucks into one of the two septage lagoons. The other lagoon was used strictly for the disposal of residential septage sludge. Subsequent groundwater monitoring revealed elevated concentrations of volatile and semi-volatile organic compounds.

In 1985, SCA voluntarily entered into a stipulation agreement with NYSDEC to conduct a remedial investigation (RI) at the site. The site was listed on CERCLA's National Priorities List in June 1986. A Phase I RI report was completed in July 1987, followed by a Phase II RI report which was completed in August 1988. In April 1990, NYSDEC formally transferred the lead role for the site to EPA. SCA entered into an Administrative Order on Consent (AOC) to complete an RI/FS with EPA in September 1990. A final RI report (March 1994), risk assessment (June 1994), and FS report (June 1994) were performed under the AOC. A ROD was issued on September 30, 1994, calling for, among other things, removal of drums and associated soils, capping the former landfill, groundwater extraction and treatment, institutional controls[2] and natural attenuation[3] of contaminants in downgradient areas.

Consent Decree negotiations between EPA and a group of twenty-eight potentially responsible parties (PRPs) to carry out the remedial design (RD) and construction of the 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 phase of the remediation, the Town of Tusten conducted a removal action (pursuant to a consent order with EPA) whereby contaminated soils from the two septage 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 nearby wetlands, thereby reducing infiltration into the waste and, thus, leachate production from the former landfill.

The drum removal component of the selected remedy, which was performed in 1995 and 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 from the landfill, and an additional 300 drums from an area adjacent to the septage lagoons, for off-site disposal. The design of the cap component of the selected remedy was completed in May 1997. Construction of the cap and restoration of wetlands was completed in 1998. Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. On-site institutional controls precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy, are expected to be in place in 2010.

In scoping out the design of the groundwater extraction and treatment system, it was determined that there were logistical problems associated with space constraints related to equipment and infrastructure sharing the same space as the landfill cap, waste-water treatment facility, and wetlands, as well as with difficulties related to transmitting the treated effluent either beneath the railroad embankment to the Delaware River or to groundwater. In response to these concerns, considerable efforts by the PRPs were devoted after cap completion to discern remedial approaches that would reduce the reliance on the full-scale groundwater extraction-and-treatment system contemplated in the 1994 ROD. These efforts have taken the form of investigations, studies, and bench- and field-scale pilot testing.

Early in this reassessment process, it became increasingly clear that there were additional, previously-unknown sources of volatile organic compound (VOC) contamination comprised of both chlorinated and non-chlorinated compounds beneath the former drum-disposal areas (a primary area beneath the landfill drum-disposal area and a small secondary drum-disposal area 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 first indicated the potential presence of these source areas. A subsequent source-area investigation performed in 2004 clearly showed the

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2 Institutional controls are administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.

3 Natural attenuation is a variety of *in-situ* processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

location of the primary previously-undocumented source area. Work to characterize the horizontal and vertical extent of this source area was conducted in 2007. Additional samples of soil, groundwater, and light non-aqueous phase liquid (LNAPL) were collected in February 2009 for the purpose of bench-scale treatability testing. All of these efforts have helped considerably in refining the conceptual site model.

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 which 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 overall average velocity throughout the entire saturated thickness of overburden 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 former landfill 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).

REMEDIAL INVESTIGATION SUMMARY

RI sampling of groundwater, surface and subsurface soil, surface water, sediment, and soil gas was conducted in three phases from 1987 to 1994 on and around the site. Since the subject of this Proposed Plan is related to the additional source areas located below the water table that were not detected during the original RI, and associated groundwater, only groundwater from the RI is discussed below. In addition, groundwater sampling has been conducted three times per year since the Fall of 1996. Vapor intrusion data, collected after the RI, is also discussed below. For information on the other media, please refer to the 1994 ROD or other documents available in the Administrative Record file.

Groundwater samples have been collected from up to twenty-six monitoring wells and Tusten Well #1 over the three phases of the RI and three times per year after the 1994 ROD. Data from samples collected at and downgradient of the former landfill revealed levels of VOCs, semi-volatile organic compounds (SVOCs), and metals exceeding the current Federal Safe Drinking Water Act and/or New York State Public Water Supplies Maximum Contaminant Levels (MCLs). The widest range of constituents and the highest concentrations were detected at monitoring wells S-1, S-2, EX-1, and MW-12 through MW-15, all of which are located in or near the landfill source area. The highest concentration of contaminants were detected at monitoring well S-2 (total chlorinated and non-chlorinated VOCs of 291,000 micrograms per liter [ug/l] and total SVOCs at 5,466 ug/l) during the April 2008 monitoring event.

Groundwater data indicate that the plume of site-related contaminants is approximately 1,300 feet wide. The former landfill is approximately 400 feet from the river. Groundwater impacts are found in shallow zones adjacent to the western edge of the landfill and in both shallow and deeper zones downgradient. From the landfill, the plume passes beneath the railroad embankment, Delaware Drive, and the previously-noted six residences and discharges to the Delaware River (see Figure 1). The majority of the contamination was detected in monitoring wells located within, or immediately adjacent to, the former landfill (*i.e.,* east of the railroad embankment). By comparison, levels in monitoring wells located within the plume area approximately 200 feet downgradient (west of the embankment) were generally one-tenth or less than those in the monitoring wells east of the embankment. Significantly lower contaminant levels in the downgradient wells indicate that natural attenuation and/or dilution affects the degree of contamination over relatively short distances. Analysis of natural-attenuation parameters in groundwater, performed as part of the long-term monitoring aspect of the 1994 ROD, has confirmed the strong presence of several natural attenuation indicators.

The vapor intrusion pathway[4] was also evaluated for several homes in the vicinity of the site. This effort was conducted from 2007 to 2009. The concentrations of the detected compounds were found to be below the levels of concern.

[4] Vapor intrusion is a process by which VOCs move from a source below the ground surface (such as contaminated groundwater) into the indoor air of overlying or nearby buildings.

RESULTS OF THE SOURCE AREA INVESTIGATION

As noted above, after the 1994 ROD, a shallow groundwater hot-spot investigation along the downgradient perimeter of the former landfill was performed. This effort, conducted in 2001, served to further refine the site conceptual 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 beneath the primary former drum-disposal area containing previously-undocumented sorbed-phase and residual-phase (*i.e.,* non-aqueous phase liquid [NAPL]) VOC contamination. Additional source characterization was conducted in 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 LNAPL were collected in February 2009 for the purpose of in-situ chemical oxidation (ISCO) bench-scale treatability testing. Annual 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 small source area near the septage lagoons. These source areas are delineated on Figure 2.

The 1994 ROD estimated that with implementation of the groundwater component of the selected remedy (groundwater extraction and treatment at the landfill with downgradient natural attenuation), the cleanup goals would be met in approximately 14 years. With the confirmed presence of a large NAPL source area, the cleanup time-frame estimate for the groundwater remedy is now estimated at 150 years. For this reason, new remedial alternatives were assessed in the 2010 FS.

SUMMARY OF RISKS ATTRIBUTABLE TO GROUNDWATER

Current federal guidelines for acceptable site-related exposures are an individual incremental lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6} (*e.g.,* the risk of an additional one-in-ten-thousand to one-in-a-million excess cancer risk) and a maximum health Hazard Index (which reflects noncarcinogenic effects for a human receptor) equal to 1.0. (A Hazard Index greater than 1.0 indicates a potential of noncarcinogenic health effects.)

The excavation and removal from the landfill of over 5,000 drums and the installation of the landfill cap have addressed non-groundwater-related risks. The potential site-related human health risks related to groundwater were identified in the 1994 ROD and have not substantially changed. The human health risk assessment, which is part of the 1994 RI/FS report and was discussed in the 1994 ROD, determined that hypothetical future use of the groundwater at the site would pose an unacceptable risk to human health. The hypothetical carcinogenic risk for exposure to groundwater by future residents was estimated to be 2×10^{-3}. This risk number means that 2 additional persons out of 1,000 would potentially be at risk of developing cancer if the site is not remediated and groundwater was to be used for potable purposes. The Hazard Index was estimated to be 140.

The vapor-intrusion pathway was evaluated and determined not to constitute a significant risk to human health or the environment.

With regard to ecological risk, any areas that may have posed such risks were addressed by the remedial actions that have already been taken at the site.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and site-specific risk-based levels.

The following remedial action objectives were established for the source areas and groundwater:

- reduce or eliminate the potential for source areas to release contaminants to groundwater;
- 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
- reduce or eliminate the potential for migration of contaminants downgradient of the former landfill.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, comply with ARARS, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial

actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains federal and state ARARs, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the source areas and the groundwater can be found in the 2010 FS report.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

The alternatives are:

Alternative 1: No Further Action

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no further action alternative does not include any physical remedial measures (beyond those remedial and removal actions already completed) that address any site-related media.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 2: Groundwater Near-Source Extraction and Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$4.1 million
Annual O&M Cost:	$611,000
Present-Worth Cost:	$11.7 million
Construction Time:	1 year

Under this alternative, five groundwater extraction wells would be installed in the upper sand and gravel unit near the source areas along the downgradient perimeter of the landfill, extending several feet into the underlying silt/sand layer. The conceptual treatment process for the groundwater would include metals precipitation, clarification/filtration, and air stripping. Treated groundwater would likely be discharged to the Delaware River via the existing Town of Tusten wastewater-treatment-facility outfall. The effectiveness of the treatment system would be assessed through long-term groundwater and surface-water monitoring. Monitoring is assumed to be conducted three times per year, and would include several surface water sampling stations west of the embankment, a network of groundwater wells, and any treated groundwater effluent discharge, all sampled for VOCs, SVOCs, metals, and municipal solid waste leachate indicator parameters.

The downgradient groundwater-contaminant plume would be addressed through MNA.

It is estimated that system construction would be completed in one year.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 3: In-Situ Source-Area Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$5.2 million
Annual O&M Costs:	$419,000
Present-Worth Cost:	$8.1 million
Construction Time:	1 year

This alternative would employ a series of in-situ technologies to treat residual material within the source areas and to accelerate depletion of the source mass.

Initially, peroxide may need to be applied to help in adjusting subsurface conditions for air sparging. Air sparging/soil vapor extraction (SVE) would be used throughout the source areas to remove a significant component of the chlorinated and non-chlorinated VOCs and petroleum hydrocarbons by volatilization. Air sparging consists of injecting air below the water table in order to volatilize dissolved VOCs and partition them into soil gas above the water table. Air sparging also promotes aerobic degradation processes. The SVE wells would be utilized to collect the soil vapors. The collected vapors would be discharged to the atmosphere following aboveground treatment, if necessary. Any treatment residuals would have to be appropriately handled (*e.g.,* off-site treatment/disposal). The air sparge/SVE system would run until one or more performance measures (*e.g.,* diminished contaminant-removal efficiencies, *etc.*) are attained. It is estimated that this system would need to be run for seven years.

For the final phase of the air sparging/SVE, amendments such as ozone would be injected to aggressively destroy some of the remaining source materials.

At the conclusion of the air sparge/SVE and amendment- addition program, the groundwater would be allowed to stabilize for up to five years. This stabilization period is necessary to, among other things, allow for the active treatment components to subside and for the equilibration of the aqueous subsurface from aerobic to anaerobic conditions.

After this stabilization period, the groundwater would be treated using ISCO, if necessary, to address the remaining recalcitrant source materials. A surfactant application would be considered to flush stubborn sorbed source materials into the groundwater where an oxidant (such as persulfate) would be deployed to destroy the newly released contaminants.

Under this alternative, pilot-scale treatability testing would be used to determine the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data would be used in the system-design evaluation.

After the ISCO deployment, if determined to be necessary, MNA would be utilized as the final step to attain the cleanup objectives in the groundwater downgradient of the landfill.

The effectiveness of this alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in mass flux, *etc.*)[5].

It is estimated that construction related to this effort would be completed in one year.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely short-term effectiveness, long-term effectiveness and permanence, reduction of toxicity, mobility or volume, implementability, cost, compliance with applicable or relevant and appropriate requirements, overall protection of human health and the environment, and state and community acceptance. The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

[5] Specific performance standards will be generated based on appropriate guidance, *e.g.*, EPA's 2004 guidance entitled *Performance Monitoring of MNA Remedies for VOCs in Ground Water.*

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance (O&M) costs, and net present worth costs.

- State acceptance indicates whether, based on its review of the 2010 FS report and Proposed Plan, the State concurs with, opposes, or has no comment on the selected remedy at the present time.

- Community acceptance will be assessed and refers to the public's general response to the alternatives described in the Proposed Plan and the 2010 FS report.

A comparative analysis of these alternatives based upon the evaluation criteria noted above follows.

Overall Protection of Human Health and the Environment

Alternative 1 would result in no active steps to address the source area or to restore groundwater quality to drinking-water standards in areas downgradient of the landfill and would therefore not be protective of human health and the environment. Alternatives 2 and 3 are active remedies that address source contamination and will restore groundwater quality downgradient of the landfill over the long term. Combined with institutional controls, Alternatives 2 and 3 would provide protectiveness of human health and the environment over both the short and long term.

Compliance with ARARs

EPA and NYSDOH have promulgated health-based protective MCLs (40 CFR Part 141, and 10 NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). The aquifer is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply. Although the groundwater downgradient of the landfill is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable or relevant and appropriate standard, because groundwater downgradient of the landfill is a potential source of drinking water.

Alternative 1 does not provide for direct remediation of the source area or the affected groundwater other than MNA and would, therefore, involve no further actions to achieve chemical-specific ARARs in a reasonable period of time. In contrast, Alternatives 2 and 3 would be more effective in reducing the source area and groundwater contaminant concentrations to a level below state and federal groundwater standards.

Emissions from the air stripper under Alternative 2 and the SVE wells under Alternative 3 would be required to comply with the substantive requirements of state and federal air-emission standards.

While both Alternatives 2 and 3 may potentially reach ARARs downgradient of the landfill sooner than Alternative 1, Alternative 3, with more aggressive source treatment, would likely attain ARARs more expeditiously than Alternative 2. A discharge-permit equivalency (*e.g.,* New York State Pollutant Discharge Elimination System or "SPDES") would be required for Alternative 2.

Other location-specific ARARs relevant to all of the alternatives include the Wild and Scenic Rivers Act (36 CFR Section 297.4), Executive Order 11990 (Protection of Wetlands), Executive Order 11988 (Floodplain Management), and the National Historic Preservation Act.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide reliable long-term effectiveness in a reasonable period of time.

Alternatives 2 and 3, which would both address the groundwater contamination with active engineered treatment systems, although by different means, would provide superior long-term effectiveness through removal of potential future contributions to downgradient groundwater contamination. There would be no long-term threat to human health or the environment as it is the intent of the preferred remedial action to restore the aquifer to drinking water standards in a reasonable period of time.

Alternative 2 would generate treatment residues which would have to be appropriately handled. Alternative 1 would not generate such residues.

Under Alternative 3, the configuration and number of air sparging/SVE wells, characterizing the extracted vapors, the application rates of the various reagents, and determining other operation and performance parameters would need to be determined based on the results of pilot-scale treatability testing. These data would be used in the system design evaluation. Under this alternative, the extracted vapors might need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (*e.g.,* off-site treatment/disposal).

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 would not actively reduce the toxicity, mobility, or volume of contaminants through treatment.

Alternatives 2 and 3 would reduce the toxicity, mobility, or volume of contaminants at the source area and in the downgradient groundwater through treatment, thereby satisfying CERCLA's preference for treatment.

Short-Term Effectiveness

Alternative 1 does not include any additional physical construction measures in any areas of contamination and, therefore, does not present a risk to site workers and the community as a result of their implementation. Alternatives 2 and 3 could potentially present adverse impacts to remediation workers, since these alternatives both would involve the installation of extraction wells, monitoring wells, and/or air sparge/vapor extraction wells through contaminated soils and groundwater. Difficulties related to space constraints and to the conveyance of treated water beneath the railroad embankment would need to be resolved for Alternative 2. Alternative 3 could pose adverse impacts to site workers since it would require the installation of significantly more wells and piping, but Alternative 2 could also pose adverse impacts to site workers because it requires treatment reagents and generates treatment residuals that would be handled by site workers. While both Alternatives 2 and 3 present some risk to on-site workers through dermal contact and inhalation of groundwater, treatment reagents/residuals, or soil vapor, these exposures can be minimized by utilizing proper protective equipment.

For Alternatives 2 and 3, the vehicle traffic associated with the construction could impact the local roadway system and nearby residents through increased noise level, as would the off-site transport of contaminated solids and delivery of potentially hazardous treatment reagents for Alternative 2. Under Alternatives 2 and 3, disturbance of the land during construction could affect the surface water hydrology of the site. There is a potential for increased stormwater runoff and erosion during excavation and construction activities that could be properly managed to prevent excessive water and sediment loading to adjacent wetlands.

Because no further actions would be performed under Alternative 1, there would be no implementation time. It is estimated that it would take 1 year to construct both Alternatives 2 and 3.

Based upon estimated time frames for the source areas in contact with groundwater to be depleted, Alternative 2 would achieve cleanup goals in approximately 150 years. Alternative 3 would achieve cleanup goals in approximately 15 years.

Implementability

Alternative 1 would be the easiest to implement, as there would be no new activities to undertake.

All treatment equipment that would be used in Alternatives 2 and 3 are proven and commercially available. Difficulties related to space constraints and to the conveyance of treated water beneath the railroad embankment would require to be resolved for Alternative 2. Transportation and disposal of treatment residues could be easily implemented using commercially-available equipment. Under these alternatives, sampling for treatment effectiveness and groundwater monitoring would be necessary, but could be easily implemented.

Cost

The present-worth costs for Alternatives 1 through 3 are calculated using a discount rate of 7 percent; a 30-year time interval was used for Alternatives 1 and 2, and a 15-year time interval for Alternative 3. The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the table below.

Alternative	Capital Cost	Annual O&M Cost	Total Present-Worth Cost
1	$0	$0	$0
2	$4.1 million	$611,000	$11.7 million
3	$5.2 million	$419,000	$8.1 million

As can be seen by the cost estimates, Alternative 1 is the least costly remedy at $0. Alternative 2 is the most costly remedy with a present-worth cost of $11.7 million. The present-worth cost for Alternative 3 is $8.1 million.

State Acceptance

NYSDEC concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be assessed following review of the public comments received on the various reports and the Proposed Plan. A responsiveness summary will be prepared to address significant comments received during the public comment period.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative 3 as the preferred alternative to address the source areas and contaminated groundwater. Specifically, this would involve the following:

- Air sparging/SVE of the source areas for approximately seven years to remove a significant component of the petroleum hydrocarbons and other VOCs. SVE wells would be installed to collect the soil vapors and discharge them to the atmosphere after above-ground treatment, if necessary.
- Amendment additions, such as ozone, to the air sparging/SVE for the final phase of the air sparge/SVE period.
- Stabilization of the subsurface for up to five years after active groundwater sparging has been completed.
- Application of ISCO, if necessary, potentially including a surfactant enhancement, to address the remaining more recalcitrant source materials.
- MNA.
- Long-term monitoring.

Pilot-scale treatability testing would be used to determine the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data would be used in the system-design evaluation. In addition, the extracted vapors may need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (*e.g.,* off-site treatment/disposal).

The effectiveness of the preferred alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in mass flux, *etc.*).

After the preferred alternative is in place, it is estimated that groundwater in the aquifer downgradient of the landfill would meet the remediation goals in approximately 15 years.

The environmental benefits of the preferred alternative may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green policy[6]. This will include consideration of green remediation technologies and practices.

EPA may invoke a technical waiver of groundwater ARARs if the remediation program indicates that reaching MCLs in the aquifer is technically impracticable from an engineering perspective.

Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. On-site institutional controls precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy, are expected to be in place in late 2010. The institutional controls already in place for areas downgradient of the landfill, as well as those expected to be in place in late 2010 for the former landfill property, would be verified as remaining in effect periodically as part of the long-term monitoring effort.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Basis for the Remedy Preference

Both Alternatives 2 and 3 are moderately difficult to implement and are energy intensive. Alternative 2 is more difficult to implement in terms of installation and operation of the groundwater treatment process while Alternative 3 is more complex during well installation. While the capital costs of these two alternatives are comparable, operation and maintenance costs are significantly lower for Alternative 3 and it has the potential to achieve cleanup goals in a much shorter period of time (150 years for Alternative 2 versus 15 years for Alternative 3). Therefore, EPA believes that

[6] See http://epa.gov/region2/superfund/green_remediation.

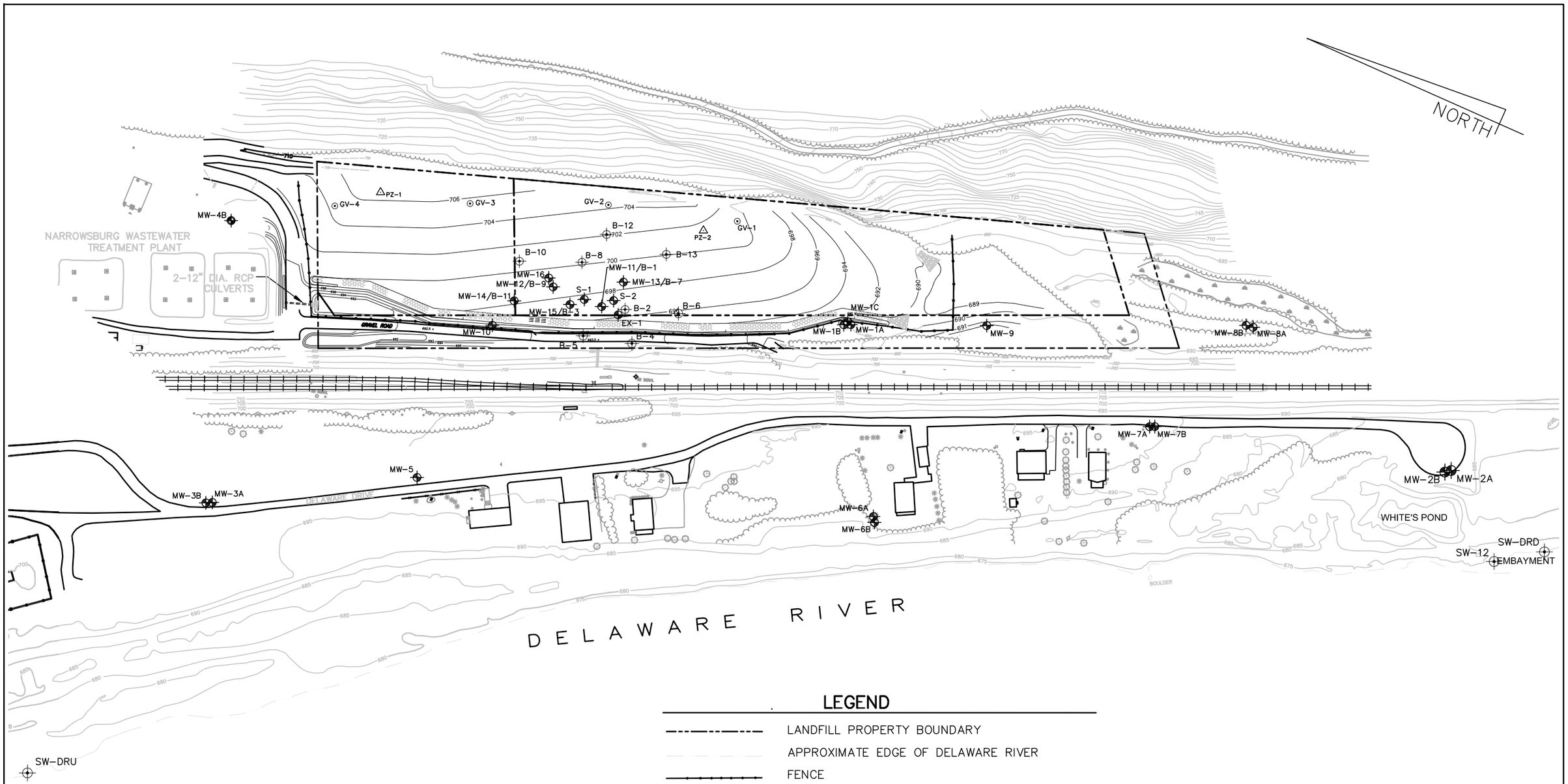
Alternative 3 would effectuate the groundwater cleanup while providing the best balance of tradeoffs with respect to the evaluating criteria.

The preferred alternative is believed to provide the greatest protection of human health and the environment, provide the greatest long-term effectiveness, be able to achieve the ARARs more quickly, or as quickly, as the other alternatives, and is cost-effective. Therefore, the preferred alternative would provide the best balance of tradeoffs among alternatives with respect to the evaluation criteria. EPA and NYSDEC believe that the preferred alternative would be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions, alternative treatment technologies, and resource-recovery technologies to the maximum extent practicable. Because treatment of the VOC-contaminated soils is being performed, the preferred alternative also meets the statutory preference for the use of treatment as a principal element.

PROPOSED AMENDMENT TO THE 1994 ROD

As noted above, this Proposed Plan proposes changes to the groundwater portion of the remedy selected by EPA in the 1994 ROD. As is discussed 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 preferred alternative in this Proposed Plan which directly addresses the source areas, the groundwater portion of the 1994 ROD (groundwater extraction and treatment at the landfill with downgradient MNA) is proposed to be amended.

As noted above, the effectiveness of the preferred alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in mass flux, *etc.*). Should the preferred alternative fail to attain these standards and goals or should its implementation prove impracticable, then "Groundwater Extraction and Treatment and Downgradient MNA" (Alternative 2), which is also the groundwater remedy selected in the 1994 ROD, would at that time be evaluated as the contingency remedy.



LEGEND

- LANDFILL PROPERTY BOUNDARY
- APPROXIMATE EDGE OF DELAWARE RIVER
- FENCE
- LANDFILL COVER ELEVATION CONTOUR
- PRE-EXISTING TOPOGRAPHY ELEVATION CONTOUR
- GV-1 PASSIVE GAS VENT
- MW-10 MONITORING WELL
- SW-DRU SURFACE WATER SAMPLE POINT
- PZ-1 PIEZOMETER

150 75 0 150

SCALE: 1" = 150'

NOTES

1.) ALL COORDINATES SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN DATUM 1983 (NAD 83) AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF N 05°05'25" AND E A DISTANCE OF 426,246.03' AS APPLIED TO THE NATIONAL GEODETIC SURVEY DATUM OF 1927 (NAD 27). ALL ELEVATIONS SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN VERTICAL DATUM OF 1988, AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF -0.5479' AS APPLIED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

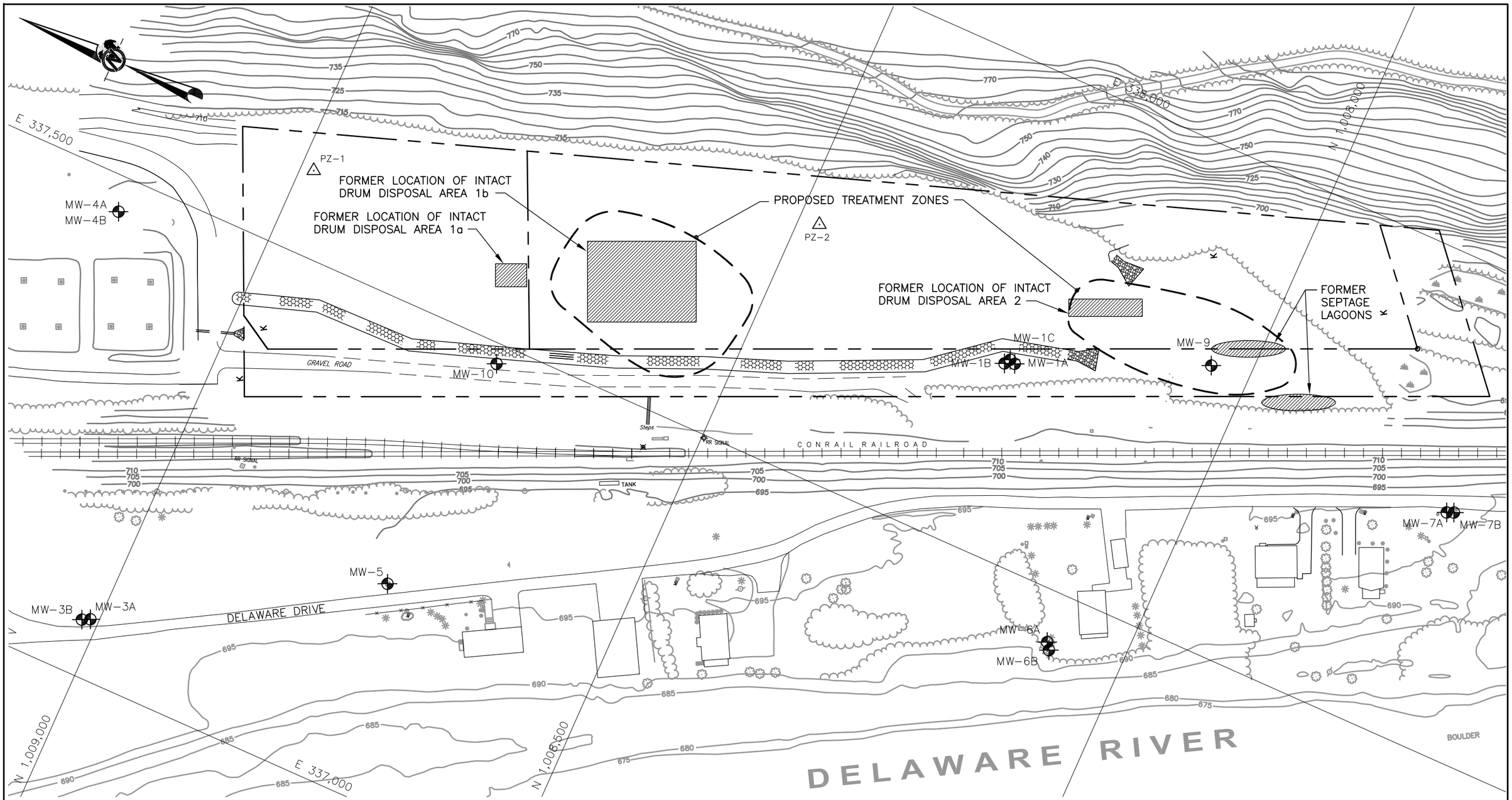
2.) TOPOGRAPHY AND SURFACE FEATURES EAST OF DELAWARE DRIVE WERE ORIGINALLY PREPARED BY FIELD METHODS BY OM P. POPLI P.E., L.S. P.C. CONSULTING ENGINEERS & SURVEYORS, ROCHESTER, NEW YORK, MARCH 1995. TOPOGRAPHY CHANGES SINCE MARCH 1995 PREPARED BY ENVIRONMENTAL RESEARCH, INC. ON DECEMBER 12, 1996. PROPERTY LINES EAST OF DELAWARE DRIVE WERE DETERMINED FROM A SURVEY MAP ENTITLED "CORTESE LAND FILL SITE" DATED MAY 7, 1985, PREPARED BY GARY PACKER, P.L.S. AND "TAX MAP, TOWN OF TUSTEN, SULLIVAN COUNTY, NY," DATED 11/20/92. LANDFILL PROPERTY BOUNDARY TAKEN FROM BASELINE-PROPERTY BOUNDARY-CONTROL, CORTESE LANDFILL SITE, TOWN OF TUSTEN, SULLIVAN COUNTY, NY, MAY 7, 1985, BY GARY PARKER, P.L.S. TOPOGRAPHY AND SURFACE FEATURES WEST OF DELAWARE DRIVE WERE DIGITIZED FROM AN ELECTRONICALLY SCANNED FILE OF THE TOPOGRAPHIC BASE MAP PREPARED BY ROBINSON AERIAL SURVEYS, INC., BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPH TAKEN APRIL 18, 1985.

3.) REFERENCE: DRAWING DEVELOPED FROM FIGURE 2, "SITE PLAN" OF THE SOURCE CHARACTERIZATION REPORT BY GOLDER ASSOCIATES, INC., DATED 24 JANUARY 2008.

SITE PLAN
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	AUGUST 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f351
FIGURE NO.	1



LEGEND

- LANDFILL PROPERTY BOUNDARY
- 750 — TOPOGRAPHIC CONTOUR
- MW-10 — MONITORING WELL
- PZ-1 — PIEZOMETER

100 0 100
SCALE FEET

NOTES

REFERENCE: FIGURE DEVELOPED FROM FIGURE 4A OF THE SHALLOW GROUNDWATER HOT SPOT INVESTIGATION, REMEDIAL WORK ELEMENT II, CORTESE LANDFILL SITE, NARROWSBURG, NEW YORK (GOLDER ASSOCIATES, INC.; 2001).

FORMER SOURCE AREAS
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	AUGUST 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f352
FIGURE NO.	2

RESPONSIVENESS SUMMARY

APPENDIX V-b

PUBLIC NOTICE PUBLISHED IN THE *SULLIVAN COUNTY DEMOCRAT ON AUGUST 13, 2010*

DAN HUST | DEMOCRAT

426 Broadway, also known as the old Sedlack Building/John Burns Building, is one of two downtown Monticello buildings developer Tommy Ting hopes to turn into performance and dining attractions seating up to 400 people. Though he hopes to open the facilities next year, more work remains at both the state and village level.

GRANT: More hoops to go through

FROM FRONT PAGE

agreed Monticello resident Tommy Mack. "… As long as we keep this focus of working together, it's going to be a good project."

Linda Cellini was in attendance on behalf of NYS Senator John Bonacic, noting his support, but as the development director for the local YMCA, she also offered her own support.

"This would be a wonderful opportunity for kids to get involved with theater, as well," she remarked. "[It will] give our young people an outlet and another place to go."

YMCA Advisory Board member Jill Weyer seconded that thought, adding that as Sullivan County's deputy planning commissioner, the county is behind the project, too.

"It's something that's much-needed in the village," said Monticello Mayor Gordon Jenkins. "… I think this project is going to enhance the whole community.… It can't hurt the village."

Other village officials were in attendance, including Trustee Carmen Rue, whom ESDC Regional Deputy Director Paul Taxter called a "one-woman lobbying machine" for her persistent efforts to keep the state focused on Ting's plans.

The village, in fact, will be in charge of much of the financing of the project, as the Restore NY grant award will be made to Monticello, not Ting directly.

Monticello will then draw up a contract with Ting to disburse the $1.7 million in two to three payments – technically reimbursements for work he will have already performed.

The village will also have to contribute 10 percent of the grant award, or $170,000.

"Cash and in-kind contributions are allowed, and 'match' shall mean cash (which is encouraged) or the value of in-kind services, contributions or administrative costs dedicated to this project," said ESDC Public Affairs Manager Lisa Willner, "including funds from federal, state (other than Restore NY funds) and local government sources, and funds from private contributions."

That process, however, awaits one more approval, this time from the state's Public Authorities Control Board. The matter is tentatively expected to be up for a vote at the Wednesday, August 18 meeting of that board in Albany.

If approval is granted, the grant disbursement agreement – a contract between the state and the village – will be sent to Monticello.

Once signed and a similar contract is in place between Ting and Monticello, work can begin.

Ting, who has to provide an additional $700,000 of his own money, said he's still securing financing but hopes to have new roofs on both buildings by the winter.

Deep discussions continue with the village about the two building permits Ting needs, which have yet to be issued, as officials are seeking more clarity and possible design changes in the plans.

Still, Ting is hopeful he can open the entertainment venues next spring.

POLICE NOTE

Stole cell phone

FALLSBURG — Fallsburg Police arrested Terance Johnson, 18, of Loch Sheldrake, and charged him with grand larceny in the fourth degree, a felony.

It is alleged that Johnson did steal a cell phone from a vehicle in Loch Sheldrake. Johnson was released on $1,500 cash bail to return to the Town of Fallsburg Justice Court at a later date.

RENAISSANCE: Everybody wins

FROM FRONT PAGE

her community who is attending SCCC.

• Jamie Evans of Neversink – Time and the Valleys Museum project

SULLIVAN RENAISSANCE SCHOLARSHIPS

The Community Foundation of Orange and Sullivan Counties awarded seven Sullivan Renaissance scholarships to volunteers who made a significant contribution to a Sullivan Renaissance project. These scholarships to the college of one's choice range from $500 to $1,000.

• Karina Arango – Phillipsport beautification – Orange County Community College

• Jaxon Denman – Neversink Renaissance projects – SUNY Cobleskill

• Lauren Hazen – Lumberland Circle Park – SUNY Oneonta

• Andrew Johnson – Mamakating Historical Society – Associated Training Services Network

• Kathryn Justus – Summitville Renaissance – SUNY Oswego

• William McKerrell – Lumberland Circle Park – SUNY Cortland

• Robert Jesse Neumann – Kenoza Lake projects – SUNY Oneonta

SHOWING OF THE FLOWERS

Special flower awards went to five communities this year.

• Best Showing of Flowers Award ($5,000) – Narrowsburg Beautification Group for an exciting, colorful, artistic, imaginative, showstopping, ingenious and delightful display, and a clever use of plant material, texture and space.

• Judges' Choice Awards ($1,000 each) – Youngsville Environmental Preservation Committee for "Most Bold and Dramatic Single Element"; Ethelbert B. Crawford Library in Monticello for "Imaginative Concepts"; Hurleyville Sullivan First for "Best Combined Architectural Elements & Floral Displays"; and Loomis Area Neighborhood Watch for "Most Outstanding Single Garden."

DAN HUST | DEMOCRAT

Above, one of Renaissance's most dedicated judges, Ted Blowes of Canada, is honored with a special award of appreciation by Renaissance founder Sandra Gerry.

COMEBACK AWARD

A special "10th Anniversary Comeback Award" of $3,500 was also presented.

• Liberty Pride – for outstanding achievement in welcoming floral displays, innovative banners, a successful community vegetable garden, extensive partnerships and a multitude of volunteers including youth.

MORATORIUM: Electoral rivals' reactions differ

FROM FRONT PAGE

Safe Energy and Sullivan Area Citizens for Responsible Energy Development (SACRED), two local environmental groups which gave public statements.

Sager continued his call to ban any drilling until a federal study on its health and environmental effects is completed, estimated to occur in 2012.

"To say that we are going to pause until May 15 of next year is a nice breath to take," he said. "However, it is more important to enact meaningful legislation that addresses the many concerns relating to this untested and badly, poorly regulated technology.… Neither I nor anyone else I know wants to be part of a massive industrial experiment, a guinea pig.… I ask you to join me in demanding that our elected officials in Albany show the same concern and sense of urgency."

Bonacic, although similarly not attacking Sager directly, seemed to disagree.

"I also applaud both Democrats and Republicans for rejecting the approach pushed by some to stop new permits until the federal government completes another study on this," he stated. "Even the most ardent environmentalist in the Senate – Democratic Environmental Conservation Chairman Antoine Thompson – acknowledged that linking our state policy to federal policy would be a mistake.

"It was, after all, Washington, D.C. politicians who allowed NYRI to be created," he said, referencing an abandoned plan to route major powerlines through the Delaware River valley, "and who bungled the BP oil spill cleanup. Letting these same people tell us how to mine the highly explosive gas under our homes would not be in our best interest.

"… Neither the anti-drilling side nor the pro-drilling side are completely happy with the legislation which passed – and that probably means it is the right thing to do, if both extremes of this argument are critics," Bonacic concluded. "What we have done though, by passing this legislation, is put a relief valve in place to ensure that the DEC does have the time they need, so our local landowners can enter into the best contracts for gas rights, and so that big industry cannot rig the process by trying to force the DEC's hand."

Callicoon Dems meet Aug. 18

SHANDELEE — The Town of Callicoon Democratic Club monthly meeting will be held on Wednesday, August 18 at 7 p.m. at Lanza's Country Inn on Shandelee Rd. in Shandelee. Call Chair Ouida Edington at 482-4739.

POLICE NOTE

Arrested for DWI while at Probation Department

MONTICELLO — Monticello Police arrested Frank Solberg, 59, of South Fallsburg on Aug. 4, and charged him with felony driving while intoxicated. Police were called to the Sullivan County Probation Department by officers.

Solberg, on probation for a 2007 felony conviction, reported to a scheduled probation appointment in a pickup truck to the Sullivan County Government Center while he was intoxicated. A chemical test administered to Solberg at the Monticello police station showed that his BAC was .08 percent.

Solberg was remanded to the Sullivan County Jail without bail pending further court action.

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY INVITES PUBLIC COMMENT ON THE SOURCE-AREA AND GROUNDWATER PROPOSED PLAN FOR THE CORTESE LANDFILL SUPERFUND SITE NARROWSBURG, SULLIVAN COUNTY, NEW YORK

The U.S. Environmental Protection Agency (EPA) announces the opening of a **30-day comment period** on the Proposed Plan and the preferred means to address source-area and groundwater contamination at the Cortese Landfill Superfund site in Narrowsburg, Sullivan County, New York. The Proposed Plan also amends the groundwater remedy selected in 1994. The comment period **begins on August 13, 2010 and ends on September 12, 2010.** As part of the public comment period, EPA will hold a **public meeting on Monday, August 23, 2010 at 7:00 pm** at the **Tusten Town Hall, 200 Bridge Street, Tusten, New York**. To learn more about the meeting you can contact Ms. Cecilia Echols, EPA's Community Involvement Coordinator, at 212-637-3678 or 1-800-346-5009.

The Cortese Landfill Superfund site is listed on the Superfund National Priorities List. Supplemental investigations were recently completed to further assess the nature and extent of contamination in site media and to evaluate source-area and groundwater cleanup alternatives for the site. Based upon the results of these efforts, EPA has prepared a Proposed Plan which describes the findings and the evaluation of potential remedies in a feasibility study (FS) and provides the rationale for recommending the preferred cleanup alternative.

The preferred remedy is comprised of:

- Air sparging/soil vapor extraction of the source area to remove a significant component of the petroleum hydrocarbons and other volatile organic compounds;
- Ozone sparging and/or other amendments;
- Application of in-situ chemical oxidation, as necessary, potentially including surfactant enhancement, to address any remaining more recalcitrant source materials; and
- Long-term monitoring.

During the **August 23, 2010 Public Meeting,** EPA representatives will further elaborate on the reasons for recommending the preferred cleanup alternative for the site and public comments will be received.

The supplemental investigation reports, FS report, Proposed Plan, and other site-related documents are available for public review at the information repositories established for the site at the following locations:

Tusten-Cochecton Library: 198 Bridge Street Tusten, New York 12764
(845) 252-3360 Hours: Mon/Weds/Fri., 10am-8pm; Tues/Sat., 10am - 1pm; Thurs., closed

USEPA Region 2: Superfund Records Center, 290 Broadway, 18th Floor, New York, NY 10007-1866,
(212) 637-4308 Hours: Mon. - Fri., 9am - 5pm

EPA relies on public input to ensure that the concerns of the local community related to Superfund sites are addressed. It is important to note that although EPA has identified a preferred cleanup alternative for the site, a final decision will not be made until EPA has considered all public comments received during the public comment period. EPA will summarize these comments along with its responses in a Responsiveness Summary, which will be included in the Administrative Record file as part of the Record of Decision, the document in which the remedy decision will be made. **Written comments and questions regarding the Cortese Landfill Superfund site, postmarked no later than September 12, 2010, may be sent to:**

Mr. Mark Granger, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866
Telefax: (212) 637-4284
Email: granger.mark@epa.gov

USEN-110886

RESPONSIVENESS SUMMARY

APPENDIX V-c

AUGUST 23, 2010 PUBLIC MEETING SIGN-IN SHEET

Cortese Landfill Superfund site

Public Meeting - Mon. August 23, 2010
Tusten Town Hall
Tusten, New York

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RESPONSIVENESS SUMMARY

APPENDIX V-d

AUGUST 23, 2010 PUBLIC MEETING TRANSCRIPT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
- -x

CORTESE LANDFILL SUPERFUND SITE

PUBLIC MEETING

- -x

Tusten Town Hall
210 Bridge Street
Tusten, New York

August 23, 2010
7:00 p.m.

A P P E A R A N C E S:

CECILIA ECHOLS,
Community Involvement Coordinator

MARK GRANGER,
Remedial Project Manager

JOEL SINGERMAN,
Central New York Remediation Section

PROCEEDINGS

MS. ECHOLS: Hello everyone, I'm Cecelia Echols, and I'm the Community Involvement Coordinator for the site here, the Cortese site. We're here to address the groundwater contamination at the site.

We also have with us Joel Singerman. He will do the Superfund process. And Mark Granger, he will discuss the site history, overview of the source area study, cleanup alternatives, and the evaluation criteria and preferred alternatives for the site.

To give you a little background, community involvement is part of the Superfund process where we look for public comment from the community in terms of cleaning up a Superfund site. And we're here to address the groundwater portion of the site.

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The last time we were here was in 1994, and Joel and Mark

will bring you into all of the things that have been happening at the site since then.

We have the proposed plan. As I asked before, I hope everyone was able to take one off the table if you didn't get one in the mail, as well as sign in at sign-in sheet.

We'll hold all questions until the end of Mark's presentation. Then we'll open up for questions and answers.

We also have a stenographer. When you're ready to give us a question, please state your name and who you are loudly so she can record it.

The information repository is here at the public library if you want to review any of the documents pertaining to this site.

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The public comment period began on August 13 and it ends on September 12.

And now we'll let Joel do

the Superfund process.

MR. SINGERMAN: Well-publicized hazardous waste disasters indicated to the nation that the process of disposal of hazardous waste was unsafe. So, Congress responded with the Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund.

The Superfund law provides federal funds for cleanup of hazardous waste sites and to respond to emergencies involving hazardous substances.

In addition, EPA was empowered to hold those responsible for the contamination to pay for or conduct necessary

response actions.

The work to remediate a site is very complex and takes place in many stages. Once a site is discovered, it's ranked by a system called the Hazardous Ranking System, which addresses

the immediate and relative risks.

If it ranks high enough, it's placed on the Superfund National Priorities List. Only sites on that National Priorities List can be addressed by the Superfund program.

Once the sites are placed on the list, the next step is we do what's called a Remedial Investigation/Feasibility Study. Remediation investigation investigates the nature and extent of contamination and its threat to public health and the environment. Feasibility Study evaluates appropriate alternatives to

address that contamination.

Once that study is completed, we then come to a public meeting such as this to describe the proposed remedy, how we want to address that contamination.

After the public comment period ends, we consider all

public comments, and then we sign a document called Record of Decision, which basically is a formal documentation of how we basically came to selecting that remedy.

Following the selection of the remedy, then we go to what's called design, which is the plans and specifications of the process of how whatever remedy is selected is developed so we can bid the construction job.

Remedial action, which is basic construction, is how the job

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is constructed.

Following that, once the site no longer poses a threat to health or environment, the site can be deleted from the National Priorities List.

Now Mark will talk about the background of the site.

MR. GRANGER: Good evening. I'm Mark Granger. I've been with EPA for twenty years. I celebrated my twenty year

anniversary this year. I've also coincidentally been with the Cortese Landfill Site for twenty years.

From my experience, what that means is when things go right, you get to share the credit with a lot of people; when things go wrong, you're pretty much standing there by yourself.

I like to think that what we have here tonight to propose is

one of the things that's gone right with the project.

I was here, as Cecelia had said in 1994. And one of the things that is interesting is that I actually remember flipping transparencies on an overhead projector at that point. What a long way we've come since then.

At any rate, what I'd like to cover tonight by way of background and technical discussion is site history, overview of the source area

studies, the cleanup alternatives that we've assembled, the evaluation criteria, and EPA's preferred alternative.

The site is located along the Delaware River along the outskirts of town. This is an aerial photo of the site, with the Narrowsburg Sewage Treatment Plant to the right and you can see the

landfill cap -- I actually have a pointer -- the completed landfill is right in this area.

A little bit of history. The landfill operated for eleven years, accepting primarily municipal solid waste. It also accepted septic sludge in two small lagoons at the back end of the property.

For a six-month period in 1973, drums and other hazardous waste were accepted at the landfill, which caused a problem which led us to study the site for a number of years, starting in the late '80s through 1992.

In 1993, we assembled a number of alternatives to address the contamination that was coming from the site. In 1994, we formalized the decision.

Shortly thereafter, we began work on removing the waste that

had been disposed of, which included the excavation and removal of over five thousand drums from three drum trenches -- one big drum trench and two smaller drum trenches -- also excavating all the materials, hazardous or not, from the septage lagoons, and installation of a protective cover over the top of that work.

This is the landfill property. This is the major drum trench. There was approximately five thousand drums there, another couple hundred in this trench, a couple hundred here, and then hazardous waste disposed in this septage lagoon, and pretty much

just septage in this lagoon.

All of these were found and excavated and removed from the property, along with fifty dumptrucks' worth of contaminated

soils; with the five thousand drums, fifty dumptrucks of contaminated soil and three tanker trucks filled with hazardous liquids.

The cap looks like this now. The property was a landfill, and when you put a protective cap over the top, it's an impermeable plastic layer that's been covered with dirt and seeded.

Another picture of the completed cap, and then a view from the top of the road; as you can see, the landfill stretching out in the distance.

I'll go over an overview of the source area studies at this point.

Because of the work that was done in removing the hazardous materials and all the excavation

that had been done on the property, there was a lot of

disturbance to the property. And then the protective cover is put over this disturbed area.

We needed to let that settle down for a little while. In the meantime, we want to monitor the situation. So, we started conducting groundwater monitoring three times a year that continues to this day, actually.

As we were evaluating this data, it raised questions. And when you have questions with data, you kind of tighten your data array. We started conducting more studies and were finding contamination in places that we hadn't really expected.

For the most part, that was in the groundwater table. When we dug up the drums and the other hazardous material, we dug down to the water table, which is sand and gravel aquifer. At that point,

you pretty much have to call it a day with the excavation equipment. But we were confident that we got everything that was hazardous material-related within the landfill right down to the water table.

What we were finding was there was then also source material beneath the landfill, beneath those drum disposal areas. So, there's a source in the groundwater area that's beneath these areas on the site.

This kind of illustrates that when we put more points in along here, we could see that if groundwater is moving this way, which is the general groundwater flow in the area, that right in this area, coming off of this drum disposal area, was the highest contamination. And that was a question that needed to be

investigated further.

Those investigations led to the conclusion that there were source areas in the groundwater beneath the disposal areas that were constituting an ongoing source of contamination to the groundwater.

In other words, the groundwater kind of moves beneath the site and takes residual contamination that's in the water table with it as it moves past.

Source area study findings. Previous efforts have successfully removed contaminant source areas from within the landfill and other disposal areas. Source areas remain, however, in the groundwater beneath the landfill and other disposal areas.

These source areas continue as a source of contamination to groundwater downgradient of the

landfill.

Just to emphasize, the

source areas that we're talking about are in the water table. Everything that was above the water table was removed as part of the previous efforts.

To address this ongoing contamination problem, we assembled some alternatives.

The first alternative that's evaluated in any proposed plan is no further action, which is basically a baseline of comparison. It assumes that you're not going to do any monitoring, you're not going to do anything active to remove the contamination, you're just going to kind of leave it there.

Sometimes it actually does get selected if it turns out that through studying the problem really hasn't been that bad. It

happens very infrequently and is certainly not relevant here.

There were two other alternatives that were considered. Alternative two was groundwater

near-source pump and treat along with monitored natural attenuation downgradient.

That involves installing wells along the downgradient perimeter to capture the water as it goes through the source areas, basically cutting it off from the downgradient area, allowing that to clean up from natural attenuation.

And these are the wells that would be installed -- one, two, three, four, five -- with their respective overlapping capture zones. That water would be treated to cleanup standards and discharged to the Delaware River.

That's alternative two.

Alternative three, in-situ source-area treatment. That's the application of a number of in-situ technologies, which means that you go right into the source and you either inject or otherwise directly address the source areas

that are in the groundwater table, which then has the same effect as alternative two, which is to kind of cut the source of contamination off from the downgradient area and allowing the downgradient area to clean up through monitored natural attenuation.

That would mean applying technologies in the source areas again; primarily, air sparge soil vapor extraction. Air sparging is blowing air into the groundwater, into the source area that's surrounded by the water and letting the contamination percolate to the top and then

collecting it with a vacuum called a soil vapor extraction system.

You can see the -- if you inject air down the purple line, there's a point there that allows the bubble to percolate up. The groundwater level is right here, this blue line.

The bubbles go up with the contamination, and this well sucks

in all the vapors above the water table and sends them off for treatment.

That's anticipated to run or are more or less seven years. You just keep running it, running it, and running it, pumping the contamination as it comes off the water table up to the ground, and treating it.

One air sparge well was the example I used on the previous photo on. On this photo, it just shows the example source area,

major source area, and how those air sparging SVE wells would be distributed across the source area and then manifolded together and the vapors treated.

As we move through the process, EPA weighs the different alternatives based on different criteria. The primary criteria we use is overall protection of human health and the environment.

There's nine criteria.

These are all explained in the proposed plan. I encourage everyone to read them and become familiar with them and kind of follow the process through the evaluation of alternatives. It takes each one of these alternatives one-by-one and discusses the various pros and cons of all the alternatives in relation to the evaluation criteria.

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The cost associated with these. Alternative one, as I mentioned before, no further action, there's no cost associated with that. Alternative two is $11.7 million for the life the remedy. Alternative three, the in-situ source-area treatment is $8.1 million.

EPA's proposed remedy in the proposed plan that we're hoping to move forward with is alternative three, in-situ source-area treatment with downgradient monitored natural attenuation.

The proposed remedy, EPA feels, protects human health and the environment, provides the best balance of EPA's criteria, reduces toxicity, mobility, and volume through treatment, is readily implementable, and is cost effective.

As a follow-up, there's also

another piece of this; the proposed amendment to the 1994 ROD.

There was a groundwater aspect in the 1994 ROD that was basically alternative two in this proposed plan. In the 1994 ROD, it was estimated that the cleanup goals would be met in fourteen years.

By virtue of the additional studies that we've conducted to characterize these source areas in the water table, it's estimated now that you would need to run that same pump and treat system for a hundred and fifty years in

order to meet the cleanup goals, and that the remedy that we're proposing tonight can meet those goals within fifteen years.

In light of that, we're looking to make the groundwater pump and treat, alternative two,

the contingency remedy should -- evaluation of groundwater pump and treat the contingency remedy should the in-situ treatment technologies fail to be effective.

My contact information. I also have business cards if anybody wants to contact me sometime after the meeting.

And we're open now for Q&A.

MR. SINGERMAN: Just before we start the question and answer, Mark described the preferred remedy. That's what this is. We will not make a decision until after we complete the public comment period, which, as Cecelia mentioned earlier, ends on September 12.

And at that time, we hope

to, by the end of September, make a decision as far as the remedy after considering public comments.

One of the reasons we're

here tonight is to get your input or any concerns you have or things you don't understand. Since the public comment period ends, we'll take comments tonight.

Also, if you think of something after tonight that you might want to question or have comment on, if you look at the proposed plan, you can get Mark's address in here, e-mail address, and you can send him comments through September 12.

We also have a web page identified in here for more information about the site.

MS. ECHOLS: Would anyone like to know what the web page is?

If you'd like to know what the web page is, and it's rather long, it's www.epa.gov/region02/superfund/npl/cortese.

Does anyone need me to repeat that?

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It's www.epa.gov/region02/superfund/npl/cortese.

And as of 12 o'clock tomorrow afternoon, the Powerpoint presentation will be loaded on the web page if you want to see it as well.

Now we'll open for questions and answers.

Does anyone have a question?

Please stand, sir, and state your name so the stenographer can --

MR. RUSSELL: Ken Russell.

I'm not a New York State resident. I live directly across the river by the waterfall on the river, and I've had a number of occasions -- in the last four years, we've had three major floods here. I always lose my boats and everything else down the river, and I have to go hunting for them. I've walked this whole

thing.

Now, you were saying about the third alternative, where everything bubbles up to the surface.

Is there a removal process in that when it bubbles up?

MR. GRANGER: Yes.

Let me just clarify that. It's not bubbling up to the surface, it's bubbling up to the surface of the water. The water is 20 or 25 feet below the ground.

So, when you're blowing the air into what they call a sparge point, it's like blowing on a straw into the bottom of a glass of soda and the bubbles would come up.

The extraction system is located above the water table, but that's also under the ground. That's like twenty feet below the ground. That's like five feet --

MR. RUSSELL: That's the pipes that go there now?

MR. GRANGER: They're not there now, but they will be.

MR. RUSSELL: There's some pipes there now.

MR. GRANGER: Those pipes are for monitoring or for venting, so there's no pipes that are related to this at this point.

MR. RUSSELL: Okay.

I'm seeing all around this area, after each one of these floods, that land was under six feet of water during each one of the floods where mysteriously water came down the river.

MR. GRANGER: Right.

MR. RUSSELL: After it recedes a little and is still wet there, it's like somebody poured oil all over the ground. It's green --

MR. GRANGER: Where is this?

MR. RUSSELL: It's on the riverside of the railroad tracks, that entire area there.

MR. GRANGER: Okay.

MR. RUSSELL: And when it's muddy, it bubbles and it's green oil and stuff.

That's why I thought it was coming out from the pipes.

MR. GRANGER: That's not my understanding --

MR. RUSSELL: Each time we get a flood, it goes right into the river and goes down and becomes part of the water.

MR. GRANGER: I will say that I've never --

MR. RUSSELL: Not the portion where it was buried.

MR. GRANGER: I understand.

There's the downgradient portion, and this remedy is actually intended to address that as well, but it addresses it by

taking care of the source that's a continuing contribution of the situation like you're describing and then cutting it off from the downgradient area.

MR. RUSSELL: You people know that it does go under water.

MR. GRANGER: That's why we're here, yes.

Groundwater is a major transport pathway for contamination.

MR. RUSSELL: I'm talking about that the water goes over the railroad tracks. It goes at least six feet underwater and becomes part of the river.

MR. GRANGER: The embankment or the tracks?

MR. RUSSELL: The road becomes part of the river when we've had these three major floods.

MR. GRANGER: This remedy is

comprehensive. It's intended to take care of all of the aspects of the contamination.

MS. ECHOLS: Sir?

MR. MAYER: Fritz Mayer. I'm with The River Reporter newspaper.

I just want to know, this

technology, the air sparging and the SVE, soil vapor extraction, has it been used at other Superfund sites, and has it been tested?

MR. GRANGER: That's a great question.

I want to say that in the late the nineties, it was considered kind of innovative. But at this point, it's been used a lot at a lot of different sites, and there's great literature on it, and it's a proven technology.

MS. ECHOLS: Sir, in the back.

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MR. KRAUS: Edward Kraus from Narrowsburg.

How is this funded, this project?

MR. GRANGER: There is no taxpayer money being used for this whatsoever.

MR. KRAUSS: The Town of Tusten hasn't any liability?

MR. GRANGER: You know,

that's an interesting question.

The Town of Tusten has liability, but it's not financial liability.

Basically, there's a group of 28 entities, of which the Town of Tusten is one. But the way that the liability scheme evolved, the Town of Tusten provides in-kind services, such as mowing, maintaining the fence, such like that.

To my knowledge, there's no money that the Town provides to

the PRP group. The PRP group funds the whole job.

MR. KRAUSS: I know that was one of the original agreements, that the Town would do the mowing.

I was wondering if that's all that they still did and all they would have to do.

MR. GRANGER: Exactly. To my knowledge, that's still in place.

MR. SINGERMAN: All the investigations Mark described were

done by the responsible parties. So, all this prior work at the site, they pretty much funded all the work at the site under the EPA supervision.

MR. KRAUSS: The dumpers?

MR. SINGERMAN: Or the parties that sent the waste to them.

MR. GRANGER: It was a complex group of generators,

transporters, and owners.

The Town, by virtue, is an owner. So, their liability was established by ownership, not by dumping or transporting.

One of the bigger PRPs was a transporter and then the rest were generators; they ran a company, generated hazardous waste, and then disposed of it at Cortese.

Does that answer your question?

MR. KRAUSS: Yes.

MS. ECHOLS: Sir?

MR. HAMILTON: Don Hamilton,

National Park Service on the Upper Delaware River. Nice to see you again, Mark.

You mentioned that the alternative three may remedy the situation within fifteen years. And then I thought you mentioned some other long timeframe for maybe one of the other

alternatives.

What's the projected time period that it would take alternative two to remedy the situation?

MR. GRANGER: Don, originally, when we signed the ROD in 1994, not having had the benefit of any hindsight whatsoever, which we hadn't undertaken any work, no drums were removed at that point, so, basically using the best science we had available, we had predicted that after we removed the source from above the water table and put a protective cap and diverted storm water, that a pump and treat

system, such as is proposed here in alternative two, would run for fourteen years and then it would meet the cleanup goals.

With the results of the source area investigations that

have evolved over the past couple of years, we re-ran those numbers. And because the water would have to slowly erode those source areas in the groundwater, just slowly erode it over time, it would take a hundred fifty years to reach the same goal.

What we're proposing here is far more aggressive. That being said, there's a limited number of technologies that can be applied to a situation like this, and, fortunately, groundwater pump and treat is one of them.

I mean, if you needed to do groundwater pump and treat, it is available. And if it needs to take a hundred fifty years, so be it.

We have something far more aggressive that's going right after these source area that we've characterized and we think we can

do that in fifteen years.

MR. HAMILTON: One more question.

If you go with alternative three, the air sparge system, and you try to collect the vapors down above the water table, do you still have monitoring wells downgradient towards the river that you'll be sampling three times a year or whatever?

MR. GRANGER: Absolutely.

This remedy's success depends on groundwater levels decreasing over time in those -- in that same monitoring wells.

As a matter of fact, we need to augment that monitoring well system on the other side of the tracks and put more monitoring wells to make sure that we're monitoring performance.

MR. HAMILTON: How many

wells are in there now?

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MR. GRANGER: I want to say six in the plume on the other side of the tracks. There are another couple that are north. So, there are three clusters.

And then there's numerous clusters on the landfill side at this point.

MR. HAMILTON: So, with alternative three, the air sparge system, you would continue to have your monitoring wells sampled three times a year indefinitely until the levels were such that you felt the site had been remediated.

Is that it?

MR. GRANGER: Yes, those monitoring wells will continue to be monitored three times a year. It could become at a certain point, if you collected enough data -- and we have an awful lot of data right now -- that after

five years or so, if it looked like levels had stabilized, you might pull back sampling frequency a little bit. You might say maybe you only need to do it two times a year for another five years or maybe one time a year.

I pretty much think that the way this needs to be monitored, that it will be done three times a year for at least the foreseeable future.

MR. HAMILTON: Thanks.

MS. ECHOLS: Sir?

MR. SPARLING: Dave Sparling, Tusten Code Enforcement Officer.

What kind of impact is this alternative three going to create on our highways and the noise?

You said this air sparge machine will evidently run for seven years.

I mean, what kind of noise

is that going to create?

MR. GRANGER: That's a good question.

I have never stood next to one in a remote area before, but that comment is now entered into the record, and we'll make sure that we cover that in the design.

MR. SINGERMAN: Can I add something?

In cases where noise may be a problem, and you put up baffling or an enclosure building if noise becomes a problem.

MR. SPARLING: There's some houses on the other side of the railroad tracks, Delaware Drive. On a still night, this could drive them nuts if it's loud.

MR. SINGERMAN: We have other sites where we have it inside a building with baffling around it.

MR. SPARLING: You've never

seen one of these things in operation, evidently?

MR. SINGERMAN: For this

particular site.

Each site is unique.

MR. SPARLING: They must create some kind of noise.

MR. SINGERMAN: Yes.

If noise is a problem, it will be addressed here.

MR. GRANGER: It's enclosed, though. Just so you know, it's an enclosed building.

MR. SPARLING: So, you'll build a building too?

MR. GRANGER: Yes.

MR. SPARLING: There was no mention that I read here that you'll build a structure.

MR. SINGERMAN: This is just conceptual.

MR. SPARLING: Okay.

Then on Page 10, you said: The EPA may invoke a technical

waiver of groundwater ARARs if the remediation program indicates that the -- that reaching MCLs in the aquifer is technically impracticable from an engineering perspective.

So, you're basically saying alternative three may not work?

MR. GRANGER: The technical impracticability stuff is done on a compound-by-compound basis, and it usually it takes twenty or thirty years before you've demonstrated that you've done everything you possibly could and you can't reach the cleanup goal for that particular contaminant.

MR. SPARLING: You also said previously if number three doesn't work, you'll go to number two.

MR. GRANGER: Right.

MR. SPARLING: Does that mean along with the cost of number three, we'll have the cost of

number two piled on top of that also?

MR. GRANGER: If it turned out that alternative three was ineffective, yes.

MR. SPARLING: Okay. Thank you.

MS. ECHOLS: Sir?

MR. SOETE: David Soete, S-O-E-T-E, Upper Delaware Council.

Dave just brought up a good question. I'm assuming you'd have at least one compressor of some type.

Will that be, like, diesel fuel or electric?

How do you pump the air down?

MR. GRANGER: It's my understanding it will be electric.

MR. SOETE: Okay.

MR. HAMILTON: Is that maybe not as noisy as something else?

What kind of pressure do you

use to pump the air into something like that?

MR. GRANGER: That's a good question.

I have to get back to you on that. I have no idea.

MR. SINGERMAN: As part of design, that's something that we'll calculate.

MR. HAMILTON: That would be just into what you think is the

source or would it go in the water table?

MR. GRANGER: Most likely both. There's going to be a lot of points in there.

Usually with sparging, you want to get a little -- you want to get in it and you want to get below it for your maximum exposure of injected air to the contaminant mass.

MR. HAMILTON: Because you wouldn't want too much pressure

that might start moving it out beyond the area?

MR. GRANGER: Right.

And we need to monitor for that as well. That's part of the design, to make sure that the vapor extraction wells are located properly.

MR. HAMILTON: Not to hog all the questions, but getting back to the funding, do you actually have to pursue the funding now once you make a

decision or is the money going to be in there from the principal responsible parties?

MR. GRANGER: The next step in the process once we formalize the decision for which way we're going, which obviously is not decided yet, once that's done, then we enter into negotiations with the parties that are liable for the cleanup.

And we don't have to chase them for money. The agreement kind of stipulates -- there's an agreement that's entered into between EPA and the parties that sets forth schedules and activities, and they undertake those at their own cost.

MR. HAMILTON: What if there is a company that went out of business or if an owner died or if there are fewer companies now than twenty years ago?

MR. GRANGER: It can happen.

The group can be configured any number of different ways.

Jointly and severally, each party is liable for all the contamination.

So, if a couple dropped out, others have to step up.

MR. HAMILTON: Thank you.

MS. ECHOLS: Sir?

MR. MEYER: Norman Meyer.

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Will the sparging system be extracting heavy metals, arsenic, cyanide, things that were dumped in there that went down to the groundwater?

MR. GRANGER: This system would not extract metals, so the metals would not be bubbled up to the surface and sucked up through the vapor extraction system.

What it would do is -- the reason that there's heavy metals migrating also in the plume is because when you site a landfill, whether it's a hazardous waste site landfill or a municipal landfill, you change the subsurface chemistry.

So, nobody dumped arsenic per se in the landfill.

MR. MEYER: It went directly into the groundwater.

MR. GRANGER: Yes, that's true. And there may have been

like a certain arsenic constituent --

MR. MEYER: The original site plan of the river at that time, when you did the first site plans in the river sediment, they were showing heavy levels of lead, arsenic, cyanide, and other things.

And those things usually don't go away very easily.

MR. GRANGER: They do not.

But one of the things of that this remedy does address is changing the geochemistry in the subsurface.

In other words -- forgive me if this sounds a little technical, but I don't think it's that technical -- basically, when you site a landfill, you change the

geochemistry to a reducing environment which then mobilizes metals that are native to the

subsurface soils.

By injecting air into the subsurface, you've switched that around to an oxidizing environment and the metals start to work their way out.

MR. MEYER: You're increasing the volatility of the chemicals so it can move within your system.

MR. GRANGER: And it becomes oxidizing environment.

MR. MEYER: So, your number two option might have to come into play if the sparging system doesn't work.

MR. GRANGER: We're confident that the sparge system will be addressing --

MR. MEYER: Your testing will tell you whether that's working or not.

MR. GRANGER: Yes.

25 MR. JACKSON: Ed Jackson,

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2 Chairman of the Planning Board of
3 the Town of Tusten.
4 Does this generate any truck
5 traffic?
6 MR. GRANGER: It will
7 generate truck traffic for
8 construction. There may be some
9 truck traffic when you have to
10 change a carbon unit out every
11 three months or six months on a
12 vapor filtering system, but it's
13 not going to be a heavy duty truck
14 traffic over time.
15 There's going to be a
16 construction phase where you're
17 going to expect to see trucks in
18 and out with pipes and equipment
19 and drill rigs to install things.
20 We anticipate to have most of that
21 done by this time next year if
22 everything moves forward.
23 MR. JACKSON: Will there be
24 any hazardous materials being
25 trucked out of there?

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MR. GRANGER: You know, that's a good question.

No. The only hazardous materials would be stuck to carbon in filters, but nothing like drums or excavated soil. All that work has been done.

1995, '96, and '97 saw a lot of truck traffic pulling hazardous materials out of that landfill.

MS. ECHOLS: Sir?

MR. HAMILTON: Don Hamilton.

Could you go back to the slide that showed the cross-sectional subsurface of the sparge system and the collection system underground?

MR. GRANGER: It's not like flipping overheads.

Okay.

MR. HAMILTON: Does that underground collection bed, is that excavated down to that point and installed and then covered

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back over, or how do you place

that there exactly?

MR. GRANGER: This is a drilled point, and it's somewhat exaggerated. It would probably be a two- or three-inch hole that's drilled down.

This is showing it a little bit exaggerated, that if this is three inches, that's actually, like, two feet in diameter. In reality, it would be the same profile as whatever the casing was above it.

That would be the same for the extraction point.

MR. HAMILTON: I guess I'm not clear on how the extraction point works.

Is there, like, a dome that catches the vapors somehow and confines them to an extraction pipe or something?

MR. GRANGER: What's

happening is you would expect -- remember that there's going to be, let's say, thirty of these. There will be thirty of these and, like,

forty or fifty SVE, soil vapor extraction, suction points.

MR. HAMILTON: Okay.

MR. GRANGER: As the contaminants come out of -- this profile here is like a source area. So, as the bubbles move through the source area from these thirty points, there's forty or fifty of these points that are pulling from a radius around this well.

And the next one is going to be here and the next one is going to be here. It's not going to pull from below the water table, it will only pull from here up, from the water table up.

MR. HAMILTON: What is the dark brown layer there, the first

layer down from the surface?

What does that represent?

MR. GRANGER: I have to look, but I think that's waste. It's a little fuzzy to me now.

MR. HAMILTON: So, the air

injection pipes draw --

MR. GRANGER: I'm sorry, that can't be waste because the source area wouldn't be near waste because it would be beneath the drum -- it's got to be something else unless it's exaggerated.

MR. HAMILTON: I'm just trying to understand how that works.

MR. GRANGER: Well, if you kind of think of a half cup of soda with a straw, and you apply a pressure on to the straw so it goes down to bottom of the cup, and now you're bubbling up the bubbles that break the surface.

Those bubbles are taking

contaminants with it. They break the surface. And you have a vacuum point in the middle of that angular space right above the liquid level that's collecting all of the vapors on a constant basis.

MR. HAMILTON: So, the collection pipe is how big a diameter pipe?

MR. GRANGER: Probably about the same, probably three inches.

They vary depending on the design. I don't have a design on this yet, but, you know, two inches or three inches.

The one that I'm running on Long Island has both two-inch and three-inch piping into the subsurface depending on how big a radius they need or how contaminated it is.

MR. HAMILTON: Is one of these pipes within the other pipe or not necessarily, just separate?

MR. GRANGER: No, they would separate, totally separate holes.

MS. ECHOLS: Ma'am, in the back.

MS. HARRISON: Peggy Harrison.

How do you know that the source area is contained?

MR. GRANGER: You know, I'm sorry, Peggy, I don't really understand the question.

MS. HARRISON: The source area that you're trying to clean up, how do we know that it's contained?

MR. GRANGER: It's not contained, and that's one of the reasons we want to go after it with this aggressive technology.

MS. HARRISON: Could it be going in different directions?

Could it be moving now?

MR. GRANGER: I see what you're saying.

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MS. HARRISON: Because we have a well.

MR. GRANGER: That hazardous waste was disposed in 1973. It's had 25 years before we pulled the hazardous waste out and then another fifteen years of -- it's a very mature source area.

MS. HARRISON: But we have had four topical floods impacting it, so the water table has changed.

MR. GRANGER: The water table is constantly changing, and

that's taken into consideration with this remedy. The water table fluctuates seasonally and on flood events.

You can look at data, groundwater elevation data for a twenty-year period, and one or two of those years are going to be really much higher than others. One or two of those years there

will also be drought events and would be very much lower than the others. But that's to be expected just with groundwater in general.

So, this remedy does take groundwater fluctuation -- groundwater elevation fluctuation into consideration.

Just getting back to your original question, though, this source is basically beneath the former disposal areas, and it's sitting there decaying very slowly over time. It's had forty years to move. If that source area was going to move, it's had forty

years to move.

We've characterized it and we know where that source area is and how to get to it and what to do to it at this point, and it isn't moving.

It is decaying, however. It is a source of groundwater

contamination over time.

MR. SINGERMAN: Basically, meaning the groundwater is moving away, migrating from the site. Contaminated groundwater is moving away from the site.

MR. GRANGER: Does that make sense?

MS. HARRISON: I think when you're on it topically, you assume it's going down river but it doesn't necessarily have to be because it will go to the lowest point.

Right?

MR. GRANGER: The source area or the groundwater?

MS. HARRISON: The groundwater.

MR. GRANGER: Yes, it will.

MR. SINGERMAN: But the groundwater is basically moving towards the river.

The source doesn't change --

natural groundwater flow is toward the river. It just happened to pick up contamination from the waste and go towards the river. The waste doesn't change the direction of groundwater flow.

MS. ECHOLS: You have another question?

MR. HAMILTON: Getting back to the pipe, basically you said it's a straw pumping air down and then you have your collection pipe.

Wouldn't that pipe also be collecting water?

MR. GRANGER: No, because the collection pipe is above the water table, it's in the soil.

You're basically moving the contamination from the water, putting it into a vapor phase, and

the vapor then moves into the soil, and the extraction point is in the soil, not in the water.

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MR. HAMILTON: Okay.

So there's no material that would need to be treated by the waste...

MR. GRANGER: There's vapor material that needs to be addressed but not aqueous, not water.

MR. HAMILTON: Was it alternative two when you talked about using Tusten's water treatment plant for some disposal?

MR. GRANGER: I'm sorry, Dave, can you repeat it?

MR. HAMILTON: I think it's probably alternative two, but I think in the report it mentioned taking liquid or whatever from the disposal site and using the Narrowsburg treatment plant to dispose of it.

MR. GRANGER: The Narrowsburg treatment -- that's a one option of several.

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The water that would be going to the treatment plant would be treated.

MR. HAMILTON: That would be alternative two, not part of three?

MR. GRANGER: That's not part of three at all. Alternative three doesn't extract groundwater at all.

MR. HAMILTON: I know I read it somewhere. I didn't know if it was two or three.

MS. ECHOLS: Sir?

MR. MEYER: Norman Meyer.

Your number two alternative will give you the best return for your buck, I think, in presenting a barrier container that's coming out of the landfill, preventing it from coming into the river and moving anywhere else.

You put the wells, you're creating a negative pressure in

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there because you're pulling it more towards the wells themselves and capture in the manifolds and filters.

MR. GRANGER: We run it through the nine criteria. That is one of the criteria.

MR. SINGERMAN: Also, as Mark said, it would take a hundred fifty years to address it that way, as opposed to we estimated fifteen years with alternative three.

So, we can solve the ground contamination problem much more quickly with alternative three.

MR. MEYER: If it works.

MR. SINGERMAN: If it doesn't work --

MR. MEYER: You have alternative two.

MS. ECHOLS: Sir, what's your name again?

MR. RUSSELL: Ken Russell.

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I was just trying to simplify. What you're saying is

you've removed the contaminants that -- those drums and everything else. Now what you're going to do is oxygenate the groundwater --

MR. GRANGER: That's a good way to put it, yes.

MR. RUSSELL: -- to purify like nature does, through the earth and passing on through streams and everything else. That's a simplification.

Everybody thinks that everything that's there is going to be removed. You've already removed the main contaminants, now you have to oxygenate the contaminated soil and everything else.

And then what, once you oxygenate it, it goes off into the air and you'll pump it out through carbon filters and everything

else?

MR. GRANGER: Yes.

MR. RUSSELL: You're not going to contain what's

underground there from shifting and going down.

I think that's what Peggy's question was.

It's just the groundwater.

MR. GRANGER: Yes.

MR. RUSSELL: The water below the water table is going to be filtered like nature does through the ground with the oxygen.

MR. GRANGER: There's two aspects to the sparging.

One is you're carrying the volatiles, the solvents, breaking the groundwater surface, and then collecting those.

Then there's the oxygenating part where you're actually stimulating biological activity,

and that's the natural part that you're talking about.

And we've demonstrated and there's some text in the proposed plan that shows that natural attenuation is occurring in the downgradient area through a number

of different processes.

When you collect your samples -- for instance, just one example, when you collect samples downgradient of the landfill, you're seeing breakdown products of -- let's say the most common one that most people are familiar with is perchloroethylene or tetrachloroethylene, same thing.

It's called perc. It's dry cleaning fluid. It's commonly known as dry cleaning fluid, but that solvent is used universally for a number of different applications.

When tetrachloroethylene

breaks down, it goes to trichloroethylene, to dichloroethylene, to ethylene, and then to carbon dioxide and water. It breaks down slowly on -- or salt. I think there's a chloride aspect to that; the chlorine has to go somewhere. That happens through natural processes.

And we've demonstrated that there are what they call daughter products from the primary contaminants that are in the downgradient; a substantial amount of daughter products, so it's not like there's a couple of daughter products. There's a substantial percentage of daughter products present as a percentage of contaminants that lead to the conclusion that monitored natural attenuation is an important aspect of this remedy in the downgradient area.

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MS. ECHOLS: Ma'am?

MS. SULLIVAN: Susan Sullivan.

The end product of this process I think you guys referred to it as carbon filtered.

What is the end product, and where does it go?

How does it get removed?

MR. GRANGER: Carbon is brilliant. Carbon as an element is brilliant at absorbing

contaminants.

I'm old enough to remember this. I don't know how many people here are old enough to remember this. There used to be a cigarette that had a little carbon filter. You could shake it and hear the little carbon grains in there.

The idea was that filter made the cigarette safer because it was pulling out some of the

volatility, some of the contaminants that were in there.

That's pretty similar to what's going on here. You're taking vapor that has volatile solvent contamination in it and sending it through the carbon. And the carbon absorbs that contamination as it's passing through this media. And when it comes out the pipe at the other even, it's below levels of concern.

MS. SULLIVAN: And then it's

trucked out?

MR. GRANGER: The carbon has to be changed out because all of the sites on the carbon molecule itself, throughout that whole vessel, will become filled up.

My experience has been that you can do it water too. You can pipe water through it. That's called an aqueous phase carbon,

and there's a vapor phase carbon.

I think they're basically on a three-month or six-month schedule where a truck has come and drop and hook up another carbon vessel and take that other one away.

MS. SULLIVAN: Give us a idea of what this site could look like.

It's a field, basically, and there's some infrastructure.

What has to happen to allow you to do method three?

MR. GRANGER: I'd anticipate that there would be fifty to a hundred pipes sticking up out of

the ground slightly that are basically manifolded to a small central building that has the equipment in it.

MS. SULLIVAN: Somebody mentioned sound.

There's a compressor

somewhere?

MR. GRANGER: All the ones I have are in the suburbs or in the city. This one is, like, out in the woods, so there's a lower bar.

But there are engineering solutions to noise problems that are typical.

MS. SULLIVAN: It will all be centralized around the building?

MR. GRANGER: The building would be in a central location, yes.

I just wanted to add that the other alternative also involves noise considerations. When you're pumping 75 gallons per minute of water, you're going to

have noise with that alternative at well. And there's also engineering solutions to that.

MS. SULLIVAN: Thank you.

MS. ECHOLS: Sir?

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MR. HAMILTON: Don Hamilton.

You said the groundwater table was about 25 feet down in this area?

MR. GRANGER: It fluctuates, but generally.

MR. HAMILTON: How deep is that aquifer from twenty feet?

How deep does it go?

MR. GRANGER: You know, you have a bedrock which is usually the bottom of one aquifer transitioning into a bedrock aquifer after that.

This aquifer I want to say is 75 feet in that particular location, but the bedrock does slope deeper as you go away from the hill, towards the middle of the river, and then it kind of breaks out again on the other side of the river.

So, that river is basically a bedrock valley that's filled in

with deposits from -- glacial deposits over time.

MR. HAMILTON: So, how deep in the aquifer water table are your air injection pipes?

MR. GRANGER: They'll be far enough to get to the bottom of the source area, which does have a bottom. And I want to say that's another thirty feet into the aquifer. So, the sparge points would be probably around fifty feet in.

And they'd be staggered, there'd be varied depths, but if you want to get to the bottom, probably around fifty feet.

MR. HAMILTON: How far up has this method been shown to percolate air carrying the volatile organic compounds up through soils?

Can it move all the way up to the surface?

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Is a hundred percent of it captured below ground?

MR. GRANGER: If you remember the slide that showed the overlapping extraction wells for alternative two, you're looking to overlap -- and you can measure these things -- overlap your suction. When it's water, you know, you have an overlapped capture zone around an extraction well.

The same thing is true -- and it's also three-dimensional, so you're capturing -- this way, you're also capturing down deeper. And in the case with groundwater, you wouldn't go up higher because you're sucking the level down, but with vapor you have, like, a spherical zone of influence and you're looking to measure pressures to make sure that those are overlapping.

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I guess to illustrate at least part of your question, if you ran the sparging with no vapor extraction whatsoever, the vapors would eventually just break out the surface and go out the top.

MR. HAMILTON: Okay.

Now you're working in an area that has the plastic liner cap that's how far below the surface of the ground?

MR. GRANGER: There's eighteen inches of cover soil and six inches of topsoil.

MR. HAMILTON: So, in places you have to punch through that.

MR. GRANGER: Yes, absolutely.

And that will have to be repaired on an ongoing basis. That's routine, though. They puncture -- for the most part, if it was just an off-the-rack cap the landfill and leave it alone,

you wouldn't be puncturing the landfill caps under those

circumstances.

But when you're putting a monitoring well or you need an additional vent, or a situation like this where there's something down there you need to get at, when you do puncture liner material, there's a standard procedure for repairing it and putting it back together.

MR. RUSSELL: Theoretically, if air that is percolating up with these volatile organic compounds wasn't completely captured by the uptake pipes, would it be prevented from coming to the surface by the plastic liner that's in place?

MR. GRANGER: Yes, yes, it would be.

MR. HAMILTON: Okay.

MR. GRANGER: I would expect

that the mass that was unaddressed by the vapor extraction system would be negligible just based on engineering principles.

MS. ECHOLS: Sir?

MR. LONDON: Hi. Jan London. Thank you all for your long-term help on this problem. Good for you.

MR. GRANGER: Thank you.

MR. LONDON: I have some questions, and I don't know if you'll have an answer for this, but what chemicals have been ID'd, first of all?

MR. GRANGER: I'm sorry, your question?

MR. LONDON: Is there one specific industry that caused this or were they just taking chemicals from everybody?

MR. GRANGER: They were taking chemicals from everybody at the time.

MR. LONDON: Was the process they were doing at the time legal?

MR. GRANGER: It was not illegal at the time. It was ill-advised, perhaps, but it was not illegal.

MR. LONDON: They accepted

chemicals from all different industries. Basically, it was a place to dump your chemicals.

MR. GRANGER: You want to know something? That's why there's a Superfund program. It wasn't illegal, and it was done all over the country.

This is one -- I'd love to say is the biggest one and we've got it nailed, but it's not the biggest one. There are plenty of other Superfund sites that are similar to this with a similar suite of contaminants.

To take your question from a different angle, there are other

Superfund sites where one industry disposed of a particular subset of chemicals. So, for the trichloroethylene or TCE, there are plenty of sites just TCE.

Typically, when you're dealing with numerous industries with numerous processes, it can be any number of things.

MR. SINGERMAN: Regarding

the legality, in 1976, the Resource Recovery Act made it illegal to dump hazardous waste in sanitary landfills.

MR. LONDON: How much has been spent so far on the process trying to remediate by taking it out?

And is all that money coming from people that shipped the chemicals here?

MR. GRANGER: Yes, no public monies. Even my time and my colleagues' time is reimbursed by

private industry.

And we negotiate the work, and it needs to be done according to law, it needs to be done according to engineering principles. The actual dollar figures, we're not always aware of what they are.

It's just you have agreed to -- through this agreement we entered into with them: You have agreed to this, this, this. You

need to do it this way on this schedule.

And we work to get that done. In the end, I can tell you millions of dollars have been spent here. I can't tell you how many. And when I say I can't, just for the record, I can't tell you how many because I don't know.

MR. LONDON: In the process of collecting the vapors, do you get a hundred percent of it or

does some of it leach out into the air?

What's the percentage that the carbon can capture?

MR. GRANGER: First of all, as an engineering principal, as I had spoken with Don, you need to establish an overlap or a capture zone beyond which contamination does not escape. And that's measured and monitored to make sure that that's maintained.

MR. LONDON: You have your manifolds going to one source and you have a filter there --

MR. GRANGER: Now, that's the other end of it. You have your suction end and you have your pressure end.

With the suction end, you have these overlapping zones of suction to make sure nothing is getting away. On the other end, you're sending it through the

carbon. The carbon is monitored on a regular basis as well and the carbon continues to grab contaminants as it flows through the vessel until the carbon is full.

This is engineering and science. When the carbon is full, it tells you, sort of like an alarm clock going off or a teapot, you'll get what they call breakthrough. It'll measure contaminants coming out the other side of the vessel, telling you you have to switch over to the other vessel next to it.

MR. LONDON: So, when it's

doing its job, it captures a hundred percent?

MR. GRANGER: Pretty close to a hundred percent. I'd be hard pressed to say a hundred percent, but it's treated down to levels that are not a concern anymore.

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MR. LONDON: How much did Cortese document -- how much profit did they make?

It looks like cost $20 million to clean up.

What's the profit that they made in dumping this stuff?

MR. GRANGER: You're talking about --

MR. LONDON: You got seven thousand barrels.

How much did they get a barrel?

MR. GRANGER: I think at the time -- I think this is a matter of record. I think in his testimony someone asked him that and he said he was getting $3 a barrel, something along those lines.

It was a different time back then.

MR. LONDON: We're just in a position now where we're looking

back and it relates to what's going on now, obviously the concern -- the number of the cleanup cost is exponential amount of times what the initial profit was.

MR. GRANGER: Can I say that the contrast is staggering?

MR. LONDON: Thank you.

MR. HAMILTON: $3 a barrel. That's probably why it ended up coming up here.

MS. ECHOLS: Sir, you have a question?

Your name again?

MR. HAMILTON: Don Hamilton.

There used to be a national pot of money or Superfund that I believe was funded by the industry that generated a lot of this material.

MR. GRANGER: That's the

Superfund tax.

MR. HAMILTON: Is that still

in existence or has it been depleted?

MR. GRANGER: The tax expired in 1995, and it was depleted probably in the early part of this decade. But that money was for projects where there were no companies for the contamination.

So, Superfund, it's not really relevant to this project.

MR. HAMILTON: Okay.

MR. SINGERMAN: But there is a source of tax -- now that the tax is expired, there are monies that come in from the federal government that are put into Superfund now.

So, it's not as much as before, but, again, with a site such as this, it's not an issue.

MR. HAMILTON: Has there been any movement to re-implement that tax?

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MR. SINGERMAN: That's up to Congress. They've been trying for a number of years, but not successful.

MR. GRANGER: I think they are just starting to put something together. I've heard that.

MS. ECHOLS: Any more questions?

MR. HAMILTON: So, I guess I'm still amazed how you're still getting money out of these people. They must be very lucrative yet.

MR. GRANGER: There's a bunch of them, first of all. And, second, if you want to stay in business you have to comply with laws and legal agreements. So, it's the cost of doing business.

MR. HAMILTON: Must be hard to anticipate you'll be doing this next phase and they'll have to put up so much money to fund that.

MR. GRANGER: Right.

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MR. HAMILTON: It just boggles my mind that they're still in business and making that much money.

MR. GRANGER: Okay.

MR. SINGERMAN: Also, EPA enforcement holds them to it. If they choose not to participate, we can go after them.

MR. HAMILTON: They can go bankrupt.

MR. SINGERMAN: Sometimes we get on a waiting list for money too.

So, if they have the money now, it's probably less costly to them to sign up and do the work rather than having to go after them.

MR. HAMILTON: Thank you.

MS. JONES: My name is Susan Jones. I'm formerly from Narrowsburg.

Maybe you addressed this

earlier. It's 2010. I'm a little confused as to 1994. That's when the barrels -- the project was

done and you were going to continue monitoring.

Why now all of a sudden is this presence of large previously unknown NAPL being identified and now action is being taken?

MR. GRANGER: In 1994, that was the decision. That wasn't one we were just going to monitor, that's one we said: There's three things that we need to do; there's remove the sources of contamination, secure the landfill with a safe cover over the top of it, and then address groundwater.

So, pretty quickly thereafter, the record of decision -- the decision document was signed in 1994, we entered into agreements that were solidified in 1995, started

working on removing source areas right then, went through '96, '97 removing source areas, put the cover on '97 to '98.

Then by virtue of all the

excavation work that had been done down to the water table, everything was disturbed. So, it needed to sit for a little while to stabilize. Primarily, because since you've stirred up all this contamination, now that contamination is going to show up in monitoring wells as a shrug.

And you don't want to design your groundwater remedy based on a shrug of contamination passing through. You want it to settle down for the long term because we anticipated doing it for fourteen years. So, that put us to 2000, 2001.

I'm going to say that we're very lucky not to have instituted

a remedy that we thought was going to take fourteen years but we now understand with good clarity that it was a hundred fifty year remedy. There's a much different cost metric associated with those two time frames for this remedy.

MS. JONES: Why is that?

Fifteen years, a hundred fifty years, why is there such a discrepancy?

Is it because there is more to it then originally thought?

MR. GRANGER: You know, you enter into estimating with the assumptions that you're making. And the assumption was that we would be able to get these drums, that we would be able to remove these source areas, and that after implementing those aggressive aspects down to the water table, that the bulk of the source will have been removed.

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In 2001, we started to see that some of this -- there was a residual aspect to this that we started to characterize in 2001. Once you import that assumption, that's a new assumption. Now you're saying: I see there's something there. Now I have to figure out where and what it is and how much of it there is.

That takes a number of years as well, so that brought us to 2007. We got good visual on that, we got a good clarification. Now we can say: Well, our assumption before was based on digging down to water table, removing all these drums, all these source areas, and letting things settle down, and we think that's going to be fourteen years.

Now this assumption is based on real data.

MS. JONES: What you're

seeing today.

MR. GRANGER: Yes.

It's been said to me a number of different ways, but each phase of the project gives you an opportunity to understand the characterization of what you're dealing with in a more refined matter. When we move into the next step, we'll understand the contamination even better than we do now.

So, as we were moving

through these processes, we were understanding things in the subsurface, which I liken to a game of Battleship a lot of times. Remember the game of Battleship, where you're sinking -- you're sending, like, a shot, but you can't see it; it's only when the person says yeah, you got that.

That's sort of what it's like when you're looking for

contamination that you can't see. You send a boring down, you get the data back, you evaluate that. Or you send a series of borings down. That tells you something. When you go back and send more borings down, now you understand it even better.

So, we're understanding things better. I think we have a good understanding now of how to proceed, and we'll understand things even better as we move forward.

MS. JONES: Thank you.

MS. ECHOLS: Sir?

MR. HAMILTON: On your map here, it shows monitoring wells 6A and 6B that look like they're downgradient of the site, pretty close to the river.

Do you know offhand what those wells have shown in terms of contaminants in the groundwater,

and what depth are those -- do those wells go down to?

MR. GRANGER: 6A is a very deep well. 6B is not so deep.

MR. HAMILTON: They're right next to one another.

MR. GRANGER: Yes, they're a cluster. They're intended to characterize verticality in that location.

I don't know the data off the top of my head, Don. It's pretty easy to get. As a matter of fact, the administrative record file for all of the RI data related to that is next door, and I'd be happy to talk to you about it.

MR. HAMILTON: I'd just be curious.

MR. GRANGER: I know it's above drinking water standards. It's one of the reasons why we're here.

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MS. ECHOLS: Any more questions?

We're going to close. We'd like to thank everyone for coming out tonight.

You can call Mark if you have any more questions about our presentation. We hope to have a decision made by the end of September.

And we appreciate all of your comments. They will become part of the responsiveness summary, which will be part of the record of decision which will be sent over to the library.

Thank you.

(Time noted: 8:26 p.m.)

C E R T I F I C A T E

STATE OF NEW YORK)
) ss.
COUNTY OF NEW YORK)

I, LINDA A. MARINO, RPR, CCR, a Shorthand (Stenotype) Reporter and Notary Public of the State of New York, do hereby certify that the foregoing transcription of the public hearing, taken at the time and place aforesaid, is a true and correct transcription of my shorthand notes.

I further certify that I am neither counsel for nor related to any party to said action, nor in any way interested in the result or outcome thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this 27th day of August, 2010.

25

RESPONSIVENESS SUMMARY

APPENDIX V-e

CORRESPONDENCE RECEIVED DURING THE COMMENT PERIOD

Cortese Landfill
Scott Birney
to:
Mark Granger
08/23/2010 03:22 PM
Cc:
"Peg Harrison", "Peggy Harrison", cwingert47, efalk, "Dave Sparling", "Ed Jackson"
Show Details

Mark,

As per our conversation, I will list my concerns with the proposed remediation at the Cortese Landfill. My comments pertain only to the interaction of the landfill site and the Narrowsburg Water and Sewer District facilities. I plan on attending the public hearing on August 23rd at 7:00 PM. Please enter these comments into the public record unless a more formal communication is required.

Water Services- I have not seen plans of the proposed facilities for Alternative #3, In-Situ Source Area Treatment and Downgradient Monitored Natural Attenuation, but have had some discussion with the designer- Conestoga- Rovers on Alternate #2- Groundwater Extraction and Treatment. My concerns remain regarding the adequacy of capacity with the existing supply to the wastewater treatment plant and its ability to serve both the needs of the wastewater treatment plant and the needs of the eventual landfill remedy. The water service, based on the distance from the boring at the plant respective to the site of the eventual remedy, would likely be more economical and more adequate in capacity to serve the remedy facility with its own separate dedicated water service and boring.

Sewer Services- I have not seen plans of the proposed facilities for Alternative #3, In-Situ Source Area Treatment and Downgradient Monitored Natural Attenuation, but have had some discussion with the designer- Conestoga- Rovers on Alternate #2- Groundwater Extraction and Treatment. My concerns remain regarding the adequacy of capacity with the existing sewer outfall at the wastewater treatment plant and its ability to serve both the needs of the wastewater treatment plant and the needs of the eventual landfill remedy. The sewer outfall, based on the distance from the boring at the plant respective to the site of the eventual remedy, would likely be more economical and more adequate in capacity to serve the remedy facility with its own separate dedicated sewer outfall and boring.

Electrical Services- I have not seen plans of the proposed facilities for Alternative #3, In-Situ Source Area Treatment and Downgradient Monitored Natural Attenuation, but have had some discussion with the designer- Conestoga- Rovers on Alternate #2- Groundwater Extraction and Treatment. My concerns remain regarding the adequacy of capacity with the existing supply to the wastewater treatment plant and its ability to serve both the needs of the wastewater treatment plant and the needs of the eventual landfill remedy. The water service, based on the distance from the boring at the plant respective to the site of the eventual remedy, would likely be more economical and more adequate in capacity to serve the remedy facility with its own separate dedicated electrical service and boring.

Access Road- The existing road access to the wastewater treatment facility is used to access the landfill site. This asphalt road is in poor condition and the concern is that with increased traffic due to the construction of the landfill remedy, the road will fail. I would ask that the eventual remedy provide for the improvement of the existing road or at the very least provide for the repair of the damages that the increased construction activity will affect.

Lastly, a concern of the Water District is that the eventual remedy would affect the migration of the contaminants in the landfill closer towards TTW#1R. I am told that this would not be a possibility of either of the proposed remedies but wish to enter into the record that no currently proposed or future remedies be considered that will affect the migration of the contaminants in the landfill closer towards TTW#1R.

Thank you for this opportunity to provide comment.

Scott Birney, Superintendent
Narrowsburg Water and Sewer Districts
210 Bridge Street
Narrowsburg, NY 12764
845-252-7376

Upper Delaware Council

PO Box 192, 211 Bridge Street, Narrowsburg, New York 12764-0192 • (Tel.) 845-252-3022 • (Fax) 845-252-3359

William E. Douglass, Executive Director • David B. Soete, Senior Resource Specialist
Laurie Ramie, Public Relations/Fund Raising Specialist • Carol Coney, Office Manager

www.upperdelawarecouncil.org

September 2, 2010

MARK GRANGER, REMEDIAL PROJECT MANAGER
US EPA - REGION 2
EASTERN COMPLIANCE SECTION
290 BROADWAY 20TH FLOOR
NEW YORK NY 10007-1866

RE Cortese Landfill Superfund Site – Proposed Plan August 2010

Dear Mr. Granger,

The Upper Delaware Council (UDC) has reviewed the U.S. Environmental Protection Agency's (US EPA) Proposed Plan, dated August 2010, for the Cortese Landfill Superfund Site located in the Town of Tusten (at Narrowsburg), Sullivan County, NY. The introduction states:

> This Proposed Plan describes source-control remedial alternatives considered for the Cortese Landfill Superfund site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the Proposed Plan as part of its public participation responsibilities to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to the remedial alternatives under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §9617(a) and Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).
>
> This Proposed Plan also proposes changes to the groundwater portion of the remedy selected by EPA for the site in a Record of Decision signed on September 30, 1994 (1994 ROD)1. All other aspects of the 19~4 remedy have been implemented. In accordance with Section 117(a) of CERCLA and Section 300.435(c)(2)(i) of the NCP, if after the selection of a remedy in a ROD, a component is fundamentally altered, EPA must propose an amendment to the ROD. EPA's proposed changes to the ROD must first be made available for public comment in a Proposed Plan.

As you know, the UDC is the oversight body responsible for the coordinated implementation of the River Management Plan for the Upper Delaware Scenic and Recreational River, a component of the National Wild and Scenic Rivers System. Our voting members are the two states (NY and PA) and thirteen local governments (NY Towns and PA Townships), which border on the Upper Delaware River. The Delaware River Basin Commission is a non-voting member. We operate under a direct contractual relationship with the National Park Service for the oversight, coordination, and implementation of many elements of the River Management Plan (RMP).

The RMP, dated November 1986, has several specific references to the Cortese Landfill and its cleanup is considered a high priority. One of the major "Planning Goals" listed in the RMP is to "*Develop and implement an interim plan for the protection of public health and safety due to the presence of a toxic landfill located adjacent to the river in the Town of Tusten, and advocate the prompt cleanup and removal of its contents.*" Regarding "Specific Management Responsibilities" under the "Water Resources Management" section of the RMP, it states, "*The Upper Delaware Council will make recommendations to the states and the Delaware River Basin Commission concerning water quality, including identification of pollution sources, water quality monitoring, and water quality-related facilities such as hazardous waste sites, sewage treatment plant operations, or other concerns. Specific attention should be given to the clean-up of a toxic landfill located in the Town of Tusten. In particular, the members of the Council should develop and implement an interim program to reduce threats to public health and safety caused by this landfill...*" The RMP also states, "*Due to the national importance of the Delaware River, the Environmental Protection Agency and the State of New York should raise the priority level of the landfill in Tusten on their clean-up lists.*"

We support the US EPA's following remedial action objectives in the plan to protect human health and the environment that were established for the source areas (of pollution) and groundwater, which are: reduce or eliminate the potential for source areas to release contaminants to groundwater; restore the aquifer downgradient of the landfill as a potential source of drinking water by reducing contaminant levels to the federal and state (Maximum Containment Levels) MCLs; and reduce or eliminate the potential for migration of contaminants downgradient of the former landfill.

The US EPA looked at three options to address the groundwater contamination: Alternative 1: No Further Action; Alternative 2: Groundwater Near-Source Extraction and Treatment and Downgradient Monitored Natural Attenuation; and Alternative 3: In-Situ Source-Area Treatment and Downgradient Monitored Natural Attenuation.

Alternative 1 will not solve the groundwater contamination problem. Alternative 2 will cost an estimated $11.7 million and take 150 years to complete. US EPA's preferred Alternative 3 will cost an estimated $8.1 million and take 15 years to complete.

Based on the cost and time estimates, and the RMP's call for the UDC to "*advocate the prompt cleanup and removal of its contents,*" we support the US EPA's preferred Alternative 3.

The UDC thanks you and the US EPA for following through with the clean-up of the Cortese Landfill over these many years. We hope that the selected remedial action is successful and that this site can one day be removed from the federal Superfund List.

Thank you for the opportunity to comment on this proposal.

Sincerely,

Harold Roeder, Jr.
Chairman

cc: Hon. David A. Paterson, NY Governor
Hon. Charles Schumer, US Senator, NY
Hon. Kirsten Gillibrand, US Senator NY
Hon. Maurice D. Hinchey, Jr., US Congressman, 22nd District NY
Hon. John Hall, US Congressman, 19th District NY
Hon. John Bonacic, NY State Senator, 42nd District
Hon. Aileen M. Gunther, NY State Assemblywoman, 98th District
Hon. Clifford W. Crouch, NY State Assemblyman, 107th District
Hon. Edward G. Rendell, PA Governor
Hon. Arlen Specter, US Senator, PA
Hon. Robert P. Casey, US Senator, PA
Hon. Christopher Carney, US Congressman, 10th District, PA
Hon. Lisa Baker, PA State Senator, 20th District
Hon. Michael T. Peifer, PA House of Representatives, 139th District
Hon. Sandra J. Major, PA House of Representatives, 111th District
Carol Collier, Executive Director, Delaware River Basin Commission
Pete Grannis, Commissioner, NYS DEC
William Janeway, Regional Director, NYS DEC - Region 3
William Rudge, NYS DEC - Region 3 and UDC Rep.
Michael Flaherty, NYS DEC - Region 3 and UDC Alternate
Dennis DeMara, PA DCNR and UDC Rep.
Gary N. Paulachok, Deputy Delaware River Master, USGS
Steven W. Lawitts, Acting Commissioner, NYC DEP
Dan Wenk, Acting Director, National Park Service
Dennis Reidenbach, Northeast Regional Director, National Park Service
Sean McGuinness, Superintendent, National Park Service - UDSRR
File

United States Department of the Interior
NATIONAL PARK SERVICE
Upper Delaware Scenic and Recreational River
274 River Road, Beach Lake PA 18405

IN REPLY REFER TO:
N 16

September 10, 2010

Mark Granger, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway 20th Floor
New York, NY 10007-1866

Dear Mr. Granger,

We appreciate you and other Environmental Protection Agency (EPA) staff conducting a public meeting in Narrowsburg, NY, on August 23, 2010, and explaining the proposed remediation alternatives being considered for the Cortese Landfill. You did a good job of explaining these options, answering questions, and alleviating some of our concerns.

We support EPA's preferred method of cleanup, Alternative 3. This more aggressive approach to remediating the contaminated groundwater at the site involves air sparging with soil vapor extraction (ASSVE). This method would, by EPA's estimate, remediate, and result in potable water at the site, in about 15 years. It is estimated that this approach would cost approximately $8.1 million over this time period. And if for some reason this method proves ineffective, EPA could resort to Alternative 2, if it had to.

Alternative 2, which would involve pumping and treating groundwater near the source, could take as much as 150 years to remediate the site, by EPA's estimation, and would cost roughly $11.7 million.

Alternative 1, which involves no further action, would do nothing to remediate the site, and is not acceptable to us.

Thank you for the opportunity to review and comment on these remediation alternatives, and for all the work you and your agency have done over the years as partners in protecting the outstanding qualities of the Upper Delaware Scenic and Recreational River.

Sincerely,

Sean J. McGuinness
Superintendent

cc: Hon. David A. Paterson, NY Governor
Hon. Charles Schumer, US Senator, NY
Hon. Kirsten Gillibrand, US Senator NY
Hon. Maurice D. Hinchey, Jr., US Congressman, 22nd District NY
Hon. John Hall, US Congressman, 19th District NY
Hon. John Bonacic, NY State Senator, 42nd District
Hon. Aileen M. Gunther, NY State Assemblywoman, 98th District
Hon. Clifford W. Crouch, NY State Assemblyman, 107th District
Hon. Edward G. Rendell, PA Governor
Hon. Arlen Specter, US Senator, PA
Hon. Robert P. Casey, US Senator, PA
Hon. Christopher Carney, US Congressman, 10th District, PA
Hon. Lisa Baker, PA State Senator, 20th District
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Michael Flaherty, NYS DEC - Region 3 and UDC Alternate
Dennis DeMara, PA DCNR and UDC Rep.
Gary N. Paulachok, Deputy Delaware River Master, USGS
Caswell F. Holloway, Commissioner, NYC DEP
Jon Jarvis, Director, National Park Service, Washington, DC
Dennis Reidenbach, Northeast Regional Director, National Park Service
Bill Douglass, Executive Director, Upper Delaware Council
D. L. Anderson, Spill Response Coordinator, National Park Service, Ft Collins, CO.

Geosyntec consultants

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11 September 2010

Mr. Mark Granger, Remedial Project Manager
U.S. Environmental Protection Agency Region II
290 Broadway, 20th Floor
New York, New York 10007-1866

Subject: Comments on Proposed Plan, Cortese Landfill Site, Narrowsburg, New York

Dear Mr. Granger:

On behalf of the Cortese Landfill Defendants (the Group), Geosyntec Consultants, Inc. (Geosyntec) is pleased to provide the following comments on the Superfund Proposed Plan for the Cortese Landfill Superfund Site, dated August 2010 and prepared by U.S. Environmental Protection Agency Region II (USEPA). The Group supports the Proposed Plan. Due to the Proposed Plan's summary nature, there are three key concepts we believe need to be reflected in the administrative record as USEPA moves toward its Record of Decision (ROD) and amendments to the Consent Decree.

First, the Group would like to state for the administrative record that the air sparge/soil vapor extraction/ozone step of the preferred alternative is not expected to achieve the ultimate (final) cleanup goals for groundwater (i.e. Safe Drinking Water Act Maximum Contaminant Levels) at the point of compliance (POC) as the criterion for cessation of sparge system operation. Rather, those steps are expected to significantly reduce the source mass and should adequately modify the source area architecture such that there is a significant reduction in the concentrations and mass flux of constituents of concern (COCs) in groundwater at the POC. Subsequent steps in the remedy, including long-term natural attenuation processes, can then finish the remediation process and ultimately achieve the final groundwater cleanup goals in a reasonable period of time. To that end, performance standards that describe decision criteria for transitions in the various steps of the remediation process, including cessation of active sparging, should be developed and included as part of the new Consent Decree Scope of Work for the preferred alternative. Lines of evidence that might be considered include, but are not limited to, achieving some percentage reduction in the mass flux of COCs along the groundwater migration pathway, achieving COC concentrations in groundwater at the POC that are within some multiple of the final cleanup goals, and/or achieving a decline in mass removal rates by the active sparging system to the point that it is

comparable to those achieved by natural attenuation processes under pre-remedial conditions. Refinement and/or addition of details to those decision criteria might be appropriate as part of the Remedial Design. Such criteria might include a multiple lines of evidence decision process. While it is probably premature to specify criteria for deciding whether and when to cease active treatment, or resume active treatment after the stabilization period, we believe it is appropriate to state the intention that such criteria will be developed during the design of that phase.

Second, given the substantial amount of time contemplated to complete the remedial process, the Group wishes to state for the administrative record the possibility that new technologies may emerge that are superior to those considered and utilized today. The Proposed Plan appropriately states that Alternative 2 should be evaluated as a contingent remedy if the preferred alternative fails to meet the performance standards and cleanup goals. The Group believes that such evaluation should include other technologies that have become available at that time that may be more effective than Alternative 2. For the same reasons, the Group believes that the same approach should be used in determining how to address recalcitrant COCs (if any) after the stabilization period of the preferred alternative. The Proposed Plan refers specifically to In Situ Chemical Oxidation (ISCO), but there may be better options available at that time.

Third, the Proposed Plan indicates that the National Historic Preservation Act (NHPA) is a location-specific Applicable or Relevant and Appropriate Requirement (ARAR). As summarized in the 2010 Feasibility Study, the NHPA was previously identified as a location-specific ARAR in the 1994 ROD and the Group completed a stage two cultural resource investigation at the site, as well as consultation with the State Historic Preservation Office (SHPO), as part of the pre-design investigations for the landfill closure design. Due to the extensive disturbance at the site resulting from trench and fill landfill operations, and the results of the stage two cultural resource investigation, the SHPO determined that no further action was necessary with respect to NHPA for construction of the landfill source control measures. The disturbances contemplated for the preferred alternative are located within the area of the prior stage two cultural resources investigation and the area of disturbance by the previous source control measures. Therefore, NHPA should not be an ARAR for the preferred alternative.

The Group appreciates the opportunity to provide these comments for USEPA's consideration in developing the new ROD and looks forward to making additional progress toward site cleanup. If you have any questions, please do not hesitate to contact the Group Project Coordinator, Mr. Mark Snyder, at (585) 223-6132 (x223) or the undersigned at (410) 381-4333.

Very truly yours,
GEOSYNTEC CONSULTANTS

Robert M. Glazier
Project Director

cc: M. Snyder (Project Coordinator)

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