RECORD OF DECISION
COLESVILLE LANDFILL SITE
TOWN OF COLESVILLE
BROOME COUNTY, NEW YORK

SITE #704010
FILABLE-YES

PREPARED BY THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
MARCH 1991

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Colesville Landfill site
Town of Colesville, Broome County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Colesville Landfill site (the "Site"), located in the Town of Colesville, Broome County, New York, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for the Site.

The State of New York concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for the Site. The administrative record index is attached.

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 Record of Decision (ROD), may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This operable unit is the final action for the Site. The selected remedy will provide containment through the installation of a cap over the landfill material and leachate collection, which will eliminate the potential for direct human or animal contact with the leachate seeps discharging to the North and South Streams. Contaminated groundwater underlying the Site will be restored to levels consistent with state and federal requirements by pumping at and downgradient from the landfill and by treating the extracted groundwater by using air stripping. In addition, the human health risks from potable use of contaminated groundwater will be controlled under the existing quarterly residential well monitoring program along with the temporary water supply and carbon filtration program for the affected residences until a new water supply is in operation. Also included in the selected remedy are groundwater monitoring, fencing, and deed restrictions. Five-year reviews will be conducted as required by the NCP due to the fact that waste will remain on-site. The purpose of the five-year review is to ensure that the remedy continues to provide adequate protection of human health and the environment.

The landfill will be regraded as necessary prior to installation of the cap to establish slopes which will encourage runoff and minimize erosion. The cap will contain the landfill material and minimize infiltration of precipitation into the landfill material. This will minimize the potential for future contamination of the groundwater.

The major components of the selected remedy include the following:

- Cutting the existing sides of the landfill to slopes of no greater than approximately 33%. The top surfaces of the landfills would be regraded to slopes of no less than 4% to provide for proper drainage.

- Construction of lined (filter fabric) leachate collection trenches.

- Installation of a multimedia cap over the landfill material. Water infiltrating through the vegetative and protective layers of the cap will be intercepted by the impermeable flexible membrane layer and conveyed away from the landfill material.

- Installation of a gravel gas venting layer, with a filter fabric layer placed over the gravel. The flexible membrane liner (FML) will be placed over the filter fabric, and another layer of filter fabric will be placed on top of the FML.

- Seeding and mulching of the top soil layer to prevent erosion and provide for rapid growth of vegetation.

- Pumping the contaminated groundwater beneath and downgradient of the landfill.

- Treatment of the extracted groundwater, using metals treatment and air stripping.

- Discharge of the treated water to surface water.

- Construction of a new water supply system for the present and future affected residences (with the continuation of existing quarterly residential well monitoring and temporary water supply and carbon filtration programs until the new water supply is in operation). It is contemplated that the new water supply system will utilize a new well or wells northwest of the affected area.

- Fencing to further protect the integrity of the caps by restricting access to the Site.

- Periodic inspection of the cap and maintenance as necessary

will provide for long-term effectiveness and permanence of the alternative.

- Imposition of property deed restrictions, if necessary. The deed restrictions will include measures to prevent the installation of drinking water wells at the Site and restrict activities which could affect the integrity of the cap.

- Initiation of a monitoring program upon completion of the closure activities. The monitoring program will provide data to evaluate the effectiveness of the remedial effort over time.

The groundwater treatment will continue until federal maximum contaminant levels (MCLs) and state groundwater and drinking water standards for the organics have been achieved in the groundwater. The goal of this remedial action is to restore groundwater to its beneficial use, which is, at this site, a drinking water source. Based on information obtained during the field investigations and on an analysis of all remedial alternatives, EPA and NYSDEC believe that the selected remedy involves using the best available and most appropriate technology to achieve this goal. It may become apparent, during the operation of the groundwater extraction system that, at a certain point, contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal. In such a case, the system performance standards and/or the remedy will be reevaluated.

The selected remedy will include groundwater extraction and treatment for at least 4 years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The contaminated groundwater and leachate is being treated, addressing the statutory preference for treatment as a principal element of the remedy. However, the size of the landfill and the fact that there are no identified on-site "hot spots" that represent the major sources of contamination preclude a remedy in which the landfilled material could be excavated and treated effectively.

Because this remedy will result in hazardous substances remaining on-site, a review will be conducted no later than five years after completion of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator

3/29/91
Date

ROD FACT SHEET

SITE

Name:	Colesville Landfill
Location/State:	Town of Colesville, Broome County, New York
EPA Region:	II
HRS Score (date):	30.26 (June 86)
NPL Rank (date):	984 (February 91)

ROD

Date Signed:

Selected Remedy

Containments:	A multi-media cap complying with New York State Part 360 Solid Waste Regulations with leachate collection and treatment
Groundwater:	Pumping at landfill and downgradient, groundwater treatment, and new water supply for affected residents
Capital Cost:	$4,273,000
O & M:	$250,000/yr
Present Worth:	$5,135,000

LEAD

State Enforcement
Primary Contact (phone): Eduardo Gonzalez (212) 264-5714
Secondary Contact (phone): Sharon E. Kivowitz (212) 264-2211

WASTE

Type:	Groundwater - 1,1 dichloroethane, 1,1,1 trichloroethane, trichloroethene, trans-1,2-dichloroethene, and benzene. Sediments - low levels of benzene, chlorobenzene, 1,1-dichloroethane, 1,1-dichloroethene, and trichloroethene.
Medium:	Sediments and groundwater
Origin:	Pollution originated as a result of disposal of industrial wastes at the landfill. Drums and liquid wastes were dumped into trenches.

DECISION SUMMARY

COLESVILLE LANDFILL SITE
TOWN OF COLESVILLE
BROOME COUNTY, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK, NEW YORK

MARCH 1991

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ATTACHMENTS

SITE NAME, LOCATION, AND DESCRIPTION

The Site, which is located in the Town of Colesville, Broome County, New York (see Figure 1), is characterized as very rural, and includes large tracts of undeveloped woodlands, as well as large-scale agricultural tracts and scattered residential parcels. Of the 113 acres on which the landfill is situated, the site occupies approximately 35 acres that have been used for waste disposal. The largest and nearest residential development is Doraville, just south of the Site.

Topography at the Site ranges from approximately 1,400 feet above mean sea level in the eastern portion of the study area, to about 970 feet above mean sea level in the west. The Susquehanna River lowland valley is at an elevation of approximately 940 feet.

Surface water in the area drains to the Susquehanna River. (see Figure 2). However, the terrace upon which the landfill has been developed is dissected by streams on the north, east, and south. Drainage in the vicinity of the Site is via two unnamed tributaries of the Susquehanna River . Tributary SR-120, the North Stream, is located north of the Site and flows westerly to the Susquehanna River. To the east and south is Tributary SR-119A, the South Stream, which flows to the south-southwest into a low-lying wet area. Both tributaries join the Susquehanna River approximately 0.5 miles above Doraville.

The Susquehanna River is classified as Class B surface water in the vicinity of the Site. Class B waters are suitable for both primary[1] and secondary[2] contact recreation, as well as for fish propagation. Tributaries SR-120 and SR-119A are Class C and D waters, respectively. These waters are suitable for secondary contact recreation and fish propagation only.

Existing flood insurance maps (Federal Emergency Management Agency, 1983) indicate that no portions of the Site are located in either the 100- or 500-year flood zone.

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[1] Primary Contact Recreation--recreational activities where the human body may come in direct contact with raw water to the point of complete body submergence (i.e., swimming, diving, water sports, and surfing).

[2] Secondary Contact Recreation--recreational activities where contact with of water is minimum and where ingestion of water is not probable (i.e., fishing and boating).

During the field investigation, three small wetland areas in the vicinity of the Site were encountered. These areas were all less than one acre in size and appear to be connected to surface drainage swales in the area.

Vegetation patterns at the Site are a mixture of herbaceous field, weed, and grass species. Both open field and forest habitats characterize the surrounding area. These habitats support a large variety of avian and mammalian species. No New York State Department Environmental Conservation (NYSDEC) Significant Habitat Areas are found on-site, although the Site is located within the range of several migratory endangered or threatened species. The predominant aquatic species found in the Susquehanna River include small mouth bass, rock bass, and white suckers.

Many of the residents of the Town of Colesville use private water supply wells to obtain domestic water supplies. These wells utilize groundwater from both shallow and deep aquifer systems. Other homes utilize groundwater obtained from springs.

The nearest homes to the landfill are located to the west and southwest along East Windsor Road. The home closest to the landfill is at distance of approximately 380 feet, and is separated from the landfill by a steep-sided ravine with a small steam flowing through it. Another home, which is not separated by a ravine or stream, is at a distance of 500 feet. Two other homes are at a distance of 640 feet from landfill.

The Town of Colesville has a population of 4,965 persons. The estimated population within a one-mile radius of the Site is 191 persons; 754 persons within two miles; and 1,921 persons within three miles.

SITE HISTORY

Waste disposal operations at the landfill commenced in 1969. The landfill was owned and operated by the Town of Colesville between 1969 and 1971. Broome County took ownership of the landfill in 1971, operating the landfill from 1971 to 1984. The landfill has been closed since 1984.

The trench method of sanitary landfilling was primarily utilized for waste disposal purposes. The area method was used to a limited extent. The Site was primarily used for the disposal of municipal solid waste, although drummed industrial wastes from various sources were also disposed of between 1973 to 1975. Operational records indicate that these drummed wastes consisted of aqueous dye waste and organic solvent waste. Known waste constituents included benzene, cyclohexane, acetone isopropyl alcohol, methanol, ethanol, n-hexane, toluene, xylene, methyl cellosolve, dimethyl ether, zinc, aluminum, iron, tin sulfate,

and chloride. In practice, drummed wastes were randomly codisposed with the municipal solid wastes and disposed of in segregated areas. These drums were either buried intact, or were punctured and crushed prior to burial.

Approximately 468,000 cubic yards of wastes was disposed within three trenches and the area landfill. Nearly 93 percent of the waste was placed within the trenches.

In 1983, samples collected from residential wells in the vicinity of the Site by the Broome County Health Department indicated that the Colesville Landfill was contaminating the groundwater beneath and in the immediate vicinity of the Site. The samples results prompted the Broome County Department of Public Works to provide temporary water supply and carbon filters with a quarterly residential well monitoring program for the affected residences, and to perform two investigative studies of the Colesville Landfill. These studies were performed by Wehran Engineering (Wehran) in 1983 and 1984.

Wehran's 1983 study indicated that the groundwater quality in the vicinity of the Colesville Landfill demonstrated a strong indication of contamination by landfill leachate. Volatile organic levels, measured as total volatile organics (TVOs), ranged from 48 to 2,800 parts per billion (ppb) within and around the landfill. Residential wells ranged from 32 ppb to 415 ppb, expressed as total volatile priority pollutants (TVPP).

Wehran's 1984 investigation confirmed the findings of the 1983 study with respect to the immediate landfill vicinity. Total volatile priority pollutant concentrations ranged from "not detected" in upgradient monitoring wells to 7,795 ppb immediately downgradient. Contamination was confined, primarily, to the upper portions of the glacial outwash aquifer that underlies the Site.

The Site was proposed for inclusion on the Superfund National Priorities List (NPL) in October 1984 and it was listed on the NPL in June 1986.

In 1988, Wehran completed a remedial investigation (RI) at the Site on behalf of the Broome County Department of Public Works, Binghamton, New York and GAF Corporation, Wayne, New Jersey, the Potentially Responsible Parties (PRPs), pursuant to an Order on Consent (Index No. T010687) with NYSDEC. In 1990, Wehran completed a confirmatory sampling program which confirmed the findings of the 1988 RI.

In December 1990, Wehran completed a feasibility study (FS) report which presented an analysis of the potential alternatives for the remediation of contamination observed at the Site.

ENFORCEMENT ACTIVITIES

On May 20, 1987, an Order on Consent (Index No. T010687) was signed by the Commissioner of the NYSDEC. The Order required the Broome County Department of Public Works and GAF Corporation, to conduct an RI/FS to determine the nature and extent of the contamination at the Site and to evaluate alternatives for site remediation. Once the remedial alternative is selected for the Site, the design and construction of such remedy will be implemented as provided for under NYSDEC's Order.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS report and the Proposed Plan for the Site were released to the public for comment on January 5, 1991. These two documents were made available to the public in the administrative record and an information repository maintained at EPA Docket Room in Region II, New York, at the Town of Colesville Town Hall in Harpursville, New York, and at NYSDEC's offices in Albany, New York. A public comment period on these documents was held from January 7, 1991 through February 6, 1991. In addition, a public meeting was held at the Broome County Office building, Binghamton, New York on January 30, 1991. At this meeting, representatives from EPA and NYSDEC answered questions about problems at the Site and the remedial alternatives under consideration. Responses to the comments received during the public comment period are included in the Responsiveness Summary, which is appended to this ROD.

SCOPE AND ROLE OF RESPONSE ACTION

The purpose of this response is to reduce the risk to human health and the envrionment due to the release of volatile organic compounds (VOCs) from the Site to the underlying glacial outwash aquifer, to eliminate the leachate seeps and discharges, to ensure protection of human health and the environment from the migration of contaminants in the groundwater and direct contact with leachate seeps, to ensure protection of the groundwater, air, and surface water from the continued release of contaminants from the landfill, and to restore the groundwater to levels consistent with state and federal water quality standards.

This remedial action will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. However, because treatment of the principal threats of the Site is not practicable, this remedial action does not satisfy the statutory preference for treatment as a principal element of the remedy. The size of the landfill and the fact that there are no identified on-site hot spots that represent the major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

This response applies a comprehensive approach (i.e., one operable unit) to remedial action at the Site. In other words, this project has not been segmented into incremental portions.

NYSDEC is the lead agency for this project; EPA is the support agency.

SUMMARY OF SITE CHARACTERISTICS

The Colesville Landfill was used for the disposal of municipal solid waste throughout its operational life. Between 1973 and 1975, industrial wastes were also disposed of at the facility. Table 1 lists the nature and amount of industrial wastes disposed of at the landfill.

It has been reported that wastes received in drums were randomly codisposed of with the municipal solid wastes and disposed in segregated areas. The drums were either buried intact, or punctured and crushed prior to burial. Facility records indicate that a narrow trench along the south-central landfill boundary was designated for drum disposal. Based upon the estimated total volume of the trenches, it was estimated that approximately 468,000 cubic yards of municipal solid wastes and industrial waste have been disposed of at the Site.

The key findings of RI and confirmatory sampling program are as follows:

- The Site is currently releasing low levels of VOCs.
- Over the last six to seven years, it has become apparent that the extent of groundwater contamination is limited in area and not increasing in severity.
- The current data suggest a slight advancement of a plume southwest of the landfill, with an overall decrease in VOC concentrations at the landfill border.
- VOCs in the part per billion (ppb) range have been detected in wells at three residences downgradient of the landfill. This contamination has been consistent over different sampling efforts, indicating that the contaminant profile has not changed since 1987.
- Historical and current data have failed to confirm contamination of the bedrock aquifer.
- The only bedrock well currently used within the path of the VOC plume is not affected.
- The available data suggest that VOCs currently being released from the landfill via the groundwater pathway are not expected

to have a measurable impact on the Susquehanna River.

- The only measurable surface water contaminated discharge points are in leachate seeps discharging to the North Stream, South Stream, and in sediments in the tributaries immediately adjacent to surficial outbreaks of landfill seeps.

- Groundwater recharge to the tributaries has not resulted in any measurable VOC levels in surface water flowing to the Susquehanna River.

- The areas affected by the seeps, as measured by VOC and metal concentrations, are limited to sediments proximate to the seeps.

- No significant releases of VOCs to the air pathway were suggested by the available data.

Soil Investigation

In order to determine the location and extent of waste landfilled within the trenches and investigate the potential extent of groundwater contamination, a multi-phase geophysical investigation was conducted in soils. The techniques utilized were a magneto-meter survey, which defines local variations in the soils' magnetic field due to buried ferromagnetic material (i.e., drums), the terrain conductivity, which measures the conductivity of subsurface materials and areas of buried waste, and earth resistivity sounding, which measures the resistivity of subsurface materials and the depth and thickness of buried ferromagnetic materials. Based on the results of the magnetometric survey and the terrain conductivity, a number of anomalies were detected which are interpreted as trenches. The results of the earth resistivity sounding indicated that the trenches are generally 30 to 35 feet deep. Furthermore, the off-landfill terrain conductivity survey did not detect any significant areas of high conductivity which might have been associated with groundwater contaminant plumes.

Groundwater Investigations

In December 1987 investigations, Wehran sampled 27 groundwater monitoring wells and 4 residential wells. Data from these sampling efforts are included in Tables 2 through 4. The landfill was found to be releasing low levels of VOCs into the groundwater. In general, five VOCs, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene, trans-1,2-dichloroethene and benzene, were the major contaminants in the contaminant plume. Analyses of data provided from the monitoring wells and Residential Well No. 1 indicate that the center line of the VOC plume extends from the landfill through well W-5 and Residential Well No. 1. No contamination was found in the bedrock aquifer. The

southern extent of the VOC plume reached beyond wells W-18 and W-16S, with low levels of 1,1-dichloroethane (24 and 67 microgram per liter (ug/l)), and 1,1,1-trichloroethane (53 and 6 (ug/l)) detected in these wells southwest of the landfill. The extent of the benzene plume was somewhat more limited compared to the other VOCs. Detectable levels of benzene were found in a monitoring well in the center of the landfill at 55 ug/l, and in wells along the west and south perimeters of the landfill ranging from 7 to 85 ug/l. It was not detected along the northern perimeter, in the residential wells, or in monitoring wells to the west of the Site. Low levels of benzene were also detected in monitoring wells located to the south of the landfill.

Groundwater monitoring data obtained during the 1989 confirmatory sampling program defined a VOC plume very similar to the plume defined by in the 1987 sampling efforts. The landfill is still releasing low levels (ppb) of hazardous substances to the groundwater. With the exception of vinyl chloride and benzene, the VOCs identified in the confirmatory sampling program were present at comparable levels and at the same monitoring well locations as were observed during the 1987 sampling effort (see Tables 2 through 4).

Analyses of on the 1987 groundwater samples showed elevated levels of dissolved metals, in particular, arsenic, cadmium, and silver in monitoring wells affected by the VOC plume. Levels of lead and zinc throughout the Site in 1987 were variable and did not fit a particular contamination pattern. Analyses of groundwater samples taken during the 1989 confirmatory sampling effort did not show the presence of lead, cadmium, and silver on the Site. Levels of dissolved zinc were once again variable and did not fit a particular pattern of contamination. Dissolved arsenic levels in the VOC plume range from 13 ug/l to 24 ug/l, but were comparable to the 13 ug/l arsenic detected in the upgradient well (MW-25). Elevated levels of dissolved iron were noted at in monitoring well W-24 in the center of the landfill (36,400 ug/l) and within the VOC plume along the southwest perimeter (120,000 ug/l in monitoring well W-6, and 3,270 ug/l in monitoring well W-7).

Surface Water and Sediment Investigations

The surface water and sediment samples collected in 1987 during the RI were obtained from five locations in the North Stream, four locations in the South Stream and three locations along the east bank of the Susquehanna River. No VOCs were detected in any of these samples and no widespread contamination of the surface water in the vicinity of the Site was noted. However, leachate seeps were noted as potential sources of localized water quality impacts on both the North Stream and South Stream. Therefore, the surface water samples taken during the 1989 confirmatory sampling program were obtained directly from the seeps, and then

10 feet and 100 feet downstream of the seep locations (see Figure 3).

In the North Stream, several VOCs were detected in water samples taken in 1989 from the seep at SW-8 and downstream from this area (see Tables 5 through 7). Levels of 121 ug/1 of 1,1-dichloroethane were detected at the seep and levels of 4 ug/1 and 3 ug/1 of 1,1-dichloroethane were detected 10 feet and 100 feet downstream, respectively. Low levels of 1,1,1-trichloroethane, chloroethane, and chlorobenzene were also detected at the seep. No VOCs were detected at seep locations on the South Stream. Samples of leachate seeps along the hillside, south of the landfill showed a very low level of 1,1-dichloroethane (4 ug/1) at SW-18.

Detectable levels of total iron, arsenic, and zinc were present in surface water samples from both streams (see Table 6). Cadmium, lead, and silver were not detected. With the exception of iron, total metal concentrations in the surface waters were not significantly elevated at or downstream form the seeps when compared to samples taken upstream of the seeps. Elevated levels of total iron were noted at and downstream from the seep at SW-8. Levels of total iron at SW-5, SW-6 and SW-7 (upstream) were 274 ug/1, 122 ug/1, and 101 ug/1, respectively, as compared with levels of 7,200 ug/1 at the seep and 1,500 ug/1 and 1,200 ug/1, 10 feet and 100 feet downstream of the seep, respectively, as was the case with surface water samples taken in 1987, elevated total iron levels were also noted at SW-2 in the area of a pond north of the landfill. Acidification of the pond water by nearby bog vegetation and the resulting mineral leaching is the likely source of the elevated iron content of the waters at SW-2. Total arsenic was detected only at the seep in the North Stream (24 ug/1) and at the seep area south of the landfill at SW-18 (34 ug/1). In the South Stream, levels of total iron were also elevated at the SW-12 seep (22,600 ug/1) and 10 feet downstream from the seep (12,100 ug/1) as compared with upstream levels of 2,630 ug/1. The highest level of iron was noted in leachate seeps emanating from the hillside south of the landfill (266,00 ug/1).

Only low levels of two VOCs (1,1-dichloroethane and chloroebenzene) were detected in sediment samples obtained from any of the seep areas (see Table 7). A sample taken at SD-8 on the North Stream contained 11 milligrams/kilogram (mg/kg) of 1,1-dichloroethane and 0.9 milligrams per kilogram (mg/kg) of chlorobenzene (see Figure 4). No VOCs were detected downstream from this point. No VOCs were detected in the sediments of the South Stream. Samples from seep areas SD-16 and SD-17, located, south of the landfill, also contained very low levels of 1,1-dichloroethane. Total cadmium, lead, and silver were not detected in any of the sediment samples. Total iron, arsenic, and zinc were detected in sediment samples from both streams and the hillside south of the landfill (see Table 8). No pattern of elevated

metals was observed at or downstream of the seeps, and no widespread contamination of stream sediments was observed. In the North Stream, levels of total zinc ranged from 128 to 1,510 mg/kg, and were variable along the length of the stream. Levels of total arsenic were also variable ranging from 8.3 to 79.7 mg/kg. Comparable levels of total iron were observed above and below the seep on the South Stream (see Table 8). By comparison with levels found in the stream sediments, elevated levels of total arsenic (276 mg/kg) and iron (242,000 mg/kg) were detected at the seep at SD-18 south of the landfill.

SUMMARY OF SITE RISKS

Wehran conducted a Risk Assessment (part of the RI) of the "no-action" alternative to evaluate the potential risks to human health and the environment associated with the Site in its current state. The risk assessment focused on the groundwater contaminants which are likely to pose the most significant risks to human health and the environment (indicator chemicals). The indicator chemicals included 1,1-dichloroethene, 1,1,1-trichloroethane, trichloroethene, tetrachloroethane, benzene, chlorobenzene, 1,1-dichloroethane, 1, 2-dichloroethane, and vinyl chloride.

The risk assessment evaluates the potential impacts on human health and the environment at the Site assuming that the contamination at the site is not remediated. This information is used to make a determination as to whether remediation of the Site may be required.

The RI report presented a detailed site specific risk assessment which addressed site conditions and exposures. The risk assessment qualitatively and quantitatively evaluated the hazards to human health and the environment at the landfill. The qualitative analysis characterized the potential human exposure pathways while the quantitative analysis determined the risk of the complete pathways.

The human exposure pathways considered were ingestion and inhalation of contaminated well water, and dermal contact with contaminated surface water and sediments near the leachate seeps. The potential exposure pathways and the population potentially affected are presented in Table 9.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate

of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

EPA considers risks in the range of 10^{-4} to 10^{-6} to be acceptable. This risk range can be interpreted to mean than an individual may have a one in ten thousand to a one in a million increased chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the Site.

For groundwater, a comparison was made between observed well contamination levels (Confirmatory Sampling Program, 1989) and existing health-based standards for the indicator chemicals identified. The standards selected for this evaluation were the MCLs for volatile organics established under the Safe Drinking Water Act, National Primary Drinking Water Standards (40 CFR 141), and the New York State Department of Health (NYSDOH) Drinking Water Standards for Volatile Organic Compound (January 1989). Observed groundwater contaminant levels exceeded these standards and guidance values for trichloroethene, 1, 1-dichloroethene, 1, 1, 1-trichloroethane, and 1, 2-dichloroethane. The maximum concentrations of VOCs detected in either groundwater monitoring or residential wells and surface water are presented in Table 10. Table 11 compares the MCL for each indicator chemical with the maximum observed contaminant levels in the groundwater at the baseline exposure points (the residential wells).

Based on this comparison of exposure point concentrations to federal and state health-based standards, the existing conditions for the groundwater in the shallow aquifer at the Site are not adequately protective of human health.

The total baseline carcinogenic risk associated with exposure to

potable well water at the Site is 2.85×10^{-4}. This value is at the high end of the range considered acceptable by EPA for carcinogenic risk (10^{-4} to 10^{-6}). Combined pathway specific intakes (ingestion and inhalation) were calculated using the Hazard Index (HI) approach. The HI for the noncarcinogenic compounds present in the groundwater at the Site is 3.85. An exceedance of 1.0 in the HI indicates that conditions existing at the Site are not adequately protective of human health.

Table 12 summarizes the carcinogenic risks associated with the intake of contaminated groundwater containing VOCs at the maximum concentrations observed in Residential Well No. 1 under baseline conditions. This table also illustrates the risks associated with exposure to the noncarcinogenic compounds present.

No elevated human health risk is anticipated from the consumption of aquatic or terrestrial game species due to the low bioconcentration factors associated with the indicator chemicals. No significant adverse toxicity impact to terrestrial or aquatic wildlife is anticipated based on the levels of the indicator parameters measured at the Site.

Exposure to the chemical substances identified at the Site may result from the consumption of contaminated well water and the inhalation of indoor air contaminated by the VOCs present in the water.

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

CLEANUP LEVELS FOR CONTAMINATED MEDIA

Cleanup levels based on public health and environmental concerns and on a review of Applicable or Relevant and Appropriate Requirements (ARARs) were developed for the Site. ARARs were used to determine the appropriate extent of site remediation, to scope and formulate remedial response actions, and to govern the implementation and operation of the selected action. CERCLA requires that primary consideration be given to remedial response actions that attain or exceed ARARs. The purpose of this requirement is to make CERCLA response actions consistent with other pertinent federal and state environmental requirements.

A requirement under CERCLA may be either "applicable" or "relevant and appropriate" to a site-specific remedial action, but not both. Currently, the only enforceable regulatory standards promulgated under the Safe Drinking Water Act are MCLs for the protection of human health. For each indicator chemical selected at the Site an MCL has been specified to a level that is protective to human health. Since MCLs exist for those indicator

chemicals ,therefore, regulatory guidelines were not used for comparative purposes to infer health risks and environmental impacts. However, Relevant regulatory guidelines as Ambient Water Quality Criteria, Maximum Contaminant Level Goals (MCLGs), and EPA Drinking Water Health Advisories were considered during the development of cleanup levels. The ARARs identified for the contaminated media at the Site are summarized below.

Soil

Since the landfill soils contain Resource Conservation and Recovery Act (RCRA) listed hazardous wastes, regulations specified in 40 CFR Part 264 Subpart F and G would be considered relevant for the installation of the multi-media cap. However, the implementation of the New York Code of Rules and Regulations (NYCRR) Part 360 final cover (cap) in lieu of a "RCRA Cap" will meet or exceed the performance requirements of Part 264 Subparts F and G at this Site. Based on the size of the landfill and the fact that there are not identified on-site "hot spots" that represent the major sources of contamination preclude any remedial response actions in which the landfilled material could be excavated and treated effectively. Therefore, the remedial action objective is to eliminate any direct contact with soil and to reduce or eliminate the infiltration of precipitation through the Site

Groundwater

The groundwater at the Site is classified by NYSDEC as class "GA", which indicates that the water is suitable as a drinking water supply. The RI has determined that contaminants from the Site have contaminated the groundwater. The remedial response objectives, therefore, include the following:

- Protect human health and the environment from current and potential future migration of contaminants in groundwater; and

- Restore on-site groundwater to levels consistent with federal and state groundwater standards.

The federal and New York State ARARs associated with quality of groundwater suitable for drinking at the Site are listed in Table 13. A comparison of the concentrations of the contaminants of concern in the groundwater to these ARARs reveals that most volatile organic compounds exceed the regulatory concentrations. As a result, the groundwater cleanup levels should meet the most stringent of the federal MCLs or the New York State Department of Health (NYSDOH) MCLs listed in Table 13. For those compounds having only non-carcinogenic effects, cleanup levels have been derived so that the total non-carcinogenic risk (HI) does not exceed unity (i.e., a value of 0.9 was used as the target HI).

The sources of each of the various cleanup levels are provided in footnotes to Tables 13.

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

Sediments

The sediments in the streams at the leachate seeps contain low levels (ppb) of VOCs. The contaminants of concern found in the sediments at the leachate seeps are benzene, chlorobenzene, 1,1-dichloroethane, 1,1-dichloroethene, and trichloroethene. Direct contact with the soil and sediments near the leachate seeps on the Site is a potential route of exposure. No chemical-specific ARARs for sediment are available at this time. The remedial action objective associated with the sediments is to eliminate the leachate seeps from the Site and any associated leachate discharges to the North and South Stream to prevent further contamination of sediments.

Since the health risk associated with direct contact of existing sediments is within the acceptable range, remediation of the existing sediments is not necessary.

DESCRIPTION OF ALTERNATIVES

The FS report evaluates, in detail, nine remedial alternatives for addressing the contamination associated with the Site.

These alternatives are:

Alternative 1: No Action with Monitoring

Capital Cost: $0
Operation and Maintenance (O & M) Cost: $14,000/yr
Present Worth Cost: $128,000
Time to implement: 0 yrs

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. Under this alternative, no remedial action to control the source of contamination would take place. However, long-term monitoring of the Site would be necessary.

This alternative would involve a continuation of the present groundwater monitoring and water supply program provided by Broome County.

Because this alternative would result in contaminants remaining

on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 3a: Limited Action, Existing Water Supply, and Use Restrictions

Capital Cost: $0
O & M Cost: $71,000/yr
Present Worth Cost: $672,000
Time to Implement: 6 months

This alternative would involve a continuation of the present groundwater monitoring and water supply program provided by Broome County. Maintenance inspections would be upgraded to ensure that the carbon/UV filters that are currently provided at the residences are properly operated for all household needs. In addition, a sampling program will be implemented utilizing the existing monitoring wells which were installed as part of remedial investigations and sampled in the confirmatory sampling program. If the County is able to purchase the affected properties, the deeds for these properties would be restricted with respect to future use of groundwater and the property.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 3b: Limited Action and New Water Supply

Capital Cost: $150,000
O & M Cost: $53,000/yr
Present Worth Cost: $648,000
Time to Implement: 1 yr (includes design)

This alternative would provide new water supply wells upgradient of the landfill, and a distribution system to the residences within the affected area would also be installed.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 4b1: Landfill Cap, Downgradient Pumping, Groundwater Treatment, and Existing Water Supply

Capital Cost: $4,163,000
O & M Cost: $268,000/yr
Present Worth Cost: $5,595,000
Time to Implement: 1.5 yrs (includes design)

This alternative would involve the installation of a multi-media cap that combines a number of layers of different materials, such as a synthetic membrane or a compacted clay layer, sand drainage layer, and topsoil/vegetation. The cap would be designed to be in compliance with New York State Part 360 Solid Waste Regulations. Groundwater would be collected downgradient using pumping wells, and treated using air stripping. Treated effluent would be discharged to North Stream or the Susquehanna River. Potable water would be supplied to residents via the current program, as described under Alternative 3a.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 4b2: Landfill Cap, Downgradient Pumping, Groundwater Treatment, and New Water Supply

Capital Cost: $4,313,000
O & M Cost: $250,000/yr
Present Worth Cost: $5,646,000
Time to Implement: 1.5 yrs (includes design)

This alternative would involve the placement of a multi-media cap complying with New York State Part 360 Solid Waste Regulations, the pumping of groundwater downgradient of the landfill using pumping wells, and the treatment of the groundwater. Treated effluent would be discharged to North Stream or the Susquehanna River. A new water supply would be provided as described in Alternative 3b.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial action may be implemented to remove or treat the wastes.

Alternative 4c1: Landfill Cap, Pumping at Landfill and Downgradient, Groundwater Treatment, and Existing Water Supply

Capital Cost: $4,193,000
O & M Cost: $268,000/yr
Present Worth Cost: $5,040,000
Time to Implement: 1.5 yrs (includes design)

This alternative would involve the placement of a multi-media cap complying with New York State Part 360 Solid Waste Regulations, the pumping of groundwater downgradient of and within the landfill using pumping wells, and treatment of groundwater. The existing water supply program, upgraded as described in Alternative 3a, would be continued.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial action may be implemented to remove or treat the wastes.

Alternative 4c2: Landfill Cap, Pumping at Landfill and Downgradient, Groundwater Treatment, and New Water Supply

Capital Cost: $4,273,000
O & M Cost: $250,000/yr
Present Worth Cost: $5,135,000
Time to Implement: 1.5 yrs (includes design)

This alternative would involve the placement of a multi-media cap complying with New York State Part 360 Solid Waste Regulations, and the pumping and treatment of groundwater at the landfill and downgradient. A new water supply and distribution system would be constructed as described in Alternative 3b.

Long-term monitoring, fencing and deed restrictions would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial action may be implemented to remove or treat the wastes.

Alternative 4d1: Landfill Cap, Downgradient Cutoff, and New Water Supply

Capital Cost: $8,811,000
O & M Cost: $230,000/yr
Present Worth Cost: $10,977,000
Time to Implement: 1.5 yrs (includes design)

This alternative would involve the placement of a partial groundwater slurry cutoff wall downgradient of the landfill and pumping and treatment of groundwater within the containment wall. A multi-media cap complying with New York State Part 360 Solid Waste Regulations would be constructed to cover the entire landfill and the limits of the slurry wall downgradient of the landfill. Attainment of groundwater standards outside the cutoff wall would occur naturally over the long-term. A new water supply would be provided as described in Alternative 3b.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 4d2: Landfill Cap, Downgradient Cutoff, and Existing Water Supply

Capital Cost: $8,701,000
O & M Cost: $268,000/yr
Present Worth Cost: $11,230,000
Time to Implement: 1.5 yrs (includes design)

This alternative would involve the placement of a partial groundwater cutoff wall downgradient of the landfill, as described in Alternative 4d1, and pumping and treatment of groundwater within and outside of the cutoff wall. A multi-media cap complying with New York State Part 360 Solid Waste Regulations would be constructed to the limits of the slurry wall downgradient of the landfill and to the limit of the landfill on the upgradient side. The existing water supply program would be continued as described in Alternative 3a.

Long-term monitoring would be included.

Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

SUMMARY OF 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 (including the statutory preference for treatment), short-term effectiveness, implementability, cost, state acceptance, and community acceptance.

A comparative analysis of these alternatives based upon the evaluation criteria note above, are as follows:

Overall Protectiveness of Human Health and Environment

The no-action alternative would not be protective of human health and the environment. Alternatives involving the utilization of the existing water supply system (Alternatives 3a, 4b1, 4c1, and 4d2) are protective of the human health, since each of these alternatives call for the provision of carbon filters to the present and future affected residences.

Alternative 3a would not be protective of the environment since no provision is provided for source containment, treatment, or leachate seepage control. Alternatives 4b1, 4b2, 4c1, 4c2, 4d1, and 4d2, which provide for source containment, groundwater treatment, and leachate seepage control, are equally protective of the environment.

Under Alternatives 4c1 and 4c2, the carcinogenic risk associated with exposure to VOCs in the groundwater from the Site would be expected to reach an acceptable range after the first year of pumping. Further decreases in the carcinogenic risk to 10^{-6} would be expected during the subsequent 3 years of pumping. The HI is anticipated to decline from a baseline of 3.85 to 0.27 after 1 year of pumping.

Compliance with ARARs

The no-action alternative would not ensure compliance with chemical-specific ARARs within a reasonable or predictable time frame. Alternative 3a, which addresses actual current groundwater use, would immediately comply with health-based ARARs at the point of use, but would provide no action to ensure compliance at the groundwater source. The pumping and containment alternatives (Alternatives 4b1, 4b2, 4c1, and 4c2) also would ensure immediate point-of-use compliance with health-based ARARs. However, these alternatives differ in their estimated time to compliance at the groundwater source. Nevertheless, each containment alternative has the potential to meet chemical-specific ARARs at the groundwater source (i.e., outside the landfill boundary). The containment alternatives involving a cutoff wall (Alternatives 4d1 and 4d2) would ensure immediate point-of-use compliance with health-based ARARs, but will not result in compliance at the groundwater source within a reasonable time frame.

All containment alternatives can be designed to meet action-specific ARARs with conventional technology.

The estimated time to meet ARARs after implementation of each alternative is presented in Table 14.

Long-Term Effectiveness and Permanence

The no-action alternative would be neither effective nor permanent in the reduction of the magnitude of risk associated with the Site.

Alternative 3a would be effective in the reduction of risk, but the permanence of this alternative would depend on the strict enforcement and frequent monitoring and maintenance of the carbon filters. By comparison, Alternative 3b would be effective in the long-term reduction of risk to residences provided with the new water supply system.

Alternatives 4b1, 4c1 and 4d2 provide for controlled source containment, and groundwater treatment, which would reduce risk, but long-term maintenance and monitoring would be required. The limited action component of these alternatives would reduce the adequacy and reliability of these options when compared to the remaining alternatives.

Alternatives 4b2, 4c2, and 4d1 provide for the reduction of risk by virtue of the provision for a new water supply, source containment and groundwater treatment. These alternatives are similar in their ability to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. The proposed controls would require long-term, O&M, but system adequacy and reliability are relatively greater as the local water supply will be unaffected by the remedial action.

In addition, Alternatives 4b1, 4b2, 4c1, and 4c2 should provide long-term effective attainment of ARARs at the groundwater source after several years.

Reduction of Toxicity, Mobility, or Volume through Treatment

The no-action alternative involves no treatment, and consequently, would not contribute to the reduction of contaminant toxicity, mobility, or volume at the Site. This assessment is also applicable to Alternatives 3a and 3b.

All of the containment alternatives (Alternatives 4b1, 4b2, 4c1, 4c2, 4d1, and 4d2) would reduce the toxicity, mobility, or volume through containment and the treatment of the groundwater using air stripping. For these alternatives, emissions from the air stripper would be at allowable limits for discharge to the atmosphere or destroyed through the use of a catalytic destruction unit.

Short-Term Effectiveness

In the short-term, the no-action alternative would not be effec-

tive in protecting human health and the environment. Improvement of groundwater quality would only occur through natural recovery, which is predicted to require at least 20 years.

Alternative 3a, Limited Action, would be effective in the short-term only for the existing residents. No significant community or worker exposure during the remediation would be anticipated. No improvement in environmental quality would be envisioned. The same assessment also applies to Alternative 3b.

All of the containment alternatives (Alternatives 4b1, 4b2, 4c1, 4c2, 4d1 and 4d2) would provide immediate point-of-use compliance with health-based ARAR limits. Alternatives 4c1 and 4c2 are predicted to provide aquifer cleanup to ARAR limits in four years. Aquifer cleanup under Alternatives 4d1 and 4d2 would take much longer.

Protection against community and worker exposure will be required with all of the containment options. For Alternatives 4b2, 4c2, and 4d1 to protect the residents, interim measures, such as maintenance of the existing filters, would be required until the new water supply system is installed and is operational. Additional worker protection measures, pursuant to Occupational Safely and Health Administrative requirements under Alternatives 4d1 and 4d2, would be required.

Environmental impacts during the construction of the groundwater pumping and treatment components of the containment options could be mitigated readily. Relatively greater potential environmental impacts are envisioned with Alternatives 4d1 and 4d2, and these impacts would require more involved mitigation measures during the installation of the cutoff wall.

Implementability

All of the alternatives are implementable.

Alternative 3a presents added administrative requirements for successful implementation due to the need to purchase additional affected residences and to institute and enforce land and groundwater use controls. This same factor must be considered with each containment option that includes limited action as a subalternative component.

The containment options calling for a downgradient cutoff wall would involve some difficult construction on steep slopes, but Alternatives 4d1 and 4d2 can be constructed. In contrast, the pumping components of all the containment options can be implements quickly and efficiently. No problems are envisioned with any of the alternatives with respect to the availability of services and materials.

The estimated time to implement each alternative is presented in Table 14.

Cost

The no-action alternative has the lowest estimated present worth cost of $128,000. Alternatives 3a and 3b have slightly greater estimated present value cost of $672,000 and $646,000, respectively.

Alternatives 4b1, 4b2, 4c1, and 4c2 have present value costs ranging from $5,040,000 to $5,646,000.

Alternatives 4d1 and 4d2, which call for a partial downgradient cutoff wall, are the most expensive at $10,977,000 and $11,230,000, respectively.

The capital, annual O&M, and present value costs for each alternatives are presented in Table 14.

State Acceptance

NYSDEC concurs with the selected alternative.

Community Acceptance

EPA and NYSDEC believe that the selected remedy has the support of the affected community. The community comments and concerns received during the public comment period were identified and addressed in the responsiveness summary which is attached as Appendix 5 of this document. None of the comments from the public raised substantive objections or concerns about the selected remedy. Therefore, EPA believes that the selected remedy has the support of the affected community.

THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, both EPA and NYSDEC have determined that Alternative 4c2, Landfill Cap, with Pumping at Landfill and Downgradient, Groundwater Treatment, and New Water Supply, is the most appropriate remedy for the Site. The selected remedy will provide containment through the installation of a cap over the landfill material and leachate collection, which will eliminate the potential for direct human or animal contact with the leachate seeps discharges to the North and South Streams. Contaminated groundwater underlying the Site will be restored to levels consistent with state and federal requirements by pumping at and downgradient from the landfill and by treating the extracted groundwater by using air stripping. In addition, the human health risks from potable use of contaminated groundwater will be controlled under the existing

quarterly residential well monitoring program along with the temporary water supply and carbon filtration program for the affected residences until a new water supply is constructed. Also included in the selected remedy is groundwater monitoring, fencing, and deed restrictions. Five-year reviews will be conducted as required by the NCP due to the fact that waste will remain on-site. The purpose of the five-year review is to ensure that the remedy continues to provide adequate protection of human health and the environment.

The landfill will be regraded as necessary prior to installation of the cap to establish slopes which will encourage runoff and minimize erosion. The cap will contain the landfill material and minimize infiltration of precipitation into the landfill material. This will minimize the potential for future contamination of the groundwater.

The major components of the selected remedy include the following:

- Cutting the existing sides of the landfill to slopes of no greater than approximately 33%. The top surfaces of the landfills would be regraded to slopes of no less than 4% to provide for proper drainage.

- Construction of lined (filter fabric) leachate collection trenches.

- Installation of a multimedia cap over the landfill material. Water infiltrating through the vegetative and protective layers of the cap will be intercepted by the impermeable flexible membrane layer and conveyed away from the landfill material.

- Installation of a gravel gas venting layer, with a filter fabric layer placed over the gravel. The FML will be placed over the filter fabric, and another layer of filter fabric will be placed on top of the FML.

- Seeding and mulching of the top soil layer to prevent erosion and provide for rapid growth of vegetation.

- Pumping the contaminated groundwater beneath and downgradient of the landfill.

- Treatment of the extracted groundwater, using metals treatment and air stripping.

- Discharge of the treated water to surface water.

- Construction of a new water supply system for the present and future affected residences (with the continuation of

existing quarterly residential well monitoring and temporary water supply and carbon filtration programs until the new water supply is in operation). It is contemplated that the new water supply system will utilize a new well or wells northwest of the affected area.

- Fencing to further protect the integrity of the caps by restricting access to the Site.

- Periodic inspection of the cap and maintenance as necessary will provide for long-term effectiveness and permanence of the alternative.

- Imposition of property deed restrictions, if necessary. The deed restrictions will include measures to prevent the installation of drinking water wells at the Site and restrict activities which could affect the integrity of the cap.

- Initiation of a monitoring program upon completion of the closure activities. The monitoring program will provide data to evaluate the effectiveness of the remedial effort over time.

The multi-media cap will be consistent with applicable regulations that require that when a FML is used in place of clay, the FML may have a permeability no greater than 1×10^{-12} cm/sec. The design requirements contained in the 6 NYCRR Part 360 standards would be incorporated into the cap design.

The cap considered above would also attain the performance requirements for caps at hazardous waste landfills as specified in 40 CFR Part 264.310. These requirements, promulgated under the RCRA, specify that the cap should:

1. Provide long-term minimization of migration of liquids through the closed landfill;

2. Function with minimum maintenance;

3. Promote drainage and minimize erosion or abrasion of the cover;

4. Accommodate settling and subsidence so that the cap's integrity is maintained; and

5. Have a permeability less than or equal to the permeability of any bottom liner present or natural subsoils present.

The first RCRA performance requirement would be attained by establishing proper slopes for drainage of precipitation, vege-

tated topsoil to promote evapotranspiration, as well as the installation of a FML with a permeability of 1 x 10^{-12} cm/sec or less.

A minimum amount of maintenance would be required for the cap. Maintenance activities would primarily consist of periodic mowing. Proper slopes and the vegetated topsoil would be established to promote drainage and minimize erosion of the cover.

It is expected that settling and subsidence has already occurred at the Site due to its age and would not occur in the future. However, an FML is considered to typically accommodate settling satisfactorily.

It is assumed that the effluent from the groundwater treatment system will be discharged by gravity to the North Stream in the vicinity of Residential Well No. 1, and that disinfection of this effluent will not be required. Should disinfection be required, an ultra-violet disinfection system would be included. In the final design, sufficient area will be allocated at the location of the groundwater treatment system for the inclusion of this disinfection system in accordance with the 6 NYCRR Parts 700-705.

The groundwater treatment will continue until federal MCLs and state groundwater and drinking water standards for the organics have been achieved in the groundwater. The goal of this remedial action is to restore groundwater to its beneficial use, which is, at this site, a drinking water source. Based on information obtained during the field investigation and on an analysis of all remedial alternatives, EPA and NYSDEC believe that the selected remedy involves using the best available and most appropriate technology to achieve this goal. It may become apparent, during the operation of the groundwater extraction system that, at a certain point, contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal. In such a case, the system performance standards and/or the remedy will be reevaluated.

The selected remedy will include groundwater extraction and treatment for at least 4 years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Air monitoring will be performed during construction at the Site. Air emissions from the treatment units during groundwater remediation will meet the air emission ARARs. Environmental monitoring will be required during the life of the treatment process. In addition, monitoring of the groundwater at the Site will be conducted for a period of thirty years after completion of the remedial construction, to ensure that the goals of the remedial action have been met.

The new water supply system will be designed to serve the affected residences with the continuation of existing quarterly residential well monitoring and temporary water supply and carbon filtration programs until the new water supply is in operation. It is contemplated that the new water supply system will utilize a new well or wells northwest of the affected area.

The selected remedy will be designed to avoid significant impacts to the North and South Streams. The discharge to the North Stream should be designed to minimize impacts associated with scouring. If the leachate seeps have not significantly subsided or improved in quality within 1 year after remedial construction is completed, collection and treatment of the seeps will be reevaluated.

The groundwater cleanup levels at the Site are based primarily on the classification of the groundwater as a drinking water source. Therefore, the MCLs for volatile organics established under the Safe Drinking Water Act, National Primary Drinking Water Standards (40 CFR 141), and the New York State Department of Health (NYSDOH) Drinking Water Standards for VOCs are relevant and appropriate.

A wetlands delineation (utilizing the "three parameter method"), and a Stage 1A cultural resources assessment will be undertaken during the remedial design phase in accordance with Executive Order 11990. A wetland assessment and restoration plan will be required for any wetlands impacted or disturbed by remedial activity.

The capital, annual O&M, and present value costs for the selected remedy are presented in Table 14.

Remediation Levels

Remediation levels are derived for concentrations of contaminants for each exposure route that is believed to provide adequate protection of human health and the environment based on available site information (55 FR 8712, March 8, 1990).

The media of concern identified for the Site are groundwater from the glacial outwash aquifer and leachate seeps in the North Stream and on the south side of the landfill.

The purpose of the response action for the Site are as follows:

- Control the release of VOCs from the Site to the glacial outwash aquifer that underlies the project area;

- Properly close the landfill and eliminate the leachate seeps, and any associated leachate discharges to the

North and South Streams;

- Eliminate the potential for direct human or animal contact with any active leachate seeps;

- Continue the existing quarterly residential well monitoring program along with the temporary water supply and carbon filtration program for the affect residences until a new water supply is constructed; and

- Restore the groundwater underlying the Site to levels consistent with state and federal ARARs.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when completed, the selected remedial actions must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

Since a new water supply is to be provided under the selected remedy, human health will be protected. Control of the leachate seeps by the capping the landfill will also prevent human contact with contaminated seeps and sediment, and will mitigate any environmental effects.

The selected remedy will protect human health and the environment through the removal and treatment of the organic contaminants in groundwater, using air stripping and metals removal. Risk reduction will be provided by the selected remedy. The carcinogenic risk associated with exposure to VOCs in the groundwater from the Site would be expected to reach an acceptable range after the first year of pumping. Further decreases in the carcinogenic risk to 10^{-4} would be expected during the subsequent 3 years of pumping. The HI is anticipated to decline from a baseline of 3.85 to 0.27 after 1 year of pumping. An HI below unity is indicative of conditions which would be protective of

human health for carcinogenic effects. Further declines in the HI to 0.10 would be anticipated during the first 3 years of remediation.

There are no short-term threats associated with the selected remedy that cannot be readily controlled.

Compliance with ARARs

The selected remedy will not result in immediate compliance with federal and state drinking water MCLs in the groundwater. However, as predicted by contaminant transport modeling, the contaminant concentrations will be within the MCLs after at least four years of pumping and treatment. The discharge to surface water will be treated to conform to State Permit Discharge Elimination System limits (6NYCRR Part 750 through 758). Discharges to the air from stripping will comply with the Ambient Guideline Concentrations in the New York State Air Guide and the standards presented in 6 NYCRR Part 212. If it is determined during detailed design that vapor phase treatment is required, it will be supplied. Installation of a cap and some downgradient pumping wells will require temporary or permanent alterations to the stream bed of the North Stream. Construction, filling, and stream relocation will be designed to comply with relevant requirements of NYSDEC and the U.S. Army Corps of Engineers (33 CFR Parts 320 through 330).

Since the landfill contains RCRA listed hazardous wastes, regulations specified in 40 CFR Part 264 Subpart F and G would be considered relevant for the cap. However, the implementation of the NYCRR Part 360 final cover (cap) in lieu of a "RCRA Cap" will meet or exceed the performance requirements of Part 264 Subparts F and G at this site. Therefore, RCRA capping requirements are not appropriate, since they do not address all facets of a municipal landfill including landfill gas controls. Landfill gas controls are addressed in NYCRR Part 360. In addition the selected remedy will comply with all chemical, action, and location-specific ARARs.

Cost-Effectiveness

The selected remedy is cost effective because it has been determined to provide overall effectiveness proportional to its cost. The total capital and present worth costs for the selected remedy are $4,273,000 and $5,135,000, respectively. The O & M cost for the selected remedy is $250,000 per year.

The selected remedy is the least expensive of all the alternatives which provide for active restoration of the groundwater resources and establish a new supply of drinking water. The most expensive alternatives (Alternatives 4d1 and 4d2) are up to 119 per cent higher than the present worth cost of the selected

remedy. Likewise, the selected remedy provides the same degree of certainty with regard to the effective removal of all the organic and inorganic contaminants.

The capital, annual O&M, and present worth cost for the selected remedy is presented in Table 14.

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

EPA and NYSDEC have determined that the selected remedy represents the maximum extent practicable to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final source control operable unit at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and NYSDEC have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, also considering the statutory preference for treatment as a principal element to the maximum extent practicable and considering state and community acceptance.

The selection of treatment of the contaminated groundwater is consistent with program expectations that indicate that highly toxic and mobile wastes are a priority for treatment and often necessary to ensure the long-term effectiveness of a remedy. All the alternatives that consider remedial action are reasonably comparable with respect to implementability, therefore, the major trade-offs that provide the basis for the selection of the remedy are the estimated time to meet the ARARs after implementation, reduction in toxicity, mobility, or volume, and cost effectiveness. The selected remedy can be implemented with less risk to the area of residents and at less cost than the other remedial action alternatives and is, therefore, determined to be the most appropriate solution for the contaminated groundwater at the Site.

With regard to implementability, the components of the selected remedy are easily implemented, proven technologies and are readily available.

Preference for Treatment as a Principal Element

By treating the groundwater by air stripping and by the installation of a landfill cap, the selected remedy addresses the principal threats posed by the Site through the use of treatment technologies to the maximum extent practicable.

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are

legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The contaminated groundwater and leachate is being treated, addressing the statutory preference for treatment as a principal element of the remedy. However, the size of the landfill and the fact that there are no identified on-site "hot spots" that represent the major sources of contamination preclude a remedy in which the landfilled material could be excavated and treated effectively.

DOCUMENTATION OF SIGNIFICANT CHANGES

There are not significant changes from the preferred alterative presented in the Proposed Plan.

Explanation of Significant Differences

COLESVILLE MUNICIPAL LANDFILL SUPERFUND SITE

Town of Colesville
Broome County, New York

EPA
Region 2

July 2004

INTRODUCTION

In accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §9617(c), and Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan, if after the Environmental Protection Agency (EPA) selects a remedial action, there is a significant change with respect to that action, an explanation of the significant differences (ESD) and the reasons such changes were made must be published.

EPA issued a Record of Decision (ROD) in March 1991 for the Colesville Landfill site (Site) that called for, among other things, capping the landfill and collecting and treating contaminated groundwater. Installation of the landfill cap was completed in 1995. In September 2000, EPA issued an ESD to modify the groundwater remedy specified in the ROD.

In April 2000, EPA performed a five-year review of the Site in accordance with Section 121(c) of CERCLA, 42 U.S.C. §9621(c). During an inspection of the Site performed as part of the five-year review process[1], EPA found a spring and a low-lying wet area contaminated with site-related pollutants, in the vicinity of the landfill. Contaminated water from the spring and the low-lying wet area can discharge to nearby streams.

This ESD describes the measures that have been and are currently being taken to prevent the migration of contaminated water from the low-lying wet area and spring.

This ESD will become part of the Administrative Record file for the Site. The entire Administrative Record for the Site, which includes the remedial investigation and feasibility study (RI/FS) reports, the 1991 ROD, a September 2000 ESD, design reports, the April 2000 Five-Year Review Report, and other reports and documents related to the Site, are available for public review at the following locations:

Town of Colesville Town Hall
Harpursville, NY 13787

New York State Department of
Environmental Conservation
625 Broadway
Albany, NY 12233-7016

and

U.S. Environmental Protection Agency
290 Broadway, 18th floor
New York, New York 10007

The changes to the selected remedy set forth below are not considered by EPA and the New York State Department of Environmental Conservation (NYSDEC) to have fundamentally altered the remedy selected in the ROD. The remedy remains protective of human health and the environment.

SUMMARY OF SITE HISTORY, CONTAMINATION PROBLEMS, AND SELECTED REMEDY

The Colesville Landfill is an inactive landfill located in the Town of Colesville, Broome County, New York. This area is characterized as extremely rural, and includes large tracts of undeveloped woodlands, as well as large-scale agricultural tracts and scattered residential parcels. Of the 113-acre parcel on which the landfill is situated, only about 35 acres have been used for waste disposal. The area is located to the north of East Windsor Road and is bounded by unnamed streams to the west, northwest ("North Stream") and to the east ("South Stream") (see figure). Surface water in the area drains to the Susquehanna River.

Waste disposal operations at the landfill commenced in 1969. The landfill was owned and operated by the Town of Colesville between 1969 and 1971. Broome County purchased the landfill in 1971, operating it until it closed in 1984.

The landfill was primarily used for the disposal of municipal solid waste, although drummed industrial wastes from various sources were also disposed of between 1973 and 1975. The drums were either buried intact or punctured and crushed prior to burial.

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[1] The purpose of five-year reviews is to assure that implemented remedies protect public health and the environment and that they function as intended.

In 1983, samples collected by the Broome County Health Department from residential wells in the vicinity of the Site indicated that the landfill was contaminating the groundwater in the vicinity of the Site. The sample results prompted the Broome County Department of Public Works to install carbon filters on wells at the affected residences, to initiate a residential well monitoring program, and to perform further investigation of the landfill in 1983 and 1984. These investigations showed elevated levels of a number of volatile organic compounds (VOCs) in the groundwater.

The Site was proposed for inclusion on the Superfund National Priorities List (NPL) in October 1984 and was listed on the NPL in June 1986. NYSDEC was designated the lead agency for this Site.

The potentially responsible parties (PRPs) for the Site, Broome County and GAF Corporation, completed an RI/FS in 1990, pursuant to an Order on Consent (Index No. T010687) issued by NYSDEC (State Order). The RI/FS showed elevated levels of chlorinated VOCs in the groundwater and identified and evaluated various remedial alternatives to address the contamination problems at the Site.

In 1991, based upon the results of the RI/FS, EPA issued a ROD, selecting a remedy for the site. The selected remedy included, among other things, the installation of a multimedia cap on the landfill, the collection and treatment of contaminated groundwater at and downgradient of the landfill, and the provision of new deep wells for six affected residences (located on five properties) in the vicinity of the landfill.

Pursuant to the State Order, the PRPs began the design of the selected remedy in 1991, completed the design for the landfill cap in 1994 and completed the construction of the landfill cap in 1995.

An alternate water supply well design (deep wells) was approved by the State in 1995. The implementation of the design was delayed, however, while Broome County attempted to purchase the five affected properties and to place deed restrictions preventing the installation and use of groundwater wells on the properties so that there would be no drinking water receptors. The County purchased three of the five properties. Two of the purchased properties are vacant and their wells have been decommissioned. One of the purchased properties is currently occupied by the former property owner, who has a life tenancy on the property. She is currently receiving bottled water from the County. Of the two remaining properties that the County has not purchased, one of them is vacant and the other one contains two occupied structures. On the occupied property, the County decommissioned an old well and a surface water supply system and installed two new bedrock wells—one for each structure. The County is currently seeking to place deed restrictions on all five of the properties to prevent the installation of groundwater wells. The County is also seeking to place restrictions on the landfill property to protect the integrity of the cap, monitoring wells, and extraction wells.

Based upon design-related aquifer tests conducted at the Site, it was determined that extracting contaminated groundwater at the landfill, as called for in the ROD, would not likely be an effective means of remediating the groundwater at the source in a reasonable time frame. Specifically, the aquifer tests determined that the aquifer near the landfill has a low permeability, which would severely limit the area of influence of the extraction wells and would allow the groundwater to be pumped at only a very low rate (0.25 to 0.5 gallon per minute). Such conditions would necessitate the installation of an inordinate number of extraction wells. This conclusion led to an evaluation of alternative groundwater technologies and the performance of a pilot-scale study to evaluate the effectiveness of one of the more promising technologies, enhanced reductive dechlorination. This process involves injecting the contaminated groundwater with an easily degradable carbohydrate solution (*i.e*, molasses), which provides excess organic carbon that promotes microbial activity in the aquifer, enhancing the breakdown of chlorinated VOCs. Based upon the results of the pilot study, which showed a significant decline in VOC concentrations, it was concluded that this technology, in combination with the installation of downgradient extraction wells (as called for in the ROD), offered the most technically feasible approach to restoring groundwater quality in a reasonable time frame. The change to the remedy was documented in a September 2000 ESD.

Molasses injections at the landfill are performed on a periodic basis. The downgradient extraction and treatment system has been operating since 2002.

In April 2000, during an inspection of the Site performed as part of the five-year review process, in the vicinity of the landfill, EPA found a spring and a low-lying wet area contaminated with site-related pollutants. Contaminated water from the spring and the low-lying wet area can discharge to nearby streams.

DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE REASONS FOR THOSE DIFFERENCES

Along the stream bank of the North Stream, which is as close as 100 to 200 feet to the west of the landfill in some areas, is a contaminated spring at the toe of a steep slope that can discharge directly into the stream. In addition, a low-lying wet area, located approximately 375 feet to the south of the landfill, can potentially overflow in rainy conditions to a vegetated drainage swale that conveys water to the South Stream. The source of this low-lying wet area appears to be groundwater discharging upward through a vertical, three-foot diameter

concrete structure that extends approximately 2.5 feet below the ground surface. The concrete structure appears to have been placed there to enhance the spring as a source of water for agricultural purposes. Until recently, the opening of this structure was partially buried and obscured by dense vegetation.

Samples from the North Stream spring showed the presence of chlorobenzene, chloroethane, and 1,1-dichloroethane (DCA) at maximum concentrations of 24 micrograms per liter (µg/l), 21 µg/l, and 58 µg/l, respectively. The chlorobenzene detection is greater than the ambient water quality criterion of 5 µg/l for the protection of aquatic organisms from chronic exposure for Class C water bodies. Since there are no detectable levels of VOCs in the North Stream, it appears that the VOCs that discharge into the North Stream from the spring are rapidly attenuated through the processes of dilution and volatilization.

Samples collected from the low-lying wet area located on the south side of the landfill showed the presence of chlorobenzene, chloroethane, and 1,1-DCA at maximum concentrations of 81 µg/l, 23 µg/l, and 45 µg/l, respectively. The chlorobenzene detection is greater than the ambient water quality criterion of 5 µg/l.

Groundwater elevations have remained relatively stable since the landfill was capped, especially in the area between the landfill and the North Stream. Stable water levels suggest that the spring and the low-lying wet area are naturally occurring at the site. Remedial measures have been and are currently being taken to prevent the migration of contaminated water to the streams.

The remedy for the low-lying wet area was implemented in September 2003. It consists of a sand filter and a granular activated carbon unit that were placed in the concrete structure (a cover was placed over the top of the structure). The water then flows through another filter and a horizontal 4-inch diameter drainage pipe running through the side of the concrete structure. A riprap-lined outlet structure to prevent erosion was installed at the discharge point of the drainage pipe.

Routine sampling will ensure that the remedy in the low-lying wet area is working properly and that ambient water quality standards are met[2]. Maintenance of the system (*e.g.*, granular activated carbon replacement) will be performed, as needed, based upon post-treatment sampling results.

The remedy for the contaminated spring along the North Stream will consist of the installation of a subsurface stone collection trench and drainage layer in the area of the spring to prevent the contaminated spring water from exfiltrating above the land surface. Riprap will be placed between the stream and the collection trench to protect the integrity of the trench and infiltration bed during high water conditions. The contaminated groundwater that is the source of the spring is being treated with upgradient molasses injections near the landfill.

The construction of the remedy for the contaminated spring along the North Stream began on July 1, 2004 and should be completed by the end of July.

STATE AGENCY COMMENTS

NYSDEC supports the change to the remedy.

AFFIRMATION OF STATUTORY DETERMINATIONS

EPA and NYSDEC believe that the modified remedy is protective of human health and the environment and complies with federal and state requirements that are applicable or relevant and appropriate to this remedial action. In addition, the remedy continues to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

PUBLIC PARTICIPATION ACTIVITIES

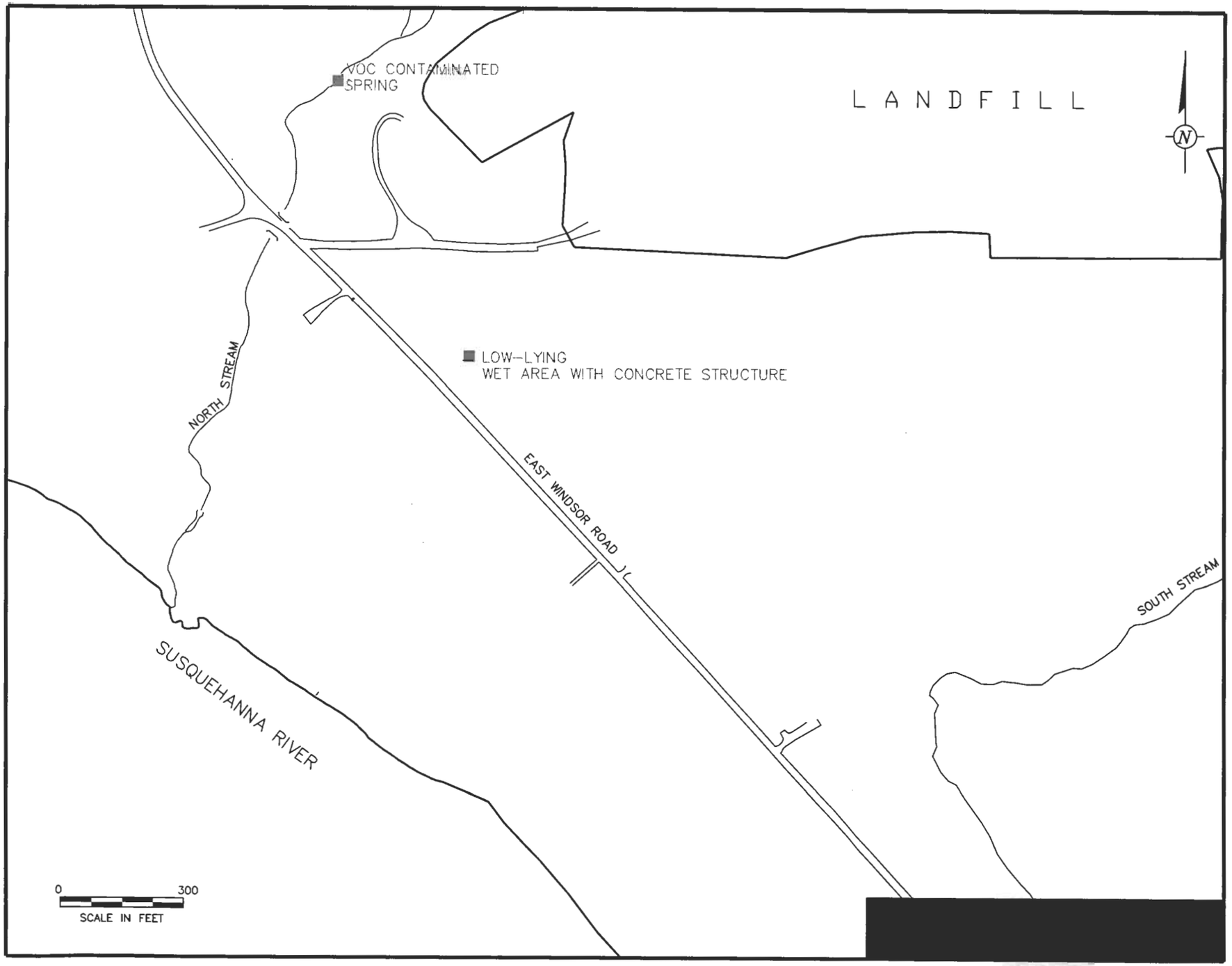
EPA and NYSDEC are making this ESD and supporting information available to the public in the Administrative Record. Should there be any questions regarding this ESD, please contact:

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

Telephone: (212) 637-4266
Telefax: (212) 637-3966

E-mail: jacob.george@epa.gov

[2] Post-treatment samples collected in October 2003, December 2003, and March 2004 indicate that ambient water quality standards are being met.


VOC CONTAMINATED SPRING
LANDFILL
N
LOW-LYING WET AREA WITH CONCRETE STRUCTURE
NORTH STREAM
EAST WINDSOR ROAD
SOUTH STREAM
SUSQUEHANNA RIVER
0
300
SCALE IN FEET